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**SERIES “MANAGEMENT, ECONOMIC
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DEVELOPMENT”**

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C O N T E N T S

1.VIABILITY OF SOME APPLIED COST SYSTEMS IN MANUFACTURING FIRMS: EGYPT'S CASE

Karim Mamdouh ABBAS 11

2.USE AND USE INTENSITY OF SOCIAL MEDIA NETWORKING SYSTEMS BY NIGERIAN AGRO-ENTREPRENEURS

Joseph Omotoso AJAYI..... 19

3.TERRITORIAL STRUCTURES AND THE POTENTIAL OF ROMANIA'S ORGANIC AGRICULTURAL HOLDINGS

Iulian ALECU, Andreea Raluca CONSTANTIN, Marian CONSTANTIN..... 27

4.DISTANT HYBRIDS IN F₄ (*VITIS VINIFERA* L. X *MUSCADINIA ROTUNDIFOLIA* MICHX.) AND OF CULTIVARS OF *VITIS VINIFERA* L. AND OF CONCERNING THE CONTENT OF SOME BIOCHEMICAL COMPOUNDS

Eugeniu ALEXANDROV, Boris GAINA..... 37

5.STUDY UPON THE SPECIES *IPS TYPOGRAPHUS* L. (*COLEOPTERA, CURCULIONIDAE*) IN THE RAȘINARI FORESTRY ECOSYSTEM, SIBIU COUNTY

Iuliana ANTONIE..... 45

6.PENSIONS MANAGEMENT IN THE RURAL AREAS

Angela BOTEZATU..... 51

7.STUDY ON THE LEVEL OF CONFIDENCE THAT ROMANIAN CONSUMERS HAVE REGARDING THE ORGANIC PRODUCTS

Narcis Alexandru BOZGA..... 59

8.ECONOMETRIC MODELING OF GDP BY EMPLOYMENT AND THE VALUE OF TANGIBLE FIXED ASSETS

Cristina BURGHELEA, Nicolae MIHĂILESCU, Iuliana MATACHE,
Andrei Mihai CRISTEA..... 67

9.APPROACH ON THE EXISTENCE OF INNOVATION IN TOURISM

Cristina BURGHELEA..... 75

10. LEASE AND ITS IMPACT ON THE LAND MARKET

Elena-Sinziana BUTNARU 81

11.WHAT ARE EUROPEAN INVESTMENTS FOR THE RURAL DEVELOPMENT IN THE REPUBLIC OF MOLDOVA

Ion CERTAN, Maria BANARI..... 87

12.THE GRAPES AND WINE MARKET IN THE REPUBLIC OF MOLDOVA: TRENDS AND INSIGHTS

Simion CERTAN, Ion CERTAN..... 95

13.THE IMPORTANCE OF ASSESSING HUMAN RESOURCES FOR THE SUSTAINABLE DEVELOPMENT-A STUDY CASE, SOUTH WEST OLTENIA REGION

**Reta CONDEI, Dorina MOCUTA, Agatha POPESCU,
Adrian TUREK 105**

14. CONSIDERATIONS UPON THE DRYNESS AND DROUGHT PHENOMENA IN THE CARACAL PLAIN, ROMANIA

**Dana Maria (Oprea) CONSTANTIN,
Victor Viorel VĂTĂMANU..... 119**

15.NEW CHALLENGES FOR RURAL TOURISM. SPECIALIZATION OF AGRITOURISM GUEST HOUSES

**Romeo Cătălin CREȚU, Petrică ȘTEFAN, Silviu GHEORGHE,
Sorin BIBICIOIU..... 123**

16.THE NEED TO IMPROVE PRACTICAL INFORMATION SYSTEM IN AGRICULTURE AND SPECIALIZED INDUSTRY

**Romeo Cătălin CREȚU, Petrică ȘTEFAN, Adrian NICOLAU,
Dinu NICOLESCU..... 127**

17."MAGIC" FORMULA OF THE JOINT AUDITS IN RAISING REVENUE THROUGH WEEDING OUT CORRUPT PRACTICES (BASED ON ROMANIA AND MOLDOVA CASES)

Diana CRICLIVAIA..... 135

18.SENSORY PROPERTIES OF SOME WHITE WINES, FLAVORED WINES AND VERMOUTH TYPE WINES, PREPARED BY USING OWN RECIPES

**Rodica Elena CULEA, Radiana Mariana TAMBA-BEREHOIU,
Nicolae Ciprian POPA..... 147**

19. QUALITATIVE PECULIARITIES OF THE FLAVOURED WINES AND OF THE VERMOUTH TYPE WINES, OBTAINED FROM THE SAUVIGNON BLANC VARIETY	
Rodica Elena CULEA, Radiana Mariana TAMBA-BEREHOIU, Ciprian Nicolae POPA.....	153
20.STUDY ON WASTE WATER TREATMENT PLANTS	
Mariana DUMITRU.....	159
21.DEVELOPMENT TRENDS OF BIOGAS	
Mariana DUMITRU.....	165
22.SEASONAL ADJUSTMENT AND FORECASTING OF THE ROMANIAN AGRICULTURAL EMPLOYMENT RATE	
Calcedonia ENACHE	169
23.RECENT TRENDS AND PROSPECTIVE EVALUATIONS ON THE PORK MARKET IN ROMANIA	
Calcedonia ENACHE, Marilena FLORESCU, Georgiana-Adelina ILIE.....	175
24.THE MATRIX OF ENERGY MANAGEMENT – AN EFFICIENT MANAGEMENT TOOL FOR FOOD INDUSTRY OF THE REPUBLIC OF MOLDOVA	
Corina GRIBINCEA.....	181
25.OPPORTUNITIES FOR RELAUNCHING THE ROMANIAN BEEF CONSUMPTION IN THE CONTEXT OF THE NEW COMMON AGRICULTURAL POLICY – A COMPARATIVE ANALYSIS IN COUNTRIES WITH SIMILAR CONSUMPTION HABITS	
Mariana GRODEA.....	187
26. IMPLEMENTATION OF ISO 14001 IN BULGARIA	
Hristina HARIZANOVA.....	193
27.EFFECT OF THE CRITICAL IRRADIANCE ON PHOTOVOLTAIC WATER PUMP DISCHARGE UNDER EGYPTIAN CONDITIONS	
Mamdouh Abbas HELMY, E. M. KHALIFA, A. M. OKASHA, A. W. ELHADDAD	199
28.DETERMINATION OF STRATEGIES OF SUSTAINABLE DEVELOPMENT AND PLANNING IN TOURIST TRAVEL	
Adelaida Cristina HONTUS.....	203

29.SUSTAINABLE TOURISM DEVELOPMENT - IMPORTANT COMPONENT OF SPATIAL TOURISTIC PLANNING

Adelaida Cristina HONTUS..... 211

30.STRATEGIC OPTIONS FOR A SUSTAINABLE DEVELOPMENT OF THE RURAL TOURISM

Romulus IAGĂRU, Pompilica IAGĂRU, Gligor CIORTEA, Nicu FLORESCU, Gheorghe CIUBOTARU, Monica Delia DOMNICA..... 219

31.SUSTAINABLE DEVELOPMENT MANAGEMENT OF THE GRASSLAND AGROECOSYSTEM IN THE CONTEXT OF BIODIVERSITY CONSERVATION AND IMPROVEMENT OF PERMANENT GRASSLAND

Pompilica IAGARU, Romulus IAGARU, Gligor CIORTEA, Nicu FLORESCU, Gheorghe CIUBOTARU..... 225

32.THE IMPACT OF EXTENSION AND RURAL DEVELOPMENT CONSORTIUM VALCELELE ON THE RURAL SPACE DEVELOPMENT

Rareş Alexandru IONESCU..... 229

33.POSITION AND PERSPECTIVES OF DEVELOPMENT OF THE FOOD-PROCESSING SECTOR IN MONTENEGRO

Miomir JOVANOVIĆ, Aleksandra DESPOTOVIĆ, Miljan JOKSIMOVIĆ..... 233

34.BARRIERS TO THE IMPLEMENTATION OF INSTRUMENTS ASSISTING SUSTAINABLE DEVELOPMENT OF AGRICULTURE

Ryszard KATA, Dariusz KUSZ..... 239

35.ASSESSMENT OF WORKLOAD MUSCULOSKELETAL SYSTEM OF MILKERS IN MECHANICAL MILKING THROUGH THE USE OF JOB STRAIN INDEX METHOD

Lukasz KUTA, Jozef CIEZ, Izabela GOLAB..... 249

36.THE ANALYSIS OF THE ECONOMIC DEVELOPMENT OF SOUTH-MUNTENIA REGION

Elena LASCĂR..... 255

37.PROSPECTS OF USING THE LOCAL ORGANIC WASTE IN THE AGRICULTURE OF THE REPUBLIC OF MOLDOVA

Tamara LEAH 259

38.EDUCATION AND HEALTH: IMPORTANT FACTORS IN THE DEVELOPMENT OF RURAL COMMUNITIES	
Camelia MĂNESCU, Teodor MATEOC, Ada-Flavia CRISTINA, Alin POPESCU, Nicoleta MATEOC-SÎRB.....	265
39.RESEARCH ON THE INFLUENCE OF REGIONAL POLICY DEVELOPMENT OF RURAL COMMUNITIES	
Camelia MĂNESCU, Teodor MATEOC, Tiberiu IANCU, Ada-Flavia CRISTINA, Alin POPESCU, Nicoleta MATEOC-SÎRB.....	271
40.POTENTIAL FOR WASTEWATER MANAGEMNET USING ENERGY CROPS	
Alistair R. Mc CRACKEN, Chris R. JOHNSTON	275
41.COORDINATES OF MECHANICAL PARK AT DOLJ COUNTY LEVEL	
Dragoş Mihai MEDELETE, Radu Lucian PÂNZARU.....	285
42.SOME ASPECTS OF MILK PRODUCTION IN ORODEL COMMUNE (2011-2013)	
Dragoş Mihai MEDELETE, Radu Lucian PÂNZARU.....	291
43.OPPORTUNITIES FOR ORGANISING CLUSTERS IN THE BULGARIAN GRAPE-WINE SECTOR	
Albena MITEVA.....	295
44.CONTRIBUTIONS TO (COLEOPTERA: STAPHYLINIDAE) IN DUMBRAVA SIBIULUI FOREST, ROMANIA IN TERMS OF THE YEARS 2013-2014	
Cristina STANCĂ-MOISE.....	301
45.FAMILY PIERIDE (LEPIDOPTERA, PIERIDAE) AND EVOLUTION OVER TIME IN FOREST GROVE SIBIU (SIBIU, ROMANIA)	
Cristina STANCĂ-MOISE.....	307
46.ESTIMATING THE IMPACT ON THE LEASING OF HOUSEHOLDS OF FARMERS IN THE RURAL AREA	
Emil MUŞAT.....	313
47.MODELING OF THE NITRIFICATION PROCESS IN A SOIL IN CĂLĂRAŞI COUNTY	
Cecilia NEAGU.....	317

48.ANALYSIS OF WEALTH STATUS AND ITS DETERMINANTS AMONG CASSAVA PROCESSING HOUSEHOLDS IN IMO STATE, NIGERIA

Ifeyani Ndubuto NWACHUKWU, Nkechi ANYANWU..... 321

49.INFLUENCE OF DRIP IRRIGATION AND OF FERTILIZATION, ON THE PRODUCTIVITY OF PLUM VARIETIES. CASE STUDY

**Nicoleta OLTENACU, Elena LASCĂR,
Cătălin-Viorel OLTENACU..... 325**

50.CAPACITY OF MAINTAINING THE APPLES QUALITY, IN FRESH CONDITION-CASE STUDY

Nicoleta OLTENACU, Elena LASCĂR..... 331

51.PRODUCTION OF RAPESEED IN THE UNITED KINGDOM, IN THE ZONAL AND EUROPEAN CONTEXT (2010-2012)

Radu Lucian PÂNZARU, Dragoș Mihai MEDELETE..... 337

52.ECONOMIC AND FINANCIAL ASPECTS OF THE ACTIVITY OF THE SC TREP MAR LLC, ȘOPÂRLIȚA, OLT COUNTY (2011-2013)

Radu Lucian PÂNZARU, Dragoș Mihai MEDELETE..... 343

53.THE EFFECT OF ADDED WHOLE OAT FLOUR ON SOME DOUGH RHEOLOGICAL PARAMETERS

**Ciprian Nicolae POPA, Radiana Mariana TAMBA-BEREHOIU,
Rodica Elena CULEA..... 351**

54.MINERAL WATER FROM SUPERMARKET VS. TAP WATER. SOME CONSIDERATIONS RELATED TO INNOCUITY

Ciprian–Nicolae POPA, Radiana TAMBA-BEREHOIU..... 357

55.RESEARCH ON THE EVOLUTION OF THE TOP ROMANIAN TRADEMARKS IN THE DOMESTIC MARKET

Agatha POPESCU..... 361

56.RESEARCH ON THE TOP ROMANIAN TRADEMARKS IN THE MILK AND DAIRY PRODUCTS' MARKET

Agatha POPESCU..... 367

57.RESEARCH ON THE TRENDS IN MILKING LIVESTOCK AND MILK PRODUCTION IN ROMANIA

Agatha POPESCU..... 377

58.RESEARCH ON THE TRENDS IN MILK PRODUCTION AND CONSUMPTION IN ROMANIA	
Agatha POPESCU.....	387
59.RESEARCH ON THE TRENDS IN ROMANIA'S MILK AND DAIRY PRODUCTS FOREIGN TRADE	
Agatha POPESCU.....	393
60.TARGETED CULTIVATION OF THE ENERGY PLANTS IN CONDITIONS OF THE SLOVAK REGIONS	
Martin PRČÍK, Marián KOTRLA.....	399
61.RESEARCHES REGARDING MORPHOLOGIC FEATURES IN SOME GOAT POPULATIONS FROM THE SOUTH OF ROMANIA	
Horia PRISECEANU, Ion CĂLIN, Dana TĂPĂLOAGĂ, Ion RĂDUCUȚĂ, Paul TĂPĂLOAGĂ.....	405
62.RESULTS REGARDING THE REPRODUCTION PERFORMANCES OF FOUR GOATS POPULATIONS IN THE SOUTHERN ROMANIA	
Horia PRISECEANU, Ion CĂLIN, Dana TĂPĂLOAGĂ, Ion RĂDUCUȚĂ, Paul TĂPĂLOAGĂ.....	411
63.“SEABUCKTHORNOLOGY” A POSSIBLE NEW INTERDISCIPLINARY SCIENCE	
Angel PROOROCU.....	417
64.THE CONTRIBUTION OF AGRICULTURAL SECTOR TO GDP IN THE REPUBLIC OF MOLDOVA	
Lilia ROTARU.....	429
65.REDUCING NITRATE LEACHING FROM SODDY-PODZOLIC SANDY LOAM SOIL WHEN APPLYING POULTRY MANURE IN COMBINATION WITH BARLEY STRAW	
Irina RUSAKOVA.....	433
66.THE POULTRY MEAT SECTOR IN THE IMPLEMENTATION PERIOD OF THE NATIONAL RURAL DEVELOPMENT PROGRAMME 2007-2013	
Andrei-Marius SANDU.....	437

67.RESEARCH OF THE MASS TRANSFER AT MEMBRANE CLEANING OF BIOGAZ	
Marat SATAYEV, Zhanar KAIPOVA,	
Aigul DZHANMULDAEVA.....	443
68.PECULIARITIES FOR AGRICULTURAL TECHONOLGY OF <i>GENTIANA LUTEA</i>	
Camelia SAVA SAND.....	449
69.INSTITUTIONAL PROBLEMS OF PIG CARCASS CLASSIFICATION SECTOR IN ROMANIA	
Roxana Florenta SAVESCU.....	455
70.GENERAL ASPECTS RELATED TO THE SALE AND PURCHASE OF FOREIGN CURRENCY IN THE FOREX MARKET IN MOLDOVA	
Tatiana ŞEVCIUC.....	459
71.PROFITABILITY IN THE CONTEXT OF THE NEEDS AND REQUIREMENTS OF SUSTAINABLE FARMS DEVELOPMENT	
Daniela SIMTION.....	467
72.PARTICULARITIES REGARDING THE CALCULATION AND PROFITABILITY ANALYSIS OF FARMS	
Daniela SIMTION.....	473
73.STUDY ON ECONOMIC DEVELOPMENT OF SOUTH-EAST REGION IN ROMANIA	
Elena SOARE, Iuliana DOBRE, Cornelia Gabriela PICIU.....	477
74.RESEARCH ON PORK MARKET IN ROMANIA	
Elena SOARE, Aurelia BĂLAN, Livia DAVID	483
75.BEEF MARKET IN ROMANIA	
Elena SOARE	493
76.THE INFLUENCE OF TECHNOLOGY MEASURES ON THE REDUCING EFFECT OF DROUGHT AT MAIZE CROP	
Costinel Eduard STOENEL.....	501

77.STATE AND IMPLAMENTATION OF THE MEASURE „RESTRUCTURING AND CONVERSION OF VINEYARDS” IN BULGARIA

Zornitsa STOYANOVA..... 507

78.CLUSTER ANALYSIS OF NATURAL DISASTER LOSSES IN POLISH AGRICULTURE

Grzegorz STRUPCZEWSKI..... 513

79.ASSESSMENT OF MAIN MINERAL WATER ROMANIAN MARKS FROM THE PERSPECTIVE OF SOME TOXICOLOGICAL PARAMETERS

Radiana TAMBA-BEREHOIU, Ciprian–Nicolae POPA..... 527

80.CHALLENGES OF AGRICULTURAL COMPANIES FROM THE PERSPECTIVE OF LABOUR PRODUCTIVITY AND FUNDING ACCES

Daniela Livia TRASCA..... 533

81.INNOVATION AMONG INTANGIBLE ASSETS (IA)

Paula - Angela VIDRAȘCU..... 537

82.FEASIBILITY OF INVESTMENT IN CHERRY ORCHARD

Andrei ZBANCĂ, Ghenadie NEGRITU, Dorin BADIU..... 545

VIABILITY OF SOME APPLIED COST SYSTEMS IN MANUFACTURING FIRMS: EGYPT'S CASE

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Abstract

The present study aims to analyze viability of some applied cost systems. The population of the study is some Egyptian manufacturing firms. The number of received questionnaires was 385. The results indicated that , according to the application extent indicator, the currently cost systems in Egyptian manufacturing firms may be descendingly arranged as follows: Activity Based Costing (ABC) system, Target Costing (TC) system , Resource Consumption Accounting (RCA) system, Activity Based Management (ABM) ,Other systems, Theory of Constraints (TOC) and Value Chain (VC) analysis.

Key words: ABC, cost systems, Egypt, RCA, TOC

INTRODUCTION

The concepts of managerial accounting have not drastically changed since the 1920s. When Henry Ford introduced the assembly line for the Model T, there was a need for better cost control. He was reported to have detested cost accounting, but became a multimillionaire in spite of his continued antipathy toward cost control methods. The global environment has changed drastically since the Model T. Worldwide competition has forced U.S.A. manufacturing companies to examine their production systems. Some major U.S.A. industries will not survive unless they make pervasive changes in the utilization of both physical and human resources. Many business practitioners and some of their former professors have already joined forces to modify and adapt the managerial accounting practices to the needs of production system changes in response to worldwide competition. The U.S.A. dominated the industrial world for three decades after World War II. It also aided the war-devastated countries, particularly its enemies, to rebuild their industries for a world of peaceful trading partners. Not until the late 1970s U.S.A. recognize that West Germany and Japan were producing high - quality products more efficiently (Lewis,1993). [26]

There is an urgent need to use a financial accounting module for analyzing the financial firms position in order to determine their performance efficiency (Mates, 2004, Petrescu, 2008, Stefea,2008). [27, 31, 35]

There is a great need to illustrate the recent debate around empirical positivistic research in management accounting, the sound definition of management accounting constructs, the closure of the gap between surveys and case studies in management accounting research, the appropriate use of statistical methods for testing hypotheses in management accounting and the use of graphics to map theory-consistent empirical research (Kholeif,2011). [22]

Review of Literature

The Activity-Based Costing (ABC):

The Activity - Based Costing (ABC) system was largely advocated by the academic and practitioners. Mohamed (1991), Atkinson et al. (1997), Balakrishnan et al. (2013) , Stefea et al. (2013), Abbas (2014a) and Kutac et al. (2014) told that this system was developed from view point of the methods of allocating the indirect costs and will be developed through determining the costs drivers and the activities performed by the various managerial departments in the company which eventually lead to returning each costing to the activity which used it and fixing the followed

consequences in determining the products costing on the basis of consumed activities. [2, 9,11, 24, 29,36]

Adamu (2010) indicated that the key idea of ABC is that activities drive costs of any organization by consuming its resources. [4]

Raiborn and Kinney(2010) stated that, in an ABC system, the costs are accumulated into activity centre cost pools, which are cost pools of which a separate reporting of costs is needed. These kinds of pools are gathered by pooling up the costs that have the same cost driver. After this the costs are further allocated out of the activity centre by using an activity driver, which measures the demand placed on activities. [32]

The Activity Based Costing (ABC) system for cost accounting is based mainly on considering that all products which a company needs to perform a set of activities and these activities result in cost that should be borne by the facility. So, the design of Activity Based Costing (ABC) system is based on the costs that are difficult to link to the recent products which are directly loaded to the activities that cause these products, then followed by the need to allocate the cost of those activities on the products according to the degree that they benefit from those activities (Al-Refa'ee, 2012). [8]

The ABC system is used as a method for allocating the indirect costs of the products in light of technological development which led to increase the percentage of indirect industrial costs (Abbas,2013). [1]

Abbas (2014b) also defined ABC system as a methodology that measures the cost and performance of cost objects, activities and resources. [3]

Căpuşneanu et al. (2011) and Abbas (2013) mentioned that, in the last decade, many entities have tried to implement the ABC system, not only in Romania and Egypt but also in many other countries. [1, 14]

Tobor (2013) proposed to bring a significant contribution to the wine sector in Romania by approaching a modern calculation method (ABC) and with favorable influences on the administration of costs but also a monitoring and performance measuring instrument such as Balanced Scorecard. [38]

Activity Based Management (ABM):

Activity Based Management (ABM) system is defined as a discipline focusing on the management of activities within business processes as the route to continuously improve both the value received by customers and the profit earned in providing that value. ABM uses activity-based cost information and performance measurements to influence management action (Cokins and Căpuşneanu, 2011). [15, 16]

Segovia1 and Khataie (2011) indicated that the ultimate reason for firms to adopt Activity-Based Costing and Management (ABC/M) is to improve their financial performance by managing their cost in such a manner that they control them and thus can reduce them. [33] There is a significant difference between cost control and cost reduction. Companies can reduce their costs without necessarily controlling them. Cost control generally leads to intelligent cost reductions, e.g. lean companies. He states that in today's global and competitive business environment, cost control has become a decisive variable in the firm's financial success. The main objective is to shed some light as to whether, how, when, and where telecommunication companies can adopt ABC/M as a means for an effective cost management. It provides evidence as to whether or not ABC/M does have a positive effect on the firm's financial performance.

Target Costing (TC):

Target costing can be defined as a suitable tool for the reduction in new product costs (Afonso et al., 2008). [5]

The TC concept is characterized by starting with identifying the price consumers are willing to pay for the products, considering their quality and functionality (Albright and Lam, 2006). [7]

Target costing (TC) may be considered a profit management technique that ensures new products earn sufficient profits to justify their production (Kee and Matherly, 2013). [21]

Căpuşneanu and Briciu (2013) stated that after analyzing the critical factors of implementation or non-implementation of target costing method, the results obtained through practical case study demonstrates the

possibility of adapting and implementing target costing method in the household appliances manufacturing entities in Romania. [14]

Mendes and Machado (2012) showed that none of the analyzed companies reports using TC with the six characteristics attributed to it by the theory: price leads to cost; consumer focus; product design focus; multidisciplinary teams; focus on the costs incurred during the product's life cycle; involvement of the entire value chain. [28]

Value Chain (VC) analysis:

Value Chains (VC) focus on value creation typically via innovation in products or processes, as well as marketing- and also on the allocation of the incremental value. They include all of vertically linked, interdependent processes that generate value for the consumer, as well as horizontal linkages to other value chains that provide intermediate goods and services (Webber and Labaste, 2010). [39]

The Value Chain (VC) is a business model that enables the organizing of operations around the value adding activities that result in a better service or product (Sopadang et al., 2012). [34]

Webber and Labaste (2010) stated that there are many ways to analyze or evaluate a value chain. [39] Analysis can stem from research of secondary information, such as government or industry data, to interviews with industry participants. It can also be derived from participatory market assessments and market observations. Once the information is gathered, numerous tools and processes help interpret and inform the resulting analysis.

Sopadang et al. (2012) indicated that efficiency according to value chain model has been evaluated. Improvement options to increase efficiency of longan supply chain management have been proposed and discussed. [34]

Value Engineering (VE):

Value Engineering (VE) is a set of techniques whose aim is to omit unnecessary costs and these costs don't perform any role in enhancing the value and function of the product (Taghizadeh et al., 2012). [37]

Value Engineering (VE) is primarily a

function-oriented approach which is used to enhance the value provided by the product, measured by the relationship between the product's functions and the costs incurred (Blocher et al., 2010). [12]

Value Engineering begins with performing functional analysis, and ends with generating cost reduction. Engineers analyze the functions of the components and the cost of each major function, and attempt to improve the products design to reduce the overall cost without reductions in the required quality and performance (Atkinson, et al., 2012). [10]

Taghizadeh et al. (2012) pointed out that for the successful implementation of value engineering in the organization, the organizational factors affecting its execution should be identified. [37] Without understanding the rate of effect of each organizational factor on the successful implementation of value engineering, there cannot be a positive view of the successful execution of these value engineering projects in the organizations.

Theory of Constraints (TOC):

The theory of constraints (TOC) is an approach to managing costs and improving quality and delivery performance, by focusing on identifying and removing bottlenecks. While TOC is a short-run approach of improving performance by exploiting the constraints, in the long run, organization can develop strategies to avoid these constraints (Kuma, 2013). [23]

Theory of Constraints (TOC) recognizes that any system's performance, or operationally a firm's output, is limited by at least one constraint. TOC develops a specific approach to manage such constraints to support the objective of continuous improvement (Hansen et al., 2009). [18]

Theory of Constraints (TOC) is a short-term measure to manage constraints and improve performance. However, critics of TOC argue that performance cannot be entirely measured in the short term. Hence, in order for a firm to improve and sustain its performance in the future, it has to identify critical success factors which are strategic in nature and its related performance measures. Such strategic perspective is lacking in TOC, although it has

enabled firms to identify and eliminate constraints (Langfield-Smith et al., 2009). [25]

Resource Consumption Accounting (RCA):

Resources Consumption Accounting (RCA) is a management accounting approach focusing on creating reliable information to minimize costs and maximize revenues to enhance the productive capability of the business, aiming greater success in a highly competitive market. RCA combines German management accounting methods known as "Grenzplankostenrechnung" or GPK which means "flexible cost planning and control " and strict form of Activity-Based Costing (ABC) for detailed process insights (Ahmed and Moosa,2011). [6]

Resources Consumption Accounting (RCA) emphasizes the fact that cost is caused and can be effectively controlled at the resource level, and recognizes that each resource has ability to create value. Since the capacity resides in resources, managing the capacity and usage of resources is the basis for effectively managing costs (El-Helbawy and El-Nashar,2013). [17]

Resources Consumption Accounting (RCA) is a quantity-based model, costs in RCA are modeled based on resource flow. Resource costs are classified as fixed or proportional based on the correlation between the input quantities to a resource pool and that pool's output quantities (Perkins and Stoval, 2011). [30]

Time Driven - Activity Based Costing (TD-ABC):

Time Driven - Activity Based Costing (TD-ABC) is a method which identifies the capacity of each department or process and allocates the cost of this capacity of resource groups over the cost object based on the time required to perform an activity. If the demand for work in these departments or processes declines, TD ABC can estimate the quantity of resources released (Kaplan, 2006). [19]

TD-ABC captures the different characteristic of an activity by time equations in which the time consumed by an activity is a function of different characteristics. This equation assigns the time and the cost of the activity to the cost object based on characteristics of each object.

The unit cost of used resources and time required to perform an activity are two parameters for this method. The time-driven approach consists of six steps (Bruggeman and Everaert, 2007): 1. Identifying resource groups and the activities for which they are used, 2. Defining the costs of each group, 3. Estimating the practical capacity of each group, 4. Calculating cost per time unit, 5. Determining the required time units for each activity, 6. Calculating cost per transaction. [13]

Kaplan and Anderson (2011) described a Time Driven- Activity Based Costing (TD-ABC) approach to overhead allocation. [20]

This is in integration with a Lean environment in order to help provide accurate product unit costs. Actually, the TD-ABC requires less accounting transactions than the common ABC allocation method and still turns out an accurate computation of product unit costs, which suggests that it can coincide more with the lean accounting approach to waste elimination.

The present study aims to analyze viability of some applied cost systems in Egyptian manufacturing firms.

The study hypotheses

The present study aims to test the following hypotheses:

H0: There is no significant difference among application extent of ABC and other modern cost systems in some Egyptian manufacturing firms.

H1: There is a significant difference among application extent of ABC and other modern cost systems in Egyptian manufacturing firms.

MATERIALS AND METHODS

Data.

The researcher used the questionnaire instrument in addition to the test approach to confirm the correctness of collected views. The number of sent questionnaire instruments was 443 (For 26 manufacturing firms in the first half of 2014) and the number of the received questionnaires was 385 with a response percentage of 86.91%.

Methods of data analysis.

A Statistical Package for the Social Sciences

(SPSS) was used for applying reliability, descriptive and inferential statistics.

RESULTS AND DISCUSSIONS

Statistical analysis

1. Reliability statistics:

a) Internal consistency reliability:

Internal consistency reliability indicator was used to assess the consistency of results across items within the test.

The results of the present study indicated that there is a correlation coefficient among the dimensions (Type of systems) of questionnaire which is significant at levels of 1 and 5%.

b) The Cronbach-Alpha Coefficient:

Cronbach's Alpha Coefficient was used as a statistical indicator.

It is generally used as a measure of internal consistency or reliability of a psychometric instrument.

The results of study revealed that Cronbach's Alpha Coefficient of questionnaire was 81.07.

2. Descriptive statistics:

Table 1 shows types of currently applied cost system in some manufacturing firms in Egypt and their application weights.

Table 1. Types of currently applied cost system in some manufacturing firms in Egypt

No.	Dimension (Type of cost system)	Repetition	Weight, %
1	Activity-Based Costing (ABC)	223	57.92
2	Activity-Based Management (ABM)	17	4.416
3	Target Costing (TC)	103	26.75
4	Value Chain (VC) analysis	1	0.260
5	Value Engineering (VE)	0	0
6	Theory of Constraints (TOC)	6	1.558
7	Resource Consumption Accounting (RCA)	27	7.013
8	Time Driven Activity-Based Costing (TD-ABC)	0	0
9	Others	8	2.078

Source: SPSS output.

The field questionnaire determined the most important modern cost accounting systems which are currently applied in the majority of

Egyptian manufacturing firms.

The descriptive statistics analysis of dimensions (Type of system) stated the weight of each system from view point of its application extent inside some Egyptian manufacturing firms.

The results analysis showed that Activity Based Costing (ABC) system has the highest weight (57.922%) and Value Chain (VC) analysis approach has the lowest value (0.260%).

While Theory of Constraints (TOC) and Time-Driven Activity Based Costing (TD-ABC) have no success (0%) as shown in Fig.1.

According to the descriptive statistics analysis and application extent indicator, the currently cost systems in Egyptian manufacturing firms may be descendingly arranged as follows:

- a) Activity Based Costing (ABC) system [57.922%],
- b) Target Costing (TC) system [26.753%],
- c) Resource Consumption Accounting (RCA) system [7.013%],
- d) Activity-Based Management (ABM) [4.416 %],
- e) Other systems [2.078%],
- f) Theory of Constraints (TOC) [1.558%] and
- g) Value Chain (VC) analysis [0.260%].

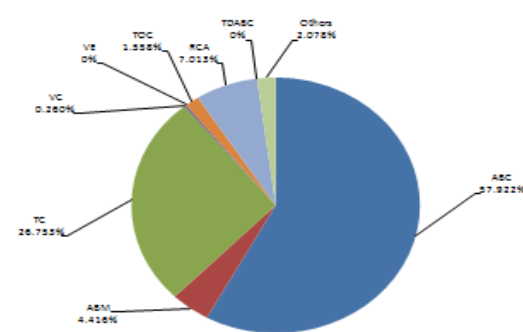


Fig.1. Weight of currently applied cost systems in some manufacturing firms in Egypt
 Source: SPSS output.

3. Inferential statistics:

The researcher used Friedman Test as Inferential statistics analysis to detect differences in treatments across multiple parameters (types of cost system).

Table 2 (A and B) shows there is a significant difference among application extent of ABC and other modern cost systems inside some

manufacturing firms in Egypt (At significance level of 1%).

Friedman Test stated that mean rank values of various cost systems were 7.11, 5.70, 4.82, 4.70, 4.59, 4.57, 4.51, 4.50 and 4.50 for ABC, TC, RCA, ABM, OTHER, TOC, VC, TDABC and VE systems, respectively.

Table 2. Output of Friedman Test (Ranks and statistics).

A. Ranks

Parameter	Mean rank
ABC	7.11
ABM	4.70
OTHERS	4.59
RCA	4.82
TC	5.70
TDABC	4.50
TOC	4.57
VC	4.51
VE	4.50

B. Test statistics^a

N	385
Chi-Square	1051.657
Df	8
Asymp. Sig.	.000

^aFriedman Test

Source: SPSS output.

CONCLUSIONS

A field questionnaire determined the most important modern cost accounting system which are currently applied in some Egyptian manufacturing firms.

There is a significant difference among application extent of ABC and other modern cost systems inside some manufacturing firms in Egypt at significance level of 1%.

According the application extent indicator, the currently cost systems in Egyptian manufacturing firms may be descendingly arranged as follows: a) Activity Based Costing (ABC) system, b) Target Costing (TC) system, c) Resource Consumption Accounting (RCA) system, d) Activity Based Management (ABM), e) Other systems, f) Theory of Constraints (TOC) and g) Value Chain (VC) analysis.

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USE AND USE INTENSITY OF SOCIAL MEDIA NETWORKING SYSTEMS BY NIGERIAN AGRO-ENTREPRENEURS

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Abstract

Agro-entrepreneurs are key to the Nigerian economy as they constitute the majority of the work force, providing food and employment opportunities for more than 60% of the largest black nation on earth. Nigeria's social media networking system which is the largest in Africa has got its usefulness in many conventional and contemporary applications in the recent times. Social media has become the fastest, cheapest and unrestricted communication and marketing tool of this jet age. This study therefore focused on the use and use intensity of social media networking systems by Nigerian agro-entrepreneurs. The study made use of mainly primary data. Primary data were collected with the aid of well-structured questionnaires assisted with interview schedules. Field data collection was conducted between June and September, 2014. Multi-stage sampling technique was used to select three hundred and sixty (360) respondents across the three (3) highly ICT compliant states (Lagos, Ondo and Oyo). Data collected were analysed using descriptive statistics and multiple regression model. The results of the regression model indicate that education, availability of power supply and customer base of the agro-entrepreneurs positively influenced use intensity of social media by the agro-entrepreneurs while age and cost of access data negatively influenced their use intensity of social media.

Key words: ICT, Nigerian agro-entrepreneurs, regression model, use intensity of social media

INTRODUCTION

Social media networking system has by far become one of the grandest benefits of the information and telecommunication (ICT) dispensation. Social media networking system has impacted greatly on the human behaviour both intra-human and inter-human relationship and their interactions with other components of the earth. Social media is redefining human level of activities and interactions across all sectors of the economy. The dynamism, ease, innovativeness, wide coverage, access and customers networking inherent in social media networking system has made social media perhaps, the most powerful tool in terms of speed and cost-effectiveness for information dissemination and marketing to the world's growing population. Social media networking system continues to grow from continent to continent, countries to countries, regions to regions and from of the economy to subsectors as new subscribers or followers continue to join the various social media across the globe.

Social media as defined by [7] is "a group of internet-based applications that build on the ideological and technological foundations of Web 2.0 and that allow the creation and exchange of user-generated content". For [8], social media depend on mobile and web-based technologies to create highly interactive platforms through which individuals and communities share, co-create, discuss, and modify user-generated content. They introduce substantial and pervasive changes to communication between organisations, communities, and individuals. World's popular social media network sites include Facebook, Twitter, Instagram, Youtube and Skype. The increase in active users' growth of these social media is astronomical. For example, Facebook had 1.35 billion monthly active users as at September, 30 2014, only within a decade of existence [5]. In Nigeria, prominent social media include Facebook, Google, Yahoo, Youtube, Eblogger, LinkedIn, and Twitter, 2go, Whatsapp and Nairaland among others. The number of social media networks

continue to dominate the most visited websites across Africa and the situation is not different in Nigeria. Social media practices have extemporised in unprecedented capacities. They have triggered human right activism and revolutions, encouraged, demanded and monitored best practices during elections and are also contributing to a larger dynamic of promoting growth on the continent through accountability and conversation. In fact, the most visited websites across the continent are social media platforms [2]

Agro-entrepreneurship in Nigeria

Nigeria has one of the most diversified economies in Africa with different sectors of the economy providing great opportunities for survival but not without their varying degrees of challenges as well. Agriculture is at the centre of the economy contributing more than 40% to the GDP [3]. Agriculture remains the lifeline of the rural and peri-urban communities employing more than 70% of them who are engine rooms for the food need of the largest black nation on earth. Agro-entrepreneurs are critical to the economy not only for the nations' food security but also as necessary strategists and agents of economic development and adjustment given its nascent and dynamic nature of a developing agro-economy. For the purpose of this study and in the researcher's view, agro-entrepreneurship is the process of starting new agribusinesses and or expanding the frontiers of existing agribusinesses to incorporate new business ideas and activities aimed at meeting the food and other agricultural needs of the citizenry with return on investment to the entrepreneur. An agro-entrepreneur develops agribusiness model, acquires the human and other required resources, and is fully responsible for the success or failure of the agribusiness. Agro-entrepreneurs are there the individuals who explore agribusiness opportunities, scan the environment, mobilise resources, convert ideas into viable agribusiness proposition and provide new agricultural products and services to the society by bringing together and combining various factors of production. An agro-entrepreneur has a distinct concept, dynamic vision and an achievable dream,

which he/she is able to convert into economic products and services. Such individuals are driven by task, challenge and opportunity with very high achievement orientation.

Social media contributions to agro-entrepreneurship and economy in Nigeria

According to the global ICT, social media network and mobile technology statistics for 2014, there are 2.5 billion internet users of the world's population of 7.1 billion. These internet users accounted for 35% of the world's population with 1.9 billion active social media network users and 6.6 billion mobile subscribers. Meanwhile in Nigeria, according to [2], internet penetration stands at about 30% with 50 million internet users. In the year 2009, 70% were visiting social networking sites, 6% e-mail and 54% entertainment. By the year 2013, 72% were visiting social networking sites, 55% e-mail and 46% entertainment [2]. The increasing number of social media network users and mobile subscribers continue to have multiplier effects on national and global economies and their component sectors.

The use of internet-based social media networking systems have enabled both small and large scale agro-entrepreneurs communicate their products more effectively to their consumers. Marketing agribusinesses explore the global reach and limitless opportunities intrinsic to social media network system to extend their products to different peoples, different economies with multicultural diversities and ensure rapid consumer feedback mechanism to improve and adjust to global best practices thereby enhancing internationalisation of indigenous products across the global.

The use and use intensity of social media networking systems by agro-entrepreneurs is an important, necessary and innovative but almost neglected area of research particularly in a developing country like Nigeria. Although the concept of social media and its applications have enormously been studied in other business activities. Notable among these business activities or aspects are small and medium scale Enterprises (SMEs), large companies and incorporations, financial institutions and retail businesses. There

abound lots of researches on social media and other sectors of the economy. Effects of social media on education is no longer new. According to [9] and [1], social media networking systems do not only make it easy for companies to communicate with their consumers, but also makes it easier for tertiary institutions to communicate related course work to their students, to encourage discussion between and among students, and to address administrative issues [9]; [1].

Agro-entrepreneurs as the commonest entrepreneurs are on the increase in Nigeria with different scales of operation and sophistication. Lagos State is home to the largest number of agro-entrepreneurs in Nigeria. Social media networking is grossly unregulated in Nigeria. Several agro-entrepreneurs now use social media to communicate and market their products. It is against this background that the study is aimed at evaluating the use and use intensity of social media networking system by Nigerian agro-entrepreneurs with the following specific objectives which include to:

- (i) Identify key demographic characteristics of agro-entrepreneurs in Nigeria
- (ii) Investigate the use and types of social media networking systems used by agro-entrepreneurs in Nigeria
- (iii) Examine the factors influencing use intensity of social media by agro-entrepreneurs in Nigeria

MATERIALS AND METHODS

The study area

The study was carried out in Lagos, Ondo and Oyo States, Nigeria. These states were selected for the study because of the high concentrations of agro-entrepreneurs and high level of ICT compliance with the use of social media networking systems.

Sampling technique and size

Multistage sampling technique was used in the selection of the respondents for this study. In the first stage, three (3) States were purposively selected for the study. They were Lagos, Ondo and Edo States. The three (3) states were purposively selected based on the

high concentrations of agro-entrepreneurs and high level of ICT compliance with the use of social media networking systems by agro-entrepreneurs. The second stage also involved purposive sampling of ten (10) agro-entrepreneurs out of the six (6) different categories of agro-entrepreneurs identified for this study from each of the three (3) states. The six (6) categories are agro-input suppliers, farm field producers, agro-processors, agro-marketers/distributors/brokers, professional service providers and others unclassified group. A total of sixty (60) agro-entrepreneurs were selected from each state to make a sample frame of three hundred and sixty (360) respondents for the study.

Data and method of data collection

Primary data were used for the study. Data were collected by means of a well-structured questionnaire, which was pre-tested in order to enhance the reliability of the data. A total of three hundred and sixty (360) copies of the questionnaire were administered, completed and returned. Field data collection was conducted between June and September, 2014.

Data analysis

Descriptive statistics and regression model were used in the data analysis. The descriptive statistics used included means, percentages, frequencies and tables. Multiple regression analysis was used to isolate factors influencing use intensity of social media by agro-entrepreneurs in Nigeria measured by the number of active hours spent on social media in a month by each respondent. The implicit form of the regression model is presented as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7 \text{ and } X_8, e)$$

Where, Y= Use intensity of social media (active hours on social media per month)

X₁=Age of agro-entrepreneurs

X₂=Sex of agro-entrepreneurs (male or female)

X₃=Education of agro-entrepreneurs (measured in years of formal schooling)

X₄=Experience in agro-entrepreneurship (in years)

X₅=Cost of ICT device used accessing social media.

RESULTS AND DISCUSSIONS

Distribution of the agro-entrepreneurs by key demographic variables

Table 1 shows the distribution of the agro-entrepreneurs by four (4) key demographic variables which are age, sex, highest level of education and years of working experience in agro-entrepreneurship. The Table reveals that most of the agro-entrepreneurs were aged less than 60 years (86.39%) while only few (13.61%) were older than 60 years. Age is a critical factor in agro-entrepreneurship as it is a function of economic viability as observed by [3].

Table 1. The distribution of the agro-entrepreneurs by key demographic variables

Age of agro-entrepreneurs (in years)	Frequency	Percentage (%)
Less than 30	56	15.56
31-40	93	25.83
41-50	83	23.06
51-60	79	21.94
Greater than 60	49	13.61
Total	360	100.00
Sex of agro-entrepreneurs		
Male	243	67.50
Female	117	32.50
Total	360	100.00
Highest level of education of agro-entrepreneurs		
	Frequency	Percentage (%)
No formal education	23	06.39
Primary school education not completed	7	01.94
Primary school education completed	13	03.61
Secondary school education not completed	46	12.77
Secondary school education completed	69	19.17
Tertiary school education not completed	79	21.94
Tertiary school education completed	113	31.39
Other forms of education	10	02.78
Total	360	100.0
Experience in Agro-entrepreneurship (in years)		
	Frequency	Percentage (%)
less than or equal to 5	95	26.39
6 to 10	148	41.11
11 to 15	68	18.89
16 to 20	31	08.61
Greater than 20	18	05.00
Total	360	100.0

The implication of this is that the Nigerian economy has got good number of economically viable agro-entrepreneurs to continue to drive the sector. It is even worthy of note that about 65% of the agro-entrepreneurs are either less than 50 years or

are fifty years old. Moreover, agro-entrepreneurship in Nigeria is male-dominated as the percentage of male in the total sample is even more than the double of the percentage of female as shown in Table 1 as well. The implication of this is that, a much-more-not distracted gender group is in the fore front of agro-entrepreneurship in Nigeria as the female folks tend to be distracted by home responsibility of managing house chores, looking after the welfare of the children both in and outside home. This is so because in Nigeria, managing home chores and looking after the welfare of children are still considered primary responsibility of the female folks and this consequently reduces in relative, the attention (in hours per day) devoted to entrepreneurship and more also agro-entrepreneurship. In addition, little more than half of the agro-entrepreneurs were educated to the level attaining tertiary education even when not all of them completed their tertiary education. Table 1 further reveals that most of the agro-entrepreneurs (67.50%) had been in the business for less than 10 years or equal to 10 years while the remaining 35% of them had had the business experience for more than 10 years. In particular, only 5% had been agro-entrepreneurs for more than 20 years. The years of experience in agro-entrepreneurship is relatively large at the upper class and low at the lower class, to give a mean of 15.9 years of experience. Since business success skills many a times, are learnt and acquired over years by learning through practical business experiences, it implies that some of the agro-entrepreneurs may not have acquired enough agro-entrepreneurship experience to shoulder serious business challenges when they arise. However, their persistence and continuity in the business over time will just provide them with the experience and the required business success skills in due course.

Use of social media networking system among agro-entrepreneurs in Nigeria

Figure 1 shows the research findings, which indicate the percentage of the six (6) categories of agro-entrepreneurs that used social media networking systems. The Figure reflects that agro-marketers / distributors /

brokers (82%), professional service providers (75%) and agro-input suppliers (72%) used social media the most while still a good number of agro-processors (65%) used the social media. On the contrary, farm field producers (18%) used social the least. In all, 61% of the total sample used social media. The findings here differentiates from [6] where 81% of the entrepreneurs sampled from SMEs in Nairobi, Kenya used social media. This question was germane for this study in differentiating the social media users from the non-users which provided a quick focus for the study in realizing its set objectives. However Figure 2 reveals that Facebook, Yahoo, Whatsapp, LinkedIn Nairaland and Google are the agro-entrepreneurs' top preferred social media networking systems in Nigeria.

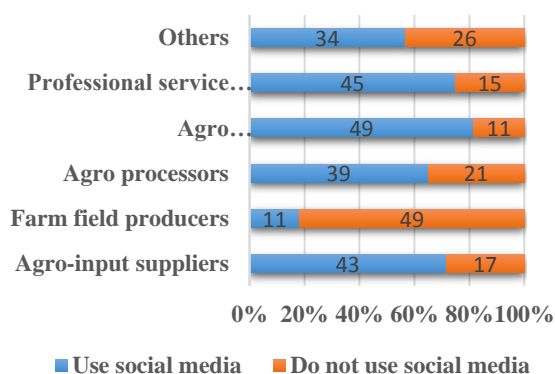


Fig.1. Use of social media networking systems among agro-entrepreneurs in Nigeria
 Source: Computed from field survey, 2014

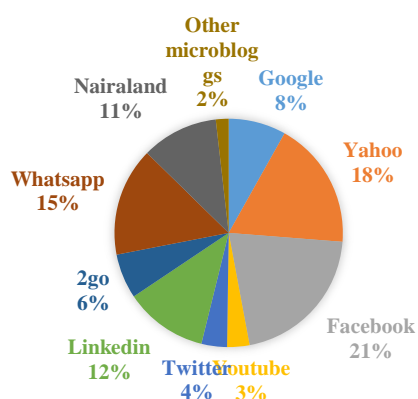


Fig. 2: Type of social media networking systems used among agro-entrepreneurs in Nigeria
 Source: Computed from field survey, 2014

Reasons for using social media networking systems

From research findings as shown in Table 3, customer relationship management (98.19%) ranked first in the list of the reasons advanced for using social media by the agro-entrepreneurs. This finding is consistent with [6] which also discovered that customer relationship management was the major reason why SMEs used social media in Nairobi, Kenya. Many of the agro-entrepreneurs had noted that customer relationship management was the most paramount reason, as they noted that most of their customers had imbibed social media and they must follow them to keep track of their contacts and relationship for continued patronage of their products and services. Other top reasons included price monitoring (2nd), creation of new markets (3rd) e-advertisement (4th) and market survey and research (5th). Agro-entrepreneur in Nigeria rarely used social media for product identification or rating as reflected by its bottom position in the respondents' ranking.

Table 2. Reasons for using social media networking systems

Variables	Frequency	Percentage (%)	Rank
Customer relationship management	217	98.19	1st
Price monitoring	201	90.95	2nd
Creation of new markets	167	75.57	3rd
E-advertisement	156	70.59	4th
Market survey and research	147	66.52	5th
Feedback mechanism	145	65.61	6th
Purchase and sales	92	41.62	7th
Networking with other agro-entrepreneurs	81	36.65	8th
Product identification/rating	78	35.29	9th
Others	56	25.34	10th

Source: Computed from Field Survey, 2014

Factors influencing use intensity of social media among agro-entrepreneurs in Nigeria

Table 3 summaries the statistics of the factors influencing use intensity of social media by two hundred and twenty one (221) agro-

entrepreneurs in Nigeria. The mean age of the agro-entrepreneurs was 38.8 years while on the average they have spent 11.2 years in school for formal education. Availability of power supply in hours per month was on the average of 286.9. Agro-entrepreneurs in Nigeria however spent N 1010.41 (an equivalent of USD 5.81 as at 28th of

November, 2014) for data access per month in using social media with 15.61 years of experience in agro-entrepreneurship. They had 30 customers on the average which caused them to spend 30.9 active hours on social media monthly for mainly managing their customer relationship.

Table 3. Statistics of factors influencing social media use intensity among agro-entrepreneurs in Nigeria

	Intensity of social media use (active hours on social media per month)	Age of agro-entrepreneurs	Education of agro-entrepreneurs (measured in years of formal schooling)	Experience in agro-entrepreneurship (in years)	Cost of ICT device used in accessing social media	Availability of power supply (hours of available power per month)	Cost of access data (in Naira)	Customer base (number of customers on social media)
Valid users	221	221	221	221	221	221	221	221
Mean	30.85	38.82	11.21	15.91	13076.92	286.88	1010.41	29.24
Median	19.00	35.00	12.00	14.00	5000.00	240.00	1000.00	20.00
Mode	56.00	45.00	12.00	20.00	5000.00	240.00	1000.00	20.00
Range	84.00	36.00	06.00	29.00	117700.00	280.00	4300.00	203.00
Minimum	04.00	29.00	00.00	01.00	2300.00	240.00	200.00	02.00
Maximum	88.00	65.00	12.00	30.00	120000.00	520.00	4500.00	205.00

Source: Computed from field survey, 2014

Table 4 shows the results of the regression analysis to examine the determinants of use intensity of social media by Nigerian agro-entrepreneurs. The use intensity of social media was measured by the active hours each agro-entrepreneur spent on social media networks in a month.

Table 4. Regression results of factors influencing use intensity of social media

Variables	Simple Log		Semi-Log		Double Log	
	Coefficients	T-value	Coefficients	T-value	Coefficients	T-value
Constants	-32.620 (9.295)	- 3.50 9*	0.183 (0.163)	1.12 5	-3.803 (0.719)	- 5.29 0*
X ₁	-0.231 (0.127)	- 1.81 5	0.003 (0.002)	1.25 9	-0.079 (0.216)	- 0.36 7
X ₂	-2118 (2.315)	- 0.91 5	-0.074 (0.0041)	- 1.81 8	-0.218 (0.122)	- 1797
X ₃	0.598 (0.387)	1.54 4	0.038 (0.07)	5.54 9*	0.757 (0.133)	5.70 2*
X ₄	0.119 (0.157)	0.75 9	-0.002 (0.003)	- 0.68 0	0.042 (0.062)	0.68 2
X ₅	7.354E- 5 (0.000)	2.27 6*	- 0.696E- 7 (0.000)	0.29 9	0.038 (0.037)	1.01 9
X ₆	0.225 (0.013)	16.5 29*	0.003 (0.000)	12.1 72*	1.966 (0.186)	10.5 59*
X ₇	0.000 (0.002)	0.07 2	5.289E- 5 (0.007)	- 1.54 2	0.202 (0.095)	- 2.13 5*
X ₈	0.065 (0.028)	2.35 5*	0.001 (0.000)	0.11 0	0.107 (0.053)	2.00 8*

Source: Computed from field survey, 2014

From Tables 4 and 5, the double-log functional form provided the best fit as shown in the regression model considering the following statistics: the number of significant variables (highest), value of Standard error (least), F-value, value of the R² and value of the Durbin-Watson statistic (> than 1) is a test statistic test used to detect the presence of autocorrelation. Five (5) of the independent variables; X₁, X₃, X₆, X₇, and X₈, were significant at 5% level (i.e. 95% confidence interval). These variables were age and educational attainment of the agro-entrepreneurs, availability of power supply, cost of access data and their customer base. The parameter estimates of each of these variables also carried signs, which are consistent with the *a priori* expectations. The results of the regression model indicate that education, availability of power supply and customer base of the agro-entrepreneurs positively influenced their use intensity of social media. However, age and cost of access data negatively influenced their use intensity of social media. It is succinct therefore, to say that the major factors influencing use intensity of social media by agro-entrepreneurs in Nigeria were these five (5) factors. All the explanatory variables together explained about 89% of the variations observed in use intensity of social media. The 1.001 value of

Durbin-Watson statistic in Table 4 is an indication of no autocorrelation although a higher value would have been better.

Table 5. Key model summary and ANOVA statistics

	R	R ²	Adjusted R ²	Stan. Error	Durbin Watson	Mean square	F-value
Simple Log	0.932	0.869	0.864	8.3988	0.690	12397.26	175.745
Semi-Log	0.876	0.767	0.758	0.1473	0.701	1.89	87.255
Double Log	0.887	0.786	0.778	0.1411	1.011	1.94	97.508

Source: Computed from field survey, 2014

CONCLUSIONS

Social media use by agro-entrepreneurs in Nigeria is relatively high at 61%. Facebook remains the most used social media network by the agro-entrepreneurs. The agro-entrepreneurs use social media mostly for customer relationship management. Education, availability of power supply, customer base, age and cost of access data are the factors influencing use intensity of social media in Nigeria. From the research, the study can succinctly conclude that use intensity of social media will improve if agro-entrepreneurs have more education, have increased hours of power supply, and have more social media compliant customers. On the contrary the more aged the entrepreneurs grow and the higher the cost of access data, the less they use social media.

It is therefore on point to recommend that, to enhance social media use and improve use intensity by agro-entrepreneurs in Nigeria, Government and other stakeholders in agro-entrepreneurship must work to ensure continuous and increased education for agro-entrepreneurs, increase power supply and increase the number of their social media-compliant customers in Nigeria.

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TERRITORIAL STRUCTURES AND THE POTENTIAL OF ROMANIA'S ORGANIC AGRICULTURAL HOLDINGS

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Abstract

The paper seeks to highlight the main issues that the implementation of organic agriculture in Romania has to face, at territorial and national level in regard to the situation of the vegetal and animal sector. The comparison of the percentages showed, on the one hand, a considerable organic potential at national level, and on the other hand, the necessity to embrace a different structure by means of organizational measures. The level of the used markers highlighted an increasing trend of organic agriculture, by means of the increase of the total area and of the areas in conversion. This can be achieved by increasing the average surface per holding and intensifying the average number of animals per organic agricultural holding, situations which at present, at national level, are associated with very noticeable variation forms.

Keywords: *agricultural area in conversion, legal status, organic agricultural holding, organic cultivation system, production capacity*

INTRODUCTION

The paper seeks to highlight one of the most important issues of Romanian agriculture, which for the aspects related to organic farming can be viewed in two-dimensional terms: the territorial structure and the size/capacity of the agricultural holding. The analysis of each of the two aspects shows differences that are interrelated, but whose result is the offer which represents the organic production itself.

In this context the level of the markers presented in absolute and relative levels highlights the following for Romania's organic farming: on the one hand, a strong potential and, on the other hand, the need for a different structure of the organizational measures. The interrelation of the two issues presented in the paper, at national and territorial level is justified/ substantiated by the markers that show a boost to the increasing trend of organic farming.

MATERIALS AND METHODS

The methodology used for substantiating this study is based on processing and interpreting

the most recent data and information which resulted from predominantly statistical research. Within this framework, the level of the markers was highlighted for the national area, along with the situation of the eight development regions, according to the data of the General Agricultural Census 2010.

Various terms were used to differentiate notions (Emergency Ordinance No. 34/2000, Official Gazette of Romania, No. 172/2000 on organic food products) [1] regarding: *utilised agricultural area organically certified*, which represents the part of the agricultural surface used by the agricultural holding which is fully converted, certified by an accreditation body, based on a contract signed yearly and which ended the conversion period to organic agriculture (the period is set according to the purpose that will be served during its exploitation for organic production), whose production is certified, being in accordance with the principles of organic agriculture; *utilised agricultural area in conversion to organic*, considered part of the agricultural surface utilised by the agricultural holding where organic production methods are employed, but, for which, a transition period is required (we can only register that

agricultural area that has not been through the whole conversion period, which for vegetal production is between 2 and 3 years).

The observation of all the instances started from the existence of territorial differences rendered by markers, and their comparison was monitored in the next stages:

- the number of holdings, surfaces/ number of animals, considered basic data which were rendered both in a gross form and by comparing synthetic percentage markers;
- for agricultural areas, the markers which were used compared percentage forms, organic certifications which are used and the agricultural area in conversion, in the structure of national levels and of development regions;
- in the case of breeding animals, the level of the actual number of animals was analysed, and the comparison of the percentages was realized for the main species (herbivorous and granivorous), in the structure of the national levels and of the development regions;
- the analysis of the organic agricultural areas

and of the number of organically bred animals rendered in the form of reports per agricultural holding, was monitored both in physical units and by the comparisons realized at national and regional level.

Methodologically, the markers in their most adequate forms were expressed quantitatively and in percentages, which compared to the territorial forms (national and development regions) were expressed in physical units and percentages. By means of the used markers, the changes of the agricultural organic production capacity (vegetal and animal) were searched for, with particular reference to the structure of the territorial potential. By means of the methodology, what was looked into was the level of the current potential, with reference to their structure and trends.

RESULTS AND DISCUSSIONS

1.The legal status of organic agricultural holdings in Romania

Table 1. Structure of the number of organic agricultural holdings according to their legal status in Romania

Specification (regarding the legal status of the agricultural holdings)	Utilised agricultural area organically certified		Utilised agricultural area in conversion to organic			Organically bred animals		
	number of holdings	% in regard to the total holdings with agricultural area organically certified	number of holdings	% in regard to the total holdings with agricultural area in conversion to organic	% in regard to the agricultural holdings with agricultural area organically certified	number of holdings	% in regard to the total holdings with organically bred animals	% in regard to the holdings with agricultural area organically certified
1.Agricultural holdings without legal status	621	100	268	100	43.15	1211	100	195.01
Individual agricultural holdings	604	97.26	246	91.79	40.72	1186	97.94	196.35
Certified natural persons, sole traders, family business	17	2.74	22	8.21	129.41	25	2.06	147.05
2.Agricultural holdings with legal status	88	100	127	100	144.31	32	100	36.36
Agricultural companies/ associations	10	11.36	7	5.51	70	-	-	-
Privately owned businesses	71	80.69	117	92.13	164.78	24	75	33.80
Research institutes/ stations, high schools with agricultural profile	2	2.27	-	-	-	-	-	-
Other types (Foundations, religious establishments, schools, etc.)	5	5.68	3	2.36	60	8	25	160

Source: General Agricultural Census 2010, Results at national level, National Institute of Statistics [2]

This can be considered a form of knowing the agricultural holdings structured from the legal

point of view, correlated by profile in point of the implications of organic agriculture.

It is to be mentioned that the organic agricultural holdings with the profile of vegetal production already own agricultural areas used by organic certification, but also in conversion to organic subsumed under forms with and without legal status. The number of organic agricultural holdings where animals are bred is also subsumed under forms with and without legal status. The mentioned issues are rendered by the level of the markers presented in Table 1, where one can see that:

-the number of holdings with agricultural areas organically certified display different levels, in reference to the fact that the agricultural holdings without legal status have a number of 7.05 higher than the ones with legal status. The following should be mentioned: out of the holdings without legal status, the majority, respectively 97.26% belong to individual agricultural holdings; out of the holdings with legal status, the majority, respectively 80.69% are privately owned businesses;

- regarding the number of holdings with utilised agricultural area in conversion to organic, one can observe the existence of the same majority for the individual agricultural holdings and the privately owned businesses.

In comparison to the holdings with utilised agricultural area organically certified, one can observe the existence of a lower level for the agricultural holdings without legal status (of 43.15%), but higher in comparison to the agricultural holdings with legal status (of 144.31%);

- the organic holdings with animal profile display a mainly increasing level for the individual agricultural holdings and the privately owned businesses (the levels being of 97.94% and 75.00% respectively).

From these analyses we can observe the predominance of the holdings whose legal status is subsumed under the form of individual agricultural holdings and privately owned businesses. At the same time what results is a boost to the increasing trend of the holdings whose utilised agricultural area is in conversion to organic, which is the situation of the holdings with legal status.

2.Organic agricultural holdings and agricultural areas in vegetal production

Initially, in the organic agricultural system, the vegetal production was best represented both in terms of technology, and in the reception of the products within the market.

Table 2. Structure of the number of agricultural holdings according to the utilised agricultural area organically certified and the utilised agricultural area in conversion to organic within the development regions of Romania.

Development region	Utilised agricultural area		Utilised agricultural area organically certified			Utilised agricultural area in conversion to organic		
	number	% in regard to total	number	% in regard to total	% in regard to the utilised agricultural area	number	% in regard to total	% in regard to the utilised agricultural area
TOTAL	3,724,332	100	708	100	0.0190	394	100	0.0105
North-West	520,623	13.98	15	2.12	0.0028	10	2.54	0.0019
Center	374,979	10.07	71	10.03	0.0189	37	9.39	0.0098
North-East	775,220	20.82	550	77.68	0.071	250	63.45	0.0322
South-East	444,412	11.93	29	4.1	0.0065	59	14.98	0.0132
Ifov	29,395	0.79	2	0.28	0.0068	1	0.25	0.0034
South Muntenia	760,944	20.43	12	1.69	0.0015	22	5.58	0.0028
South-West Oltenia	554,616	14.89	6	0.85	0.0011	5	1.27	0.0009
West	264,143	7.09	23	3.25	0.0087	10	2.54	0.0037

Source: General Agricultural Census 2010, Results at regional level, National Institute of Statistics [2]

-The following were discussed: the number of the agricultural holdings, of the organic cultivation areas and of the average level of agricultural area per organic holding, which were rendered structurally according to the

development regions, where a different presentation was realized for the utilised agricultural area organically certified and the utilised agricultural area in conversion to organic.

Regarding the number of holdings for the three areas (utilised agricultural, utilised organically certified and utilised in conversion), the data in absolute and relative figures presented in Table 2 highlight the following issues:

- the number of agricultural holdings structured according to the utilised agricultural area per development regions, at the level of year 2010 is very different, rendered by a maximum for the North-East and South Muntenia regions and a minimum for the Ilfov and West regions;
- the number of holdings that own utilised agricultural area organically certified is very low, of 708 at national level. The differences among the holdings with utilised agricultural area organically certified are significant within the development regions in comparison to the national total of 708 holdings. It can be observed: a significant maximum for North-East region (77.68% of total), Center (10.03% of total) and very low values for the other

regions (between 4.1% and 0.28%). Out of the total number of holdings at national level which own utilised agricultural areas organically certified, compared to the utilised agricultural area this level represents 0.019%, for which one can observe a variable between 0.0011% and 0.087% within the regions;

- the holdings with utilised agricultural area in conversion to organic, are only 394 at national level, observing similar differences within the regions (North-East with maximum and Ilfov with minimum). Regarding the percentage comparison to the utilised agricultural area, one observes the same similar values rendered in advance but with much lower levels (at national percentage level is 0.0105%, and within the regions the variables between 0.0009% and 0.0322% are maintained).

The analysis of the existing surfaces in organic holdings subsumed under the profile of vegetal production, in total and in the regional structure, rendered in Table 3 displays the following results:

Table 3. Structure of the surface of agricultural holdings according to the utilised agricultural area organically certified and the utilised agricultural area in conversion to organic within the development regions of Romania.

Development region	Utilised agricultural area		Utilised agricultural area organically certified			Utilised agricultural area in conversion to organic		
	ha.	% in regard to total	ha.	% in regard to total	% in regard to the utilised agricultural area	ha.	% in regard to total	% in regard to the utilised agricult. area
TOTAL	13,306,128	100	23,213.13	100	0.17	26,951.06	100	0.20
North-West	1,808,346.84	13.59	1249.28	5.38	0.01	474.42	1.76	0.02
Center	1627289,82	12.23	2948.03	12.7	0.02	3416.41	12.68	0.20
North-East	1940158,30	14.58	6944.52	29.91	0.05	5693.66	21.13	0.29
South-East	2,194,373.72	16.49	4502.58	19.4	0.03	10848.63	40.25	0.49
Ilfov	62,446.10	0.47	27.75	0.12	0.0002	3.65	0.01	0.005
South Muntenia	2,333,684.61	17.54	4591.96	19.78	0.03	4457.84	16.54	0.19
South-West Oltenia	1,608,414.07	12.09	1063.06	4.58	0.007	581.31	2.16	0.03
West	1,731,414.87	13.01	1885,95	8.13	0.01	1475.14	5.47	0.08

Source: General Agricultural Census 2010, Results at regional level, National Institute of Statistics [2]

- the utilised agricultural area of 13,306,128 ha. at national level is rendered differently within the regions, the fluctuations in structure being represented by surfaces whose value is between 17.54% for South Muntenia and 0.47 % Ilfov;

- regarding the utilised agricultural area organically certified at national level, one observes the existence of a total surface of

only 23,213.13 ha. which analyzed in the county structure is much diversified (from 29.91% in the North-East region to 0.12% for Ilfov). In comparison to the total utilised agricultural area, the utilised agricultural area organically certified represents only 0.17%, percentage level that in the regional structure varies between 0.05% and 0.0002%;

- the utilised agricultural area in conversion to

organic was also analyzed by the same terms of comparison. The first aspect to notice was that this area in conversion is bigger than the certified area, the comparison of the percentage level of the regions to the national total of 26,951.06 ha. fluctuating between 40.25% and 0.01%. Comparing the area in conversion to the utilised agricultural area the values which result show a maximum for the South-East region (of 0.49%) and a minimum for Ilfov (of 0.005%).

Therefore, both in the analysis of the total territorial areas and in the regional structure, analyzed according to the organic systems, the differences are maintained, noticing an

increasing trend of the surfaces in conversion. The structure of the agricultural areas per holding can be considered a qualitative marker of the cultivation area of the organic system. Only by means of this marker, one can know the direction of the territorial architecture of the agricultural holdings existing in this system of organic cultivation. Dimensionally and comparatively, the data presented in Table 4 highlight the level of the organically certified areas and those in conversion, at national level and within the structure of the development regions, where the following can be inferred:

Table 4. Structure of the agricultural surface per organic holding according to the utilised agricultural area organically certified and the utilised agricultural area in conversion to organic within the development regions of Romania (average surface per holding).

Development region	Utilised agricultural area		Utilised agricultural area organically certified			Utilised agricultural area in conversion to organic		
	ha./holding	% in regard to average at national level	ha./holding	% in regard to national total	% in regard to the utilised agricultural area	ha./holding	% in regard to national total	% in regard to the utilised agricultural area
TOTAL (average at national level)	3.57	100	16.90	100	473.38	68.40	100	1915.96
North-West	3.47	97.19	1.81	10.71	52.16	47.44	69.35	1367.14
Center	4.33	121.28	196.53	1162.89	4538.79	92.33	134.98	2132.33
North-East	2.50	70.02	97.81	578.75	3912.4	22.77	33.28	910.8
South-East	4.93	138.09	8.18	48.40	165.92	183.87	268.81	3729.61
Ilfov	2.12	59.38	0.95	5.62	44.81	3.65	5.33	172.16
South Muntenia	3.06	85.71	382.66	382.66	2266.28	202.62	296.22	6621.56
South-West Oltenia	2.90	81.23	88.58	524.14	3054.48	116.26	169.97	4008.96
West	6.55	183.47	314.32	1859.88	4798.77	147.51	215.65	2252.06

Source: General Agricultural Census 2010, Results at regional level, National Institute of Statistics [2]

- the utilised agricultural area per holding shows a surface of 3.57 ha. at national level, and by means of the comparative analysis of the development regions, percentage variables between 121.25% and 59.38% result;
 - the organic certified area which is of 16.90 ha./holding at national level is much bigger than the average for the utilised area (of 4.7 times). In the regional structure compared to the national level, one observes the existence of some variables which can be rendered by significant differences: it is to be observed a maximum for the West region (of 314.32 ha./holding) and a minimum for Ilfov (of 0.95 ha./holding). In regard to the utilised agricultural area, the comparison rendered in percentage structure signifies increases whose

rhythms are between 1.65 to 47.9 times;
 - the average surface per holding in conversion, as a result of the comparative analysis, also indicates significantly different forms. In regard to the average at national level of 68.40 ha./holding, in the regional structure, the variable is between 296.22% and 3.65%. At the same time, comparing the form in conversion to the total utilised area, one observes a boost to the surfaces which at national level is of 19.15 times, and in the structure of the regions one observes the existence of a maximum between 40.08 and 1.72 times.
 It hereby results a boost to the surfaces per holding for those forms where the organic cultivation system is implemented.

Synthetically, one can observe the tendency to differentiate the level of the markers which represent the number of holdings, along with an increase of the total territorial area and of the average surface per holding for those included in the organic system. This trend is permanently associated with the noticeable difference which is manifested in the structure of the development regions.

3.Organic agricultural holdings and the actual number of animals

The organic system of animal breeding has much more diverse implications, mainly determined by technological reasons. The overview of the organic system within the structure of the main animal species

(herbivorous and granivorous) subsumed under the development regions of Romania, was analyzed by means of the number of holdings, the total number of animals per species within the agricultural holdings, and of the number of animals per agricultural holding.

The number of the organic agricultural holdings structured according to the actual number of animals per species and development regions, rendered by comparing the structure of the markers in absolute and percentage values from Table 5 signifies the following:

Table 5. Structure of the number of agricultural holdings according to the actual number of animals, by species of organically bred animals, within the development regions of Romania.

Development region	Cattle		Sheep and goats		Pigs		Poultry		Other species of animals	
	number of holdings	% in regard to total	number of holdings	% in regard to total	number of holdings	% in regard to total	number of holdings	% in regard to total	number of holdings	% in regard to total
TOTAL	936	100	146	100	426	100	701	100	114	100
North-West	30	3.21	11	7.54	31	7.28	32	4.56	4	3.51
Center	53	5.66	46	31.51	31	7.28	52	7.42	58	50.88
North-East	768	82.05	62	42.47	220	51.64	421	60.06	39	34.21
South-East	3	0.32	3	2.05	-	-	3	0.43	4	3.51
Ilfov	4	0.43	1	0.68	1	0.24	10	1.42	2	1.75
South Muntenia	2	0.21	1	0.68	3	0.7	3	0.43	3	2.63
South-West Oltenia	16	1.71	4	2.74	49	11.5	61	8.7	-	-
West	60	6.41	18	12.33	91	21.36	119	16.98	4	3.51

Source: General Agricultural Census 2010, Results at regional level, National Institute of Statistics [2]

- for herbivorous species (cattle, sheep and goats), the number of agricultural holdings which practice the organic system is different for the national total, but mainly within the development regions. The holdings where cattle are bred are concentrated in the North East development region (the percentage level in regard to total being of 82.05%), along with a minimum in the South Muntenia development region (0.21%). For sheep and goats the percentage level and the maximum level, respectively, are maintained within the same North East region (60.00%), and the minimum in the South Muntenia and Ilfov

regions (1.00%);
 - for the granivorous species (pigs and poultry) the difference between the number of holdings can be rendered by a territorial localization. In the case of breeding pigs in an organic system, out of the total of 426 holdings at national level, 51.64% are concentrated in the North East development region, 21.36% in the West region, and for the other regions the percentage variations are between 7.28% and 0.24%, with the remark on the South East region where there are no organic holdings for pig breeding. Breeding poultry in an organic system which comprises

a number of 701 holdings at national level is structurally represented by the same regions, respectively North East (with 60.06%) and West (with 16.98%);

- in the category of agricultural holdings with species of animals, the 114 such holdings are concentrated in the Center (50.88%) and North East regions (34.21%).

Thus, the structure of organic breeding holdings for the main animal species is

represented by a concentration of over 3/4 out of the total in 2-3 of the development regions. Regarding the structure of the total number of animals (herbivorous and granivorous) bred in an organic system within the agricultural holdings at national and regional level, which is rendered in Table 6, the following aspects can be emphasized:

Table 6. Structure of the number of animals within agricultural holdings according to the actual number of animals, by species of organically bred animals, within the development regions of Romania.

Development region	Cattle		Sheep and goats		Pigs		Poultry	
	number of animals	% in regard to total	number of animals	% in regard to total	number of animals	% in regard to total	number of animals	% in regard to total
TOTAL	6,348	100	17,852	100	1104	100	22,147	100
North-West	292	4.6	2234	12.51	142	12.86	552	2.49
Center	1347	21.22	10306	57.73	101	9.14	728	3.29
North-East	4158	65.5	1048	5.87	389	35.24	5336	24.09
South-East	110	1.73	159	0.89	-	-	55	0.25
Ifov	17	0.27	5	0.03	10	0.91	398	1.8
South Muntenia	150	2.36	400	2.24	16	1.45	6062	27.37
South-West Olt.	64	1.01	17	0.1	116	10.51	7243	32.7
West	210	3.31	3683	20.63	330	29.89	1773	8.01

Source: General Agricultural Census 2010, Results at regional level, National Institute of Statistics [2]

-within the herbivorous species (cattle, sheep and goats) bred in the organic system, one observes a difference both in number and in the structure of their territorial distribution. For cattle, out of the total of 6346 heads at national level, the North East and Center regions have the majority (the value level being of 65.5% and 21.22%, respectively, and for the rest of the regions, the variables expressed in percentages are between 4.6% and 0.27%. The total number of sheep and goats that represent 17,852 heads is concentrated in Center, West and North-East regions (the value in regard to total being of 57.73%, 20.63% and 12.51%), for the other regions the levels being between 5.87% and 0.03%;

- for granivorous species (pigs and poultry), bred in the organic system, the differences have a special condition included in the regional territorial distribution. For the species pig, the national level is represented by 1104 heads of animals, which are concentrated in the North-East, West and North-West regions (the values in regard to

total being of 35.24%, 29.89 % and 12.86%), for the other regions the values decreasing up to 0.91%. For the poultry bred organically, the number of 22,147 heads at national level is concentrated in the South-West Oltenia, South Muntenia and South-East regions (the values in regard to the national level being of 32.7%, 27.32% and 24.09%, respectively).

Rendered synthetically, by the analysis of the actual number of animals, structured territorially, one can observe the same non-homogeneous situation of the territorial distribution, as it is remarked in the previous analysis regarding the number of agricultural holdings.

A synthetic marker of the structure of the current situation of animal breeding in the organic system of Romania is provided by the structural analysis of the number of animals per agricultural holding. Represented by the same actual numbers of animals (herbivorous and granivorous species) and also the structure of the development regions, in Table 7 this situation is analyzed and the following result:

Table 7. Structure of the number of organically bred animals per agricultural holding, within the development regions of Romania.

Development region	Cattle		Sheep and goats		Pigs		Poultry	
	number of animals/ holding	% in regard to the average at national level	number of animals/ holding	% in regard to the average at national level	number of animals/ holding	% in regard to the average at national level	number of animals/ holding	% in regard to the average at national level
TOTAL (average at national level)	6.78	100	122.27	100	2.59	100	31.59	100
North-West	9.73	143.51	203.09	166.09	4.58	176.83	17.25	54.60
Center	25.41	374.77	224.04	183.23	3.25	125.48	14	44.31
North-East	5.41	79.79	16.90	13.82	1.76	67.95367	12.67	40.10
South- East	36.66	540.70	53	43.34	-	-	18.33	58.02
Ilfov	4.25	62.68	5	4.08	10	386.10	39.8	125.98
South Muntenia	75	1106.19	400	327.14	5.33	205.79	2020.66	6396.51
South-West Oltenia	4	58.99	4.25	3.47	2.36	91.11	118.737	375.86
West	3.5	51.62	204.61	167.34	3.62	139.76	14.89	47.13

Source: General Agricultural Census 2010, Results at regional level, National Institute of Statistics [2]

- for the herbivorous species, the difference is marked both in the number of animals, and also in the development regions. For cattle, the number of animals per holding, in average at national level is of 6.78, an average number which is exceeded by the South Muntenia, South-East, Center and North-West regions (the excess over the national percentage level being of 1.4 to 11.0 times), and for the other regions the percentage level being inferior (between 79.79% and 51.62%). In the case of the sheep and goats, the average number of animals per holding is of 122.27 heads, that record variations between 327.14% for South Muntenia region and 4.08% in Ilfov, according to the term of comparison in the structure of the development regions;

- for the granivorous species, the analysis points out differences specific to the discussed species. For pigs, the average per holding at national level of 2.59 heads is compared to the regional structure, observing significant excesses for the majority of the regions (these being between 386.10% and 125.48%). In the case of poultry, whose average per holding at national level is of 31.49 heads, by the analysis of the regional structure, one observes the existence of some excesses only for South Muntenia, South-West Oltenia and Ilfov regions (the excess being from 63.96 to 1.25 times), the rest of the regions ranging

below the national level.

The issues regarding the animal production capacities in the organic system expressed by the structure of the average number of animals per agricultural holding in regard to the average national level highlight the concentration in certain regions of the center and the south of the country, along with a lower level and variation for the other regions.

CONCLUSIONS

As a result of an analysis of the organic agriculture system, regarding the number of agricultural holdings and vegetal and animal production capacities at national and regional level, the following resulted:

- Methodologically, the synthetic and derivative markers were expressed quantitatively and in percentages, by territorial comparisons (national and development regions) monitoring the physical units and the percentages, by expressing the level of the existing potential, with reference to the structure and its trend.

- One could observe a predominance of the number of holdings whose legal status is subsumed under the individual agricultural holdings and the privately owned businesses. There is an increasing trend of the number of holdings whose utilised agricultural area is in

conversion, situation remarked for the holdings with legal personality.

- The analysis of the total territorial areas of the organic holdings at national level and in the regional structure, one observed that certain differences were maintained, at the same time remarking an increasing trend of the total territorial area and of the areas in conversion.

- What resulted was an increase of the average surface per holding by subsuming under the organic system, a trend that is associated with the noticeable difference that is manifested in the structure of the development regions.

- The structure of the organic holdings for breeding the main animal species (herbivorous and granivorous) is significantly represented in a concentration of the number of these holdings, the levels of over 3/4 din total being subsumed under 2-3 of the development regions.

- The actual number of animals bred in an organic system was analysed in the territorial structure where one could observe the same non-homogeneous situation of the territorial distribution. Within the herbivorous species (cattle, sheep and goats), one observes both a difference in number and in the territorial structure of the regions, and for the granivorous (pigs and poultry) the same differences are manifested, but specific to the territorial distribution in regions.

- Expressed by the structure of the average number of animals per organic agricultural holding in regard to the national average level, one notices a concentration of a higher level in regard to the national one existing in certain regions in the center and the south of the country, and for the other regions the existence of a lower level associated with very noticeable variations of the existing level of the production capacities.

level, Institutul Național de Statistică (National Institute of Statistics)

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DISTANT HYBRIDS IN F₄ (*VITIS VINIFERA* L. X *MUSCADINIA ROTUNDIFOLIA* MICHX.) AND OF CULTIVARS OF *VITIS VINIFERA* L. AND OF CONCERNING THE CONTENT OF SOME BIOCHEMICAL COMPOUNDS

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Abstract

The process of obtaining distant hybrids, as well as any crossing of cultivars of Vitis vinifera L. with representatives of species possessing the necessary qualities (resistance to diseases and pests, low temperature, etc.) may change the spectrum of chemical and biochemical compounds responsible for flavour, colour and taste of grapes, obtained juice and wine. Botanical description of distant hybrids was performed during all phases of the vegetative stages; the organs of the plants were studied from spring, at bud unfolding, until early autumn, at the fall of the leaves. For the determination of diglucoside-3,5-malvidin, the fluorimetric method, for determining the methyl anthranilate, the gas chromatographic method was applied. Based on the analyzes of biochemical constituents of grapes of the distant hybrids: DRX-M4-578; -502; -571; -660; -609; -580; etc., compared to the traditional cultivars „Feteasca albă” and „Rară neagră”, it has been found that these varieties are similar. So, the distant hybrids of grapevine haven't inherited unwanted characters for vines, some of them are strictly limited (diglucoside-3,5-malvidol). These hybrids don't have the specific characteristics of direct production hybrids, characterised by the foxat taste of the grape berries, caused by the presence of the methyl anthranilate. The distant hybrids studied according to the classical uvologic and technological principles can be classified as follows: 5 distant hybrids are attributed to the table vine species and 2 distant hybrids have mixed properties. According to the physical and biochemical indices of the grapes of the studied distant hybrids, their characteristics are similar to European vine species.

Key words: anthocyanin, diglucoside-3,5-malvidin, grape, methyl anthranilate

INTRODUCTION

The process of obtaining distant hybrids, as well as any crossing of cultivars of *Vitis vinifera* L. with representatives of species possessing the necessary qualities (resistance to diseases and pests, low temperature, etc.) may change the spectrum of chemical and biochemical compounds responsible for flavour, colour and taste of grapes, obtained juice and wine [5, 8].

As a result of numerous studies over the years, the most chemicals that are found in different anatomical parts of the vine have been identified. The acids, tannins and pigments are chemicals that determine the taste, aroma and color of berries.

Physicochemical peculiarities of grape berries are varied and depend on the characteristics of the soil, the pedo-climatic conditions of the region, agro technical works undertaken and the time of harvest.

Scientific studies have shown that certain plants, such as grapes, blueberries, pomegranate etc. contain a substance called resveratrol, which determines the plant resistance to various unfavorable environmental factors [4, 12].

It is well known that the concentration of diglucoside-3,5-malvidin (malvin) in the grape juice of the new cultivar of grapevine “Negru de Ialoveni” is about 45 mg/dm³ - 60 mg/dm³, exceeding the allowable limit in the European Union – 15 mg/dm³, almost 3-4

times. Recently the international Organisation of Vine and Wine discussed the issue of reducing this index in wines at the limit of 5 mg/dm³, which requires to be monitored in distant hybridization selection in order to try and approve only the varieties with low content of phenolic compound diglucoside-3,5-malvidin.

Another important component of grape juice of hybrids of any type, including the distant ones, is methyl anthranilate (3,4-benzoxazole), which has the main role in the creation of taste and smell (flavour) of foxate (of naphthalene or/and phenol) [9, 17, 13].

Methyl anthranilate is a nitrogen compound from the group of benzoxazoles, it is formed in grapes (especially at direct producing hybrids) in quantities of 0.2 to 3.5 mg/dm³ of juice. It is found in wine in the same concentrations along with another volatile aromatic chemical component - isoamyl acetate [17]. That's why this important chemical constituent of grape juice of new hybrids of intraspecific selection needs to be determined, studied and considered as a criterion for preselection.

As a result of crossing the cultivated vine (*Vitis vinifera* L.), with the set of chromosomes 2n = 38, with the American vine (*Muscadinia rotundifolia* Michx.), with the set of chromosomes 2n = 40, scion-rooted distant hybrids with increased resistance to phylloxera were created, with the diploid set of chromosomes of 2n = 38 [2, 3, 5].

MATERIALS AND METHODS

The grapevine distant hybrids (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) of F4 (DRX-M4-578; -502; -571; -660; -609;-580;-512) and the grapevine cultivars "Feteasca albă", "Rară neagră" and "Negru de Ialoveni" were the object of study [2, 6, 7].

For the quantitative and qualitative determination of diglucoside-3,5-malvidin, the quantitative and qualitative fluorimetric method was applied.

Qualitative determination (identification of diglucozid-3,5-malvidol). In an Erlenmeyer flask, 10 mL of control wine with 15 mg/L of diglucozid-3,5-malvidin, which have been

treated with 1,5 mL of solution of acetic aldehyde, are taken. It is stirred about 20 minutes for combining free SO₂ in wine with acetic aldehyde. In a centrifuge tube with a capacity of 20 mL is introduced 1 mL of wine treated with acetic aldehyde, to which is added a drop of 1 M hydrochloric acid and 1 mL sodium nitrite solution. The tube content is stirred; it is expected for 2-5 minutes the oxidation-reduction reaction of malvin and then 10 mL of ammonia solution are added. Under the same conditions, in another centrifuge tube, we treat 10 mL of the control wine containing 15 mg or 5 mg malvin/litre. It is stirred and then we wait 10 minutes and then centrifuge it.

We decant the clear liquids from the two centrifuge tubes, two calibrated tubes with ground glass stopper. The fluorescence of the analyzed sample of wine compared with the control sample is examined in UV light at 365 nm.

The wine samples which do not give fluorescence or their fluorescence is far below the control wine, are considered as lacking diglucoside-3,5-malvidin. In case of a slightly lower, equal or higher fluorescence in comparison with the control wine, the quantitative determination of diglucoside-3,5-malvidin is necessary [12, 13, 14, 15, 16, 17]. For determining the methyl anthranilate, the gas chromatographic method was applied. Extraction of methyl anthranilate was performed by absorption on a resin of the type Amberlite XAD-2, followed by elution with azeotropic mixture of pentam-dichloromethane solvent (2:1 ratio by volume). The organic extract is half concentration and injected into a chromatography capillary column of fused silica. When leaving the column the terpineols get into the mass spectrometer to be detected. In the chromatography column are injected 2 µL of organic extract obtained from must or wine and 2 µL of each internal standard. The scanning area of the mass spectrometer is between 30 m/z and 300 m/z, at an interval of 1 sec./cycle. The spectrum obtained is compared with that of the internal standards of reference and the terpineols content is calculated. [10, 11, 14, 15, 16, 17].

Distant hybrids of vine (*Vitis vinifera* L. x *M. rotundifolia* Michx.) served as study material. Botanical description of distant hybrids was performed during all phases of the vegetative stages; the organs of the plants were studied from spring, at bud unfolding, until early autumn, at the fall of the leaves. The biomorphological characteristics of the organs were studied at the stages of: - bud unfolding – leaf and shoot growth - blossoming – berries growth - grapes ripening, wood maturing and leaf drop. [1, 2, 3, 4]

RESULTS AND DISCUSSIONS

In the specialized literature (biological, uvological and oenological) is also described another series of substances communicating vegetal or herbaceous flavour: 2-methoxy-3-isobutyl pyrazine and 2-methoxy-3-methylethyl pyrazine, both of the pyrazines group which is formed in grapes. They are found as volatile free forms in the grape juice of hybrids and in the obtained wine.

Their sensory perception threshold is 10 mg/dm³ and at a content of more than 24 mg/dm³ in total they are easily detected by smell.

Furanol with taste and flavour of "strawberry" was also detected in the juice and wine obtained from hybrids. The gustatory perception threshold is high, at the level of 700 mg/dm³. Next to it, another natural chemical compound, namely aminoacetophenone with smell and taste of phenol was detected [9, 10, 11, 13].

But the content of the last constituents from the must and wine of direct producing hybrids and North American grapevine species (*Vitis labrusca*: Concord, Delavar, Izabela etc.) is quite low and it is difficult to assess exactly their influence on the aromatic spectrum of products from grapes (must, juice and wine).

The results of investigations of the harvest of 2014, whose direct aim was to verify whether by obtaining distant hybrids were not transmitted through hereditary trait specific characteristics of varieties of direct producing hybrids, whose index of methyl anthranilate concentration ranged from 0.30 mg/dm³ of juice up to 3.6 mg/dm³ [17].

The data presented in the Table. 1, Fig. 1. show a similarity between the distant hybrids and classic cultivars: at cultivars with green-yellow grapes of distant hybrids, this index attests 0.08 mg/dm³ - 0.17 mg/dm³. These results reveal a similarity of distant hybrids DRX-M4-571; -578; -609; DRX-M3-3-1, at the content of methyl anthranilate, with the classic grapevine cultivar "Fetească albă" of the species *Vitis vinifera* L.

At the new cultivars – the distant hybrids DRX-M4-660 and DRX-M3-3-1 of red-violet colour (like pomegranate), with the content of this biochemical constituent of 0.21 mg/dm³ - 0.24 mg/dm³, is observed a similarity to the classic cultivar "Rară neagră" of the species *Vitis vinifera* L. that has accumulated in fresh juice 0.27 mg/dm³ of methyl anthranilate.

The organoleptic assessments of the quality of grapes of the eight distant hybrids and classic cultivars allowed us to note the absence of the foxate flavour (smell) and taste typical of direct producing hybrids and especially of the North American cultivars of the species *Vitis labrusca* (Concord, Izabela, Noah, Lidia, Delaware, Othelo and others).

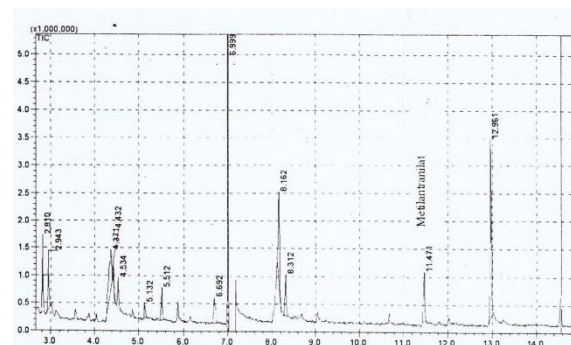


Fig. 1. The content of methyl anthranilate in grape juice of distant hybrids of grapevine *Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.

Only in the intraspecific hybrid "Negru de Ialoveni" from the vine section of the National Institute of Vine and Wine was determined by the same gas chromatography method [17] an increased concentration of methyl anthranilate of 0,49 mg/dm³, which reaches values close to some direct producer hybrids [8].

Another important feature of hybrids of any provenance (intra-, extraspecific selection, etc.) is the concentration of the phenolic compound - anthocyanic diglucoside-3,5-

malvidin, which is strictly limited to wine exports to the markets of the European Union; the limit is of $\leq 15 \text{ mg/dm}^3$ [11, 12].

In this context, they started the determination of this anthocyanic component (colouring in grapes) by a known and widely used method [16] in EU countries.

The results in the table show that this index in the fresh juice of the distant hybrid ranges between 7.7 g/dm^3 - 9.3 g/dm^3 of diglucoside-3,5-malvidin (DRX-M4-660; DRX-M3-3-1), while in the classic cultivar "Rară neagră" (S.A. „Cricova”, v. Lucești, d. Cahul) - only 4.9 mg/dm^3 of diglucoside-3,5-malvidin. (Table 1., Fig. 2.) These results allow us to affirm that according to the index values – diglucosid-3,5-malvidin concentration - the distant hybrids F_4 of cultivars obtained at the Botanical Garden (Institute) of the ASM do not differ substantially at the same index of the classic cultivar "Rară neagră".

The intraspecific hybrid "Negru de Ialoveni" is an exception in the conducted investigations with 74.0 mg/dm^3 of diglucoside-3,5-malvidin in grape juice of this cultivar from the Vine Collection of the National Institute of Vine and Wine.

According to the content of phenolic compounds, including anthocyanins from grape juice of direct hybrids compared with that of classical cultivars of *Vitis vinifera* L.: "Fetească albă" and „Rară neagră”, these varieties do not differ radically, but only within the limits of 184 mg/dm^3 - 260 mg/dm^3 at phenolic compounds in green-yellow grapes: DRX-M4-571; DRX-M4-512 etc. and 1987 mg/dm^3 – 2316 mg/dm^3 at distant hybrids DRX-M3-3-1 and DRX-M4-660 respectively.

The concentration index of anthocyanins in the coloured cultivars does not reveal an essential difference between the distant hybrids and the classic cultivars "Rară neagră": from 513 mg/dm^3 to 640 mg/dm^3 for the distant hybrids of grapevine and a (regular) content of 469 mg/dm^3 at "Rară neagră" from the group *Vitis vinifera* L.

The grape juice of intraspecific hybrids "Negru de Ialoveni" contains high amounts of phenolic compounds of about 2790 mg/dm^3 and anthocyanins of 861 mg/dm^3 , a fact

confirmed by the scientists E.Scorbanov and A.Zemșman in their research carried out in 2001-2003.

Analyzing the features of the distant hybrids of vine (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) in comparison with common species of table grapes, which are characterized primarily by large berries (length, weight, diameter), it has been found that the distant hybrids DRX-M₄-502 and DRX-M₄-578 have medium-sized berries (20 mm.), DRX-M₄-571 and DRX-M₄-640 have berries of 21 mm and DRX-M₄-512 has berries of 22 mm in length (Table 3.).

According to the consistency of the pulp it has been found that the grapes of the distant hybrid DRX-M₃-3-1 can be used both for direct consumption and for industrial processing, the same as the vine species „Chasselas Rose” and “Muscat Hamburg”, which are used for consumption and light wines production.

The distant hybrid DRX-M₄-578 has typical properties of the vine species *Vitis vinifera* L. - berries with a slight floral aroma with savour of quince.

According to the taste and aroma characteristics, the distant hybrids DRX-M₃-3-1; DRX-M₄-502; DRX-M₄-512 etc. can be attributed mainly to the species of table grapes.

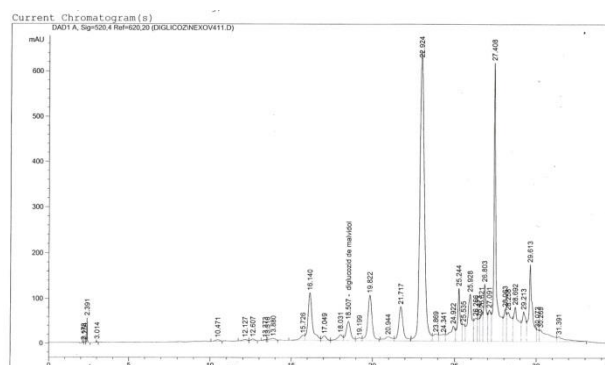


Fig. 2. The methyl diglucoside-3,5-malvidin content in grape juice of distant hybrids of grapevine *Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.

It has been attested that the distant hybrid DRX-M₄-580 has obvious herbaceous nuances, in their structure the flavour of melissa prevails. For this hybrid, an optimal, balanced ratio of acidity, sugars and tannin

substances is characteristic. The distant hybrid DRX- M₄-502 is characterized by the crisp pulp of the berry with pronounced taste features typical for table grapes. The berry juice of most distant hybrids has a pleasant fresh taste (with moderate acidity), and some have a harmonious, sweet, soft taste, (DRX- M₄-609, DRX- M₃-3-1).

Organoleptic assessments of the fresh juice obtained from hybrids created at the Botanical Garden (Institute) of the ASM in comparison with the grape juice of classic varieties “Feteasca albă” and „Rară neagră” from JSC Cricova made during the harvest from 2014 (appreciation of flavour - smell and taste etc.) allowed us to attest a likeness of berries colour, of flavour and taste of the juice extracted from them, with little nuances at each investigated cultivar (Table 1., Fig. 1.).

Table 1. The content of methyl anthranilate, diglucoside-3,5-malvidin in grapes of distant hybrids of grapevine (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.)

Form	The content of the compounds, mg/dm ³		
	methyl anthranilate	Diglucoside-3,5-malvidin	anthocyanins
DRX-M ₄ -578	0.15	-	-
DRX-M ₄ -502	0.08	-	-
DRX-M ₄ -571	0.17	-	-
DRX-M ₄ -660	0.21	7.7	640
DRX-M ₄ -609	0.16	-	-
DRX-M ₄ -580	0.09	-	-
DRX-M ₄ -512	0.13	-	-
DRX-M ₃ -3-1	0.24	9.3	513
Feteasca albă	0.11	-	-
Rară neagră	0.27	4.9	469
Negru de Ialoveni	0.49	74.0	861

At the overall score, the hybrids with green-yellow grapes are gustatory-olfactory distinguished: DRX-M₄-609 with 9.5 points and DRX-M₄-502 with 9.0 points. Among those with red-purple grapes (like pomegranate), the hybrid DRX-M₃-3-1 stood out with 9.3 points.

Obviously, the representatives of the species *Vitis vinifera* L.: “Feteasca albă” and „Rară neagră” scored 9.9 points and 9.8 points, respectively, which fall within their traditional and typical values.

The intraspecific variety “Negru de Ialoveni” did not exceed the score of 8.9 points, being too tannic in taste and practically neutral in flavour.

Table 2. Organoleptic features distant hybrids of grapevine (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.)

Form	Colour of grapes	Organoleptic features		
		Aroma	Taste	points
DRX-M ₄ -578	Green-yellow	Floral	White fruits	8.9
DRX-M ₄ -502	Green-yellow	White fruits	Summer apple	9.0
DRX-M ₄ -571	Green-yellow	Floral	White sweet cherries	8.7
DRX-M ₄ -660	Red-violet	Red fruits	Early plums	9.1
DRX-M ₄ -609	Green-yellow	Neutral, light floral	Fruity	8.5
DRX-M ₄ -580	Green-yellow	Wild flowers	Aronia, currant	9.5
DRX-M ₄ -512	Green-yellow	Neutral, light floral	Quince, white fruits	8.8
DRX-M ₃ -3-1	Red-violet	Blackthorn flowers	Early plums	9.3
Feteasca albă	Green-yellow	Wild flowers	Harmonious	9.9
Rară neagră	Red-violet	Black fruits	Rich, red fruits	9.8
Negru de Ialoveni	Red-violet	Neutral	Incense, red fruits	8.9

Table 3. Biomorphological features of distant hybrids of grapevine (*V. vinifera* L. x *M. rotundifolia* Michx.)

Form	Bunch of grapes		Grape	Seed		
	Length (cm.)	Compact.	Size (mm)	Number	Length (mm)	Weight (mg)
DRX-M ₄ -578	17	130	20.0	1-2	7.0	50.0
DRX-M ₄ -502	12	70	20.0	1-2	6.0-7.0	40.0
DRX-M ₄ -571	17	130	21.0	1-2	6.0-7.0	50.0
DRX-M ₄ -660	20-25	130-150	21.0	1-2	5.0-6.0	50.0
DRX-M ₄ -609	16	100	19.0	1-2	6.0	40.0
DRX-M ₄ -580	15	90	17.0	1-2	7.0	40.0
DRX-M ₄ -512	14	90	22.0	1-2	7.0	55.0
DRX-M ₃ -3-1	10	70	10.0	1-2	4.0	40.0

As for the biochemical and physicochemical indicators, according to the concentration of organic acids (tartaric and malic acid) all distant hybrids can be attributed to European vine species *Vitis vinifera* L., the tartaric acid varying in the range of 3.2 g /dm³ up to 4.7 g/dm³ and malic acid varying from 1.9 g/dm³ up to 3.1 g/dm³ (Table 4.).

Table 4. Acidity

Hybrid	Titrateable acidity, g/dm ³	pH	Tartaric acid, g/dm ³	Malic acid, g/dm ³
DRX-M ₃ -3-1	5.5	3.6	4.7	2.9
DRX-M ₄ -502	6.0	3.5	3.7	2.4
DRX-M ₄ -512	6.8	3.1	4.1	3.1
DRX-M ₄ -571	6.6	2.9	4.1	2.7
DRX-M ₄ -578	6.1	3.3	3.2	2.1
DRX-M ₄ -580	6.2	3.1	4.3	2.4
DRX-M ₄ -609	5.9	3.4	3.7	1.9
DRX-M ₄ -640	6.4	3.0	4.5	2.9

The glucose and fructose concentration constitute on average 95.5 - 99.3% of the total concentration of sugars (100%).

The glucose / fructose ratio is typical for European vine varieties, varying in the range of 1.04 - 1.17 (Table 5.).

Table 5. Sugars

Hybrid	Sugars, g/dm ³	Glucose, g/dm ³	Fructose, g/dm ³
DRX-M ₃ -3-1	166	84.2	80.5
DRX-M ₄ -502	163	85.5	74.1
DRX-M ₄ -512	159	82.0	70.3
DRX-M ₄ -571	144	77.1	65.8
DRX-M ₄ -578	158	81.3	69.7
DRX-M ₄ -580	167	84.8	80.7
DRX-M ₄ -609	163	83.7	78.3
DRX-M ₄ -640	151	78.8	70.5

The concentration of phenolic substances denotes the belonging of the obtained distant hybrids to the varieties of table grapes. The amount of these substances in distant hybrids of vine with green-yellow berries varies within the limits from 201 mg/dm³ up to 293 mg/dm³ and for hybrids with berries with a red-violet hue - from 777 mg/dm³ up to 809 mg/dm³ (Table 6.)

Table 6. Chemical properties

Hybrid	Phenolic substances, mg/dm ³	Resveratrol, mg/dm ³	Pectins, mg/dm ³
DRX-M ₃ -3-1	809	8.5	714
DRX-M ₄ -502	292	8.1	580
DRX-M ₄ -512	288	6.6	517
DRX-M ₄ -571	263	5.7	703
DRX-M ₄ -578	274	7.3	647
DRX-M ₄ -580	293	6.8	439
DRX-M ₄ -609	201	7.7	516
DRX-M ₄ -640	777	11.7	697

It is worth mentioning that the resveratrol concentration, as a biological compound for human nutrition, is relatively higher compared to classical vine varieties (4.1 - 5.3 mg/dm³) and it varies at distant hybrids within the limits from 5.7 mg/dm³ to 11.7 mg/dm³ (Table 6.)

According to physical and biochemical indices of the berries of the studied distant hybrids, their characteristics are similar to European vine varieties: the total nitrogen varies within the limits from 563 mg/dm³ until 740 mg/dm³, phosphorus - 179-263 mg/dm³, calcium 107-156 mg/dm³, potassium - 1367-2013 mg/dm³ and magnesium - 103-144 mg/dm³ (Table 7.).

The colour of vine berries is a very stable morphological character. This index has not only a practical significance for winemaking, but is also used as a character of determination and classification of species and varieties of vine. Some grape varieties can be distinguished only by the colour of the berries.

Table 7. Chemical properties

Hybrid	N, mg/dm ³	P, mg/dm ³	Ca, mg/dm ³	K, mg/dm ³	Mg, mg/dm ³
DRX-M ₃ -3-1	563	263	156	2013	109
DRX-M ₄ -502	590	199	117	1710	123
DRX-M ₄ -512	591	240	109	1907	151
DRX-M ₄ -571	621	213	121	1415	103
DRX-M ₄ -578	640	240	131	1800	110
DRX-M ₄ -580	611	179	127	1881	144
DRX-M ₄ -609	583	186	141	1919	119
DRX-M ₄ -640	740	223	107	1367	127

Analyzing the physicochemical characteristics of the berries of distant hybrids of vine (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.), in comparison with the berry colour, it was found that the concentrations of chemical substances: phenolic substances, resveratrol, pectin etc. vary depending on the colour of berries.

The concentration of phenolic substances in berries of distant hybrids of vine varies depending on their colour: distant hybrids with green-yellow berries contain on average 268.5 mg/dm³ phenolic substances and distant hybrids with red-violet berries contain on average 793 mg/dm³.

The resveratrol concentration also varies from 7.03 mg/dm³ in berries with a green-yellow hue to 10.1 mg/dm³ in berries with a red-violet hue.

The mass concentration of pectins also varies from the 567 mg/dm³ in berries with a green-yellow hue to 705.5 mg/dm³ in berries with a red-violet colour. (Fig.3.)

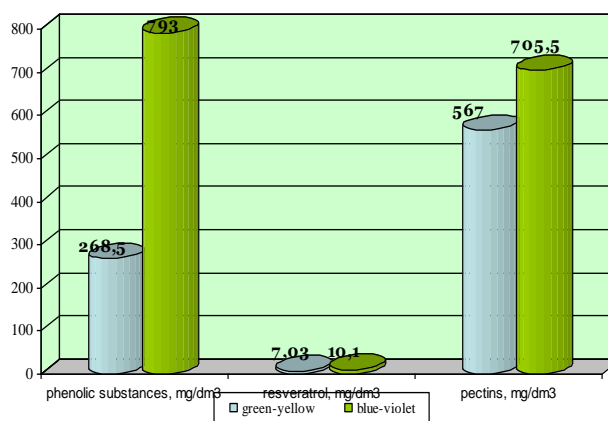


Fig. 3. Physico-chemical peculiarities depending on the color of distant hybrids berries (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.)

Climatic conditions characteristic, the average air temperature for the period from June to August, in Moldova, was higher than normal values with 3.0 to 4.5 ° C and it was +21.7 ...

+24.8 °C.

In June, the average air temperature was higher than normal values with 2.9 - 4.4 °C, and, it was +20.7 ... +24.0 °C.

The average daily air temperature in June reached +29 ... +31 °C on the territory of Republic of Moldova and the maximum air temperature this month reached +37.2 ... +40.1 °C.

July was the warmest month of this year, with a monthly average air temperature of +23.7...+26.7 °C, exceeding the norm with 4.3 - 5.7 °C.

The abnormally warm weather continued in the first 10 days of August. The average air temperature was +24.1...+27.5 °C; so, it was with 4.1 - 5.6 °C higher than the normal temperature at this time.

In the summer, the maximum soil surface temperature reached the value of 71 °C. The number of days with the maximum air temperature of +30 °C and higher in this summer was 39-62 days (while the norm is about 8-27 days). The number of days with temperatures of 35 °C and higher was generally 16-35 days (the norm is about 1-2 days). Values of air temperature of +40 °C and higher were registered on 40% of the country for the first time, the number of days with such values being 1-3 days.

The quantity of rainfall during the summer in the country was basically 70-145 mm (35-70% of the norm). The total number of days without precipitations throughout the season was about 60 days.

Taking into account the weather conditions during June - August 2012, it was established that the most part of the country showed strong and very strong drought. The hydrothermal coefficient for that period averaged 0.5, which corresponds to strong and very strong drought.

In such climatic conditions, mixed vine varieties acquire easily specific characteristics of table grape varieties and acquire less characteristics of the varieties used in industrial processing (they have less juice and berries are crunchy).

In the years with high humidity and moderate temperatures, the opposite phenomena are observed: pulp is less crunchy and is juicier;

the juice is more acidic, with lower carbohydrate concentration [12].

CONCLUSIONS

The distant hybrids of vine (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) are scion-rooted, are resistant to phylloxera; from organoleptic point of view, these hybrids don't have the specific characteristics of direct production hybrids, characterised by the foxat taste of the grape berries (caused by the presence of methyl anthranilate) or herbaceous taste (hexane, hexene, and cis- and trans-derivates).

The distant hybrids of vine (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.), studied according to classical uvologic and technological principles, are classified in the following way: 5 distant hybrids are attributed to the table grapes varieties and 2 distant hybrids possess mixed properties (for current consumption and industrial processing).

From organoleptic point of view, the studied distant hybrids of vine (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) don't possess characteristic features of direct production hybrids, which have a specific taste of foxat (due to the presence of the methyl anthranilate) or herbaceous taste (hexanal, Hexenal, cis-and trans-derivates).

According to the concentration of organic acids (tartaric and malic acid), all distant hybrids can be attributed to European vine species *Vitis vinifera* L., the tartaric acid ranging from 3.2 g/dm³ to 4.7 g/dm³ and the malic acid - from 1.9 to 3.1 g/dm³.

The most distant hybrids have crunchy pulp and the taste of the juice is pleasant, harmonious, fresh (with moderate acidity), sometimes sweet and soft (DRX-M₄-609; DRX-M₃-3-1).

Based on analyzes of biochemical constituents of grapes of distant hybrids DRX-M₄-578; -502; -571; -660; -609; -580; -512; - M₃-3-1 etc. in comparison with the classic cultivars „Feteasca albă” and „Rară neagră” it was found that these cultivars are similar.

The distant hybrids of grapevine *Vitis vinifera* L. x *Muscadinia rotundifolia* Michx. haven't

inherited unwanted characters for vines, some of them are strictly limited (diglucoside-3,5-malvidin).

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STUDY UPON THE SPECIES *IPS TYPOGRAPHUS* L. (COLEOPTERA, CURCULIONIDAE) IN THE RAȘINARI FORESTRY ECOSYSTEM, SIBIU COUNTY

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Abstract

*The disturbance of the equilibrium between the endogenous and exogenous command factors of human origin leads to massive perturbations in the forestry ecosystems affecting all the living beings within the biocenosis and especially the forestry entomologic fauna. Under some circumstances the pest insects from the forestry ecosystem can produce big damages to the trees in the case of maintaining high effectiveness of these and for many years, too. Our study aimed the monitoring the species *Ips typographus* L., a forestry pest, which by its action produces important damages to the spruce fir. The research work ran for two years, during 2012-2013, in the area of Rașinari Forestry District, Sibiu County. The work method was to install at the skirt of the forest the traps with pheromones bait in the researched area. There were collected a number of 4,146 samples of which in 2012 were captured 1,973 individuals and in 2013 were captured 2,173 individuals. There was established a growth of the pest population in the studied biotope, this being the same as at the national level. As a consequence there are imposed further studies in order to find the most proper solutions regarding stopping the dissemination of the insect into new territories and maintaining the density of the population of the pest beyond the economic level of damage.*

Key words: Coleoptera, forestry ecosystem, *Ips typographus*

INTRODUCTION

A high attention upon the evolution of the Romanian forestry ecosystem was firstly drawn by Berca in 2006.

Romania is among the countries with a medium degree of covering, namely 26.77% of the total forest surface, being on the 10th place in Europe. As a result of reducing the forestry surface in the last decades, with almost 5 million hectares, today the forestry patrimony of Romania is estimated at a surface of 6,341 thousands hectares from which the forests hold 6,339 thousand hectares [3].

The forest is considered a conglomeration of ecosystems with specific characteristics made up of trees, bushes, herbaceous plants and fauna. The trees that are the main factor of the trophic and dynamic forestry ecosystem are continuously under the action of the endogen factors (such as physical and chemical elements of the system, biotic components) and exogenous command factors of atropic

origin [1]. The atropic factors are as follows: the weather changes (high or low temperatures, diminution of the ozone stratum due to pollution); the modification of the ecosystem through excessive clearing, intensive agriculture, urbanizing, fires, excessive use of pesticides, especially insecticides against the forestry pests and last but not least the apparition of “new pest species” and the “secondary pests” [5,17].

The deregulation of the equilibriums among these factors leads to massive perturbations in the forestry ecosystems having strong influences upon the living beings within the biocenosis and mostly upon the forestry entomologic fauna. This, under certain circumstances, can produce major prejudices upon the trees, in case of maintaining high effectiveness of pests and for many years, too. The forestry entomologic fauna can attack diverse parts of the trees: leaves, fruits, roots, bark, the wood and seeds. The insects attacking leaves belong to the orders *Lepidoptera* [6, 10, 14, 16], *Coleoptera* [1, 2]

and *Hymenoptera* [9]. There are numerous insects that attack both the resinous and leafy trees. The main category of pests in the leafy forests in Romania is represented by the species belonging to the order *Lepidoptera* with the classical example of the species *Limantria dispar* L. (the hairy caterpillar of the oak) [11,15]. The insects that attack the wood (xylophages) produce galleries in the wood or between the bark and the wood. They belong to the orders *Coleoptera*, *Lepidoptera* and *Diptera*. Among the insects attacking the wood and the bark of the trees is included also the species *Cerambyx cerdo* L. [4] and *Ips typographus* L., species with a stressed secondary character and which make the object of our study.

During the last years the deregulations among the endogen and exogenous command factors from the forestry ecosystems determined that the pest *Ips typographus* L. named also “European spruce bark beetle” to produce major attacks in the spruce fir forests in our country. The insect is considered “a secondary pest” which attacks the trees in a weakly condition. By mass multiplying this can transform into a primary pest and can attack healthy trees producing great damages to the forestry ecosystems. In 2014 in the spruce fir forests in Bistra Valley basin the trap trees presented intensification of the attack, from weak to middle (between 8.6 and 39.8 entries/m² on analyzed bark) [8]. In the Brasov area there were also collected with the help of the pheromones traps a big number of samples of *Ips typographus*: in 2009-14,632 samples, in 2010-32,921 samples and in 2011-54,179 samples which affected the wooden part in the quoted ecosystem [7]. In the Retezat National Park the attack of the pest took proportions in 2010. This attacked the spruce fir trees on an area of 1,500 hectares, the infestation comprising 2,000 cubic meters [8]. Important damages have been noticed in the Semenic-Caraș Keys National Park where were eliminated 8,000 cubic meters of wood, the damage being estimated at 3 million lei [9]. In the last two years in the Vișeu area also were cut 100,000 cubic meters of wood presenting attacks of *Ips typographus* [18]. A correct economic management imposes an

advantageous equilibrium between the necessary expenses and the expected benefits in the forestry ecosystem [12]. The uncertainty or the risk bound to the forestry economic management must come into discussion regarding a durable and sustainable development of the ecosystem [13].

MATERIALS AND METHODS

The researched species in the forestry ecosystem *Ips typographus* (Linnaeus, 1758), which is commonly named “European spruce bark beetle”. Systematically the species belongs to Class: *Insecta*, Order: *Coleoptera*, Suprafamily: *Curculionoidea*, Family: *Curculionidae*, Subfamily: *Scolytinae*.

The adult can have sizes from 3.5 to 5.5 mm, having a brownish black color with yellow hairs. The elytrons have a dark brown color with rows of dots. On the posterior part these present a bevel cant which has four teeth on each part. The third one is bigger and thicker toward the top (Photo 2). The antennas are slightly in a right angle (Photo 1). These together with the legs are yellow. The larvae are white and apodal.



Photo 1.
Ips typographus L.
Antenna slightly in right
angle. (original photo)



Photo 2 *Ips typographus*
L. Elytron's teeth.
(original photo)

The research was done in a spruce fir arboretum round 80 years old in Șanta area, Rașinari Forestry District, Sibiu County, at 1,420 m. altitude.

The forestry fond of the Rașinari Forestry District has 9,962 hectares from which the area occupied by woods 9,891 hectares (7,174 hectares resinous trees, 2,717 hectares leafy trees). The forestry formations were built on the structure of the five basic species (spruce fir, fir tree, beech, evergreen oak and oak), the greatest part being covered by the spruce fir 58%, showing that the spruce fir is at large. The other basic formations are consisting of

beech and evergreen oak. The oak has a symbolic presence (Table 1).

Table 1. The forestry formations of the Raşinari Forestry District

Kinds of wood	Surface (Ha)	(%)
Pure spruce fir areas	4,293.1	56
Mixed spruce fir-fir-beech	281.3	4
Spruce fir-beech	163,0	2
Pure mountain beech	1,799.3	23
Pure hill beech	224.8	3
Pure evergreen oak	673.9	9
Evergreen-beech	184.9	2
Evergreen-oak	69.8	1

Source: <http://www.osrasinarira.ro>

The time during the investigation took place was 2012-2013.

The collecting method of the biologic material was done using the wing type of pheromones traps. The trap is made by two rectangular panels put perpendicularly one over the other. On it there is a lid in a pyramid shape, as a protection against the wind and the sun. In the middle of the joining of the two plastic follies there is made a hole in which is placed the pheromones bait, using Atratyp pheromone. In the inferior part the trap continues with a funnel in a pyramid shape for collecting and conducting the insects in a plastic recipient. This has a lid with a wire net for leaking the water (Photo 3).



Photo 3. Pheromones trap of wing type (original photo)

The pheromones traps were put at the skirts of the forest, the distance among them being of 100 m. There were three traps. Their installing was done at the end of April 2012, 2013. The checking up of the pheromones traps and the collecting of the insects was done one in a three days or weekly function of the weather. The insects shouldn't be left too long in the traps, because they decompose and emanate a bad smell diminishing the one of the

pheromone.

During this period there were collected a number of 4146 adults and they were preserved in alcohol of 60% till they were sorted and identified.

RESULTS AND DISCUSSIONS

Ips typographus is known as the main pest of the spruce fir tree, having a share of 80% from the total of *Scolytinae*, identified in the attack. It attacks trees of 40 years old but mainly those round 60 to 100. In 2012 were captured a total of 1973 samples from 3 pheromones traps (Table 2).

From the data in the table 2 can be noticed that during 2012 the flight of *Ips typographus* began at the beginning of May. The attack of the pest registered maximum values within June for the traps 2 and 3, and regarding the trap 1 the maximum value of the captures was registered in July.

Table 2. The numerical abundance of the species *Ips typographus* L. during 2012

Nr. Trap	Date of installin g the trap	Date of checking the trap/ nr. sample on trap												Total adults/ trap
		May			June			July			August			
		4	7	31	4	7	30	4	7	31	4	18	31	
1	29.04	29	-	87	99	43	98	89	35	98	5	38	21	642
2	29.04	25	-	91	98	59	87	98	49	69	9	41	28	654
3	29.04	63	-	83	99	51	99	99	38	74	4	32	35	677
Total month/year		378			733			649			213			1,973

The collecting in June was bigger because it corresponds to the first flight of the insects, which is considered to be the most active and dangerous. At the beginning of August there was registered a reduction of the number of captures, and at the end of this month the number of coleopterons was reduced significantly. With the help of the trap 1 were collected 642 adults, the trap 2 -654 adults and from trap 3 -677 adults.

In 2013 were captured a number of 2182 adult with 3 pheromones traps placed in the same place like in 2012, respecting the same program of collecting as in the previous year (Table 3).

During the year 2013, with the help of the traps 1 and 2, it was collected a number of 704 sample for each trap and in trap 3 a number of 764 adults.

Table 3. The numerical abundance of the species *Ips typographus* L. during 2013

Nr. Trap	Date of installin g the trap	Date of checking the trap/ nr. sample on trap												Total adults/ trap
		May			June			July			August			
		4	7	31	4	7	30	4	7	31	4	18	31	
1	29.04	31	40	90	98	47	99	91	37	97	9	40	25	704
2	29.04	29	35	87	99	61	90	99	51	70	7	45	31	704
3	29.04	65	71	88	99	56	98	98	40	76	6	38	30	765
Total month/year		536			747			659			231			2,173

The same as during 2012 the biggest values of the captures were in June, respectively in July. The number of captures decreases beginning from August and coincides with the second flight of the insects that is considered a reduced flight.

By a comparison between 2012 and 2013 there can be established a raise of the population of *Ips typographus* in the researched forestry ecosystem.

As a result of the researches done in the field we established the intensification of the attack of this pest species against the spruce fir trees, these being vulnerable due to their age, the arboretum reaching 80 years old. Initially, the attack was headed against the enabled, broken, hurt trees. There was noticed how the attack came down to the tree stem till almost to their base. The growth of the pest in the area can have as an effect into transforming it from a secondary species in a primary one. We can prevent the multiplying of the coleopteron by hygiene, by taking out the attacked wooden materials and by applying a corresponding integrated material against the pest, preventing the attack against the healthy trees.

CONCLUSIONS

The attack produced by *Ips typographus* L. against the spruce fir trees extended in the last years in more areas of the country.

During the period 2012-2013 the study was done in the Raşinari forestry ecosystem, area were the spruce fir tree wood is preponderant.

Noticing and finding out the “European spruce bark beetle ” trees was done during the two years by using the pheromones baits. There were used every time 3 wing type traps placed at the skirts of the wood having 100 m. distance one from each other.

There were captured a number of 4,146 adults

of *Ips typographus* of which 2,173 samples in 2013 and 1,973 samples in 2012.

Because the pest is in extension there should be make more studies permitting to lead to the most proper solutions in order to stop the dissemination of the insect in new territories, maintaining the density of the pest population under the economic damage limit.

Giving the information to the forestry personnel regarding knowing this pest should be a permanent preoccupation using all the means at hand.

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PENSIONS MANAGEMENT IN THE RURAL AREAS

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Abstract

Local boarding houses tourism has found its best expression represented by tourist areas, because the natural landscapes and authentic rural customs already exist and thrive. Rural tourism and tourism business initiation at the hostel comes with solutions for rural development. Moreover, the rural areas represent about 92% of the total area of the country. In this context, the author comes to treat the aspects of tourism activities in rural areas in this article, focusing on practical research in the field. There are described pensions performance factors, complexity of administrator`s functions from pension, the importance of cooperation and the networking in the field and examples of good practice.

Key words: *agripension, guesthouse, rural tourism, tourist, management*

INTRODUCTION

The management and organization of the tourism activity in the rural pensions is the main issue of these businesses, in the context that the rural tourism businesses are small, ran by people who usually don't have travel or tourism management studies.

Therefore, over several years of studying the aspects of rural tourism and rural tourism management we intend to analyze these issues in depth.

Pensions` management can be defined in the Dictionary of tourist terminology as a structural process involving planning, organization, coordination, training and control of material, financial and human resources available to the manager in order to achieve objectives.[6]

Guesthouses in rural areas are basically households organized on the basis of ordinary village houses.[2] Thus, the advantage of initiating rural tourism business involves relatively minimal investment related to the construction of the accommodation place. The house may be old (hence the charm and mystery of rest in the country), but tourists are offering all comforts: bathroom, shower, comfortable furniture equipped bedrooms with free access to court etc.

Rural touristic pension is largely a family business, so the most common legal form is

the individual enterprise, as an example we can mention pensions Hanul lui Hanganu (Hanganu`s Inn), Casa din luncă (House meadow), La nuci (At nuts), Vila roz (Pink villa), Vila verde (Green villa), Casa mierii (House of honey) etc. According to the methodological norms for classification of tourist accommodation structures touristic pension is the tourist accommodation, located in an urban or rural location, for the accommodation of tourists, with a capacity of between 3 and 20 rooms, operating in private homes or in independent buildings, that provides catering. [5] The name of boarding houses/guesthouse and agripensions in rural areas, usually, includes words *house, inn, villa*.

Currently in Moldova, according to official statistics there are about 19 touristic pensions, although the number is much higher, but practice a semi-legal activity or do not correspond to classification of tourist structures. This is also determined by the complexity of opening a hostel (many documents, bureaucratic aspect) and the high cost of opening. If to make a parenthesis, for example, note that in Poland to start business in rural tourism are required only IDs of family members and veterinary certificates proving that animals from pension are healthy. In this context, we suggest revising and simplifying the initiation of rural tourism

business procedure.

In different rural touristic pensions and agripensions, the owners have at least one agricultural activity, like animal husbandry, cultivation of different types of plants, orchards, vineyards, or production of handicraft articles. This kind of activity must take place continuously.

MATERIALS AND METHODS

The purpose of this research aims to analyze the management activity within touristic pensions/agripensions in the Republic of Moldova.

Field research was conducted during the months of June to August 2014, the period of intensive work of rural tourism activities.

Were analyzed five rural tourist pensions and agripensions in the center of the Republic of Moldova. An in-depth study was made in Agripension Butuceni, which is located in the village with the same name - Butuceni - Orhei. The study focused on observation and interview as direct research methods, as well as detailed analysis of documents and statistical data sources as secondary data collection methods, comparison of organizational aspects of tourist pensions in various European countries.

It is also used description as a method of presenting pensions.

We have analyzed the websites of these hostels, guest book, suggested menus to tourists.

Discussions with managers/administrators of investigated pensions provide a first-hand factual material.

For the analysis of economic indicators and performance indicators of Agripension Butuceni were used mathematical and statistical methods.

$N_{in} \max = \text{tourist accommodation capacity in operation} * \text{Nr./day in a given period}$ [1]

where:

N_{in} - the number of overnight stays in a certain period;

Another indicator analysed is the *attendance rate* that reflects the ratio of the number of nights and number of rooms occupied. Usually, the amount is between 1 and 2,

which expresses the average number of customers who are in a room occupied at a given time.

$$I_f = N_{in} / (\text{nr. of rooms} * \text{nr. of days/month}) \quad [2]$$

where:

I_f - the attendance rate;

Net capacity utilization rate of tourist accommodation are:

$$I_n = N_{in} / \text{nr. of rooms} * 100\% \quad [3]$$

The annual *net capacity utilization rate* at Agripension Butuceni is about 20 percent.

Seasonality index indicates the demand for tourism, tourist flows print uneven evolution over time, particularly important effects on the economy, environment and society.

Looking at the number of tourists and backpackers hostel in seasons, it is noted that in recent years, the second and third quarters (April-September), most tourists arrived. This is due to religious holidays (Easter) in this period and annual leave and holidays.

Index expresses the ratio between the average quarterly seasonality and general media, which has a maximum rate (more than 1) in the third quarter. Fourth quarter is balanced by its end, when the number of tourists at the end of December increased considerably. The main economic indicators are reflected in the table 3.

The performance of the pension is due to cooperation, partnerships the boarding has extended. It has contracts with travel agencies as the following: International Travel, Tourism Solei, Amadeus Travel, Tatrabis, Aviatur. Other partners include hotels Vila Verde, Europe and Manhattan. Also, a number of private equity firms, which organize various celebrations or business party inside the pension are permanent customers.

In assessing the views of tourists to the services provided by the Agripension Butuceni, author developed a feedback questionnaire, which the tourist is asked to complete it at the end of his stay. By this questionnaire tourist sees that his opinion matters and pension managers strive to provide comfort and leisure to tourists during their stay.

RESULTS AND DISCUSSIONS

In the Republic of Moldova tourist pensions are classified by stars (1-4 stars) and the agripensions - 1-3 stars, [5] compared to other European countries we can be classify them by flowers or daisies: in Romania - from 1 to 5 stars/daisies in Austria starting from 2 daisies, in France accommodation type "meubles" are ranged from 1 to 4 keys, those of "Gites" from 1 to 5 spices, and in region of Flanders (Belgium) from 1-4 clover leaf. [4] Evolution of agripensions in the Republic of Moldova in the last 5 years is modest (table 1), which reflects the fact that this type of business is not too attractive for local entrepreneurs, despite the efforts of authorities to boost the tourism in the rural sector areas, which also recorded in the National Strategy "Tourism 2020". [7]

Table 1. Tourists accommodated in collective tourist accommodation establishments (pensions and agripensions, *people*)

	2009	2010	2011	2012	2013
Total pensions and agripensions	15	13	15	19	19
%, share of pensions in total accommodations	6,02	5,2	6,07	7,3	7,1
Total places	913	743	813	905	867
%, share of accommodation fund of pensions	3,21	2,62	2,95	3,2	3,0
Tourists checked in pensions	12346	13290	11701	11570	11526
%, share of checked people	5,41	5,78	4,71	4,31	4,24
Net capacity utilization rate,%	19	18,9	15,7	16,6	15,7

Source: prepared by the author based on National Bureau of Statistics

Touristic pensions administration. The management of this activity usually involves both spouses, that hold all business responsibilities (for example, guesthouses *Vila verde, Casa din luncă, La nuci, Hanul lui Hanganu*). In this activity a person can have multiple functions. The tourist pension manager activity is quite complex, and more difficult than activity of a simple hotel manager, because it is responsible for reception, kitchen and promotion (for example, the manager of *Agripension*

Butuceni. He must be well informed, know all legislative changes in this domain and take account of sustainable tourism component.

At the same time, the owner of the guesthouse, which can be its manager, depending on needs, can take part-time staff being trained inside the pension or with studies in related areas: culinary, business, customer relations, handicrafts etc.

Owners/managers of rural touristic pensions should have a number of personal and professional skills. Among the personal skills we can mention:

- Spirit of initiative;
- Imagination and creativity;
- Promptitude in implementing the ideas and receptivity to proposals that are received from tourists (often tourists are generators of "free ideas");
- Esthetic spirit;
- Decisional capacity;
- Care for hygiene (he must take care of his look, especially when he hosts visitors, even if he is in process of preparing tables or other chores) etc. [1]

Most rural pensions in Moldova work 120 days per year: the months June-August, Easter holidays, winter holidays or during holidays like Great Sunday, Sănzienile, Folk Song Festival etc.

Specialization and differentiation strategies.

We mentioned that rural tourism businesses are usually small business of accommodation up to 20-40 seats and a little more for serving dinner, so that`s the reason why enlargement is not the best option. Each household has something specific to offer to tourists, and it should be noted and made it so that the tourist can feel this. The tourist knows that if at *Casa părintească* (Palanca, Călărași) he finds a menu (sărbușcă - kind of soup, sarmale (cabbage rolls), baked traditional pies, mainly peppermint pies, the herbage tea from "biblical garden" of housewife, gem), then at the guesthouse *Casa din luncă* (Trebujeni, Orhei) he will be served with a rustic lunch (soup, omelet, salad, wine). Some tourist pensions do not have a set menu, which is offered at the tourist`s request.

A pension has its own style, taking into the consideration the customs, traditions or

specifics of rural villages. Pension's administrator may adopt one of two styles: the manor manorial or traditional style. One of the original ideas of tourist accommodation is accommodation "bașcă" (Hanul lui Hanganu), a sort of cellar or basement adapted and equipped for tourist accommodation.



Fig. 1. Bașca in pension *Hanul lui Hanganu*

The objects of touristic interest should have a "history" or a "legend". In the households we can find things with great cultural value, which present interest for tourists (for example, a traditional blouse (ie) dating from the early twentieth century, a photograph of the village over a hundred years old, agricultural items, towels, articles of furniture: bed (sovcă), chest, a traditional box (sunduc), portraits, icons, etc.), so owners need to know the history and legend of these things. At the same time, they must combine the traditions and customs with the village history or touristic objectives. The owner/manager of the guesthouse *Casa părintească* offers tourists local history lessons promoting national culture and customs among Moldovan tourists.

The originality of each pension is created with imagination of the pension's owners or employees and every detail counts and influences customer's loyalty. The customer does not forget the pension where he was served at a high level or from which he received a gift or which makes him want to return back. For example, at the guesthouse *Vila Roz* foreign tourists will return in the coming years because they planted roses (in the same context in spring they could plant trees or shrubs under the motto "A tree for continuance"). At the *Agripension Butuceni*

tourists baked bread or picked grapes to make wine.

It matters how tourist is welcomed, if at a hotel they give you the keys, at a tourist pension, they may propose a glass of water, wine, a pie or traditional bread and salt.

Organization of rural touristic pensions. Because they directly deal with receiving guests and their program throughout their stay, the hosts are basically "linked" to the house, and in their absence it is handled by other family members or people trained. [3] All activities must be coordinated in time for the tourists not to be intimidated or wait for the cleaning of the accommodation or meal preparation. The main activities of householders should not interfere with tourists, and the animals and birds around the house should be housed in special detours away from home. Rooms and sanitary facilities for tourists should be made exclusively available to them. Inside the accommodations shouldn't be allowed personal belongings of the hosts.

Performance of pensions often are reached in time, but on the way to perfection can be committed many errors in the administration of rural pensions. Although in training programs for pension's administrator are proposed more tips on issues to be avoided, however they still persist.

Performance indicators of Agripension Butuceni. The *Agripension's* mission is to develop and promote rural tourism and meet the quality needs and customer requirements. The managers of the boarding-house set the goal that everybody who passes the threshold of the house could feel like at mother's home. The recollection of "lejanca" (kind of bed) stories where you can "seem to hear again the sweet voice of our grandparents spinning the fairy-tales about Făt-Frumos and Ileana Cosânzeana", the smell of hot food just taken out of the oven, the atmosphere of the medieval village where the traditions of our people are still alive, a glass of wine which keeps the sweet of sunrays, the hospitality of hosts – everything will be offered at our boarding-house.

Accommodation capacity of *Agripension Butuceni* is 17 rooms (38 accommodation

places). Ascension of the tourist flow was noticed in the last two years, when occupancy in June-August weekends reached 100%. Also, there is an annual increase in occupancy in the period 2012-2014 by 5% annually, the employment rate reached 60%. The pension is visited daily average of about 30 tourists, backpackers, and in 2013 the number of tourists reached 15 thousand people.

Although the number of tourists is growing, the share of foreigners in the total number of tourists has decreased in the last 3 years by 20 %.

Table 2. Proportion of foreign tourists in the total number of tourists at the Agripension Butuceni, %

Period, years	Foreign tourists	Domestic tourists/vizitors
2012	70	30%
2013	63	37%
2014	48	52%

The 2014 summer period was characterized by a large flow of domestic tourists, tourists prefer resting in a quiet environment, with a short stay. Foreigners choose short stays (1-2 days) or weekend, which due to the hospitality of the hosts, scenic spots, tranquillity, you can even extend up to 7 days. For most tourists Agripension -Butuceni is a transit stop. Initial uncertainty, fear of the unknown makes foreigners more reserved, so with obtaining safety and quality of services and abundant cuisine, length of stay tends to increase. At the same time during your stay, in our opinion, is thwarted also by high prices. A tourist spends an average day at the pension 1000 lei (about 55 euro) for a week and this amount may rise to 400 euros, which would exceed a Romanian or Bulgarian seaside holiday. Although prices are justified by the cost and quality of service, they shorten the tourist season.

The contingent of foreign tourists at the Agripension analysed in the period 2012-2014 is inhomogeneous. Once home to a top downwards they come from: Romania, Ukraine, the Netherlands, Bulgaria, France, Poland, Croatia, Switzerland, Belgium, Turkey, Azerbaijan, USA, China, Colombia,

etc. Purpose of travel concerns in principle local community knowledge, traditions, customs, tour of Old Orhei Historical and Cultural Festival annually snacks.

Table 3. The main indicators of Agripension Butuceni, August 2014

Nr.	Indicator	Value
1.	$N_{in\ max}$	1178 overnights
2.	N_{in}	950 overnights
3.	I_f	1.8
4.	I_n	80.6%

The staff of Agripension Butuceni. For proper work and better meet customer requirements as are employed 12 people in states with set hours of work: 1 administrator, 2 Kitchen, 4 help chefs, waiters and staff. Their functions are clearly established, if necessary being accumulated. One of the weaknesses is that only 3 of them have studies in tourism, personnel activity is based more on intuition and experience or self-education. Employees are people from Butuceni and Trebujeni, and other remote areas.

The Agripension Butuceni can provide full board (3 meals) on request. Practice proves that applicants of full board are mainly domestic tourists' connoisseurs of local cuisine. Foreigners opt for lighter and varied menu.

Packages include 2 gourmet lunches and dinners "National" and 2 lunches and dinners "Economy". Lunch "National" fits in the price of 300 lei (15 euros) per / person, and the "Economy" range between 150 and 200 lei (7-10 euros) per / person. Dinner offers a wide range of dishes to choose, the price exceeds 320 lei (16 euro). In this context mention that the prices are considered by tourists as high or exaggerated.

Promoting activity of Agripension Butuceni. Notoriety of Agripension Butuceni has increased in recent years due to quality services, tourist satisfaction or as the maximum says "Any satisfied customer is a carrier of positive information". Accordingly, a satisfied client will attract others, and in return will become a loyal customer.

Promoting television (TV show - Folk fan Asphalt de Moldova, filming of videos, interviews) are effective ways to attract

tourists. Also visit of Agripension by outstanding personalities from various fields increase its attractiveness.

Annual participation in rural tourism exhibitions abroad (Bulgaria 2013, Israel 2014), but also in the country (Exhibition: Tourism, Leisure, Hotels) is a good opportunity to promote the pensions' activities.

Promoting by web page created in three languages: Romanian, Russian, English, offers the possibility to the tourists to discover the Butuceni hospitality, beautiful places, and history of the country as a whole.

In the second table are considered the most notorious websites guesthouses in the area.

At the Agripension Butuceni to tourists are also provided business cards and leaflets information. However, the lack of budget, reduced accommodation capacity concentration of tourist demand in the summer months and excess demand at certain times make the promotion to be sporadic, inconsistent and unprofessional.

Customer retention and dispersed demand throughout the year is one of the concerns of pension's administration that is looking for solutions in this area.

In author's opinion to improve economical and financial indicators of Agripension Butuceni, it is necessary to perform the following:

- Creating a database of tourists;
- Computerized evidence of tourist's activity of agripension;
- Creating a local guide maps for tourists accommodated at the hostel because disperse the accommodation, entertainment, dining, and reception;
- Initiating a guest book and placing it in a visible place, placing comments on the website of agripension;
- Systematization of pension's activities and creating unique concept of pension;
- Evaluation of questionnaires for staying tourists by developing opinions and requesting their completion, in order to determine satisfaction of tourists, but also their grievances, suggestions from them;
- Customer loyalty by keeping constant contact;

- Passporting Old objects from dining room and reception of agripension.

Table 4. The analyse of web sites

The existence of the information sought by tourists boarding site in the countryside	Agropensiunea Butuceni	Casa din luncă, Trebujeni	Hanul lui Hanganu, Lalova	Casa de sub stâncă Trebujeni
<i>Category comfort/receiving unit classification</i>	+	-	-	-
<i>Image gallery, sometimes filming location video</i>	+/-	+/-	+/+	+/-
<i>Details table, menus</i>	+	+	+	+
<i>Prices, payment arrangements agreed (including card types supported)</i>	+/-	+/-	+/-	+/-
<i>Check-in and check-out</i>	+	-	-	-
<i>Visitor comments and discussion forums</i>	-	-	+	-
<i>Contact clear / detailed</i>	+	+	+	+
<i>Information about objectives and tourist attractions, tourist</i>	+	+	+	+
<i>Indication distances from: landmarks, center, train station, close to major cities</i>	Partially	Partially	Partially	Partially
<i>Leisure opportunities</i>	+	+	+	+

Cooperation and partnerships on the rural tourism market. The multiplier effect generated by the rural tourism is one of the indicators of success in rural businesses. Any performance obtained from a pension or guesthouse, a handicraft workshop will lead directly and increase benefits for the local community.

A rural tourism business cannot operate independently without the support of public partners or cooperation with other companies in the area.

One of the major partners in the management of rural tourism business is local government (LG). Additional benefits consist of rebirth local customs and traditions, stimulating local

trade, training people from the community in entrepreneurship, thus tackling the issue of migration and attracting investment and LG can solve the problems related to rural boarding of infrastructure: construction of roads, sewerage, telecommunications networks, protection and preservation of landmarks, the approval of local programs of support and development of rural tourism, for example Tourist Destination Nisporeni-Prut: Tourism Development Plan of Nisporeni (2009-2013); Rehabilitation of Medieval Court Lăpușna for sightseeing.

Other public partners would be organizations managing tourist attractions: museums, nature reserves, churches. In fact, the church has a tradition for centuries to promote rural tourism, as well as hospitality services, so its appearance as an active partner in current affairs is not surprising. Other collaborations would be with diverse as folk craftsmen or groups. For example, the pension's hall may be exposed to various works of painters, sculptors, and other craftsmen in the town which tourists could buy.

In promoting and supporting rural tourism a special role have professional associations. They appear as behavioural adjustment tools and imposing its members' interests in dealings with the State or public organizations, but also the tourism sector regulator in rural areas. Among them we can mention: National Association of Travel Agencies from Moldova (NATA), Association of Tourism Development in Moldova (ADTM), National Association of Rural Ecological and Cultural Tourism (ANTREC).

The opportunities for growth and development of agro tourist pensions only open in the field by creating a network or association. They can provide assistance and advice in the field, improve, diversify, promote local rural tourism product.

CONCLUSIONS

In conclusion, we mention that tourism in rural boarding is a growing trend both at European and national level, and for the success of such business is required good

management, that is not sporadic and inconsistent. Rural tourism can be considered tourism of crisis periods, given the fact that tourists would opt for a holiday in the countryside with less than high mountains or in the context of the owners of pensions revising pricing policy. More and more tourists are interested in historical and cultural sights, this could give rise to rural transit pensions where tourists would stay one night on the way to more remote areas of the country or if they would like to visit several objectives over a period of 1-2 days.

Creating local tourism brand "tourism in the country" would ensure confidence of tourists in such services, and for that we would benefit from the creation of a single logo to designate a rural guesthouse or agripension.

We mentioned earlier that rural tourism is concentrated more in the summer, so we consider it necessary to create a model of "rural tourism year" which would include many forms of tourism dispersed throughout the year.

The Internet has revived the world, so online booking should not lack from the hostels website and pension's managers will ensure this.

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STUDY ON THE LEVEL OF CONFIDENCE THAT ROMANIAN CONSUMERS HAVE REGARDING THE ORGANIC PRODUCTS

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Abstract

Organic agriculture is a domain that is growing rapidly both in Europe or worldwide and in Romania. However, there is a limited number of researches which, by the used methodology, are able to offer a definite and appropriate image of the Romanian market of organic products. In this respect, we considered as relevant to conduct certain market researches which can offer a wide image of the Romanian market of organic products. The present study aimed to briefly present some ideas learned from these researches concerning the level of confidence that the Romanian consumer has in organic products and the way in which the level of confidence may influence the purchasing behavior. Among the most important conclusions, it could be mentioned the low level of confidence that a large number of Romanian consumers has regarding the organic products, the decision to buy organic products is strongly influenced by the confidence expressed by the consumer, as well as the lack of confidence in organic products represents one of the main reasons for not buying it, in some cases being more important than the high price. After a deeper analysis, the final conclusion is that, at least partially, the low level of confidence in organic products is determined by the confusion and the low information level, on one hand, and by some producers' practices that so not seem to comply with the certification community norms.

Key words: confidence, organic, organic certification, Romanian consumer

INTRODUCTION

Organic agriculture is growing rapidly both in the European Union and in Romania. As the certified organic products on the market, the demand has had a continuous increasing direction during the last decade. According to the last report published in 2013 by the International Federation of Organic Agriculture Movements (IFOAM), the widest organization in organic farming [14], the development course of the organic sector is obvious.

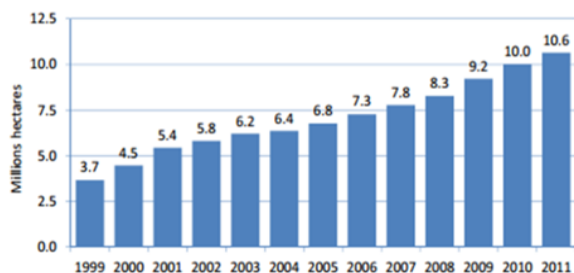


Fig. 1. Europe – Development of organic agricultural land 1999-2011

Source: Lampkin, Nik and FiBL, based on national data sources and EUROSTAT

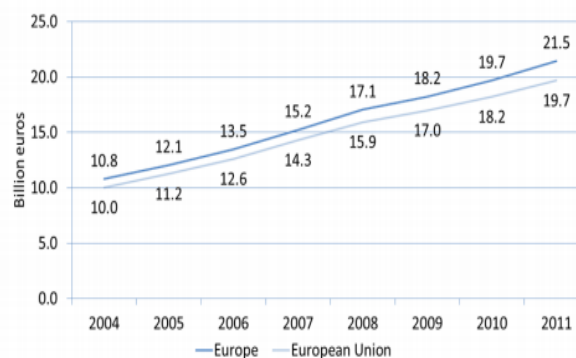


Fig. 2. Europe and European Union: Market development 2004-2011

Source: FiBL-AMI surveys 2006-2013

In Figure 1 it is presented the evolution of the surfaces of organic farming in Europe during 1999-2011.[11] It has a continuous growing direction, in a little more than a decade practically reaching to a triple size of total surfaces for organic farming. The evolution of the surfaces included in organic farming is directly related with the increased market of organic products (Fig. 2).

Considering the 2011-2014 reference interval, the evolution of the market growth rate

registered a faster rhythm than the total of organic farming surfaces, which means that the demand recorded a slight increase than the offer. [11, 12]

The same directions are available for the organic products market in Romania.[3] According to the most recent reports of MARD, the number of producers registered in organic farming increased five times during 2010-2014, while the cultivated areas almost doubled.[15]

According to the IFOAM report, during the year 2011, the market value of organic products in Romania was of about Euro 80 million. (IFOAM-FiBL). [11]

Despite these trends, there is a very limited number of market researches regarding the organic products market in Romania.

In addition, in most of the cases, the methodology used to conduct the researches is not able to provide an overview on the consumption or the consumers of such products.

In a different approach, the food market in Romania is characterized by some certain features which substantially vary from most the EU markets. Two of these features are the large number of producers who are operating in small farms and self-consumption.

Based on these aspects, this study aimed to carry out a market research on the organic products market in Romania. The purpose is to highlight a series of market characteristics regarding consumers, manufacturers and retailers of organic products.

Among the most interesting results are the ones relating to the confidence that the Romanian consumer has regarding the authenticity of the organic products. Confidence is a very important component of the consumer behavior as it represents a motivating factor and it can become, as further demonstrated, the main reason for buying or non buying organic products.

MATERIALS AND METHODS

The study goal is to complete an analysis of the level of confidence that consumers have in organic products or, more precisely, that those products strictly respect the European

certification rules in force. Furthermore, the study aims to clarify the correlations of the level of confidence that exists between the consumer and his/her purchasing behavior and the consumption of organic products.

The study is based on the results of two wider researches carried out during October 2013 and June 2014: a quantitative research among consumers and a quality research among the farmers registered in organic farming in Romania.

The quantitative research was carried out in April-June 2014 and it targeted a focus group of 1,000 people nationally representative for urban areas. It was conducted and concluded with satisfactory accuracy a random sampling, planned according to gender, age group and type residence places. The research was conducted by survey, having as data collection instrument the telephone survey.

The exploratory research was carried out during the period October-December 2013. The method of primary data collection was represented by in-depth semi-directed interview.

The investigated focus group included 15 persons, owners or managers of organic farms. In order to obtain a more comprehensive image, farmers from all geographical areas of the country were interviewed.

Producers of all important farming sectors were also represented: field crop, vegetable farming, animal husbandry, beekeeping, mixed farms.

Another criterion regarding the sampling was the configuration of the landscape where the farmers carry out their activity. Therefore, with approximately equal proportions there are represented the plain, hills and mountain areas. [2]

The statistical analysis of the data was performed using the IBM SPSS Statistics software. For the qualitative research we used the interview content analysis method.

We also consulted and used secondary data sources, especially those from Ministry of Agriculture statistics, as well as the information obtained directly from the Department of Organic Agriculture representatives within the Ministry.

RESULTS AND DISCUSSIONS

First of all we have to mention that, of the total of consumers focus group on the organic products, were asked only those who answered that they knew what organic products were. They represent 83.6% of the population studied, while 13.25 % of respondents answered that they did not know what organic products were, and 3.1% were not sure. (fig. 3)

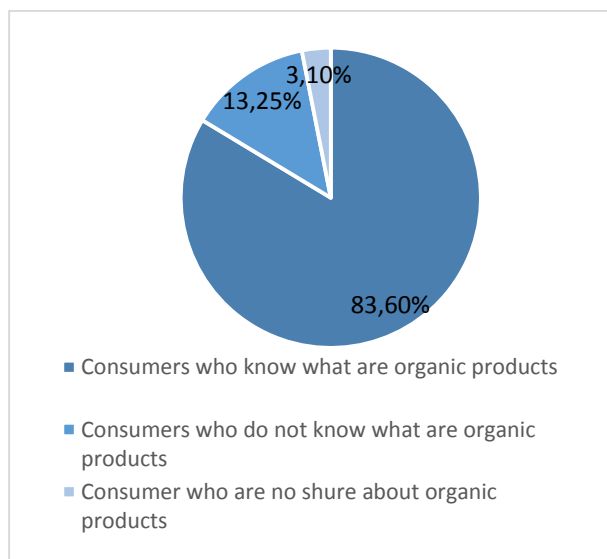


Fig. 3. Responses distribution to the question “Do you know what are organic products?”
Source: Own calculation.

The level of consumers' confidence in conformity of organic products

To verify directly the level of confidence in organic products, the respondents were asked a question: "Do you believe that organic products strictly observe rules of certification? Namely, are they really organic..." The answers were recorded using a semantic differential scale of 5 steps. (fig. 4)

It may be noted that a satisfactory level of confidence (a lot of confidence or enough confidence) was expressed by 19.5% of respondents, while 38% of them said they had pretty little or very little confidence that organic products observe the certification standards.

A special discussion may exist in the case of more than 42% of the respondents who were placed in the middle of the scale.

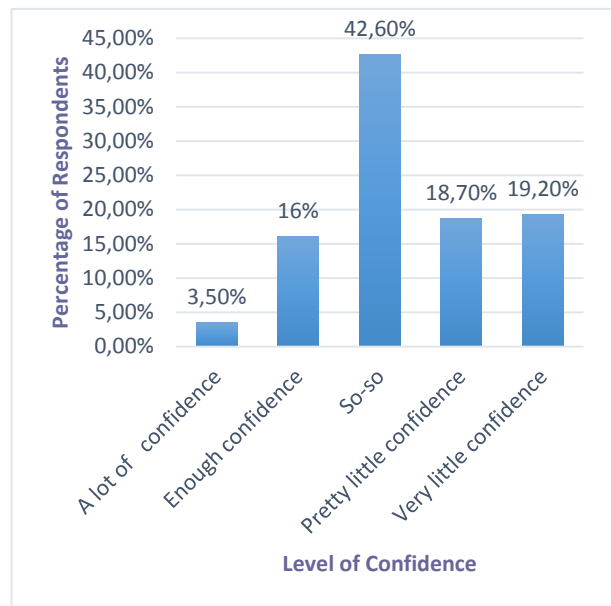


Fig. 4. The respondents' level of confidence regarding organic products
Source: Own calculation.

In the event that the secondary data regarding the consumers of organic products in Romania would have been more detailed and if there were previous representative researches on that matter, so that hypotheses could be formulated, we could have chosen a scale with an even number of steps. In this way we could have determined how many of the nearly half of respondents who were placed in the middle of the scale were likely to confide in than to distrust and how many vice versa. Given the present situation, we believe that the answer „so so" rather indicates an insufficient level of confidence in genuineness of organic products. However, it may be assumed that some of those who answered, there was a percentage of undecided persons and a number of respondents who are merely not interested in that domain, but whose balances cannot be determined in this research. Back to the matter, there was a small percentage of respondents, less than 20%, who stated that had a lot of confidence or enough confidence in the organic products.

Comparing with the European Union level, approximately 70% of the consumers declared that they confided in the organic products.[13] The causes of this situation are more subtle and do not represent the subject of the present study. However, during the research we

identified some clues which could explain the low confidence of the Romanian consumer in organic agriculture. Among them we mention the confusion that many of the respondents made between certified organic products and conventional products without certification, presented as organic, as well as the low level of consumer's information on organic products. To support these statements, among others, the answer to the question "How do you recognise the organic products when buying them?" can be added. We consider eloquent the fact that only 9.1% of the buyers of organic products state the ECO certification/ logo/ label as being the identification element of organic products. In terms of bivariate analysis, there is not any significant connection between the level of confidence in organic products and respondents' gender, age category to which they belong, type of residence place or level of education.

There is a weak connection between the level of confidence in organic products and the information level that the respondents declare that they have on such matter. In order to determine how informed respondents consider themselves on organic products, they were asked to perform a self-evaluation on a scale from 1 to 10. Afterwards, in order to enable the statistical analysis, according to the scales given, we established three categories of respondents: well informed (9-10), averagely informed (5-8) and poorly informed (1-4). The correlation is demonstrated in the way that the persons who answered that were well informed about the organic products tend to have more confidence that those products comply with the certification norms. Thus, 29% of those well informed said that they had a lot of confidence or enough confidence, compared to 18% of those who consider themselves averagely informed and 12% of the poorly informed. On the other hand, regarding those who declared no confidence in organic products certification, there were no significant differences according to the level of information

The way in which the level of confidence influences the buying behavior of organic products

One of the directions undeniably detached from quantitative research is that confidence is the main factor to influence the decision to purchase. More precisely, lack of confidence, or insufficient confidence in organic products expressed by a high percentage of respondents represents, together with the price or the consumption from own products, are some of the main reasons which limit the purchase of organic products.

The questionnaire used for mentioned research comprises a number of open questions, including at least three which are directly related to reasons for buying/ not buying organic products. Such questions were addressed to those who declared that they have not bought organic products so far, and those who buy such products monthly or rarely. After analyzing the content of open questions we were able to categorise the received answers in several generic categories. Buyers of organic products were asked which were the main factors that could increase the frequency of purchase. (Table 1).

Table 1. Main factors that could determine the respondents to buy organic products more often.

	What could determine you to buy organic products more often?	Respondents (%)
1	Lower prices	32.8
2	The safety that the products are organic. More Confidence in farmers	30.1
3	Products availability in shops	10.9

Source: Own calculation.

They unassisted identified elements which could determine them to buy organic products more often. In table 1 it can be observed that, together with the price, the lack of confidence in producers/ the safety that the products meet the rigors of organic farming, represent the main factors which determined the consumers not to buy organic products more often. As a matter of fact, these factors are directly correlated.

Taking into account the fact prices for organic products are significantly higher than those of conventional products [5, 8], the consumer needs a proper motivation to pay more. While superior qualities and benefits associated with

organic products are not questioned by most of the respondents (including those who have never bought such products), the lack of confidence is in the position to reduce or even to cancel a positive motivation associated with intrinsic qualities of organic products. The same discussion is valid also for the category of respondents who have not bought organic products so far. When asked about the main reasons for not buying they answered unassisted and their responses are listed in the following table (Table 2).

Table 2. Main reasons for not buying organic products

	What are the main reasons why you have not bought organic products so far?	Respondents (%)
1	Own production. Family has a farm at the countryside	33.1
2	The lack of confidence	28.9
3	The price is high	23.2

Source: Own calculation.

In this case too, the lack of confidence is the second reason for not buying, in order they mentioned.

Worth noting that the most frequent reason for not buying is determined by particularity of the Romanian market, self-consumption, while for consumers who do not have opportunity to get their own products, lack of confidence is a more frequently reason for not buying than the high prices, generally associated with organic products.

A subcategory of respondents who have not bought organic products yet, but expressed their willingness to buy such products in future, were asked to mention the main factors that might facilitate the purchase (Table 3).

Table 3. Factors that could encourage the buying of organic products among the non-buyers.

	What could determine you to buy organic products in future?	Respondents (%)
1	More confidence. The safety that the products are organic	22
2	Lower prices	19.5
3	A healthier way of life. Other reasons concerning the health	16.3

In this case too, confidence has been identified as the main motivating factor, with a greater balance in the answers comparing to the decrease of prices, which, in previous

researches, was considered to be the most important reason for not buying organic products among the informed consumers. [5, 8].

It may be noted from the data previously presented, that both consumers and non-consumers of organic products, in large numbers, express their lack of confidence regarding the genuineness of these products. For both categories of respondents lack confidence represents a factor that limits or restricts the purchase of organic products. The relationship between the confidence and the decision to buy organic products can be expressed more clearly, and analyzing the correlation between the level of confidence declared by the respondents and the answer to the question “Have you bought organic products so far?” (Fig. 5)

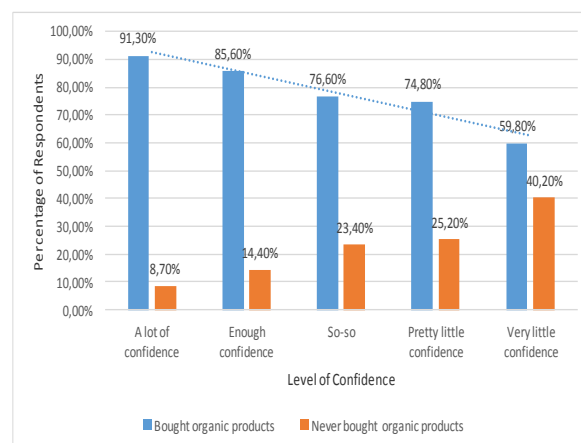


Fig. 5. Consumers/Non Consumers variation depending on confidence level

Source: Own calculation.

It may be noted that between the two categories of answers there is a significant connection, in the meaning that they are inversely proportional.

As the level of confidence in organic products decreases, the percentage of persons who have never bought organic products increases. Interesting to note is the fact that there is no, in case of buyers of organic products, statistically significant connection between the level of confidence and the frequency of purchase, although the respondents who buy frequently organic products seem to have more confidence in their genuineness.

This lack of correlation can be rather

explained by the confusion that many of consumers make between certified organic products and similar conventional products, which they consider as being organic, confusion which influences the analysis results of the primary data.

Confidence in organic products from the perspective of producers and control authorities.

Having as its starting point the low level of confidence expressed by a large percentage of consumers, we considered to necessary to correlate their point of view with the perspective of those involved in the production and the control authorities. Especially, to conduct a brief analysis to see whether the reticence and concerns expressed by consumers regarding the conformity of the organic products have a real basis.

Producers' point of view, as shown in exploratory research by in-depth interview, at declarative level, is normal. Organic products produced in the farms are in full compliance with European certification norms, safe for consumption and of higher quality comparing to conventional products. Although the analysed sample was relatively small, typical of qualitative research, there are some indications that determine us to question the sincerity of some manufacturers. [2]

Precisely, 13% of those surveyed state regarding their competitors that they do not strictly observe the rules of organic farming. It should be noted that they are part of a more developed branch in Romanian organic farming, the production of eggs. Taking advantage of the fact that we were able to contact all leading manufacturers registered at the Ministry of Agriculture regarding the organic eggs production, we conducted a detailed analysis of this sector[1].

Considering the respondents' statements and the visits of production facilities, where we were allowed to visit, we could identify another two aspects that question the conformity of the organic products in this category:

- 2 of 5 producers said they obtained very high productions (percentages of egg laying 87-93% per day), difficult to achieve even for conventional farming systems and totally

unnatural for organic farming. In this situation the conformity of the feed used with rigors of organic farming can be questioned, more precisely the use of chemical or biological synthesis components, which significantly increase production, but are prohibited in organic farming.[6]

- Where we were allowed to visit the production facilities (in 2 cases out of 3 which gave us the permission), the growing system seemed to be rather industrial, closer to conventional agriculture than organic agriculture. Actually, all the equipments were automatic and the birds had at most theoretically access to grazing grass (4 square meters per bird as required by law) in reality, although the weather was favorable, the birds were kept inside farm.[6, 9]

There are some question marks regarding other analyzed branches of organic farming, such as crop production, they are all connected mainly with high levels of production reported by some farmers, basically similar to those of conventional agriculture.[7,10] However, we are able to bring specific scientific arguments, we prefer only to bring them into question.

Although we mentioned the previous aspects, it is imperative for the accuracy of the analysis to mention that this is not a general course, in most of the analysed cases we lack of basis to say that there are suspicions about the respondents' sincerity or the quality of their products.

The perspective of the control and certification authorities is clear: all organic certified products on the market comply with European legislation in force.

Representatives of certification authorities accredited in Romania take advantage of every opportunity (conferences, specific exhibitions, producers meetings) retire their point of view. It cannot be questioned in a scientific research. However we can discuss on this topic, the points of view of governmental organizations in Romania.

In Romania, the organic agriculture is represented by a department within the Ministry of Agriculture and Rural Development.

Although undersized, it deals with solving all

problems of organic agriculture, as well as strategies proposals and implementation of EU strategies regarding the development of the sector.

The representatives of this department provided us with the latest statistics available, and giving us additional information that are not found in these statistics. We consider important and relevant the presentation of some conclusions that emerged from the discussions with the department director of Organic Agriculture Department within MARD. The ideas are directly related to certification authorities, certification and compliance process of organic products and these are presented with the prior consent of the person mentioned.

- In 2013, MARD withdrew the accreditation the two institutions of organic certification on Romanian market, after finding serious and repeated irregularities when performing the control tasks. The economic agents certified by the mentioned authorities were forced to remedy the identified deficiencies and to re-certify to other accredited authorities. A great part of the important operators on the organic products market from Romania were certified by two authorities that had lost accreditation. The certification and control authorities currently accredited do not have enough staff, especially qualified specialists to verify the specific activity of all the economic agent in the portfolio.

- Laboratory analysis of the finished products, with the purpose to identify certain compounds banned in organic agriculture are rarely used.

- Certification and control authorities tend to be very tolerant towards the economic agents that they inspect, the main cause of this fact is represented by the contractual relationship between them (certification and control authorities are financed exclusively from sums collected from the farm operators they verify, charged as certification fees)

- Government authorities have difficulties in monitoring the sector because of the small number of staff.

- Government authorities prefer not to publicise the deficiencies found, to avoid

discrediting a perspective sector, which is just starting out.

In short, we can say that there are some specific reasons that could feed the lack of consumer confidence in organic products. In this study we tried to determine, among other things, if there are some objective factors that may underlie at the low confidence of the Romanian consumer, in organic products. These factors were identified as a result of scientific research and we can not say in any way that any one of them would be widely known. Specifically, we can not categorically say that any irregularities in the process of obtaining organic products identified by us, although real, are among the factors that influence consumer confidence in organic products or its purchasing behavior. All that we can say is, with a very high degree of certainty, that there are significant irregularities.

CONCLUSIONS

Following the researches, it can be concluded that the level of confidence of the Romanian consumer in organic products is quite low.

A relatively small percentage of respondents (under 20%) declare they have enough or very much confidence in this product category, while almost 40% of them say they have little or very little confidence in organic products. By comparison, according to research carried out at EU level, approximately 70% of consumers say they have confidence in organic products.

The lack of trust does not refer to the intrinsic qualities of organic products. The benefits of their consumption and superior qualities to the conventional products are acknowledged and accepted by the majority of respondents, including those who have not so far bought organic products. Instead, consumers have strong reservations about the authenticity of organic products and that if indeed they strictly fulfill the rules of certification in force.

Lack of confidence regarding the conformity of organic products significantly influence consumer buying behavior, in particular the decision to purchase organic products. Both

non buyers of organic products, and those who do buy such products at a lower frequency (the vast majority of buyers, in fact, buy a monthly or occasional) mention in large numbers and unattended, as the main reason for not purchasing, the lack of confidence / insufficient confidence.

Also, following the analysis of primary data, it was unquestionably revealed that the levels of confidence in purchasing / not purchasing organic products are directly correlated. As the level of confidence in organic products declared by the respondents increases, the percentage of those who buy such products increases too.

Analyzing the data obtained from exploratory research among producers and secondary data provided by the Department of Organic Agriculture within MARD, we concluded that there could be a link between the low confidence manifested by the Romanian consumer in organic products and certain objective factors which could affect the quality of these products.

There are elements that can cause us to believe that the production process does not meet in all cases the national standards (and European at the same time) of organic certification. Among these elements we mention very high productivity achieved in some farms we studied or the industrial technological process observed in the case of certain producers. In addition, seem quite unclear the integrity and professionalism shown by some organic certification bodies. As main argument in this direction can highlighted, the withdrawal of accreditation, in 2013, of two major certification and control bodies present on the Romanian market. Although in this study we have identified a number of elements that can question the conformity of some organic products present on the market, we do not have sufficient data to support categorically that any irregularities identified by us, although real, would be among factors that influence consumer confidence in the organic products.

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ECONOMETRIC MODELING OF GDP BY EMPLOYMENT AND THE VALUE OF TANGIBLE FIXED ASSETS

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Abstract

The economic potential of a country is consistently a primary goal of existence and sustainable development, to ensure the livelihood of all residents, increase living standards. To achieve this major goal rigorous study must be complex to formulate a diagnosis and real economic status and rationale, on the basis of economic and legislative policy decisions, decisions addressing both immediate time horizons as well as longer periods of time.

In this context, we analyzed dynamics of GDP according to the dynamics of employment and dynamics of tangible fixed assets of the economy by applying a rigorous econometric modeling methodology.

Key words: economic growth, employed population, GDP, tangible fixed assets.

INTRODUCTION

The importance indicator "Gross Domestic Product" (GDP) to scale both economic potential and economic performance in a space related to a territorial state is well known and this indicator approach financial and economic analysis and econometric presents a reasoned understanding the significance and usefulness conclusions offered to substantiate macroeconomic decisions [3][10]. The definition given to the concept of gross domestic product, states that it is a representative macroeconomic indicator which reflects the sum of the market value of all goods and services for final consumption products in all sectors of the economy within a country within a year.

We can also specify that GDP is the sum of consumption expenditure of households and private non-profit organizations, gross investment spending, state spending, investments for storage and export earnings minus the imports value.

Size and GDP growth are directly influenced by the quantity and quality of use, both employment and tangible fixed assets of the economy. In the context of economic logic says that:

-Employment contribution by its economic performance contributes to the economic outturn GDP sized form;

-Give tangible measure of technical equipment, implementing programs to ensure the investment and development process necessary to develop technological potential economic and defining influence development and GDP growth [4].

The considerations presented can provide the opportunity to support a study likely to bring useful information to base macroeconomic decisions to promote a real economic progress [1].

MATERIALS AND METHODS

GDP growth correlation analysis based on the dynamics of population and the dynamics of tangible fixed assets by applying a methodological support of an econometric nature will be made based on the data presented in Table 1.

The analysis of scatter graph as a form of graphical representation of the interdependence between GDP and employment respectively tangible fixed assets value.(Fig.1.)

Table 1. Dynamics of GDP, employment and the value of tangible assets during 2000-2011

Year	GDP y = SER01 Mil. RON	Employment x ₁ = SER02 Thousands	Value of tangible fixed assets x ₂ = SER03 Mil. RON
2000	80984.6	9334	144978.2
2001	117945.8	9330	217150.6
2002	152017.0	9234	285556.4
2003	197427.6	9223	672244.7
2004	247368.0	9158	552622.2
2005	288954.6	9147	624752.8
2006	344650.6	9313	718629.7
2007	416006.8	9353	915282.8
2008	514700.0	9369	1346619.
2009	501139.4	9243	1483570.
2010	523693.3	9240	1563631.
2011	557348.2	9138	1672434. ¹⁾

Source: www.insse.ro

Figure 1 showed that between ser01 and ser02 was clear geometric outline form while between ser01 and ser03 is estimated with sufficient reason, that there is a linear interdependence, as it increases the value of tangible fixed assets occur an increase of GDP, justifying option to perform calculations in the following three variants:

1. Linear multifactor model:

$$y = a + bx_1 + cx_2;$$

2. Cobb-Douglas multifactor model:

$$y = a \cdot x_1^b \cdot x_2^c$$

3. Linear logarithmic multifactor model:

$$\log y = a + b \log x_1 + c \log x_2$$

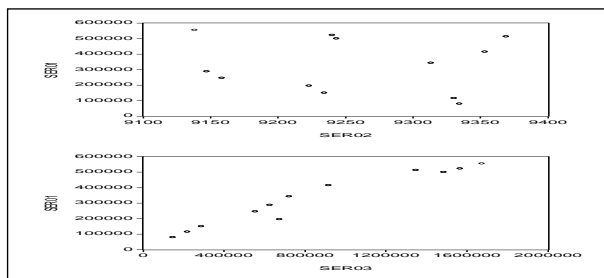


Fig. 1. Interdependence between GDP and employment and GDP and fixed assets

After comparing the results for certification of the three models, is possible to argue, on a statistical basis, the viability of a model for political and economic decisions [8][9].

Calculation of indicators needed to define mathematical model and some graphic illustration of real, estimated or residual variables are structured for each of the four econometric models [2][5][6][7]. To obtain these results we used the software Eviews.

Model 1. Linear multifactor model

Linear multifactor model was prepared by the method of least squares and has the following configuration:

$$\hat{y} = -1459592.0 + 164.5199x_1 + 0.312052x_2$$

Key indicators of econometric representation of this model are exposed in Table 2, plus explanatory tables 3 and 4, and graphic representations of Figure 2 to Figure 4.

Table 2. Synoptic picture of econometric representation indicators for assessing the viability of linear multifactor model of GDP by population and the value of tangible fixed assets

Dependent Variable: SER01 y = GDP			
Method: Least Squares			
Sample: 2000 - 2011; Included observations: 12			
SER01 = C(1)+C(2)*SER02+C(3)*SER03			
$y = a + bx_1 + cx_2 \rightarrow \hat{y} = -1459592.0 + 164.5199x_1 + 0.312052x_2$			
Variable	Coefficient	Std. Error	t-Statistic
SER02 C(2) = „b”	164.5199	160.3575	1.025957
SER03 C(3) = „c”	0.312052	0.024289	12.84721
C(1) = „a”	-1459592.	1488442.	-0.980617
R-squared	0.948862	Mean dependent var	328519.7
Adjusted R-squared	0.937498	S.D. dependent var	171870.6
S.E. of regression: $\pm \hat{\sigma}_{y,\hat{y}}$	42968.26	Akaike info criterion	24.38663
Sum squared resid	1.66E+10	Schwarz criterion	24.50786
Log likelihood	-143.3198	F-statistic	83.49748
Durbin-Watson stat	1.173942	Prob(F-statistic)	0.000002

Table 3. Real and estimated levels of the dependent variable (GDP) by population and the value of tangible fixed assets respectively beach residual term (linear multifactor model)

Obs.	Actual	Fitted	Residual	Residual Plot
				$\pm \hat{\sigma}_{y,\hat{y}} = \pm 42968.26$ $-\hat{\sigma}_{y,\hat{y}} \quad 0 \quad +\hat{\sigma}_{y,\hat{y}}$
2000	80984.6	121278.6	-40293.0	. * . .
2001	117946.0	143141.	-25195.3	. . * . .
2002	152017.0	148693.	3323.69	. . . * .
2003	197428.0	267550.	-70122.7	*
2004	247368.0	219528.	27839.9	. . . * .
2005	288955.0	240227.	48727.7	. . . * .
2006	344651.0	296832.	47819.0	. . . * .
2007	416007.0	364778.	51228.5	. . . * .
2008	514700.0	502010.	12690.2	. . * . .
2009	501139.4	524016.	-22876.7	. . * . .
2010	523693.3	548506.	-24812.4	. . * . .
2011	557348.0	565677.	-8328.66	. . * . .
Total	3942236.6	3942236.6	0	. . * . .

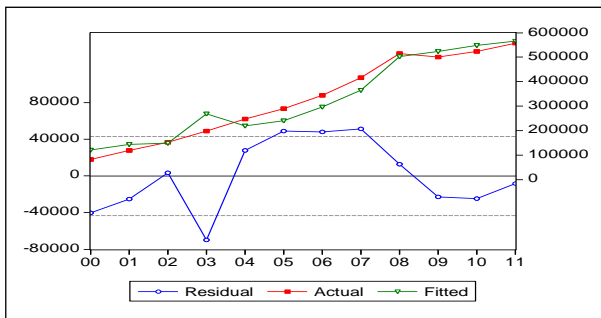


Fig. 2. Graphical representation of residue levels of real (actual) and estimated levels by multiple linear regression equation for the GDP by population and the value of tangible fixed assets (multifactor linear model)

Table 4. Synoptic picture of the results to verify the hypothesis of heteroscedasticity of the residual variable (linear multifactor model)

White Heteroskedasticity Test:				
F-statistic	2.349936	Probability	0.163950	
Obs*R-squared	7.943589	Probability	0.159372	
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 2000 - 2011; Included observations: 12				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.48E+12	5.83E+12	-0.938631	0.3842
SER02	1.16E+09	1.26E+09	0.923618	0.3913
SER02^2	-61824.54	68023.66	-0.908868	0.3985
SER02*SER03	-22.74659	12.25786	-1.855674	0.1129
SER03	223235.7	116611.1	1.914360	0.1041
SER03^2	-0.007309	0.002344	-3.118281	0.0206
R-squared	0.661966	Mean dependent var	1.38E+09	
Adjusted R-squared	0.380270	S.D. dependent var	1.45E+09	
S.E. of regression	1.14E+09	Akaike info criterion	44.86107	
Sum squared resid	7.86E+18	Schwarz criterion	45.10353	
Log likelihood	-263.1664	F-statistic	2.349936	
Durbin-Watson stat	2.946662	Prob (F-statistic)	0.163950	

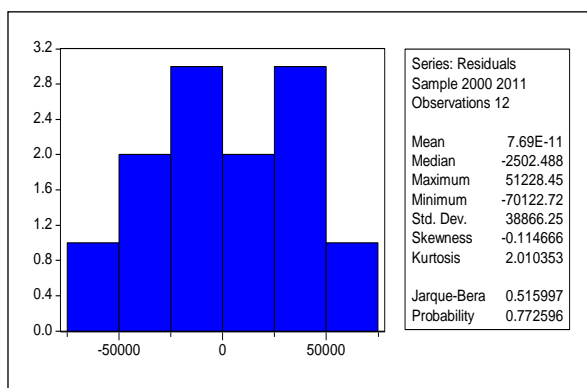


Fig.3. Normality test for distribution of the residual variable based on statistical criteria Jarque-Bera (multifactor linear model)

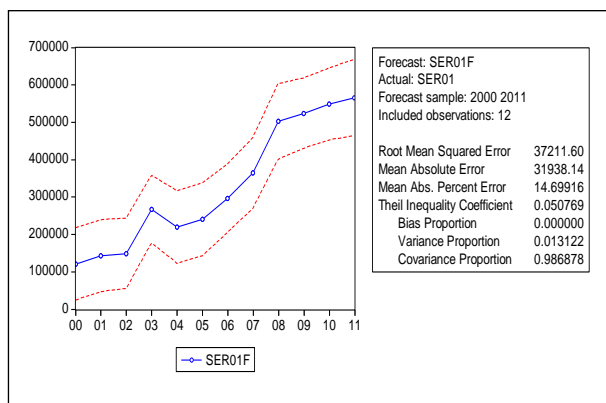


Fig. 4. Graphical representation of estimated level of GDP ($SER02F = \hat{y}$) and limits within ± 2.228 estimation of mean error based on Student repartition law with 5% (linear multifactor model) ($\pm t_{q=0.05; f=n-k=12-2} \cdot \hat{\sigma}_{y, \hat{y}} = \pm 2.228 \cdot 42968.26$)

Model 2. Multifactor Cobb-Douglas model

Cobb-Douglas multifactor model was elaborated using method of least squares and

has the following configuration:

$$\hat{y} = 0.001530 \cdot x_1^{0.990995} \cdot x_2^{0.745461}$$

Key indicators of econometric representation of this model are exposed in Table 5, plus explanatory tables 6 and 7, and graphic representations of Figure 5 and Figure 6.

Table 5. Synoptic picture of econometric representation indicators for assessing the viability of Cobb-Douglas model of GDP by population and the value of tangible fixed assets

Dependent Variable: SER01= y = GDP				
Method: Least Squares				
Sample: 2000 - 2011; Included observations: 12				
Convergence achieved after 500 iterations				
$SER01 = C(1) \cdot SER02^{C(2)} \cdot SER03^{C(3)}$				
$y = a \cdot x_1^b \cdot x_2^c \rightarrow \hat{y} = 0.001530 \cdot x_1^{0.990995} \cdot x_2^{0.745461}$				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1) = „a”	0.001530	0.050030	0.030586	0.9763
C(2) = „b”	0.990995	3.558445	0.278491	0.7869
C(3) = „c”	0.745461	0.069116	10.78564	0.0000
R-squared	0.957255	Mean dependent var	328519.7	
Adjusted R-squared	0.947756	S.D. dependent var	171870.6	
S.E. of regression: $\pm \hat{\sigma}_{y, \hat{y}}$	39284.36	Akaike info criterion	24.20736	
Sum squared resid	1.39E+10	Schwarz criterion	24.32859	
Log likelihood	-142.2442	Durbin-Watson stat	1.428700	

Table 6. Real and estimated levels of the dependent variable (GDP) by population and the value of tangible fixed assets respectively beach residual term (Cobb-Douglas model)

Obs	Actual	Fitted	Residual	Residual Plot
$\pm \hat{\sigma}_{y, \hat{y}} = \pm 39284.36$ $-\hat{\sigma}_{y, \hat{y}} \quad 0 \quad +\hat{\sigma}_{y, \hat{y}}$				
2000	80984.6	92602.7	-11618.1	
2001	117946.	125094.	-7148.14	
2002	152017.	151860.	157.045	
2003	197428.	287157.	-89729.2	*
2004	247368.	246398.	970.020	*
2005	288955.	269673.	19281.3	*
2006	344651.	304720.	39931.1	*
2007	416007.	366485.	49522.3	*
2008	514700.	489550.	25149.9	*
2009	501139.	519190.	-18050.7	*
2010	523693.	539763.	-16069.2	*
2011	557348.	561311.	-3963.04	*

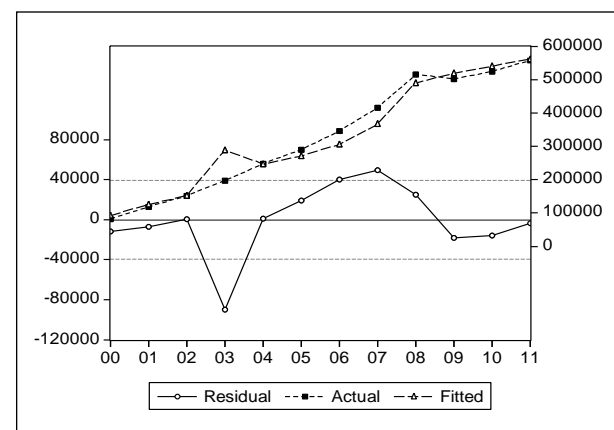


Fig. 5. Graphical representation of residue levels of real (actual) and estimated levels by Cobb-Douglas regression equation for the GDP by population and the value of tangible fixed assets (Cobb-Douglas model)

Table 7. Synoptic picture of the results to verify the hypothesis of heteroscedasticity of the residual variable (Cobb-Douglas model)

White Heteroskedasticity Test:				
F-statistic	1.024963	Probability	0.478462	
Obs*R-squared	5.527983	Probability	0.354887	
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 2000 – 2011; Included observations: 12				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.31E+13	1.16E+13	-1.126655	0.3029
SER02	2.81E+09	2.51E+09	1.117920	0.3064
SER02^2	-150613.0	135761.5	-1.109394	0.3097
SER02*SER03	-26.27037	24.46421	-1.073828	0.3242
SER03	260184.2	232732.3	1.117955	0.3063
SER03^2	-0.009351	0.004678	-1.998876	0.0926
R-squared	0.460665	Mean dependent var	1.16E+09	
Adjusted R-squared	0.011220	S.D. dependent var	2.30E+09	
S.E. of regression	2.28E+09	Akaike info criterion	46.24316	
Sum squared resid	3.13E+19	Schwarz criterion	46.48561	
Log likelihood	-271.4590	F-statistic	1.024963	
Durbin-Watson stat	2.262536	Prob (F-statistic)	0.478462	

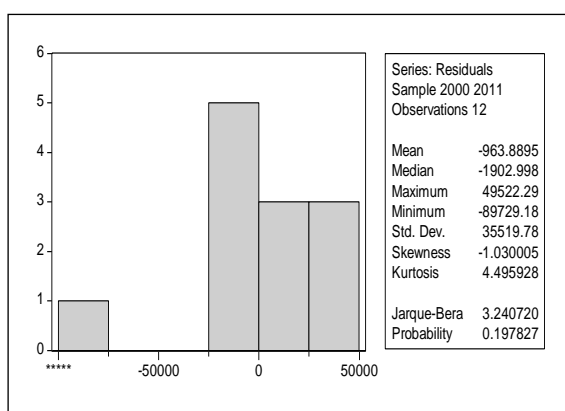


Fig. 6. Normality test for distribution of the residual variable based on statistical criteria Jarque-Bera (Cobb-Douglas model)

Model 3. Linear logarithmic multifactor model

By applying the method of least squares linear multifactor model is formalized through a logarithmic regression equation which has the following configuration:

$$\log \hat{y} = -35.40121 + 4.084655 \log x_1 + 0.793360 \log x_2$$

Key indicators of econometric representation of this model are exposed in Table no.8, plus explanatory tables 9 and 10, as well as the graphical representation of Figure 7 and figure 8. It is noted that the logarithmic multifactor model present some difficulties of comparability with other models due to the logarithmic form of representation of expressed econometric indicators.

In Table 8 are presented variables of studied system in logarithmic form on which we proceeded to determine the representation econometric indicators.

Table 8. Dynamics of GDP, employment and the value of tangible fixed assets during the period 2000-2011 (in logarithmic form)

Obs	SER04 = logser01	SER05 = logser02	SER06 = logser03
2000	11.30201	9.141419	11.88434
2001	11.67798	9.140990	12.28835
2002	11.93175	9.130648	12.56219
2003	12.19313	9.129456	13.41838
2004	12.41863	9.122383	13.22243
2005	12.57402	9.121181	13.34511
2006	12.75029	9.139167	13.48510
2007	12.93846	9.143452	13.72699
2008	13.15134	9.145162	14.11311
2009	13.12464	9.131622	14.20996
2010	13.16866	9.131297	14.26252
2011	13.23095	9.120197	14.32979

Note: Logarithms are calculated with base „e”, (e = 2,718281828)

Table 9. Synoptic picture of econometric representation indicators for assessing the viability of logarithmic model of GDP by population and the value of tangible fixed assets

Dependent Variable: SER04				
Method: Least Squares				
Sample: 2000 – 2011; Included observations: 12				
SER04 = C(1)+C(2)*SER05 + C(3)*SER06				
Log ser01 = C(1)+C(2)*log ser02+C(3)*log ser03				
$\log \hat{y} = a + b \log x_1 + c \log x_2 \rightarrow \log \hat{y} = -35.40121 + 4.084655 \log x_1 + 0.793360 \log x_2$				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
SER02 C(2) = „b”	4.084655	4.910421	0.831834	0.4270
SER03 C(3) = „c”	0.793360	0.054111	14.66183	0.0000
C(1) = „a”	-35.40121	45.02827	-0.786200	0.4520
R-squared	0.961174	Mean dependent var	12.53849	
Adjusted R-squared	0.952546	S.D. dependent var	0.644769	
S.E. of regression:	0.140457	Akaike info criterion	-0.875517	
$\pm \log_e \hat{\sigma}_{y,\hat{y}}$				
Sum squared resid	0.177553	Schwarz criterion	-0.754291	
Log likelihood	8.253105	F-statistic	111.4009	
Durbin-Watson stat	2.072009	Prob (F-statistic)	0.000000	

Table 10. Real and estimated levels of the dependent variable (GDP) by population and the value of tangible fixed assets respectively beach residual term (logarithmic model)

Obs	Actual	Fitted	Residual	Residual Plot $\pm \log_e \hat{\sigma}_{y,\hat{y}} = \pm 0.140457$ $-\log_e \hat{\sigma}_{y,\hat{y}} \quad 0 \quad +\log_e \hat{\sigma}_{y,\hat{y}}$
2000	11.3020	11.3669	-0.06488	. * .
2001	11.6780	11.6857	-0.00768	. * .
2002	11.9317	11.8607	0.07108	. * .
2003	12.1931	12.5351	-0.34194	* . .
2004	12.4186	12.3507	0.06791	. * .
2005	12.5740	12.4431	0.13088	. *
2006	12.7503	12.6277	0.12262	. * .
2007	12.9385	12.8371	0.10138	. * .
2008	13.1513	13.1504	0.00094	. * .
2009	13.1246	13.1719	-0.04729	. * .
2010	13.1687	13.2123	-0.04364	. * .
2011	13.2309	13.2203	0.01062	. * .

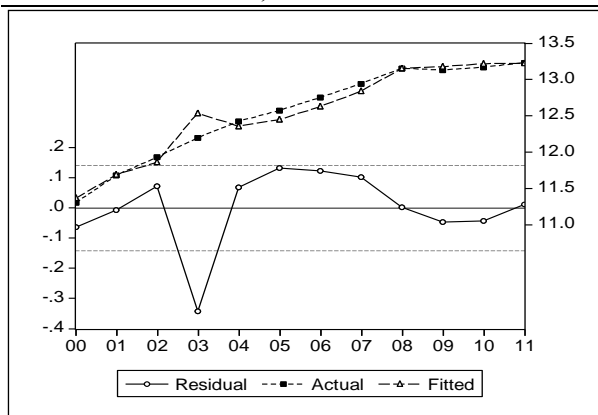


Fig. 7. Graphical representation of residue levels of real (actual) and estimated levels by logarithmic regression equation for the GDP by population and the value of tangible fixed assets (logarithmic model)

Table 11. Synoptic picture of the results to verify the hypothesis of heteroscedasticity of the residual variable (logarithmic model)

White Heteroskedasticity Test:				
F-statistic	0.532996	Probability	0.716554	
Obs*R-squared	2.801562	Probability	0.591563	
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 2000 – 2011; Included observations: 12				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-249.9121	384.5148	-0.649942	0.5365
SER02	26.61431	41.62250	0.639421	0.5429
SER02*SER03	-1.958150	3.036022	-0.644972	0.5395
SER03	18.92095	28.38059	0.666686	0.5263
SER03^2	-0.039092	0.030833	-1.267845	0.2454
R-squared	0.233464	Mean dependent var	0.014796	
Adjusted R-squared	-0.204557	S.D. dependent var	0.032672	
S.E. of regression	0.035859	Akaike info criterion	-3.524119	
Sum squared resid	0.009001	Schwarz criterion	-3.322074	
Log likelihood	26.14471	F-statistic	0.532996	
Durbin-Watson stat	2.389049	Prob (F-statistic)	0.716554	

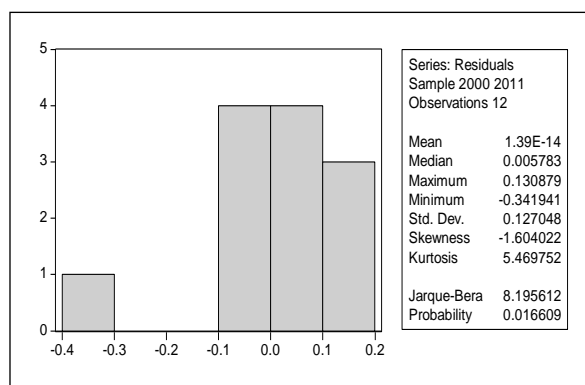


Fig. 8. Normality test for distribution of the residual variable based on statistical criteria Jarque-Bera (logarithmic model)

RESULTS AND DISCUSSIONS

After processing statistics for the variables considered to form an interdependent system, GDP, employment and the value of tangible fixed assets, were obtained the results listed in Table 2 for Model 1, in Table 6 for model 2

and in Table 11 for model 3.

Interpretation of the results refer to indicators representing econometric on which it is estimated that certification of the quality and durability of the three designs which are exposed to a comparative form in Table 12 [11].

Table 12. Table of comparative synthetic viability results of three models

Econometric indicators	Model 1	Model 2	Model 3
Mathematic formula of model	Linear multifactor $\hat{y} = -145959.20 + 0.001530 \cdot x_1 + 164.5199x_2 + 0.312052x_2^2$	Cobb-Douglas $\hat{y} = 0.001530 \cdot x_1^{0.990995} \cdot x_2^{0.745461}$	logarithmic $\log \hat{y} = -35.40121 + 4.084655 \log x_1 + 0.793360 \log x_2$
R-squared	0.948862	0.957255	0.961174
R-raportul de corelație	0.974095	0.978394	0.980395
S.E. of regression: absolute	42968.26	39284.36	(log _e) 0.140457
relative (%)	13.08%	11.96%	1.12%
Durbin-Watson stat	1.173942	1.428700	2.072009
D-W (q=0.05): 1.54<DW<4-1.54 (q=0.01): 1.25<DW<4-1.25			
Jarque – Bera	0.515997	3.240720	8.195612
Probability	0.772596	0.197827	0.016609
Heteroskedasticity Test	homoscedasticity	homoscedasticity	Homoscedasticity
Akaike info criterion	24.38663	24.20736	(log _e) -0.875517
Schwarz criterion	24.50786	24.32859	(log _e) -0.754291
F-statistic	83.49748		111.4009
Prob (F-statistic)	0.000002		0.000000

Interpretation of results in Table 15, and a summary in the other tables and graphical presentations allowed drawing the following conclusions.

CONCLUSIONS

The ratio of the correlation between the size of 0.974095 and 0.980395, confirming the existence of a strong correlation between the variables studied system in all three variants of econometric models. This finding is supported in graphical form of fig. 2, 4 and 5; Multiple determination coefficients (R - squared) shows that over 95% of GDP change is determined by the change of employment and that value of tangible fixed assets. The difference from 100% is the relative size of the influence of other factors that were not included in the models;

Based on the information defined by the size ratio of the correlation can be established the following order of viability of three models: the first is positioned the logarithmic linear multifactor model followed by the Cobb-Douglas model and finally multifactor linear

model. It is noted, however, that the differences are not significant in these circumstances the light of this criterion, the three models are considered equivalent. The criterion F (Fisher distribution) confirmed that all three models, ratio of correlation is significantly different from zero;

The variable x_2 , the value of fixed assets is certified in statistical terms as significant in all three econometric models. This variable is associated with a regression coefficient that is affected by a very low estimate of the standard error and that the criterion t (Law Student distribution) is significantly different from zero for a significance level of less than 5%. This finding warrants priority to act by applying economic policy measures to increase more sustained value tangible fixed assets through investment;

Linear multifactor model dimensioning an estimate of 0.312052 GDP change if variable x_2 (the value of tangible fixed assets) is amended with a monetary unit with the restriction to remain at a constant level of variable x_1 (number of employees)

In the context of the models developed, the variable x_1 (employment) and the regression coefficient that is assigned, do not have a conclusive significance in statistical terms, based on testing which is subjected by the criterion t;

Estimate the standard error of the regression equation has the minimum value, both in absolute and relative, in the case of the Cobb - Douglas, which can be a criterion for assessing the viability of this model;

Durbin -Watson statistic criterion confirms the absence of the phenomenon of autocorrelation values of the error term in the Durbin -Watson distribution with 5% significance threshold, only logarithmic linear multifactor model, but for a significance level of 1% is considers that the residual variable is not auto-correlated for the Cobb -Douglas model. Models that do not meet the non-auto-correlated residual values can affect the correct interpretation of following econometric indicators:

-Estimate the standard deviation of the equation is less than the actual value and therefore the coefficient of determination and

correlation report that are oversized. In these conditions the intensity of the interdependence of the variables of the system is higher than in reality;

-Criterion t used to test the significance of the parameters estimated values of the regression equation is not conclusive. In this case the t - statistic values are overstated , which would better confirm the significance of the parameters;

The distribution of the residual variable in the criterion Jarque-Bera is known, statistically speaking, that does not differ significantly from the normal distribution for linear multifactor models, because in these cases the corresponding probability is over threshold 60% accepted. Where not confirming the hypothesis of normality of the distribution of the error term, the quality parameters of the regression equation to be of maximum likelihood and the calculation of confidence intervals is assessed as inconclusive or compromised;

Homoscedasticity residual variable on the basis of test White, is proven for each of the three patterns. Under these conditions specifying the following findings:

-Dispersion error is constant;

-Application of the "t Criterion" to check the significance of the regression equation parameters is fully conclusive;

Statistical information criteria, Akaike Information Criterion and Schwarz Criterion, support sustainability of Cobb-Douglas model and logarithmic model because of the lowest values;

The results shown in ordinary coefficients of linear correlation matrix (Table 12) invalidates multi-collinearity phenomenon, that variable x_1 does not correlate with the variable x_2 , according to the Klein test, as

$$R^2_{y; x_1, x_2} > r_{x_1, x_2} .$$

Table 12. Ordinary coefficients of linear correlation matrix

	y	x_1	x_2
Y	1.000000	-0.105103	0.971021
x_1	-0.105103	1.000000	-0.186486
x_2	0.971021	-0.186486	1.000000

By fulfillment of this condition, the parameters of the regression equation show a

good representation of the econometric model capacity.

Identified findings offer a practical, freedom of choice, with reasonable confidence, for any of the models developed. There is however possible to make a recommendation for priority application, the extrapolation calculations, the model formalized by multiple linear regression equation, by considering econometric support information. Multifactor Cobb-Douglas models and linear logarithmic model, attaches greater importance to variable "value tangible fixed assets" compared to other models, which may be relatively unrealistic conditions of the country.

Regarding "employment" variable expressed position that locates the three models is affected by the failure to confirm its statistical significance. Population growth while reducing unemployment and increasing social productivity will reposition the importance of this variable.

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APPROACH ON THE EXISTENCE OF INNOVATION IN TOURISM

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Abstract

This article aimed to highlight the existence of innovation in tourism based on the international literature. From conceptualization of the research period it was found that definition can be universally valid applied in all sectors of the economy and, equally, in the tertiary sector, where there are tourist services. Coming either from English or French, "innovation" defines both a process and its results. Adapting to the constantly varying wishes of customers, innovation is a key element underpinning the survival and existence of competition in a dynamic environment that is changing radically. Current studies reveal that there are other indirect benefits of innovations such as image enhancement, improved customer loyalty, and ability to attract new ones. In this study, it was paid a special attention to the long-term prospects related to the tourism sector in countries such as Australia, Latin America, Africa, China and emerging markets such as India and Indonesia. This has resulted in tourism expenditure forecast for the period 2013 - 2019 performed using information provided by the Ministry of Business, Innovation and Employment.

Key words: forecast, innovation, innovation models.

INTRODUCTION

The concept of innovation was introduced in economic literature by Joseph Alois Schumpeter, which defines it as assembling a new production function, because it covers the case of a new product, a new organization or opening new markets [8]. Another definition of innovation given by Schumpeter, innovation reveals that factors combine in a new way, or is a successful completion of new combinations [8]. Based on the definitions given by Schumpeter, has emerged another definition that innovation is seen as a form of new ways of doing things, or better exposed unique combination of production factors [7]. Schumpeter's innovation studies were continued by Peter Drucker, who believes that innovation consists in a search organized and with a well-defined change and systematic analysis of the opportunities that these changes could provide economic or social innovation [3]. In accordance with the provisions of Peter Drucker, innovation should be understood and implemented as an opportunity that materializes as a new product or service. Innovation may be an idea, practice, process or product that turns an idea

proposed as a solution in an application that is perceived as new by individuals [7].

Although at a first analysis or interpretation we tend to believe that the above definitions refer to innovation that occurs in the production of goods, if we study in detail, we find that they are universal and can be applied in all sectors and also in the tertiary sector, where we find tourism services. Therefore, we must realize that what distinguishes innovation in the tourism sphere of production is accounted for by differences in finished goods.

If in the process of production of a product we are dealing with a commodity, tangible and stored, for the production process of a service is different because the service is immaterial, intangible and perishable or not stored.

This concept is derived from English or French, "innovation" defines both a process and its results.

Classical and generally accepted definition can be exposed as follows:

"Innovation includes all measures of scientific, technical, organizational, commercial and financial resources necessary for successful completion of development and marketing of new or

improved materials and products, new or improved processes, or for the introduction and implementation of a new social service".

Therefore, this concept can be defined as the conversion of ideas, a:

- new or improved product launched on the market;
- operational process (technologic) new or improved use in industry or other economic activities;
- new type of social service;
- organizing a new type of activity.

Romanian tourism industry contributes increasingly higher on economic growth and is one of the best opportunities to create income and jobs for our country. However, Romanian tourism development cannot be considered as guaranteed.

The continuous increase in the number of tourist destinations and improve the quality of existing ones put pressure on those responsible for Romanian destinations to find better ways to compete in the tourism market and to do so in a sustainable manner. Sustainable tourism development comes from the existence of the negative impact on the surroundings, culture and lifestyle of the Romanians.

One aspect of innovation in this area is the existence of new forms of tourism to the detriment of traditional. Competitive advantage [1] is no longer based on the natural potential, but is replaced by the day of the anthropic due science, information and communication technology. New tourism emphasizes the complexity and segmentation of tourism demand, increased flexibility of supply, distribution and consumption and the discovery of new sources of profitability among the industry. A key area in this direction aimed at using information and communication technology.

Innovation is a key element to survival and competition in a dynamic environment that is changing radically.

Thus, the impact of technological innovations will depend, in general, on inventors and creativity to end users of new technologies. According to the WTO, the Internet has revolutionized the distribution of tourist information and travel offers effective selling

default. A growing number of Internet users are online shoppers and tourism will have a share of increasingly large market in e-commerce.

Therefore, innovation in this area is triggering a strong competition between super friendly interfaces for booking/payment online, compare tariffs modules, applications for mobile phones booking accommodation "on the move", software that bids hotels to accommodate potential customers or social travel planning modules etc.

Innovation in firms operating in the tourism services is a default process and held without precise steps, consisting of spontaneity with ideas that develop within the company meet the real needs of consumers.

Lately, the travel and tourism sector has been identified as a priority by the Romanian Government under the National Development Plan. However, even so, the importance of innovation has been underestimated for tourism services.

The hospitality industry is quite shaken where chains of companies and enterprises are constantly forced to seek ways to improve the quality and reputation, reducing costs and increasing sales and profits.

Current studies reveal that there are other indirect benefits of innovations such as image enhancement, improved customer loyalty, and ability to attract new ones.

MATERIALS AND METHODS

Existing innovations in the hospitality industry by their nature are largely intangible. In other words, it is difficult to manage and evaluate in terms of frequency of execution time (efficiency) and the contribution to maintaining customer satisfaction and keeping market efficiency (getting higher benefits or profit) [5].

The study showed that this industry needs a better understanding of the factors that lead to innovation performance.

Measuring innovation in hospitality success is achieved by evaluating new products and services; evaluation is based often on measurements financial performance. For example, the indicators related to income and

profits, sales volume or market share are difficult to determine [7].

Managers argue that one of the most sensitive in the development of new services in the hospitality sector is on the employees. True barometers in assessing the degree of satisfaction of the consumer, they are not only passive elements. Going into direct contact with customers, they can also become sources of innovation ideas and innovations can even propose Welcome desires of potential new services by consumers.

So far studies show that can be identified and indirect benefits of innovations, such as image enhancement, improved customer loyalty, and ability to attract new customers.

In tourism, the focus is on innovative behavior of organizations. According to an assessment by the Boston Consulting Group on innovative behavior of organizations revealed the following ranking of the most innovative companies in the global tourism reflected in the table below:

Table 1. The most innovative companies in tourism

Tourism companies in TOP 50 (mentioned for "unique experience offered to consumers")	Tourism ranking (travel, tourism and hospitality)
17. Walt Disney Company	1. Marriot International
28. Virgin Group	2. Hilton Hotel Groups
30. McDonald's	3. Virgin Group
32. Starbucks Company	4. Starwood Hotels & Resort Worldwide
37. Singapore Corporation	5. Walt Disney Company
49. Southwest Airlines	

Source: Băcanu B., 2009:249 [2]

Over time, under the pressure of market demands and challenges of competition, have developed several models of innovation, one of the best known and most widely used in tourism, is the model Abernathy-Clark.

a. **The Abernathy-Clark** is a model adapted innovations in tourism.

Based on the Schumpeterian idea of "creative destruction" the model classifies innovations studied in two dimensions: intensity subsequent obsolescence of knowledge innovation and change commitments intensity industrial innovations stimulated [4], [6]. Application of the model in the tourism industry is attributed to Anne-Mette Hjalager [4].

Some concepts have not the same meaning for

all authors, which means that research in this area still requires further attention.

The model was developed by Abernathy and Clark and adapted for tourism by Anne-Mette Hjalager; are illustrated four types of innovations: the **usual**, **niche**, **revolutionary** and **architecture**. Presentation of the model is as follows. Its vertical axis indicates the knowledge and skills used to produce services or products. Sometimes the old qualifications and ideas need to be replaced, sometimes developing existing structures is sufficient. Horizontal axis indicates whether model-specific innovations make connections to be obsolete or whether converge towards strengthening existing ones [6].

Through the model shows that radical innovations are the least common. Over a period of time their impact can be considerable. "Normal or incremental innovations are made through existing powers and relations, in some instances increase productivity is improved quality of training offered or employee of a hotel." [10] Niche innovations, such as cooperation with a tour operator, supporting new forms of cooperation and not focus on skills, introduce new structures and architectural innovations are redefining relationships with consumers and existing markets [6].

Using this model of innovation, every firm in the tourism can adapt its services, selecting or combining types of innovation model [9].

Other models of innovation

a. **The linear model "research - technology - market"** or Idea -> Invention -> Innovation -> Market is a model that has dominated almost three decades thinking in science and technology.

This model has adapted so alternative "science push" that could be applied in the period 1950 - 1960 and the alternative "demand-pull" that followed and has the main merit of being linking research - development and product market technologies.

b. The new economy has led the transition from the linear model of innovation to **interactive models or chain link**. In the economic entity model linking chains (chain - link model), based on the existence of new market opportunities and / or inventions

arising in science or technology, and followed by a project for the new process or product that sequentially leads to production and marketing.

It can be seen that, at present, innovation is a set of permanent interactions and feedbacks.

In practice, the terms "process innovation" and "innovation activity" are considered more appropriate to express the fact that the traditional separation between scientific discovery, invention, innovation and technology transfer, no longer exists.

b.1. **The interactive innovation** combines two different types of interactions:

- processes occurring within a company or group of companies engaged in a network;
- relationships between a business and science technology system (broadly), in which it operates.

A feature of the innovation process is given by the cumulative nature.

Most often, an innovation can generate another innovation. The states that have developed successful innovation policies, most often, the future will hold high economic performance.

Despite the above, it was found that the innovation process can be relatively uncertain. In other words, technological change cannot be accurately predicted, expected or interpreted.

c. If the **development model based on investment** is focused mostly on material factors endowment of activity in order to achieve and exploit "comparative advantage" in the model of development based on innovation, investments are mainly oriented towards equipping high level, with factors of "intangible" "intangible" of activity (research, information, education, new forms of work and organization, active and adaptive management) correlated with the development of information and communication technologies to support flows, networks and flexible production structure, high performance [11].

d. The **development model based on innovation**, research (basic, oriented, precompetitive, applied), as transverse branch factor in the economy - the engine of innovation and technology transfer process

control loop system as research - development, have a major role, the key elements of the innovation process, driven by intense competitive climate.

e. The **multipolar model** is functional and applicable, when innovations leading features occurring at different stages in different industries because of their collaborative researches have exceeded the boundaries between industries.

f. The **spirit of innovation** may be evidenced by the fact that a cycle ended innovative leadership failure causes another leader from another branch, each solving specific problems the skills they have.

g. The **innovative cluster type** means a way of concluding alliances modern advantageous because the principle of cooperation and competition, so it can be defined technological skills exist within the branches in order to achieve the fusion of technologies.

RESULTS AND DISCUSSIONS

Ministry of Business, Innovation and Employment show that long-term outlook is positive for the tourism sector. Increased spending is expected to come from countries such as Australia, Latin America, Africa, China and emerging markets such as India and Indonesia (see Fig. 1) [12].

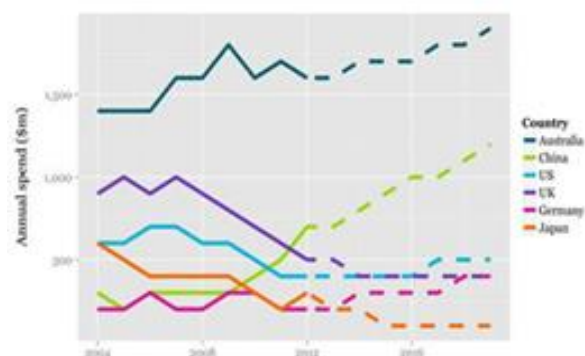


Fig. 1. Tourism expenditure outlook for 2013 – 2019 based on country

Source: Ministry of Business, Innovation and Employment [12]

Michael Bird, General Director of the institutions and systems performance, reported that the forecasts show that the number of visitors and spending is expected to

grow in the period 2013 - 2019, which is great news for the industry and the wider economy of New Zealand.

Also, saying that there will be changes in the composition of visitors, depending on their age, their countries, why they visit, how long they stay and how much they spend.

It is quite clear that the global financial crisis has had an effect on the number of visitors from the UK and Europe traveling in New Zealand. Thus, according to predictions, it is expected that traditional markets such as the UK continue to decline.

Even so, the existing decline in our traditional markets should be more than offset by strong growth in China and Australia. All these improvements are expected visitor arrivals from the United States.

It can be seen that emerging markets in Asia, Latin America and Africa can and will be a profitable source of visitors to New Zealand. The growth in these emerging markets economies is also expected to increase the number of visitor arrivals from Australia that because of resources will benefit from the growing demand of these countries [12].

In conclusion, these predictions will encourage tour operators and providers of related sectors to focus on projected changes in the mix of visitors and actively aligning their business plan to ensure the recovery of these exchanges.

CONCLUSIONS

In the context of a knowledge-based society we should be aware of the idea that knowledge has become the main factor of production and progress, and the need for innovation and learning processes, considered fundamental for sustainable development.

In other words, the concept of innovation has become a true cure for their wide range of organizational enterprises. To enable innovation within organizations, research and development functions are no longer sufficient survival compete successfully on an international dynamic market.

Innovation refers to the production of as many outputs, not ideas or happiness.

For companies operating in the tourism

services, innovation is not predetermined and organized process has no precise steps, most often reflecting the spontaneity with which ideas developed within the company meet the real needs of consumers.

From the above definitions given, innovation can identify their common element, namely the change. Change or needs to change are those that lead to the emergence and development of innovation and market launch of new products or services. Another important factor contributing to the emergence of innovations related to the field of tourism is reflected by the existence of different needs of customers. Tourism companies desire to achieve customer requirements leads, in addition to developing products and services, the chance of gaining competitive advantages. Owning such an advantage helps to increase company profits and hence its development.

Although the opinion of specialists reveals that innovation in tourism is difficult to quantify, practices in innovation and currently used in hotels not only helped companies develop, but also contributed to increase their competitiveness.

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LEASE AND ITS IMPACT ON THE LAND MARKET

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Abstract

The importance and value of land increases as the development of the economy is higher. Under this criterion the land market in Romania behave as such, because the development of the Romanian economy is lower compared to the European developed economies. Because agricultural land is one of the main strategic resources in land market, the state must act with great caution and responsibility. In this context, 2014 marks the liberalization of agricultural land market in Romania for potential investors from Europe under the Common Agricultural Policy. Along with the sale and purchase, cooperation and association, leasing and renting, leasing farmland is a direct economic measure movement of land ownership in agriculture. The main effect of these movements of land ownership is increasing the size of agricultural holdings by concentration or consolidation of land ownership .

Key words: land market, lease, movement of landownership

INTRODUCTION

The land market is an objective component of the free and democratic market economy. [4] Operating rules of the land market are broadly similar to those of any other economic good market, but there are specific elements.

On one hand, the land has a national importance as it is a special material good which cannot be territorial deployed, multiplied or manufactured and it is a vital element in the existence of a nation. On the other hand, it is no price of land in general, each field or plot has its price. [7]

Leasing land market segment is more dynamic. Current lease confers legislative conditions being an accelerator for passing quality of agricultural goods, especially those of nature land, from small to big farms.

By means of rental lease, agricultural goods are object of a contract between the owner, usufructuary or other legal holder of agricultural goods, called lessor and lessee, on the exploitation of agricultural goods for a special period and at a price determined by the parts.[10]

From a legal point of view, rent is a temporary leasing of immovable rights in return for payment; use, exploitation of property which has been leased. From a

financial standpoint, this is the amount paid by the tenant owner for the use, operation of such property.

For use lease transfer can be done through a written contract between the lessor, on the one hand, and the lessee, on the other hand.[2]

Legislative provisions concerning the preparation of specialized agricultural tenants, agricultural practice or a certificate of agricultural knowledge and presentation of guarantees required by lessors were repealed, so everyone can be tenant. [8]

MATERIALS AND METHODS

The purpose of this paper is to determine its effects on the movement lease land ownership. Various statistical data for the year 2013 from the National Institute of Statistics, the National Institute of Statistics Tempo, and EU and other information sources have been used in order to make this analysis.

What we proposed to a further importance it is the identification of the correct functioning of the land market and the impact of certain basic elements of which the most relevant is the lack of land register.

The main problem of the land market in Romania is the lack of cadastre or an owners database and lots of coordinates and other. In

Romania there are a few common cadastres where all the work is completed, and those are in Transylvania and Banat, but never in Moldavia and Wallachia.

Currently in Romania there is no updated situation on to the unincorporated land cadastre, although in the last 20 years it was noticed anumber of fundamental changes in the structure of land.[1] Cadastre recognizes the ownership and determines the size of each plot in terms of borders, positions, neighbors, helping to establish the category of use, taxes and a fair price of each parcel.[9]

RESULTS AND DISCUSSIONS

Relative shares of owned and rented farmland

The diversity of agricultural tenure it can be shown by a comparison of the relative shares of owned and rented farmland across different regions of EU.

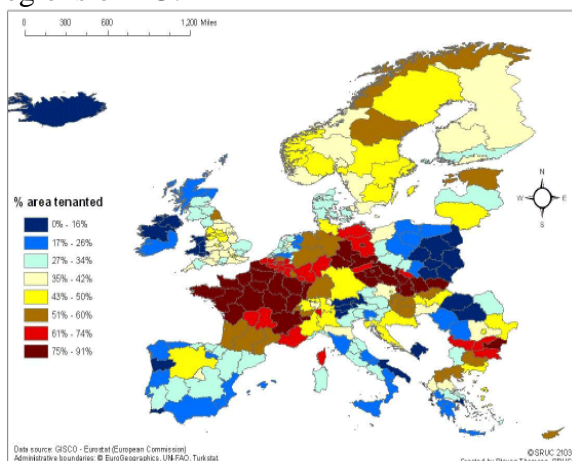


Fig.1. Proportion of Utilisable Agricultural Area that is tenanted across the EU,

Overview Of Agricultural Land Tenure In Selected Countries, Scottish Agricultural Tenure Evidence Review, <http://www.gov.scot/Publications/2014/06/9792/7> [13]

In Table 1 it is presented rented land as a current share of utilised agricultural area in selected countries.

The variation in rented land's share of tenure is dramatic, ranging from less than 20% in Ireland and Romania to over 80% in Slovakia and the Czech Republic. In addition, the share of rented land has also varied over time - rising in some countries whilst falling in some others.

In European Union countries with developed agriculture, land use, especially agricultural goods contracting, with special reference to the lease, is a common policy. [2]

Table 1. Rented land as a current share of utilised agricultural area in selected countries

Country	% rented	Country	% rented
Belgium	67	Finland	34
Bulgaria	79	Romania	17
Lithuania	48	France	74
Czech Republic	83	Slovakia	89
Danemark	34	Germany	62
Norway	42	Greece	32
Estonia	50	Hungary	56
Poland	20	Spain	27

Source: Overview Of Agricultural Land Tenure In Selected Countries, Scottish Agricultural Tenure Evidence Review, <http://www.gov.scot/Publications/2014/06/9792/7> [13]

Leasing in countries such as England, France, Germany and Spain takes the form of classic menus from the owner, the tenant, which typically has operating capital, which is slightly smaller size. In Romania, leasing is practiced in other conditions: surface owners have more, but smaller, which no land consolidation helps to provide leaseholders the possibility of conducting business on large plots, less crumb. [6]

In Belgium, France, Luxembourg, Germany proportion of leased land used exceeds 50%, while in Romania lease is almost 5 times less as a proportion of total operated area.

In France, Belgium, Holland, Italy, Spain regulations are more complicated matter, being established form of lease, lease duration, amount of rent etc. In countries like Germany, United Kingdom, Greece regulations are more liberal, allowing greater freedom of the parties in the lease. Specific legislation in Denmark and Ireland is forcing owners to exploit agricultural land and limit the right to lease them.[5]

Most European countries prohibit or restrict foreigners to acquire agricultural land, which encourages land lease by individuals and/or foreigners legally. This lease is the most

common method of land transaction.

The influence of lease on the size of agricultural holdings

In 2013, from the utilized agricultural area, about 61.4% and from the owned area 27.4% were leased, without significant changes compared to previous years.

The number of farms according to the utilized agricultural area both owned and leased is shown in Table 2.

Table 2. Number of farms and agricultural area by type of property

Indicators	MU	2010	2013
The number of farms	thousands	3,859	3,630
Owned agricultural area	thousand hectares	8,169.88	8,016.38
Agricultural area rented	thousand hectares	3,645.84	3,577.34

Source: Farm structure survey in 2013, <http://www.insse.ro/cms/ro/content/comunicate-de-pres-a-arhiva/> and author calculations [12]

According to the data presented above, the average area of agricultural land relative to the number of farms is about 3 hectares, of which 2 hectares are owned and 1 ha is leased.

Compared with 2010, in 2013 there has been a 5.9% decrease in the number of farms and 1.8% of the owned agricultural area.

The amount of rent in Romania

In the year 2014 the lease was less than the EU average. The amount of rent compared to the obtained production is presented in Table 3.

Table 3. The amount of rent in Romania

County	Average production (kg/ha)	Lease (kg/ha)
Teleorman	4,000	700
Gorj	3,000	600
Constanța	2,900	400-900
Călărași	3,500	850
Cluj	3,000	400-500

Source: National Institute of Statistics, Tutorial Tempo Online, http://www.insse.ro/cms/files/Tutorial_Tempo_Online/Tutorial_Tempo2.htm [11]

As it can be seen, the lease is correlated with soil quality. Thus, the Baraganului lease area

may even reach the equivalent of 900-1,000 kg grain per ha.

Therefore, renting, that is the action of movement of the land market has a significant role in increasing the size of agricultural property, mainly land ownership by moving from small to large farms.

In the South region, which includes Calarasi county, the average leased area by a farm was 68.2 hectares in 2012. Compared to other regions, it can be said that the rent in South Muntenia has an important contribution to land consolidation, since in the North West and South East average size of a farm is approximately 10.2 hectares, an area too small for sustainable agriculture.

The average size of farms in the EU is 30 hectares, while in Romania is about 3.8 hectares, which means that small subsistence farms could not exploit large areas of land.

In Table 4 one can see the differences between Romania's situation and situation in other European countries.

Table 4. Number of farms by area

Country	< 5 hectare	20-50 hectare	>50 hectare
Belgium	122,100	133,400	87,900
Greece	6,551,400	302,500	853,600
France	1,304,400	992,200	1,970,500
Romania	3,530,720	161,100	14,400

Source: www.europa.eu [14]

Compared to other European countries, in Romania subsistence farming predominates. [5]

This clearly suggests that the consolidation of small farms should be encouraged. Merging will occur naturally if agriculture will become profitable, farmers seeking to grow the area of the holding.

Leasing surfaces is particularly important in the case of Romania, where the land restitution process and establishment of ownership have transferred the ownership and use of land to over 3.8 million people, of which over 40% were age for over 60 years and 30% are retired. [7]

Other 500,000 people who were returned to earth live in the urban areas, have alternative careers and are not interested to resume farming and till the land.

In this context, the lease, the land market share, has an important role for the transfer of land resources from less active producers to the most active and effective ones, generating potential productivity gains by land consolidation [3].

CONCLUSIONS

Unlike shares of sale of agricultural land, to which the request existence cadastre and land book, Ending a lease for not request those documents, for which, for the owners of agricultural land in special elderly with incomes well below average Closure of lease contracts can be a great alternative.

Some advantage of the lease farm can be analyzed starting from this points of view:

- it does not affect land ownership regime, both during contract and after its termination;
- it is an alternative for those who, for various reasons, are not able to work their land;
- by exploiting the land, its value is maintained or even increased;
- the lease is a fixed income, determined in advance, which is very important in hiring their own costs;
- being of part of the land market supply, it may choose to impose tenant rules for negotiating the lease;
- compared with land acquisition, leasing requires less financial efforts, tenants may make investments in equipment and materials required to achieve a higher production;
- on agricultural products market, it substitutes the farmer;
- in terms of production area, its productivity is superior because it monitors the profitability and not self-sufficient in production.

Cadastre is the most important economic and non-economic action, which assures the movement of land ownership, namely: buying, cooperation, association, leasing, renting, etc.

The lack of cadastre maps hampers the consolidation and concentration of land

ownership, and the selling of the land.

A measure with positive impact on the economy which could support the individual holdings is to set up a long-term development strategy. Small individual farms do not have the financial means needed to lease large areas of land to work and sale obtained production. Since these family farms should be the main tenants of small plots, they should support the economy by facilitating the granting of loans, granting subsidies or grants to be able to perform the work.

Another measure with good economic impact is that the state to encourage people working their agricultural land only for own consumption. In this purpose, it should be created new jobs in the rural areas and convince the rural people to lease the farmland they hold in favor of large farms which would help to create a competitive agriculture.

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[14]www.europa.eu

WHAT ARE EUROPEAN INVESTMENTS FOR THE RURAL DEVELOPMENT IN THE REPUBLIC OF MOLDOVA

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Abstract

Since its independence Republic of Moldova takes great efforts to align with the big family of the European Union and in July 2014 it has made a huge step towards this by signing the Association Agreement and Free Trade Agreement with the EU. These impose our country to accelerate reforms and take all possible measures in order to reduce the gap of economic and socio-cultural development, adjusting it to the EU standards. One of the most sensible issues is the rural space conservation and further durable development that needs wide types of actions in almost all aspects. In the paper the authors consider what are EU investments for the rural development that will sum up with some conclusions and recommendations to be implemented in the Republic of Moldova.

Key words: EU integration, EU investments, market economy, rural area, rural development

INTRODUCTION

Eastern Europe has experienced dramatic economic change in the last 25 years where in the former communist countries prevail structural reasons for social exclusion. These reasons are, first of all, weak or lack of social infrastructure caused by the collapse of state owned industry and farms followed by significant social welfare cuts. The process of transition from the command to market economy of the Republic of Moldova which began in 1990 evolves with difficulty mostly in the rural areas. This paper is aimed to present the importance of European investments in the rural areas from Moldova. The social infrastructure is a necessary but not a sufficient condition for the rural development. Hence, if the social infrastructure does not assure the minimum of living conditions, then people and business are forced to leave. Under these circumstances, the authors consider the way of implemented European projects influence the development of the rural areas in the Republic of Moldova, as well as the results they are expected to bring for the inhabitants' lives.

MATERIALS AND METHODS

In order to describe the implementation of the European investments in the rural areas of Moldova, the following information sources have been used: publications specific to the theme, published papers in the proceedings of national and international conferences, laws and various regulations, official documents on policies and economic mechanisms, documents regarding the requirements for the integration into the EU. The study of statistical information on water supply and sanitation of communities from the Republic of Moldova, and the rural area development after independence of the country helped us to understand and explain both the evolution of the living conditions in rural areas and improvement of social infrastructure.

In the research, there were applied various methods and techniques specific for economic investigations such as: statistical analysis of the data regarding GDP, population, migration, water resources, investments etc, documentation, critical approach and synthesis of the studied literature, logical deduction, and comparison method.

RESULTS AND DISCUSSIONS

In 2012 Gross Domestic Product (GDP) totalled MDL 87,847 million (EUR 5,490 million), with an increase of 7% compared to 2008 (Fig.1). Thus, in 2012 there has been a continuous recovery of the Moldovan economy, after the severe decline recorded during 2009 as a result of the global economic crisis. However, in compared prices GDP has decreased by 0.8% as against 2011. [5]

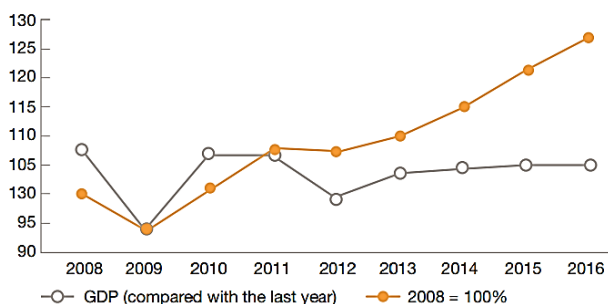


Fig. 1. Gross Domestic Product of the Republic of Moldova

Source: Investing Guide Moldova, 2013.

The evolution of the entities after 90s declined continuously due to the inefficiency of institutions and their activities that lead to social exclusion.

Social exclusion is a complex phenomenon, dynamic and multidimensional, linking various dimensions of life from which people are excluded. There is no single, agreed definition, mainly due to the difficulty in defining an ideal referenced state of inclusion. Social exclusion refers to marginalization from employment, income, social networks such as family, neighbourhood and community, decision making and from an adequate quality of life. The problems of social exclusion are often linked and mutually reinforcing. It is often difficult to disentangle the causes and consequences. The risk of social exclusion is highest for those with multiple disadvantages.

In Western Europe social exclusion is mainly linked to unemployment. Here, however, it is about social infrastructure that is the result of the shift from an industrial based economy to a service oriented and technology dominated economy. And although the welfare state is under pressure, when compared to Eastern

Europe, it continues to provide significant benefits in the form of income support, national health and retirement payments. The fight against social exclusion has been a major concern of EU policy since the early 1990s.

[1] The participation in employment and access to resources, rights, goods and services for all have become the goal of the EU. In order to increase transnational policy cooperation, all the Member States have been asked to prepare national action plans on social inclusion.

Republic of Moldova has all kinds of fresh water resources (rivers, lakes and groundwater).

Surface waters and groundwater of Nistru and Prut rivers are the most affordable, better distributed on the territory and with a high percentage on economic recovery.

The hydrographical network of the Republic of Moldova (Fig. 2) represents about 3621 rivers with a total length of about 16000 km and an average density of 0.48 km/km² in the North, up to 0.12 km/km² in the left bank of Nistru. Besides those mentioned, the hydrographical network includes 3,500 lakes.

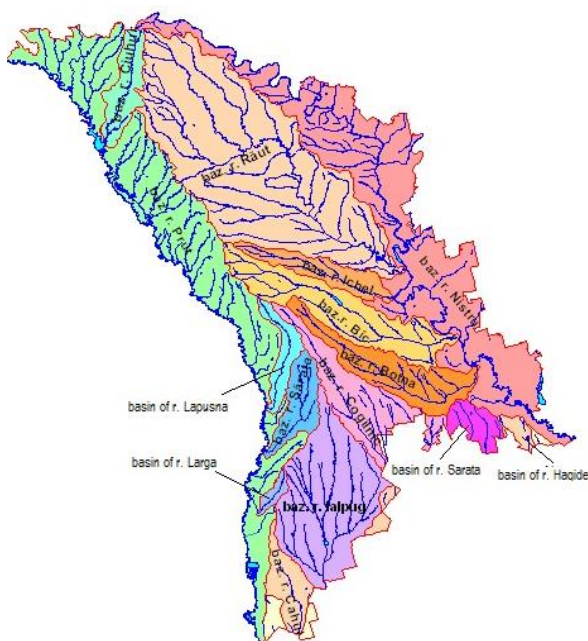


Fig. 2. The hydrographical network of the Republic of Moldova

Source: Government Decision no. 662 of 13.06.2007.

The largest Nistru River has a length of 630 km and Prut - with a length of 695 km (in Moldova), with an annual rate of 13.6 km³,

and underground sources (over 6 200 fountains). The country operates 541 water supply systems, of which only 46% meet the requirements of hygiene and 3% have authorization required for operation.

The groundwater water has always served as a traditional source of drinking water for villages in Moldova. The construction of artesian wells allowed the provision with water for an insignificant part of the population. Only 17% of rural residents are provided with piped water, others use water from wells and springs. On the territory of traditional wells, that groundwater will remain for a long time the main source for drinking water. Today, as decentralized sources of water are used about 150 thousand wells, using groundwater, the quality of which, in most cases, is unsatisfactory because of the increased content of nitrates, sulphates, chlorides, sodium, mineralization and high hardness. [2]

Currently, 67% of the existing water supply systems in rural areas do not meet hygienic requirements, being in poor condition. Only 20% of underground water sources analysed in this program in 77 villages have proper water quality regulatory requirements and can be used as sources of centralized water-drinking household. [3]

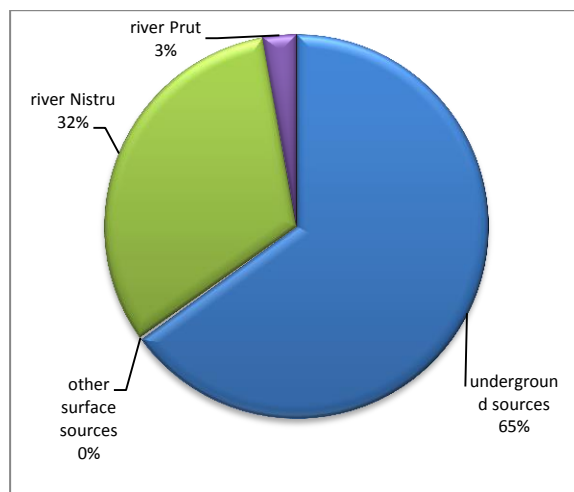


Fig. 3. Main sources of supply with drinking water
Source: Government Decision no. 662 of 13.06.2007.

The main sources of drinking water of Moldova are underground sources, which feed 100% of the rural population and 30% of urban and 65% of the entire population. From

surface sources the most important is river Nistru, which are assigned 32%, river Prut - 2.8%, other surface sources - 0.2% (Fig. 3).

According to the National Bureau of Statistics of the Republic of Moldova, the preliminary number of Moldovan population is of 2,913,281 inhabitants (except the Eastern districts and mun. Bender) recorded in the census of 12 to 25 May 2014. There were included people who immigrated, numbering 329,108, for which answered the domestic family members. In the urban areas were reviewed 995 227 people and 1 918 054 people in rural areas (Fig. 4), so that there is preponderance in maintaining the rural population of the country, which is 65.8% compared to 34.2% in urban areas.

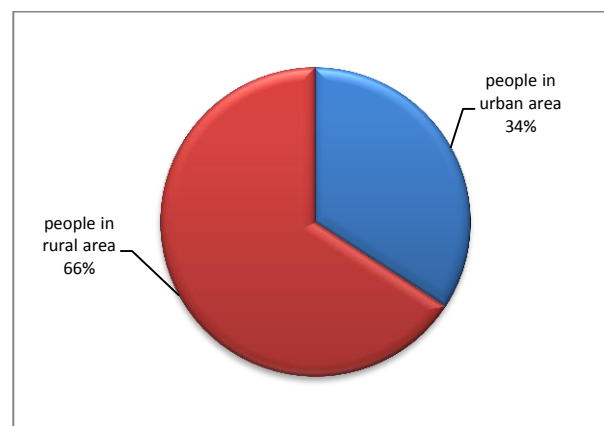


Fig. 4. Distribution of population by residence
Source: www.statistica.md

Currently, the centralized water supply have 1032 places, including 3 cities, 52 cities (100%) and 977 villages, representing 66% of their total number.

While Moldova achieved independence in 1991 as a middle-income country, it is now one of the poorest countries in Europe, with GDP per capita significantly below the average of the Central European countries. Moldova is ranked 117th in the 2009 Human Development Report, with a Human Development Index (HDI) value of 0.72. Thus, Moldova is one of the lowest ranking countries, in terms of HDI, covered by the European Neighbourhood Policy. With a per capita income of US\$ 880 (GNI Atlas method, 2005) Moldova is the poorest country in Europe and the only one currently

classified as a low-income country by the World Bank. Many of them, recently moved out of poverty, are just above the poverty line and are vulnerable to an economic downturn. Thus massive land privatization and establishment of National Cadastre System create premises for local development.

In the Republic of Moldova, the volume of departures abroad of the population for reasons such as work or studies have taken a vast proportion during the transition period. Migration was a reason why people looked for a better life and for better living conditions.

The data of the survey conducted in October-November, 2011 by the Association Hilfswerk Austria International, in partnership with the Center for Sociological Studies and Marketing "CBS-AXA" (a sample of 1107 persons; of the total number of respondents, 417 said they had at least one family member working abroad) indicated that migration has both positive and negative effects on the socio-economic life of the country. [10]

Remittances, which are around 21% of GDP, are among the advantages of migration (Fig. 5), and namely they are primarily contributing to raising the living standards of migrants' families.

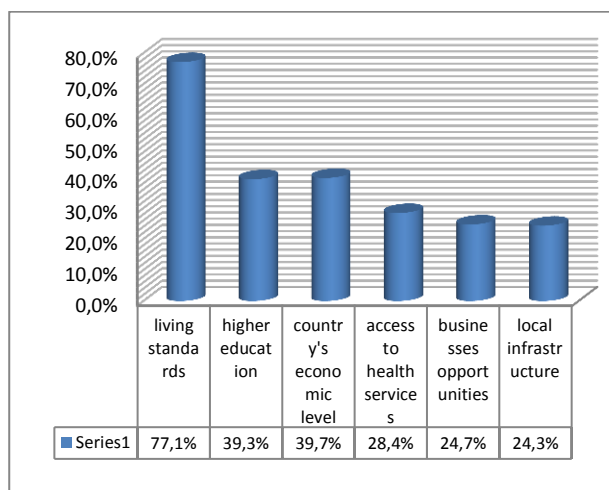


Fig. 5. The biggest advantages of migration
Source: www.unimedia.info

In carrying out community projects are involved all people equally sustains a third of respondents, in addition they noted, however, that the more are involved families without migrants (20%) than families with migrants (12.6%).

However, the respondents mentioned that the phenomenon increases the family capacity to provide education to children educated.

Remittances sent from abroad are mostly used for current consumption, investment in real estate, education, health, debt repayment. Investments in production, donations or grants certain community projects remain insignificant. Thus, sociologists believe that migration has a more positive effect on households rather than the community as a whole (Fig. 6).

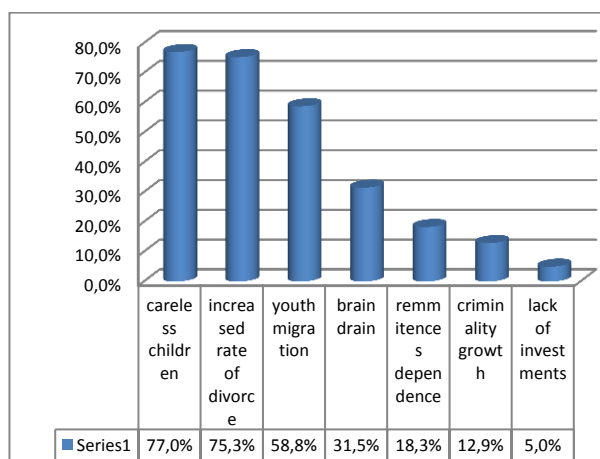


Fig. 6. The biggest disadvantages of migration
Source: www.unimedia.info

Over the last five years the situation in rural areas remained the same, or almost nothing has changed.

Yet more than half of respondents believed that if no one had left the country, the situation in Moldovan communities would be worse. Only 10% of respondents claimed that the situation would have been better.

In 2012 the unemployment rate was 5.6%. The total amount of unemployed people includes: 62.3% men and 37.7% women; 64.3% urban population and 35.7% rural population.

Total FDI According to statistical data in 2012, the inflow of the net direct foreign investments into the economy of Moldova amounted to USD 159 million, decreased by 43.3% from the level in 2011. [5]

Two thirds of the foreign capital existent in the Republic of Moldova is invested in joint venture companies, while the rest belongs to companies in foreign ownership. From the perspective of the total capital value and also

from the numerical perspective, companies with foreign capital are concentrated in the category of companies with a large share of foreign capital (75 - 100%), indicating that foreign investors prefer to control the management of companies as much as possible, or even integrally. Net flow of foreign direct investment in the national economy in 2011 increased considerably, amounting to USD 274 million (Fig. 7). Net foreign direct investment flow is differentiated by sector. Thus, in the banking sector capital investments in 2011 were the smallest in the last 5 years (i.e. USD 7.64 million), while in other sectors, net direct investment flows were much higher and amounted to USD 247.75 million, with an increase by 31.8% compared to 2010.

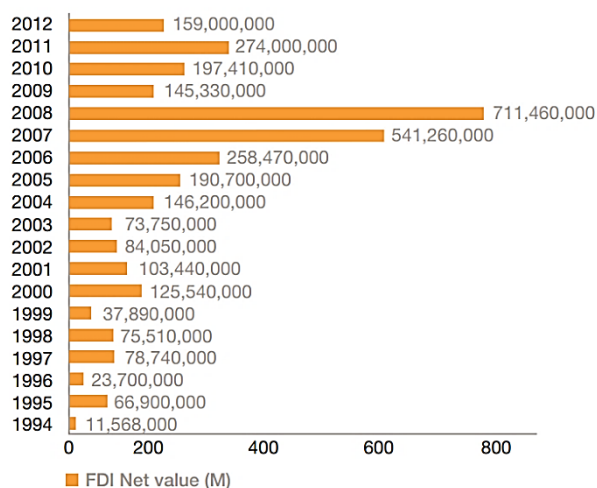


Fig. 7. Net flow of foreign direct investment in the national economy

Source: Investing Guide Moldova, 2013.

Openness to Foreign Investment Moldova continues to take steps towards developing a stronger economy, reforming a cumbersome regulatory framework, combating corruption and adopting reforms aimed at improving the business climate. Poor physical infrastructure, cumbersome licensing procedures, excessive permit requirements and proliferation of fee-for-services to public authorities and commercial organisations all contribute to a business environment that remains among the most challenging in the region.

Foreign Direct Investment Companies with foreign capital are larger than the local ones and promote a more active investment policy

in comparison to companies with domestic capital. Large-scale production, better economic performances and greater access to external financial sources has made it possible for companies with foreign capital to register essentially bigger inflows of tangible and intangible assets during recent years. During that period it has also been demonstrated that, with some exceptions, companies oriented towards satisfying internal demand promote a more active investment policy.

Recent years have seen an increase in foreign direct investment (FDI) as investors have taken advantage of the eastward expansion of the European Union, which has bordered Moldova since the accession of Romania on 1 January 2007. The Government of Moldova has made efforts to tackle some obstacles to investment, such as corruption and red tape. Furthermore, Moldova has declared European integration a strategic objective. The country had an Action Plan with the EU that set out a roadmap for democratic and economic reforms and the harmonisation of Moldovan laws and regulations with European standards. The EU cooperates with Moldova in the framework of the European Neighbourhood Policy and its eastern regional dimension, the Eastern Partnership. The key goal is to bring Moldova closer to the EU.

The European Neighbourhood Instrument is the EU financial instrument dedicated to the Neighbourhood for the period 2014-2020. It replaces the European Neighbourhood and Partnership Instrument (ENPI) of 2007-2013. Other funding sources are the thematic programmes, focused on human rights and civil society. EU assistance to Moldova takes mainly the form of country Action Programmes funded every year under the ENI. Moldova benefits also from regional and multi-country Action Programmes funded under the ENI. [8]

Nowadays, there is only this project that is applied in solving the issue of rural infrastructure development and expected results are as follow:

- Over the next three years, Moldova will access over 53 million for strategic modernization of agriculture;
- In 2014, the Agency for Payments and

Intervention for Agriculture capitalized approximately 110.7 million lei allocated through ENPARD funds;

- until now were supported 525 farms and agricultural enterprises, which led to the creation of over 1,200 jobs.

If to extend this project in village Brinzenii Vechi, district Telenesti than the social infrastructure issue of this rural area will be solved. In the last years the population has decreased, largely owing to the emigration of residents seeking economic opportunities elsewhere. Moreover, a sharp decline in the standard of living and in the quality and availability of public health, medical facilities, and water and sewerage systems in the last decade lowered life expectancy, development of agro-food business and maintenance and improvement of local enterprises.

In 2012 from the National Environmental Fund was funded the project for renovation of a spring in the village, for this being allocated 30 00 lei. However, this is just a small part of the other wells that need renovation. According to a study performed by the National Centre for Public Health (3rd trimester, 2014) in the field of water usage and protection for the sanitary-chemical and microbiological indicators out of 20 wells from the village, just one was according to sanitary norms.

Systems for water supply in the country are of 1998 complexes with varying arrangement grades of settlements from the communal sector. Of this number in a satisfactory condition are 1015 complexes, 870 are requiring reconstruction, 26 systems cannot be restored, as for 54 systems; there is a lack of information on their technical condition.

Distribution networks have a length of 8994 km, of which 3725 are in an unsatisfactory condition, and therefore the degree of hazard statements reached 4.9/km, a fact which shows major pipes' wear. From 271 pumping stations 226 are in unsatisfactory condition.

Estimating the situation on zones, we notice that in 2014 the share of localities connected to centralized sewerage networks is represented by only 4 administrative units in a rate of 80 – 100% (eg: mun. Chisinau -

91.3%, districts Comrat - 92.3% Floresti - 91.1%, Orhei - 100%) and in 21 other administrative units, this index is less than 20 per cent.

Of the approx. 35893 mil inhabitants, from the public water benefit 1994 mil people (50.6%), including 1136 mil - in urban areas (which represents 58% of the total population supplied with water and 76% of urban population) and 858 thousand - in rural areas (which represents 43.0% of the total population supplied with water and 40.7% of rural population).

The localities where the percentage of water non corresponding to the sanitary-chemical standards in schools did not exceed the 20% are: Chisinau - 4.2%, Balti - 3.6%, Drochia - 5%, Ialoveni - 14.3 % Comrat - 8%, Vulcanesti - 4.3%. The most disadvantaged administrative units where the share of non-compliance of water in schools was greater than 80% are: Ceadar-Lunga - 88.9%, Cimislia - 100% Causeni - 91.2%, Telenesti - 94.6% Taraclia - 94.4%, Basarabasca - 100%, Anenii Noi - 93.3% and Glodeni - 84.6%. [4]

From the total of rural areas, access to centralized water supply and sewerage systems have 251 localities (17%), only to centralized water supply - 511 localities (34.5%). The remaining villages and communes have no communal water pipes and the population uses groundwater from wells. In Orhei only 5 populated centers have communal systems of water supply and sewerage, 47 localities use groundwater from wells. In Soroca district 31 of the 68 rural populated centers do not have central water supply, all of them except Soroca city have no sewerage. There is a lack of centralized water supply systems in 30 localities in Riscani district and in 37 localities in Leova. [3]

The problem of social infrastructure became an actual one for the government. Due to the lack of money, it addressed the foreign IFIs.

Analysing the main ways of attracting funds for financing investments in water supply systems and sanitation, we ascertain the following:

(a) Acquisition and use of grants; There are several notable achievements towards

attracting and use of grants, of which:

- Funds obtained from the European Union in the Food Security Program in the amount of 2 mil Euro, which is already implementing specific projects for water supply and sewerage in 16 localities (cities Anenii Noi, Criuleni, Drochia, Riscani, localities Bucovat, Bascalia, Brinza, Costuleni, Cosnita, Gura Cainarului, Ghetlova, Petresti, Pelivan, Tanatari, Varatic);

-Funds obtained from Sweden and Switzerland, which will be implemented in 30 localities;

- Turkey grant allocated for the construction of water treatment plant in the city Ceadar-Lunga.

(b)Financing through loans repayable investments; The most significant achievements in this area are the credit granted by the State of Kuwait in 2006 to 6 priority localities Straseni, Taraclia and Hincesti, Carbalia, Sarata Veche and Risipeni and the credit granted by Turkey to supply water to four towns in southern regions.

Although during the last 10 years the water supply and sewerage faced financial hardships, the value of public service infrastructure investments in water supply and sanitation has increased since 2001, both through attracting external funding various programs as well as the efforts of operators financing from own sources and from state and local budgets.

“The pluvial sewerage. Promoting and implementing innovative action to climate change” is a project funded by the European Union within the “Non-state actors and local authorities in development Programme” and implemented by the Chisinau City Hall in partnership with Odessa City Council. [7]

The project implementation period was 30 months, from December 2009 to June 2012, and the total project budget was 900.000 Euro, out of which 737.147 Euro was due to the Chisinau City Hall. The project was aimed to promote and implement innovative logistics operations and constructive adaptation to climate change in Chisinau and Odessa, by involving social actors in promoting these principles. Also, its goal was to reduce the effects of heavy rain and flooding by

improving the pluvial water collection and evacuation systems and their orientation into natural water tanks, as well as to optimize urban traffic by improving problematic areas created after the floods.

ENPARD project was launched by the European Commission under the Sector Policy Support Programme (SPSP) "Economic Stimulation in Rural Areas that comes to sustain the development of the infrastructure– a new policy initiative, which is part of the EU's commitment to inclusive growth and stability in its neighbourhood, and recognizes the potential importance of agriculture in terms of food security, sustainable production and employment in rural areas. [9]

ENPARD was created by two Joint Communications of the European Commission and the European External Action Service in March and May 2011.

EU offers all partner countries the opportunity to participate in a dialogue on ENPARD topic and is ready to assist in implementing policies and reforms related ENPARD all those committed to transforming agriculture rural development a priority sector for cooperation with the EU.

This will include assistance in the preparation of agricultural and rural development strategies in the long term together with all relevant stakeholders, and to create the necessary institutional capacity at national and local level. ENPARD will be based on the experience of EU reform process in agriculture and rural areas in pre-accession countries and will take into account the diversity of experiences and efforts in partner countries. ENPARD also adopts a strategic and holistic approach, with emphasis on the participation of civil society and stakeholders in the sector.

National sectorial strategy that defines the challenges and objectives sectors forms the basis of a political dialogue between the EU and its partners. For ENPARD dialogue should lead to joint multiannual work program prepared by partner countries and agreed with the EU, in which countries to define their policy objectives in agriculture and rural development. This dialogue will

facilitate regional trade and help to identify pilot actions where necessary.

CONCLUSIONS

During the last years huge changes occurred, a fact that comes to support the thesis of the unicity of EU investments for the rural development, enabling major changes and the vitality of the rural areas through time.

Certainly a lot of qualities such as adjustability, compatibility, uniformity, unity, etc. are characteristic for “set of rules” of this sector, being at the same time integrated and incorporated in the sustainable development of a country. From our point of view this is one of the most relevant examples of two major ways of system export with a lot of pros and contras.

In conclusion we have to state that the durable development of rural space in our country may be assured by a various number of factors:

-Mobilization and thought-through use of human, natural and material capital;

-Promoting and support of economic activities in the rural space;

-Improvement of business climate and provision of support to the small agricultural producers;

-Assurance of a favourable investment climate for the development of business environment;

-Vocational education of human resources in the rural space.

All above mentioned factors might remain only in theory without a well-developed and efficient used social infrastructure.

The development process cannot be a general scheme accepted and approved by all the communities. Each community depending on the economic conditions and the specific of the region, adopts its own development strategy, taking into account certain principles and laws.

Generally, the role of the local public administration is to assure conditions for a better living environment, to form and attract new funds, to create and maintain dynamic partnerships with different sectors in terms of local development process, to adapt the local comparative advantages to native economic

activities, which might lead to a level of economic prosperity to the expectations of the population.

Some recommendations could be underlined:

-Specific measures might be focused on disadvantaged territories and ensure access for all residents to improved drinking water and adequate sanitary conditions;

- Infrastructure projects could be realized only by international partners' support;

-Project implementation must rely on appropriate techniques.

It is necessary that the local authorities to constantly promote the concept of sustainable development, to preserve and improve the existing infrastructure in villages, which will raise the living standards of citizens and will strengthen the support to local business.

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THE GRAPES AND WINE MARKET IN THE REPUBLIC OF MOLDOVA: TRENDS AND INSIGHTS

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Abstract

Grapes and wine products were and are symbolizing both the agriculture and economy of Moldova. Until the 90s of last century the main consumer of our drinks was the Russian Federative Republic. On its markets we sold more than four fifths of wines from grapes and more than 90 percent of sparkling wine. After the approval of the Declaration of Independence (August 27, 1991), our country has made considerable efforts to reform the national economy, to transition from centrally managed economy to a market economy that - and allows the manufacturer to direct activities according to demand and primarily domestic market. The request of grapes and grape products on the domestic market rules according to our traditions and previous practice and must be covered entirely by the local production. The national market for vine products is characterized by excessive fluctuations generated by the dynamics of production of grapes and processed products thereof, price volatility, increased competition, etc. Grapes and grape products obtained in Moldova exceed the domestic market demand and our country is doomed to commercial relations with other countries and/or groups of countries. The emergence of new socio-economic system open to the world triggered the joint efforts of the international community's own produced undoubtedly important changes not only in shape, but also background in trade flows and wine grapes. The European Union has been and remains an important actor of major interest to us. The signing and ratification in 2014 of the Association Agreement between Moldova and the European Union will definitely contribute to increase the sales in the Common Market of the European Union, but our country is required to know the trade policies of the EU and should adjust its national trade policy to the EU requirements. In the paper the authors reflect on the grapes and grape products market, studying the import and export of such products, seek practical operation of the CIS market and Common Market. According to this study the authors come up with some proposals that would change the situation on the national market for the better and would accelerate the integration of the national market in the European Union Common Market.

Key words: *efficiency, grapes, integration, market, policies, price, resources, wine*

INTRODUCTION

After the approval of the Declaration of Independence (August 27, 1991), the Republic of Moldova is making significant efforts to reform the national economy. The emergence of new socio-economic system open to the world has produced undoubtedly important changes not only in form, but also contextual in trade flows of grapes and wine.

The starting point for the effective development of any branch of the national economy, including horticulture is the national market's development of grapes and wine. The national market for products of the vine usually is fully satisfied from domestic production. It is characterized by price

volatility, increased competition, principles and mechanisms adapted to the realities of the period we are experiencing.

Grape production and products processed in our country exceeds the requirements of the internal market and we are forced to orient producers to international markets. Integration, including that in the Common Market usually occurs and is born where common interests are accompanied by similar economic policies of countries that intend such purposes. Obviously, it requires the study of foreign markets' development, our country's opportunities to join the Common Market of the European Union.

The study of the national market integration of grapes and wine in the Common Market

can be found in national and international researches. However, even if this issue has been discussed at various official meetings in our country, addressed to the scientific sessions, presented in various national and international publications, national market integration of grapes and wine in the Common Market develops in a difficult and controversial manner.

This situation urged us to estimate the evolution of the national market integration of grapes and wine in the Common Market. This study has enabled us to come up with some modest recommendations on the practical application of the Association Agreement of the Republic of Moldova to the European Union on the national market of grapes and wine.

MATERIALS AND METHODS

Among the materials used in research are the normative acts of the European Union and Republic of Moldova, textbooks, monographs and other publications specific to the theme, national and international conferences materials which helped us to understand and explain both the evolution of the national market integration processes of grapes and wine in the Common Market, and allowed us to identify the factors that influence these processes.

The quantitative analysis is performed on selected data and processed by the authors based on Eurostat, the statistical yearbooks

and other publications of the National Bureau of Statistics, other official communications of the institutions of the Republic of Moldova. The empirical study, analysis of the links provided us meanings and explanations pertinent to the phenomena and processes occurring in the national market integration of grapes and wine in the Common Market.

RESULTS AND DISCUSSIONS

Production of grapes and winemaking in the Republic of Moldova

The Republic of Moldova's economy passes through a difficult phase of changes initiated on July 25, 1990 when the Moldovan Parliament decided "to qualify the transition to a market economy as a model of management and the main measure for the economic recovery of the republic."

In terms of transition from centrally managed economy to a market economy, agricultural holding, irrespective of the organization form, determines what and how much to produce according to the market demand. The market demand is the result of a complex of political, legal and economic factors.

The national economy is characterized by the growth of gross domestic product of the Republic of Moldova to Lei billion 6.48 in current prices in 1995 (Table 1) to Lei billion 100.51 in 2013 or 15.5 times and in comparable prices - from Lei billion 4.67 in 1995 to Lei billion 96.52 in 2013 or 20.6 times.

Table 1. The gross domestic product of the Republic of Moldova

	1995	2000	2005	2010	2011	2012	2013
Total GDP, billion lei, current prices	6.48	16.02	37.65	71.89	82.35	88.23	100.51
Total GDP, billion lei, prices comp. to 2005	4.67	12.58	34.43	64.72	76.78	81.74	96.52
Agriculture, value added (% of GDP)	33.0	29.0	19.5	14.4	14.8	13.1	15.0
Grapes, % of the agricultural production	*	12.0	12.8	12.1	14.4	15.8	*

Note*= lack of data

Source: Elaborated by authors based on selected information from www.statistica.md

For all countries, including the Republic of Moldova, agriculture was and remains the support of human existence and, therefore, is the most powerful steady factor in the

harmonization of the economic development. The share of agriculture in GDP generally tends to decrease from 33.0% in 1995 to 13.1% in 2012 and 2.52 times and increases to

15% or 1.9 percentage points. The share of grapes in the added value of agricultural production tends to increase slightly from 12.0% in 2000 to 15.8 % in 2012.

The total area of vineyards in Moldova reduces from 256,000 ha in 1980 to 137,000

ha in 2013 (Table 2) or about 46.5 %. The vineyard plantings in fruit decreased from 200,000 ha in 1980 to 128,000 ha in 2013 or by 36 % which showed that planting new areas with vines fell catastrophically.

Table 2. Area, production and productivity of vineyard plantations

Specification	1980	1985	1990	1995	2000	2005	2010	2011	2012
Total area, thousand ha	256	220	201	186	149.1	148	145	140	141
Including those in fruit	200	170	171	172	141.5	140	133	128	129
Of the total mass varieties	-	16.6	31.1	24.9	21.4	20.0	20.0	20.0	20.0
Production of grapes, thousand tons	1201	654	940	852	703.8	518.5	481.6	594.8	505.9
Of which table varieties		23.5	82.5	105.9	112.0	57.0	46.0	86.0	70.0
Average production per ha, quintals	60.0	37.5	53.8	49.2	49.5	36.2	34.9	45.5	38.6
Production of table grapes per ha quintals	-	23.5	40.3	44.6	57.0	29.0	26.0	51.0	41.0

Source: Elaborated by authors based on selected information from www.statistica.md

If in 1980 young vineyard plantings were 21.88% of the total vineyard area then in 2013 they formed only 6.57 per cent.

Horticulture development is considerably influenced by available resources, particularly natural resources. Over 58% of the vineyards are located in the Republic of Moldova on land sloping down to 5 degrees. At the same time almost half of the lands with inclination of 5-10 degrees are arable. Of all the arable land, 45 per cent is severe slope of 5-10 degrees. Surprisingly, 24% of the lands above 10 degrees are arable lands.

Reducing newly planted vines surfaces, in utmost, was influenced by the situation that was created in vineyard nurseries. The volume of planting material production fell from 70 million pieces in the seventies to almost 3 million - currently. Today, basically, we do not have rootstock plantations.

Reducing areas planted with vines expresses a dangerous trend for the judicious exploitation of agricultural lands, to ensure sufficient economic efficiency, to maintain ecological balance and influenced the production of

grapes.

The total production of grapes varies from 1.201 million tonnes in 1980 to 481,600 tons in 2010. Obviously, grape production volume was determined by surface vine groves and grape production per unit area of plantations in fruit with which it perfectly correlated. The grape production per unit area of plantations in fruit varies between 60 quintals per hectare in 1980 to 34.9 quintals per hectare in 2010.

Grape production in agricultural enterprises is reduced from 472 600 tons in 1996 (Table 3) to 69 100 tons in 2010 and then oscillates reaching 168,300 tons in 2013. The share of grapes harvested in farms in total is reduced categorically from 61.6 % in 1996 to 14.3 in 2010, and then slightly increased to 27.5% in 2013. During 2010 – 2013 dominates the production of grapes harvested in households which decreases from 48.4% in 2010 to 39.5% to 2013.

Most grapes per each hectare were harvested in households from 46.8 quintals in 2005 to 63.5 quintals in 2011, followed by peasant households (farms) with a surface up to 10 ha

with 33.6 quintals in 2005 and 27.0 quintals in 2010 and agricultural enterprises with 41.9 – 64.6 quintals in 2011-2013.

Table 3. Grape production in agricultural holdings

Indicators	1996	2000	2005	2010	2011	2012	2013
Global production, all categories of farms, thousand tons	767.3	703.8	518.5	481.6	594.8	505.9	612.7
Average production per ha, quintals	45.2	49.5	36.2	34.9	45.5	38.6	47.3
Global production in agricultural enterprises, thousand tons	472.6	218.0	122.8	69.1	127.3	110.4	168.3
Share in total, %	61.6	31.0	23.7	14.3	21.4	21.8	27.5
Average production per ha, quintals	39.7	44.6	31.3	23.7	46.0	41.9	64.6
Grape production in peasant households (farms) with a surface up to 10 ha, thousand tons	*	*	217.2	176.7	201.5	176.6	192.7
Share in total, %	*	*	41.9	36.7	33.9	34.9	31.4
Average production per ha, quintals	*	*	33.6	27.0	33.6	29.1	32.6
Population households, thousand tons	*	*	172.2	233.0	260.7	213.4	242.2
Share in total, %	*	*	33.2	48.4	43.8	42.2	39.5
Average production per ha, quintals	*	*	46.8	56.0	63.5	51.0	58.1

Note*= lack of data

Source: Elaborated by authors based on selected information from www.statistica.md

The volume production of grapes undoubtedly influenced wine production. Production of natural wines, as is apparent from Table 4, varies from 9.3 mil dal in 1995 to 36,3 mil dal in 2005, forming a gap from 1 to 3.9. In the past four years, it practically stabilized at 12.5 mil dal in 2011 and 14.8 million in 2012. Sparkling wines vary from 416 ths dal in 2000 to 1190 ths dal in 2005 forming a gap in four

years from 556 ths dal in 2010 to 686 ths dal in 2011.

Production of divine varies from 240 ths dal in 2011 to 1394 ths dal in 1990.

The organization of horticulture, production of grapes and processed products influenced both the domestic and foreign market.

Table 4. Production of wine and divine

	1985	1990	1995	2000	2005	2010	2011	2012	2013
Natural wine of grapes, million dal	12.8	16.3	9.3	10.7	36.3	13.0	12.5	14.8	14.0
Sparkling wine, thousands dal	864	804	948	416	1051	556	686	654	596
Cognac (divine), thousands dal	828	1394	589	427	1190	439	240	308	345

Source: Elaborated by authors based on selected information from www.statistica.md

Grape and Wine Trade

The national market for vine products is characterized by excessive fluctuations generated by the dynamics of production of grapes and processed products thereof, price volatility, increased competition, etc. If the value of retail sales of food products has increased to 3.6 billion lei in 2005 to about 8

billion lei in 2010, or by 2.2 times and alcoholic beverages and other beverages – of about 2 times. Table grapes harvested in plantations from the Republic of Moldova that even in 2013 amounted to about 20 kg per capita practically do not cover the recommended amount.

The value of sales of alcoholic beverages on

the domestic market has steadily increased from 140.5 mil lei in 1996 (Table 5) to 868.0 mil lei in 2013 or by 6.2 times. The share of sales of alcoholic beverages in food products leaped from 1.25% in 1996 to 5.61% in 2013 and by 4.5 times.

Table 5. Value of retail sales of wines, million lei

	1996	2000	2005	2010	2011	2012	2013
Food products	1,123.4	1,442.9	3,611.4	8,049.2	10,170.1	10,958.1	13,004.3
Of which: - alcoholic beverages	140.5	236.1	415.5	698.6	741.0	759.3	868.0
Including: - Wines	22.80	33.97	58.4	132.3	169.0	168.5	196.8
- Sparkling wines	18.90	23.64	62.5	139.3	169.0	168.5	196.8
- Cognac (divine)	17.97	40.27	100.8	176.4	202.9	202.2	236.2

Source: Elaborated by authors based on selected information from www.statistica.md

Table 6. Export and import, \$ million

	2005		2010		2011		2012		2013	
	mil \$	%	mil \$	%	mil \$	%	mil \$	%	mil \$	%
Export total	1,090.9	100	1,541.5	100	2,216.8	100	2,161.9	100	2,428.3	100
Food products	396.0	36.3	316.9	20.6	330.6	14.9	390.9	18.1	427.3	17.6
Alcoholic beverages	314.5	28.8	178.2	11.6	181.3	8.2	215.0	9.9	252.3	10.4
Wine and grape must	278.2	25.5	137.9	8.9	132.5	6.0	142.1	6.6	149.6	6.2
Import total	2,292.3	100	3,855.3	100	5,191.3	100	5,212.9	100	5,492.4	100
Food products	147.5	6.4	308.6	8.0	355.8	6.9	380.0	7.3	403.5	7.3
Alcoholic beverages	34.0	1.48	45.0	1.17	50.3	0.97	68.3	1.31	76.1	1.4
Wine and grape must	8.18	0.36	3.16	0.82	2.43	0.47	1.38	0.26	1.94	0.35

Source: Elaborated by authors based on selected information from www.statistica.md

The value of retail sales of wines has increased by 8.6 times in the reference years, sparkling wines – by 10.4 times, the divine – by 13.1 times.

If in 1996 in the structure of alcoholic beverages sold domestically dominated the wines made from grapes with 16.2% then in 2013 dominate the cognac with 27.2 per cent. Internal market, including that of grapes and processed products is limited to the approximately 4.0 million consumers, by the production and consumption of table grapes and alcoholic beverages in households of the

population, the modest income and other factors. Thus our country is doomed to export grapes and processed products.

The value of exported goods increased by \$ 1.0909 mil in 2005 (Table 6) to \$ 2.4283 mil in 2013 or by 2.23 times.

The value of goods imported by our country basically has the same behaviour as exports. However, the import's growth is faster. Thus, the value of imported goods in 2013 increased by 2.4 times compared to 2005.

Obviously, this situation influenced greatly the trade balance. The trade deficit increased

from \$ 1201.4 mil in 2005 to \$ 3064.1 mil in 2013 or by 2.4 times. The rapid increase in the trade deficit is extremely dangerous for the national economy.

The value of the agricultural production exported by our country ranges from \$ 316.9 mil in 2010 to \$ 427.3 mil in 2013, but their share decreased from 20.5% respectively to 17.6% of the total exports. Export of fresh or dried grapes (raisins) increased from 10.8 ths tons in 2005 to 37.5 ths tons in 2013.

The export of food products dominates categorically the alcoholic beverages, even though their share decreased from 79.4% in 2005 to 59.0% in 2013. The materials presented in Table 6 undeniable show that the

most important alcoholic product exported by Moldova was and remains wine and grape must which formed 88.5% in 2005 and in 2013 - 59.3 per cent.

A special interest is the orientation of trade flows. *Export of fresh or dried grapes (raisins)* was and remains oriented mainly towards markets of Commonwealth of Independent States (CIS). So, in 2005 the export of fresh or dried grapes (raisins) on CIS markets (Table 7) made up 57.8%. In all the years shown in Table 7 export of grapes exported to CIS markets exceeds that of the EU market and in 2013 it reached the highest level - 94.9 per cent of the total.

Table 7. Export and import of fresh or dried grapes (raisins)

	2005		2010		2011		2012		2013	
	ths t	\$ mil	ths t	ths \$	ths t	ths \$	ths t	ths \$	ths t	ths \$
Export total	10.80	2.45	26.74	12.99	32.99	17.55	31.18	14.50	37.50	17.03
including: - CIS	6.24	1.60	26.18	12.73	30.87	16.54	26.66	13.02	35.60	16.11
- EU	4.55	0.86	0.56	0.26	2.10	0.97	4.44	1.44	1.79	0.86
- other countries	0.01	0.002	0.0	0.0	0.02	0.04	0.08	0.04	0.11	0.06
Import total	0.71	0.46	2.11	2.72	6.54	6.16	3.24	3.41	4.44	4.68
including: - CIS	0.002	0.001	0.23	0.35	0.19	0.27	0.17	0.33	0.12	0.32
- EU	0.026	0.02	0.21	0.28	0.13	0.20	0.23	0.36	0.06	0.10
- other countries	0.68	0.44	1.67	2.09	6,23	5.69	2.84	2.72	4.26	4.35

Source: Elaborated by the authors based on data of the National Bureau of Statistics of the Republic of Moldova

Both in CIS and EU the export of fresh or dried grapes (raisins) is greater than import, except the year of 2005. In 2005 export of fresh or dried grapes (raisins) on the CIS markets outruns the import by more than 3000 times, then in 2013 – only about 300 times.

Export of wine and grape must was decreased from 32.15 mil dal in 2005 to 12.69 mil dal in 2010, then it is held practically at less than 12 mil dal till 2013.

Wine and grape must is primarily exported to CIS markets. But the share of wine and grape musts exported to CIS markets (Table 8) is reduced from 97% in 2005 to 71 per cent in 2013. If in 2005 to the Russian Federation are

exported 25.09 mil dal of wine and grape must (80.4% of the total exports to CIS markets), then in 2013 – 2.67 mil dal (30.4% of the total exports to CIS markets).

The export of wine and grape must to the EU markets has increased steadily from 0.66 mil dal in 2005 to 1.94 mil dal in 2013 or by 2.94 times.

In 2005 about 40% of wine and grape must exported to the EU were to Czech Republic and Romania, and in 2013 on the markets of these countries – 58.8% or by 1.5 times more.

Table 8. Export and import of wine and grape musts

	2005		2010		2011		2012		2013	
	mil dal	mil \$	mil dal	mil \$	mil dal	mil \$	mil dal	mil \$	mil dal	mil \$
Export, total	32.15	278.2	12.69	137.9	12.12	132.5	12.19	142.1	12.35	149.6
including: CIS	31.19	265.5	10.73	110.6	9.86	100.9	9.41	106.4	8.81	103.5
of which RF	25.09	208.4	4.23	47.9	2.53	33.2	3.14	40.5	2.67	34.4
- EU	0.66	9.46	1.12	18.3	1.47	20.7	1.62	20.9	1.94	27.5
of which Check Republic	0.09	1.25	0.27	4.06	0.38	5.52	0.37	4.83	0.64	8.18
Romania	0.17	2.39	0.12	1.86	0.32	2.93	0.47	3.86	0.50	4.58
Germany	0.08	1.28	0.07	1.36	0.06	1.20	0.06	1.08	0.06	1.24
Italy	0.002	0.03	0.01	0.02	0.15	1.05	0.01	0.13	0.005	0.07
other countries	0.31	3.20	0.76	8.91	0.78	10.8	1.17	14.9	1.59	18.8
of which USA	0.04	0.70	0.05	0.89	0.11	1.94	0.09	1.66	0.04	0.82
Import, total	2651	8.18	425.2	3.16	273.9	2.43	38.7	1.38	60.5	1.94
including: CIS	-	-	3.92	0.08	-	-	-	-	2.5	0.07
- EU	2049	7.97	294.9	1.81	204.9	2.02	25.6	1.14	18.2	1.28
- other countries	11	0.21	126.3	1.27	37.8	0.41	13.1	0.34	39.8	0.58

Source: Elaborated by the authors based on data of the National Bureau of Statistics of the Republic of Moldova

Considerations on trade relations perspective

In a country like Moldova which tends to establish relations based on market economy, money and profit usually dictates things. The same country, if you intend to own the joint efforts of the international community you should not neglect the political factor and the behaviour of those who have trade relations.

The South - Eastern area from which a part is the current territory of the Republic of Moldova over the years has been "in the way of all evils". Beginning with the third century this area was crossed by various hordes that have caused division and political organization in small states. The following centuries witnessed continuous struggles between the great European powers of the time - Austria, Turkey and Russia for possession of these territories. Currently we are in the geopolitical interests having business relations with two groups of markets:

on the East the Commonwealth of Independent States (CIS) and on the West the European Union member states (EU-27).

After the approval of the Declaration of Independence (August 27, 1991) the country's trade relations with these markets underwent major changes. In 2000 Moldova exported goods and services on the Eastern market worth \$ 276 mil (including on the Russian market worth \$ 210 mil, or 76%), respectively in 2010 – 624; 404; 65% in 2013 – 923; 632; 68%. Russian Federation was the main consumer of our wines.

After the Russian "embargo" in 2006, the total balance changes. The European Union is the main destination of exports: 536 mil USD compared to 423 mil USD in the CIS. In 2013 Russia blocked access to our wines on its market and subsequently many other products. For 2014 we forecast a decline in exports to Russia which requires us to export our products, including grapes and wines in

other markets.

Firstly, the market must ensure free movement of products between countries and/or groups of countries. To these requirements perfectly corresponds the European Union with which the Republic of Moldova signed the Association Agreement whose main objective is to establish the Deep and Comprehensive Free Trade Area (DCFTA).

In accordance with Article 67 of the ratified version of the Association Agreement between the EU and Moldova, "Parties shall cooperate to promote agricultural and rural development, notably through gradual approximation of policies and legislation." Furthermore Article 70 states that "The Republic of Moldova shall carry out approximation of its legislation to the EU acts and international instruments referred to in Annex VII to this Agreement according to the provisions of that Annex." Chapter 5 of the Agreement regulates the customs and trade facilitation.

In the context of the agreement to export grapes and processed grape products on the Common Market it is required that Moldova shall adjust the normative acts of Regulation (EC) no. 1493/1999, Regulation No. 753/2002 of the Committee, and Regulation No. 1234/2007 of the European Parliament and the Council which include **administrative regulations** regarding *new planting rights, restrictions* that require application of the methods, rules, practices and oenological standards recommended by the International Organization of Vine and Wine (IOVW), **generalities** on fresh grapes, grape and grape juice, wine mixture, specific **rules** regarding

the presentation and product names, marketing **norms** to improve and stabilize the operation of the common market in wines; **levers and economic instruments** such as how to get financial resources to promote agricultural and rural development, support measures aimed at consolidating the wine sector, **aid** for the Member States to ensure the quality of wine and others.

Secondly, it must provide to each participant the materialization of the comparative advantage. David Ricardo back in 1817 showed that although the nation had an absolute advantage over another in the production of two different commodities, the less efficient nation cannot be *equally* less effective in the production of both goods. In the production of one of them it will be more effective. Thus, the comparative advantage occurs.

The international trade could create a benefit for each country, representing a positive assessment game, or one where both countries 'gain' from their employment in commerce. The only limitation to such a creative benefit trade is that the nation less effective cannot be *equally* less efficient in the production of both goods. The comparative advantage is reflected in the structure of exported and imported goods, prices etc.

The price of grapes sold on the domestic market (Table 9) oscillates between 1782 EUR/ton in 2009 and 4308 EUR/ton in 2012, the ratio was 1 to 2.4. The cost price of the grapes varies between 1809 EUR/ton in 2009 and 3361 EUR/ton in 2010.

Table 9. Prices of grapes sold by agricultural enterprises on the domestic market

Indicators	2005	2006	2007	2008	2009	2010	2011	2012	2013
Selling price, lei/ton	3,181	2,754	2,724	2,487	1,782	3,258	3,260	4,308	3091
Cost price, lei/ton	2,410	2,384	2,346	2,361	1,809	3,361	2,514	2,839	*
Level of profitability,%	31.0	15.9	22.0	9.6	6.0	8.6	36.5	37.0	*

Source: Elaborated by the authors based on data selected from www.statistica.md

The price is also an important tool to balance the interests of insurance consumers and producers of grapes. Complex vine and wine production is developing normally if the price exceeds the cost of them. In the recent years there has emerged a dangerous trend in the

ratio between costs and selling price. If in 2003 the ratio selling price:the cost price was 1.8 to 1, then in 2009 it was 0.98 to 1 and in 2010 -0.97 to 1.

Obviously, the ratio formed between the cost and price cannot provide the manufacturer a

profitable activity. This even imposes him to losses and into the arms of bankruptcy. Of course, in such circumstances when the cost price exceeds the selling price, the manufacturer of grapes is no longer motivated, which encourages him to look for other activities or to grub up vineyards and cultivate other plants.

For us, a country exporter of wine and grape must the realization price in foreign markets is crucial. The price of a decalitre of wine and grape must (Table 10) exported increased steadily from \$ 8.65 in 2005 to \$ 12.11 in 2013 or by 1.4 times.

Table 10. The price of a decalitre of wine from grapes exported, USD

	2005	2010	2011	2012	2013
Total	8.65	10.86	10.93	11.66	12.11
including: - CIS	8.51	10.31	10.23	11.31	11.75
of which RF	8.31	11.32	13.12	12.90	12.88
- EU	14.33	16.34	14.08	12.90	14.17
of which Check Republic	13.89	15.04	14.53	13.05	12.78
Germany	16.00	19.43	20.00	18.00	20.67
Italy	15.00	20.00	7.00	13.00	14.00
Romania	14.06	15.50	9.16	8.21	9.16
Other countries	10.32	11.72	13.85	12.74	11.82
of which USA	17.50	17.80	17.64	18.44	20.50

Source: Elaborated by the authors based on data of the National Bureau of Statistics of the Republic of Moldova

The price of a decalitre of wine exported to CIS countries increased from \$ 8.51 in 2005 to \$ 11.75 in 2013 or by 1.38 times. But it is below average by 1.6% in 2005 and 3 per cent in 2013.

Much more accelerated, and namely by 1.55 times, increased the price of a decalitre of wine and grape must exported to the Russian Federation, and if in 2005 it made up 96% from the average, then in 2013 it exceeded the average by 6.36 per cent.

The price of a decalitre of wine and grape must exported to EU Member States ranges from \$ 12.90 in 2005 to \$ 16.34 in 2010.

However, it was higher in the EU Member States than in CIS countries by 1.68 times and in 2013 – by 1.21 times.

The price of a dekalitres of wine and grape must exported to Germany exceeded the EU average by 11.6% in 2005 and by 45.9% in 2013. Thus, we can see the advantage of exports of wine and grape must to the EU Member States markets.

In order to select the target markets it is required to know the export-import ratio of each Member State of the European Union. Wine imports into the EU-27 (Table 4) are maintained at 51541 million hl in 2010 and 52.058 million hl in 2007.

The largest importers are Germany with 13.739 million hl in 2010, making up 26.6% of total imports and the UK with 11.915 million hl in 2010, making up 23.1% of total imports, Netherlands with 3.409 million hl forming 6.6% of total imports, Sweden with 1.845 million hl forming 3.6% of total imports and Denmark with 1.847 million hl forming 3.6% of total imports.

The main suppliers of wine to the EU are the United States, Chile, Argentina, South Africa and Australia. These countries have developed aggressive marketing strategies by which promote on the Common Market their products at competitive prices.

EU is the largest exporter of wine, even if the wine export was reduced from 59,825,000 hl in 2007 to 57,360,000 hl in 2010 and by 4.2 per cent. If the ratio between export and import in 2007 was 1.15:1, then in 2010 it was 1.11:1. The largest wine exporters in 2010 were Italy with 18.223 million hl or 31.77% of total EU exports of wine, Spain with 15.833 million hl, or 27.6%, France with 12.175 million hl, or 21.2 per cent, Germany with 3.587 million hl or 6.25%, Portugal with 2.452 million hl or 4.27 per cent of total exports in 2010.

The main recipients are the USA, Canada, Japan and Switzerland.

CONCLUSIONS

In order to improve and stabilize the operation of the common market of wines including the grapes, musts resulting in wines, the Member States may lay down marketing rules to regulate the offer. We obviously consider that by applying certain mechanisms are made

efforts to regulate the common market, including the production, consumption, import and export of grapes and wine.

Through this, Moldova will find solutions as not losing the Association Agreement on free trade in the agricultural sector, and how to financially support the development of competitiveness of agriculture. "Therefore, states the European Commissioner for Agriculture, Dacian Cioloș, we insisted to adopt this strategy because it includes investment measures in agriculture and agri-food sector of alignment with European norms and standards for food products".

Hence, the agreement will help to strengthen relations between the EU and Republic of Moldova, to gradual economic integration and leaves open the way for further progressive developments in EU– Republic of Moldova relationships.

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THE IMPORTANCE OF ASSESSING HUMAN RESOURCES FOR THE SUSTAINABLE DEVELOPMENT-A STUDY CASE, SOUTH WEST OLTENIA REGION

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Abstract

In the center of all the activities of an organization is the human being. All the other resources such as land, buildings, equipments, vehicles or money are only of a secondary importance. Without people, business cannot be achieved. The importance of the human being in the success management of a business is to make from the "Human Resource Management" the essential competence for all the managers. This responsibility is not only to give people jobs, to guide them how to work and to record their performances, although the managers have to do this thing. Beside all these, there is an investment: to give people the power they need to act efficiently and effective. It also means to exploit the individual knowledge, the talents, the imagination and creativity for the common good. The world changes with an unprecedented speed determine each organization to employ competent, well informed, loyal, flexible and talented personnel. The managers should think well at what they offer to employees and at what they expect from them if they want to reach high performance and increase the firm competitiveness.

Key words: economic development, sustainable development, education, continuous learning, human resources

INTRODUCTION

Human resource management is the organizational activity that allows the most efficient use of the people (employees) to achieve organizational goals, group and individual. [17]

The most outstanding "asset" of a company is the human resource. The other resources of the organization can be used only by means of human resource.

A country cannot develop economically, if it has not the appropriate human resources. The human resources capacity is obtained both by birth and through the accumulation of experience.

In order to achieve objectives, and ensure sustained success, it is imperative for any company that wants to be successful to identify ways in which to stimulate performance. [6]

Sustainable development must be a priority, allocating budget expenditures for education and research, health care and social assistance, and to recruit human resources that contribute to performance in organizations. [13]

By the accession of Romania to the European

Union, it has become a priority the organizing of the national economic space in units appropriated to the implementing of regional development policies and also the development of a proper statistical system. In Romania, there have been created 8 development regions, defined as „areas which correspond to groups of counties, established by their voluntary association, based on a convention signed by the representatives of the county councils and, respectively, by the general council of Bucharest.

These regions have similar dimensions as number of inhabitants and, except Bucharest-Ilfov region, as surface. The development regions are territorial units large enough to be a good basis for the development and implementation of regional development strategies, allowing the efficient use of financial and human resources.

Long term strategy of the organization sets the future directions, such as: increase income, market share, cost reduction, or diversification in another domain of activity. All these evolutions involve adjustments of the number and composition of the workforce. Therefore, it

is necessary to develop long-run and large-scale plans regarding the recruitment and selection of new employees, training of those existing or dismissal of the employees who no longer meet the needs of the organization. Consequently, the director of the human resources develops the strategy and submits it for approval to the administration council, establishing the categories of staff needed to be employed, and the funds required to be allocated for the recruitment-selection and for training-specialization, so that the enterprise to have sufficient and competent staff, at the appropriate time.

The strategic management of the human resources is the process through that the human resource management is linked to the overall strategy of the enterprise, in order to achieve the goals and objectives of the organization. [7]

The human resources strategy is that part of the general strategy of the enterprise that refers only to the human resources function, so that it is a functional strategy. Like in the case of the general strategy of the organization, in the human resources strategy, *decisions are taken at three levels*:

- *At strategic level*, the general director and the human resources manager establish long-term directions, such as career management, reward policies.
- *At managerial level*, the long-term plans are concretized through the development of concrete programs; for example, the recruitment program or the reward program.
- *At operational level*, the concrete programs that have been developed are put in practice. The salaries and other forms of reward are paid, the courses and other training and perfecting programs are organized and conducted, the staff recruitment and selection is done. The strategy should be developed on time, and not in response to crises that arise. So it has to be *proactive, not reactive*. The human resources managers are more involved in the strategy development stage, so there will be fewer crises in that resolving they should offer assistance.

The human resources strategy of the organization can have the expected results only when it is developed and is followed by the entire staff of the organization, when there is

close cooperation between the corporate top management and human resources managers. Particular attention should be paid to areas that require special talents and to events that major affect the human resources, such as: geographic expansion, introduction of products and services, increase the degree of automation, mergers and acquisitions, in order to see if there are or may be created specialists in the respective labor markets. There must be taken into consideration the factors affecting the human resource management: economic, demographic, social, political, modifying the branch configuration.

Some important studies presented the research results regarding labour force in Romania and its different regions. Some results referred to South West Oltenia Region, pointing out the dynamics of work force, the main indicators regarding active population, employment and unemployment, distribution of work force by living space, gender and training level, employment and unemployment rate, salary level, activity employment rate. [1, 3, 4, 9, 13, 15, 16, 17, 22]

In this context, the paper aimed to continue the analysis of work force in South West Oltenia Region in the period 2007-2012 and to analyze the human resource assessment in the agricultural companies whose business is oriented to a sustainable development.

MATERIALS AND METHODS

The paper presents a study case regarding the assessment of employed people in the South West Oltenia Region.

In this purpose, firstly, it was made an analysis of labor force in South West Oltenia Region using the following specific indicators: population, active population as total, by also by gender and living area, distribution of employed people by economic activity, employment and unemployment rate, GDP per capita as a measure of labor productivity.

The period of reference was 2007-2012 and the empirical data were collected from National institute of Statistics, Romania's Yearbooks 2009,2012, 2013, as well as from Statistical Division from Dolj County. [12,

16]
 They were processed using the fixed basis indices and also the comparison method. The study also include a field survey based on a sample of 10 managers of agricultural holdings operating in South West Oltenia Region. The interviewees accepted to collaborate to this study answering to a questionnaire entitled "What kind of manager you are?" in order to identify what type of human resource management style they apply. The questionnaire included 28 questions

which are similar to the ones used by Covrig, S.S.(2007). [5]
 The questions were grouped in 4 categories of 7 questions characterizing 4 management styles: (a) the management style focused on analysis and control (the questions 1-7), (b), the management style based on communication (the questions 8-14), (c) the productive-affective management style (the questions 15-21) and (d) the permissive-intuitive management style (the questions 22-28).

Table 1. The questionnaire used in the field survey

Management style	Questions
Management style focused on analysis and control	1.Are the length of the career in a company and loyalty the most important items of a recompense system? Yes/No 2.Are rules made to be respected? Yes/No 3.Do you prefer the activities which are involving you the most? Yes/No 4.Is the systematic control of the subordinates a need for an efficient management? Yes/No 5.Do you often use to criticize your own activity? Yes/No 6.Do you prefer to use official means of communication, task allocation and written letters? Yes/No 7.Is there a correct and incorrect way to fulfill your duties, but there is always the best one?Yes/No
Management style based on communication with the subordinates	8.Is the discussion about programmes and projects an efficient tool to motivate the subordinates? Yes/No 9.Do you prefer to establish the general directions of the activity, and the details to be mentioned during the activity running? Yes/No 10.Do you prefer to leave the details of the activity to be established by subordinates, but you ask them to set up periodical reports regarding their achievements? Yes/No 11.Are staff assessment, work recognition and material incentives the main factors contributing to the work motivation? Yes/No 12.Is it right that the most subordinates fulfil correctly their duties if they knew what they would have to do? Yes/No 13.Is a convincing leader an efficient manager? Yes/No 14.Is it important to explain to the new employees the objectives and strategy of the company, salary level and prospect of the professional carieer? Yes/No
Productive-affective management style	15.Do you appreciate original thinking if it has practical application? Yes/No 16.Is it important to pint out the success items and not the ones of failure? Yes/No 17.Are always the group decisions the best because the subordinates could contribute to them by their experience? Yes/No 18.Is it right that each of us is born with the ability to solve problems and be a creative person? Yes/No 19.Is it important to you to develop a pleasant business and earn more money? Yes/No 20.Is the variety of work environment a way to increase the enthusiasm and productivity? Yes/No 21.Is it important to help anew employee presenting him/her the relationships inside the company and general requirements of a task and its details to be found later? Yes/No
Permissive and intuitive management style	22.Is the mutual confidence a way to integrate the individual needs with the company interests and goals? Yes/No 23.Is it true that the activity is achieved the best when each employee establishes his/her own ways to fulfil the tasks? Yes/No 24.Is the subordinates' success or failure the most efficient form of assessment? Yes/No 25.Do you think that when work productivity is low, it is the best to go walking or watching a movie instead of analyzing the causes? Yes/No 26.Doyou like the meetings with your collaborators to make a brainstorming session in order to collect their ideas for setting up the future programmes and strategies of the company? Yes/No 27.Do the Management Board Meetings and the hierarchical relationships irritate and disturb you from the normal running of the activities in the company? Yes/No 28.Any time when you are facing a resistance to a new project or the things are going on a false track, is it the best way to postpone till the situation will become more favorable? Yes/No

Source: Covrig Model, 2007[5]

The questionnaire used in the field survey is presented in Table 1.

RESULTS AND DISCUSSIONS

1. Evaluation of human resources activity

Many of the experts in human resources consider that the activity results they perform

could not be quantified. Generally, the human resources activity is perceived as generating costs, without contributing directly to the income of the enterprise. Therefore, it is often the target of reducing costs. In terms of costs and benefits, the human resource activities are classified by the

directors and managers in: (a)Essential activities, (b)Optional activities and (c)Optional studies.

Essential human resources activities are considered those without which the organization cannot develop. The need to conduct these activities is pressing and real, although incur high costs, and the benefits of these activities are directly and measurable. Such activities are: (a)recruitment, selection; (b)training at the workplace; (c)remuneration; (d)the benefits programs; (e)work protection; (f) relations with the unions.

Human resource activities are considered optional: job analysis, performance evaluation, career development, training programs, organizational communication, human resource planning.

The managers consider them as useful management tools, but expensive and without clear and immediate utility for organization. Since these activities benefits are indirect and unquantifiable, in some organizations they are considered unimportant, and in others represent a luxury possible to be satisfied only in favorable economic conditions.

The optional studies of the human resources, such as:

- the analysis surveys of the employees attitude,
- the evaluation of staff training programs, are least recognized as necessary by managers, who rarely understand their utility, this being very difficult to quantify.

2. Attracting and selection of human resources unoccupied

Being an activity performed by the organization to attract human resources unoccupied, in order to meet the needs of workforce, the recruitment involves choosing the best performing employees, a prerequisite condition for the success of a company. An important role in attracting staff is the provision of specific working conditions to the intelligent, creative and initiative employees. [2]

The recruitment decision is the result of the human resources forecasting management, because any enterprise realizes its recruitment process either to adapt the amount of work available to the activity needs, or to balance the human resources depending on the

recruitments and departures scheduled. For this reason, the recruitments can have a strategic character, responding to long-term requirements, or to conjuncture requirements, or are related to the internal staff movements, such as the release of a job as a result of promotion or transfers.

The main classification of the recruitment sources relates to the internal and external sources, each with its own advantages and disadvantages. Although the internal recruitment is more advantageous in some cases, both for enterprise and for candidate (motivation increases, as well as the sense of belonging to the organization), because is faster, there are known more information about candidate, the time for job guidance is shortened considerably, it prevents the recruitment of employees with more knowledge, favoring the appearance of „Peter principle”, according to which „people tend to get up the hierarchical ladder up to their level of incompetence”. The external recruitment, besides the fact that attracts a staff with more new knowledge, which determines the increasing of the competitiveness level and allows the enrichment of the internal human potential of the enterprise, can have negative effects, which are reflected in the difficulty of attracting candidates, given the complexity of the labor market, the costs are much higher than for internal selection, and job integration time required is much higher. Another negative aspect that the employer assumes is the risk that the new employees do not raise the expectations, having a lower potential than could be observed in the selection process.

The staff selection precedes the recruitment activity, and requires candidates' evaluation by different methods and selection of the one that is most compatible with the job, after that the hire offer is done. Selection of the human resources is an uncontested activity, of it depends the success of human resource management and of the activity developed.

The human resources selection takes place in the staff department of the enterprise and the responsibility is of the staff department manager, or of the superior management. [11] This stage is very important for creating the organization relationship with the public, because is created an unfavorable image both

for employers and for organization. This is an aspect overlooked by many human resources specialists, because they forget that in the recruitment and selection process not only the employer evaluates the candidate, but also the candidate assesses the organization. If discriminatory selection practices are used, if using inappropriate tests or behavior, the future employee may consider organization as inappropriate to its needs. [22]

In the selection stage can be used different tools: job applications, CV-s, references, tests, medical examinations or interviews. Selection tests are often standard tests that take into consideration the providing of a tool for an objective measurement of the human characteristics. Regardless of the tools used in the selection stage, the employment must comply with relevant legislation, without taking account of the stereotypes or discriminations against persons with disabilities or minorities.

To streamline the human resources department, are needed new approaches in terms of recruitment and selection of staff. The main trend that determines new approaches of the human resources specialists and not only, is primarily the youth trend to develop a career at the workplace. How the enterprises respond to this trend? One answer is that the representatives of the human resources departments of the enterprises to organize different forms of dialogue with the young people close to graduation to better understand their wishes and aspirations. Also, the students from the final year can be chosen for the fulfillment of responsibilities within the enterprise in order to better knowledge of the profession for which they are preparing. [12]

Other trends regarding the recruitment are:

- development of the employer brand- they give a special importance to increase the online visibility and media coverage;
- dedicating time to the environmental objectives;
- more information programs for the employee – the employer approaching proactively to the key employees of the firm to transmit or transforming the reward system into a more visible object and more understandable to all;
- using the employees blog-s for the recruiting announcements;

- revitalization of the page that contains jobs;
- the use of the online video communication means has surpassed other domains, becoming one of the most interesting ways to demonstrate the emotion and passion of those working in that firm (a more than adequate example is Google);

- use of recruitment through mobile phones, namely by SMS, video by mobile phone or internet pages with jobs accessible through mobile phones;

- modernization plans for succession of managers, as globalization and increasing the retirement age become stringent realities, so that it will be necessary to replace the retirees and adding the external candidates to the succession plan;

- recruiting at global level through globalization of the own websites, using the global recruitment sites or globalization of programs for transmitting information.

3.Development Strategy for South West Oltenia Region, for 2014-2020, Strategic Area 6. Human resource development, social inclusion growth [8]

Romania is running an important Strategical Programme for the period 2014-2020, having the goals to assure human resource development and social inclusion growth.

One of the priorities of the European Commission for 2020 is the inclusive growth, alongside with intelligent and sustainable growth. Thus, it will put an increased accent on the human resources development, education and the development of their skills, lifelong learning, promoting social inclusion, increasing the employment of labor, poverty reduction, and strengthening the administrative capacity.

Also, the Lisbon Strategy relaunched can be achieved only based on the increasing level of training the human resources, through better systems of education and training. In this context, the European Commission has proposed the focusing on the European cooperation in education and training, until 2020, on four strategic directions: implementation of lifelong learning; improving the quality, efficiency and the results of education and training systems; promote the equity and active citizenship; increase the

innovation and creativity, including entrepreneurship, at all levels of education and training. [10, 21]

In the Romanian society, there is a widespread recognition of the fact that education represents the strategic factor of the future development of the country, through its essential contribution to the multidimensional and predictive shaping of the human capital. Education should be perceived as a way to sustainable development that, in fact, is a learning process in searching of innovative solutions.

The quality training of human resources is a precondition for a competitive performing on the labor market. A highly skilled workforce is essential for a knowledge-based, competitive and sustainable economy.

In the current economic and financial crisis conditions, the investment in continuous training, qualifying, retraining or professional conversion is the leverage for increasing flexibility and adaptability to the new challenges.

For the next programming period, the investment in the quality development and growth of human resources from the South West Oltenia Region will be supported and encouraged in all areas, but especially in: education, research, social, health, public administration, good governance, economics and entrepreneurship.

Thus, by the investment in human resources development in the areas mentioned above, at the South West Region level will encourage and support also indirect outcomes such as: expansion, diversification and improving the quality of health and social services, public administration, etc. but also their access to the population.

The population health is one of the most important aspects of the quality of human capital, which is a key component in the process of increasing the competitiveness of the regional and local level. Meanwhile, the access of population to quality health services and health care has a direct implication in increasing their life quality.

Another domain that should represent a priority for the South West Region in the next programming period is the social services and human resources involved. It should further

support the development, expansion, diversification and increase the quality of social services for a wide range of beneficiaries, especially disadvantaged and vulnerable groups, and also people with special and social needs. [19]

Among the people with the greatest needs for social reintegration in the South West Region are: disadvantaged persons of Rom ethnicity, disabled persons, single elder people, long-term unemployed, people with poor training and qualification, addicted persons, victims of domestic violence, ex-prisoners, etc.

An essential role in the sustainable development process at regional and local level is of local public administration, both by the involvement and support of this process and by providing people and potential beneficiaries (firms, investors, etc.) of a wide range of services. Diversification, development and increase the quality of local public services, but also of their accessibility is an essential condition in raising the standard of living of the inhabitants, but also in involving the community in the management and sustainable development activity at local and regional level.

Within the European Union, one of the most relevant changes is the awareness of social policy importance alongside with the employment, which are considered features that make the difference between developed societies.

The low participation on the labor market remains a challenge for Romania. The insufficient institutional capacity, low level of national services for labor employment, the inadequate level of skills acquired after graduation, high school dropout rate, persistent mismatch between the qualifications offered by the education system and labor market demands, low rate participation in programs of lifelong learning, training and professional retraining, low investment in training and increasing the quality of human resources and other issues will be challenges in the next programming period at the South West Region level in order to support and develop policies, projects, actions or concrete measures aimed at increasing employment, participation on the labor market.

In the last twenty years, in the South West Region, but also in Romania, there have been a series of negative demographic phenomena that caused demographic changes, one of the most important consequences being the raising of population decline.

4. Analysis of work force in South West Oltenia Region, Romania

To have an idea about the situation of human resource in the South West Oltenia Region, a brief analysis is presented below regarding the dynamics of the main indicators during the period 2007-2012.

The South West Oltenia Region is a part of the West Development Region of Romania. It consists of 5 counties: Dolj, Gorj, Mehedinti, Olt and Valcea counties, totalizing 29,212 square km surface, representing 12.25 % of Romania's territory. [13]

In 2012, the population of the South West Oltenia Region accounted for 2,220,224 inhabitants of which: 31.38 % were living in Dolj County, 16.86 % in Gorj County, 12.98 % in Mehedinti County, 20.56 % in Olt County and 18.22 % in Valcea County. (Table 2)

Table 2. Population of the South West Oltenia Region by county in 2012 (persons)

County	Population (persons)	Share (%)
South West Oltenia Region- Total	2,220,224	100.00
Dolj	696,774	31.38
Gorj	374,233	16.86
Mehedinti	288,086	12.98
Olt	456,536	20.56
Valcea	404,595	18.22

Source: NIS, 2013, Own calculations [12]

The active population slightly declined from 1,103 thousand persons in 2007 to 1,100 thousand persons in 2011.(NIS, 2012)

At national level, it was recorded a similar decreasing trend, Romania's active population, registering a decline from 9,353 thousand persons in 2007 to 9,263 thousand persons in 2012, meaning by 0.97 % less. (NIS, 2013)

The number of civil population is higher in Dolj County, (31.8 %) followed by Valcea, Olt, Gorj and finally by Mehedinti county where it was found the smallest number of population (12.98 %).(Table 3).

Table 3. The structure of civil population by county in the South West Oltenia Region, 2007 and 2011 (%)

County	2007	2011
South West Oltenia Region	922,3	898,2
Dolj	31.5	31.8
Gorj	16.0	16.0
Mehedinti	13.3.	13.0
Olt	19.8	19.4
Valcea	19.4	19.8

Source: NIS, 2012, Own calculations. [12]

Table 4. Dynamics of active population in the South West Oltenia Region, 2007-2011 (Thousand persons)

Spec.	2007	2008	2009	2010	2011	2011/2007 %
Active pop.	1,103	1,112	1,107	1,100	1,100	99.72
Employed People	1,028	1,040	1,032	1,017	1,024	99.61

Source: NIS, 2012, Own calculations [12]

About 55.66 % of the population in the area is living in the rural space, with small differences from a county to another.

In this respect, a slight decline was registered from 56.22 % in 2007 to 55.66 % in 2011.(Table 5)

Table 5. Dynamics of employed population in the South West Oltenia Region by living space, 2007-2011 (Thousand persons)

Spec.	2007	2008	2009	2010	2011	2011/2007 %
Employed people	1,028	1,040	1,032	1,017	1,024	99.61
Rural	578	590	594	584	570	98.61
Share(%)	56.22	56.73	57.55	57.42	55.66	-
Urban	450	450	438	433	454	100.88
Share(%)	43.78	43.27	42.45	42.58	44.34	-

Source: NIS, 2012, Own calculations [12]

At national level, the distribution of employed people by living area showed that 51.4 % of the population is employed in the urban area, while the remaining of 48.6% was employed in the rural area.

Therefore, the South West Oltenia region had an agricultural characteristic as long as more people compared to the national average percent were living in the rural area.

By gender, in 2011, the South West Oltenia Region had 558 thousand males (54.49 %) and 466 thousand females (45.51 %) compared to the level recorded in 2007: 563 thousand males (54.76 %) and 465 thousand females (45.23 %).(NIS, 2012)

At national level, the male active employed

population is dominant, with a share of 55.33 %, while the female employees accounted just for 44.67 % in 2012. (NIS, 2013) [14]

Employment rate was 18 % in average, but in agriculture was very high, 46.6 % in comparison with other fields of activity: 14 % in trade, transport, accommodation and food service and 4.5 % in buildings.

Unemployment rate was about 6 % compared to 7 % at national level.

At national level, employment rate registered a slight increase from 58.8 % in 2007 to 59.5 % in 2012, and the unemployment rate recorded also an increasing trend from 6.4 % in 2007 to 7 % in 2012.

The Ministry of Work, Family and Social Protection in its National Agency for Work Force Employment (ANOFM) Report concluded at December 31 [20], 2014, mentioned that in Romania there were 478,338 unemployed people, by 9,489 persons more than in November 2014. The unemployment rate increased for men to 5.78 %, while for women decline to 4.73 % at national level. From the total unemployed people, 66.74 % were in the rural area. [18]

The unemployment rate is very high in the South West Oltenia Region.

However, as a positive aspect regarding the South West Oltenia Region, at December 31, 2014, the number of unemployed people decreased by 11 persons in Olt county and by 76 persons in Mehedinti County, while in Valcea county is increased by 25 %.

Dolj (0.20 %), Olt (8.11 %) and Mehedinti (9.75%) have a high unemployment rate compared to other counties, mainly with Ilfov County (1.56 %, the lowest level).

Similar results were noticed in 2012 when Dolj county had 9.69 %, Gorj 7.78 %, Mehedinti 9.8 %, Olt 8.01 % and Valcea 6.35 %.

Also, the youth unemployment is one of the highest in the EU, 21.9 %, a reason as socila inclusion to be among the top priorities of the EU in the its future strategy. [1]

Agriculture is well represented among the activities run by the local population. However, almost all the "farmers" have subsistence holdings, and their agricultural land is spread in many small plots which do not allow the application of high technologies and as a result

labor productivity is very low. [21]

The contribution of the South West Oltenia Region agriculture to GDP was 7.5 % in 2012, while the other economic branches contributed much better: 45.2 % services, 25.7 % industry, 12.3 % constructions, 9.3 % others. [16] Employed people in agriculture of the Region accounted for 931,9 thousand people in 2012, of which in agriculture 322.7 thousand people (34.62 %), industry 179.9 thousand people (19.30 %), constructions 61.7 thousand people (6.62 %) and trade 94.6 thousand people (10.15 %).[12, 16]

The highest vacant seats rate was registered for qualified workers in agriculture, forestry and fishing, 1.27 %, compared to 0.46 % for specialists in various fields of activity and service workers [13]

According to the forecast for 2020, it is expected as the demographic situation to be worse.

About 1 million ha are destined to agriculture for cropping cereals, oil plants, vegetables, fruits, potatoes, sugar beet and vine.

The main industries in the are: machinery industry, chemicals, metallurgy, food industry, textile industry, building materials and ship building.

The main companies operating in the local industry in 2013 were: Alro SA, Pirelli Tyres Romania SRL and TMK-Artrom SA, in Slatina, Olt County, The Energetical Complex Turceni SA, and Rovinari SA, Gorj County, The Energetical Complex Craiova SA, CEZ Distribution SA – Craiova, CEZ Selling SA – Craiova, Dolj County, The Autonomous Company for Nuclear Activities RA, Drobeta Turnu Severin, Mehedinti County, MW România SA, Drăgășani, Olt County. [6]

5.Asessment of the management styles practiced by the managers of agricultural companies operating in South West Oltenia Region

The 10 managers of agricultural holdings in the area are characterized by a specific structure depending on age, farm profile, profession and training level.

The distribution of managers by age category was the following one: 40 % between 41-50 year old, 30 % between 31-40 years old, 10 % between 20-30 years old, 10 % between 51-60

years old and 10 % over 60 (Table 6).

Table 6. Managers' distribution by age

	20-30 years	31-40 years	41-50 years	51-60 years	Over 60 years	Total
No	1	3	4	1	1	10
Share (%)	10	30	40	10	10	100

Source: Own calculation.

The managers' structure by farm profile was the following one: 60 % were dealing with cereal cropping, 20 % with dairy farming and 20 % with vegetable growing (Table 7).

Table 7. Managers' distribution by farm profile

	Cereal cropping	Dairy farming	Vegetable growing	Total
No.	6	2	2	10
Share (%)	60	20	20	100

Source: Own calculation

The managers' structure by profession was the following one: 60 % agronomists, 20 % veterinary doctors and 20 % horticulturists (Table 8).

Table 8. Managers' structure by profession

	Agronomist	Veterinarian	Horticulturist	Total
No.	6	2	2	10
Share (%)	60	20	20	100

Source: Own calculation

The managers training level was very high because all of them graduated a faculty at University of Craiova and University of Agricultural Sciences and Veterinary Medicine of Bucharest.

The managers' answers (Yes/No) by question are presented in Table 9.

For the 1st set of questions, it was recorded a number of 56 "Yes" answers, representing 80 % of the 70 possible answers and 14 "No" answers that is 20 %.

For the 2nd set of questions, there were registered 45 " Yes" answers (64.28 %) and 25 "No" answers (35.72 %)

For the 3rd set of questions, there were counted 40 "Yes" answers (57.14 %) and 30 "No" answers (12.86%).

For the 4th set of questions, there were registered 35 " Yes" answers (50 %) and 35 "

No" answers (50%).

Taking into account all the 28 questions, the managers gave 176 " Yes" answers and 104 " No" answers, totalizing 280.

It is obvious that a number of 6 managers are practicing the 1st management style based on analysis and control of the subordinates, because the tasks are officially communicated, the rules should be respected by every employee, the results' evaluation is compulsory, including also the manager own results, looking for the best solutions to better solve the problems.

The manager M1 has affirmatively answered all the 7 questions characterizing the 1st style, representing 36.84 % of the total 19 affirmative answers and 25 % of all the 28 answers.

The manager M2 also answered affirmatively all the 7 questions characterizing the 1st style of management, representing 38.88 % of the total 18 "Yes" answers and 25 % of all the 28 answers.

The manager M3 gave 7 " Yes" answers, representing 38.88 % of the total 18 "Yes" answers and 25 5 of all the 28 answers.

The manager M4 answered positively 6 questions and 1 negatively. The positive answers represented 35.29 % of the 17 positive answers and 21.42 % of all the 28 answers.

The manager M6 recorded 6 " Yes" answers and 1 " No" answers. The positive answers represented 33.33 % of the 18 positive answers and 21.42 % of all the 28 answers.

The manager M7 also recorded 6 " Yes" replies, representing 37.50 % of the 16 positive answers and 21.42 % of all the 28 answers.

A number of 2 managers are practicing the 2nd management style based on communication.

They discuss all the plans and projects with their subordinates showing them the general directions and objectives of the company and also the measures needed to be taken, because they consider that the employees should be convinced what they have to do and what incentives they will get after fulfilling their duties the best way.

Table 9. Managers' answers (Yes/No) by question

Question number	Managers' answers									
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
1	Yes	Yes	Yes	No	No	No	Yes	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	No
4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
6	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
7	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
8	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes
9	Yes	No	Yes	No	Yes	No	No	No	Yes	No
10	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	No
12	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No
13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14	No	No	No	No	Yes	No	No	No	Yes	No
15	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
16	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
17	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes
18	No	No	No	No	No	No	No	No	No	Yes
19	Yes	No	No	No	No	Yes	No	No	Yes	Yes
20	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	Yes
21	No	No	No	No	No	No	No	No	No	No
22	No	No	No	No	Yes	No	No	Yes	Yes	Yes
23	No	No	No	No	No	No	No	Yes	No	No
24	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
25	No	No	No	No	No	No	No	Yes	No	No
26	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
27	No	No	No	No	No	Yes	No	Yes	No	No
28	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes

Source: Own centralization of the results

The manager M5 registered 7 "Yes" answers that is 36.84 % of the 19 positive answers and 25 % of all the 28 answers.

The manager M9 also recorded 7 "Yes" answers representing 35 % of the 20 positive replies and 25 % of the all 28 answers.

Only one manager M10 is practicing the 3rd productive-affective management style as he considers that group decisions are the best ones as each subordinate could offer good solutions to many problems, based on his practical experience and original thinking. also, he consider that work environment is very important to keep the spirit and grow the productivity of the employees with a deep positive impact on the company performance.

The manager M10 registered 6 "Yes" answers representing 37.50 % of the 16 positive answers and 21.12 % of all the 28 answers.

The manager M8 is the only one who likes to apply the 4th management style based on mutual trust, permission and intuition, leaving the employees to establish the ways needed to

solve problems. He also like brainstorming and uses it to collect the best opinions from his collaborators. He registered 6 " Yes" answers for this style, representing 40 % of the 15 "Yes" answers and 21.42 % of all the possible answers.(Table 10)

As one can notice from Table 10, each manager has opinions on all the other management styles, he agrees or disagrees various aspects which could allow us to draw the conclusion that each manager could apply a mixture of management styles, selecting the most adequate depending on the situation of the company, characterizing him what kind of manager is.

This is a peculiar aspect not only the agricultural companies but also for the companies dealing with other businesses. But in the field of agriculture, where production processes are under the continuous change of the market and climate conditions, the management style should be a flexible one, even though a manager could have a dominant style.

Table 10. Managers' answers by management style

Manager	Answers for the management style based on analysis and control		Answers for The management style based on communication		Answers for the productive-affective management style		Answers for the permissive and intuitive management style		Total answers	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
M1	7	0	4	3	5	2	3	4	19	9
M2	7	0	4	3	4	3	3	4	18	10
M3	7	0	4	3	4	3	3	4	18	10
M4	6	1	4	3	4	3	3	4	17	11
M5	5	2	7	0	3	4	4	3	19	9
M6	6	1	4	3	4	3	4	3	18	10
M7	6	1	4	3	4	3	2	5	16	12
M8	3	4	4	3	2	5	6	1	15	13
M9	5	2	7	0	4	3	4	3	20	8
M10	4	3	3	4	6	1	3	4	16	12
Total	56	14	45	23	40	30	35	35	176	104

Source: Own calculations.

6. Measures to be taken in order to improve human resource management

The objectives of the Strategy for South West Oltenia Region for 2014-2020, Strategic Area 6. Human resource development could be reached only if important measures will be taken to improve the human resource management.

Among the most important measures, there are the following ones:

- Facilitating the access to education and qualification of people working in the fields of: education, research, social, health, public administration, economics and entrepreneurship;
- Encourage and support the active population in improving their skills through access to training and lifelong learning;
- Diversify and increase the quality of services provided by public administration and strengthening of good governance;
- Improve the quality of human resources and supporting professional and territorial mobility of labor;
- Development and diversification of labor offer by encouraging and supporting the creation of new jobs
- Improving labor intermediation;
- Promoting and supporting the fundamental rights, combat discrimination, exclusion and prejudice among vulnerable groups and disadvantaged communities;
- Employment growth by supporting the creation of new jobs and facilitates the access

on labor market among the vulnerable persons or socially disadvantaged persons;

- Improving the quality of life for vulnerable and social disadvantaged groups by facilitating the access to education, training, qualifying and retraining, particularly for the population of Roma ethnicity;
- Promote and support the social economy and social enterprises.

CONCLUSIONS

The human resources represent the only resource from an enterprise which can have the capacity to increase its value over passing the time, unlike all the other resources of the enterprise, that wear out if not physically, then morally.

The organizations have then to purchase and to allocate the necessary resources in reaching the goals. By the way these resources are used depends the future of the organization. All the organizations are composed of people, which are placed in the forefront so that to reach much easier the goals proposed.

The human resources management studies or should study the "human part" of the organizations management and not least the relationships employees - employer. The aim is to ensure that the employees, human resources respectively, are used so that the employers obtain the greatest possible benefits from the skills of the employees and

they, in their turn, obtain both material and spiritual rewards at the workplace. The human resources management is based on finding a work psychology using techniques and procedures known as « personnel management », which is that part of the human resources management that concerns of ensuring resources for the organization, determining and meeting the needs at the work place, procedures and practical rules governing the relations between the organization and the human resource.

The study case regarding the South West Oltenia Region reflected how important are human resources mainly in agriculture, but also in the field of services, industry and constructions.

The high percentage of the rural population, the low productivity level, the low training level, the lack of material and financial resources are major aspects which the authorities should take into account in the future in order to increase performance and competitiveness of the local economy and solve the social problems.

In the human resource management, the managers' capacity and abilities to work with their subordinates depend on their professional knowledge and practical experience, communication skills, assertiveness, intuition, abilities to evaluate the strengths and weaknesses of their employees, to distribute the tasks and responsibilities in the most adequate way to each one, to explain all of them the objectives the company need to reach and the ways and measures required to fulfill the goals.

A good manager is the one capable to assess himself in a critical manner and consider that he should improve all the time his management style.

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CONSIDERATIONS UPON THE DRYNESS AND DROUGHT PHENOMENA IN THE CARACAL PLAIN, ROMANIA

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Abstract

This study analyzes and evaluates the dryness and drought in the Caracal Plain, a division of the Romanian Plain, using some climatic indices (the De Martonne aridity index, the Angot report and the Angot precipitation index) and Péguy and Walter-Lieth climographs, for the 2000 – 2013 period. There have been used climate data from the Caracal Meteorological Station. The quantitative and comparative analysis of the above indices and of the climographs indicates that the intensity and duration of dryness and drought phenomena in the Caracal Plain have the same characteristics with the Oltenia region, meaning a slight increase from west and south-west to the east and north-east, which increases the degree of continentalism, and also from the north to the south.

Key words: climatic index, climographs, drought, dryness, the Caracal Plain

INTRODUCTION

On the general background of global warming, of the extreme events and the trend towards more pronounced aridity, the knowing of the geographical spread of dryness and drought phenomena is necessary in order to implement the most appropriate measures for mitigating and combating these phenomena. This aridity trend is observed in Romania, especially in the southern and south-eastern regions, where most crops have to be flooded in order to optimize the yields.

The dryness and drought phenomena (like climatic risk) are among the most complex ones, having a gradual progress. Several factors contribute to their occurrence, namely: the active surface peculiarities, the weather, the physiological peculiarities of plants and the anthropic factors. [11, 12]

Among all these factors, the dynamics ones, which indicate the persistence of some characteristics of time, the lack of precipitation, the temperature increase etc., are the most important, determining the intensity of drought. Firstly, the atmospheric

drought occurs, followed by the pedological one, while the complex drought (both atmospheric and pedological one) installs in the maximum intensity phase.

The dry period is the interval of 5 consecutive days without precipitation or with low precipitation that did not exceed the daily average. *The drought period* is the interval of at least 14 consecutive days in the cold season (XII–III) and at least 10 consecutive days in the warm semester (IV–IX), with no precipitation or where the amount has been of $\geq 0,1$ mm/day [2].

The dryness and drought phenomena are characterized by the absence of precipitation (due to prevailing of the anticyclone, as a consequence of the stationary baric anticyclone formations with a huge progress over Europe, which cover the territory of Romania) and by the increased evapo-transpiration.

This paper aims to evaluate the dryness and drought phenomena in the Caracal Plain, based on the quantitative analysis of both the climatic indices (the De Martonne aridity index, the Angot report and the Angot

precipitation index) and the Péguy and Walter-Lieth climographs.

The Caracal Plain is situated in the south of Romania, in the historical region of Oltenia, being a division of the Romanați Plain, which belongs to the Romanian Plain (Figure 1).

It is located at west of the Olt Valley, being characterized by the predominance of slow and relatively flat shapes, which impose a remarkable homogeneity of the landscape, the height varying from 180 – 190 m in the north, to 45 – 50 m in the south [1].



Fig. 1. The geographical position of the Caracal Plain in Romania
 Source: own processing from www.google.ro

MATERIALS AND METHODS

For this study, there have been used the database of the meteorological observations with long string of data made at the Caracal meteorological station, located at an altitude of 106 m, 40° 06' N latitude and 24° 21' E longitude, for the period 2000 - 2013 (Figure 2).

The processing of these climate data aimed to calculate and analyze the *De Martonne aridity index*, the *Angot report* and the *Angot precipitation index* and to achieve the *Péguy and Walter-Lieth climographs*, which show the presence, frequency and intensity of the dryness and drought phenomena [13].

The climatic indices were calculated based on simple mathematical formulas [8], dedicated, most relying on the reports of the two meteorological elements: the air temperature and the precipitations [5]. For each index has been presented the way they are calculated.



Fig.2. The geographical position of the Caracal Meteorological Station in the Oltenia Region, Romania
 Source: own processing from www.arcgis.com

The De Martonne aridity index ($\text{mm}/^{\circ}\text{C}$) is used to characterize the aridity, indicating the restrictive character for certain plant formations, being calculated yearly, monthly and in the growing season. The De Martonne annual aridity index is calculated based on mathematical formula: $I_a = P/(T + 10)$, where P is the annual amount of precipitation, T is the annual average air temperature, 10 is the value in Celsius degrees, value which is added to denominator, to produce positive results in regions with negative annual average temperatures. *The De Martonne monthly aridity index* is calculated based on the formula $I_m = 12p/(T + 10)$ [3].

The Angot report (mm) is the ratio of precipitation in the warm semester and the amount of precipitation in the cold semester, being an indicator of the continentalism degree [3].

The Angot precipitation index (K) is the ratio of the daily average volume of precipitation in a month and the annual daily average precipitation volume. The formula is $K = q \cdot 365/Q \cdot n$, where K is the Angot index, q is the monthly average precipitation, Q is the annual amount of precipitation, 365 is the number of days in a conventional calendar year and n is the number of days of the month, where February is of 28 days. The Angot index is used to determine the characteristics of precipitation for each month of a year [9].

Besides the quantitative analysis, expressed by various climatic indices, the use of graphics, such as the Péguy and Walter-Lieth

climographs, highlights the generalization of the dryness and drought phenomena in all the Caracal Plain area.

RESULTS AND DISCUSSIONS

The Oltenia Plain belongs to the transition climate subsector from outside the Carpathian arch, characterized by emphasizing of the continental climate, with clear and warm weather during summer, due to the continentalization of the oceanic air masses from the west and tropical-sea in the south-west and south, reaching warm and relatively dry in the studied area. The continental air masses, coming from the east and northeast are hot and dry from the beginning [4]. In the period under review, the annual average temperature, at the Caracal meteorological station, is 11.9° C and the precipitation amount of 564.3 mm. The precipitations have frontal and thermo-convective origins, being primarily in the form of rain.

The aridity De Martonne index expresses the humidity or drought conditions, with low values for drought and high values for the wet climate. Analyzing the data in Table 1, one can notice, that in the studied area, the annual arid index Martonne has a value of 25.8. According to the classification which takes into account the applicability limits of this index, the Caracal Plain area has a semi-humid climate, where the steppe vegetation is well represented. The monthly values of this index varies between 54.3 in January to 18 August, being the only month with value less than 20, value which indicates a semiarid climate.

The Angot report is an indicator for the continentalism of the climate. For the period 2000 – 2013, in the analyzed area, the value of this ratio is 1.1. This value closed to unity indicates a relatively uniform distribution of the precipitations throughout the year.

The Angot precipitation index (K) highlights the climate feature of each month. The subunit values of 0.8 in January, February, March, December and of 0.9 in November indicate dry months. The unit values in April and May indicate months with a normal distribution of precipitations. The overunit

values in June (1.5), July (1.2), August, September and October (1.1) indicate rainy months.

The annual value of this index, at the Caracal meteorological station is 1, as shown in Table 1.

The Caracal Plain belongs to type III default, according to this index and to the zonal distribution of precipitations, being characterized by a significantly reduced annual amplitude with two maxima and two minima of precipitations [7].

Table 1. The variation of the climatic indices in the Caracal Plain, at the Caracal meteorological station, during the period 2000 – 2013

month	The De Martonne index	The Angot index - value	
I	54,3	0,8	subunit
II	39,1	0,8	
III	27,4	0,8	
IV	24,4	1,0	
V	21,5	1,0	
VI	25,6	1,5	unit
VII	20,1	1,2	
VIII	18,0	1,1	
IX	21,7	1,1	
X	29,3	1,1	
XI	28,8	0,9	overunit
XII	45,2	0,8	
an	25,8	1	

Source: Own calculations.

The Péguy and Walter-Lieth climographs, made for the Caracal meteorological station highlight the periods of dryness and drought.

The Péguy climograph enables the simultaneous analysis of temperature and precipitation for all the months.

Based on Figure 3, it appears that the only arid month is August, while July belongs to the hot and humid months.

The Walter-Lieth climograph shows the presence or absence of the dryness and drought periods.

For the Caracal Meteorological Station, the climograph does not reveal a drought period. The dry period installs in June, July, August, September and May (Figure 3).

The climographs indicate that the humidity deficit periods during a calendar year, are the same with the maximum requirements of the plants cultivated in the Caracal Plain [10].

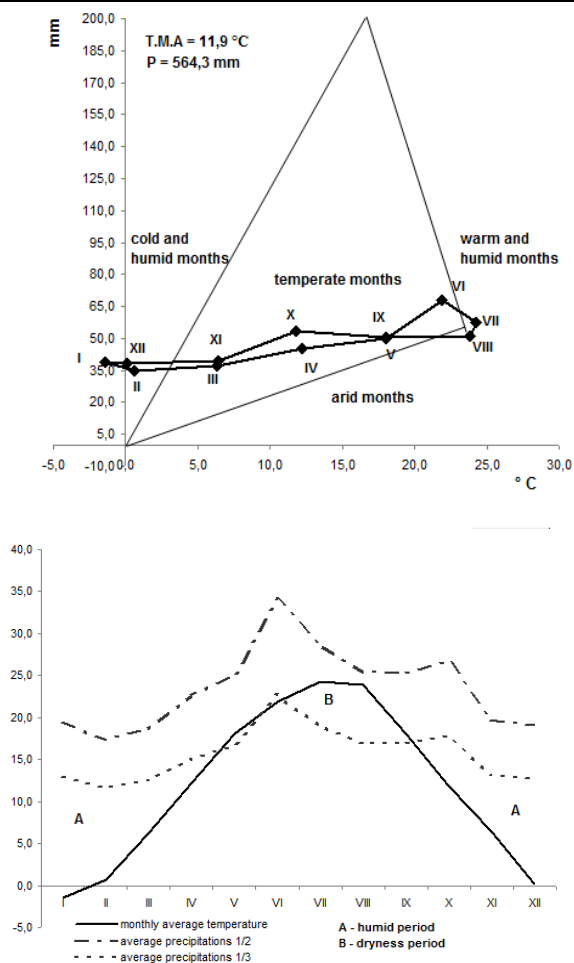


Fig. 3. The Péguy climograph (up) and Walter-Lieth climograph (down) at the Caracal meteorological station, during the period 2000 – 2013
Source: Own determination.

CONCLUSIONS

The evaluation of dryness and drought phenomena for the Caracal Plain is a both scientific and practical necessity.

The more this evaluation is performed for lower durations of time, the more efficient the correlation with the crop phenology or spontaneous vegetation is, thus determining their implications in the growing season [6]. The temporal difference in the frequency and intensity of the dryness and drought phenomena is the result of the convective motion activity intensification and of the local front, plus the latitudinal thermal gradient orientation, characteristic to Oltenia, which the Caracal Plain belongs to. This characteristic is explained by the position of

the region in the "dead end" of the Romanian Plain, plus the Mediterranean influences [11]. For the period 2000 – 2013, throughout the country, and thus in the studied area, there were five years of extreme drought and three years of excessive rains [12].

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NEW CHALLENGES FOR RURAL TOURISM. SPECIALIZATION OF AGRITOURISM GUEST HOUSES

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Abstract

As an alternative of Romania's sustainable development, rural tourism is considered to be an assembly of product-price- consumption, which awards the country multiple opportunities for integration into European structures. Taking into consideration the Government Decision no. 20/2012 on the approval of multi-annual programmer for destinations, forms and tourism products development, the 3rd article, the 1st line, e item "actions regarding a specialized ranking of reception structures with accommodation in the hydropathical (spa) and rural tourism in Romania", as well as the measures covered in the Strategic and Operational Marketing Plan for Romania during 2011-2015, the National Authority for Tourism together with the National Organization for Rural, Ecological and Cultural Tourism, The Partnership Federation in Romanian Tourism and the Management, Economic Engineering in Agriculture and Rural Development at the University of Agronomic Sciences and Veterinary Medicine in Bucharest launch the pilot project: "A thematic specialization of tourism and agritourism guest houses in Romania".

Key words: agritourism, innovation, management, strategy, sustainable development

INTRODUCTION

Tourism is one of the economic sectors that have experienced the most rapid expansion in recent decades.

The economic benefits of the tourism industry are manifold.

The tourism industry generates a significant number of jobs and investment in this area has a relatively short amortization period.

Local economy as a whole benefits as a result of tourism development (Cretu, 2012). [3]

Tourists create additional demand for consumer goods and services, stimulating the tertiary sector (services, trade, craft industries, etc.).

Meanwhile, rural tourism infrastructure tends to have more developed urban infrastructure and services.

Transport and real estate are two major branches that have earned through tourism development.

Should be considered, indirect benefits obtained by increasing the visibility and interest in those regions of Romania which records a large influx of tourists.

If you currently share of tourism in GDP is low at both national and regional level (about 2-3%), medium term this can easily double, even without expansion of tourist reception by adopting projects innovative and sustainable.

In this paper, the main purpose was to propose several criteria useful to identify sustainable and specialized agro guesthouses.

MATERIALS AND METHODS

Because of the tourism potential of Romania, in 2007 it was developed a master plan for this area for the period 2007-2026, which is a necessary tool in the long-term development of tourism, providing a framework for policy support at the national level to develop a sustainable management in the tourism industry. [7]

According to the Statistical Yearbook 2012 of Romania, National Institute of Statistics, the main tourism industry is presented in table 1. [5]

In Romania, the first two positions are occupied by South-East and Central, where tourism attractions are well represented.

Table 1. The main indicators of the tourism industry in Romania, by region (31 July 2011)

Indicators/		Regions							
		North-West	Centre	North-East	South-East	South-Muntenia	Bucharest-Ifov	South-West Oltenia	West
1.	Tourist reception – no.	650	1,197	604	974	533	155	377	513
2.	Tourist accommodation capacity - seats	28,459	45,388	21,927	95,587	24,111	21,086	18,274	23,671
3.	Existing accommodation capacity - thousand places - days	8,830.6	12,867.4	6,423.5	14,336.2	7,199.8	7,644.1	4,761.2	6,354.5
4.	Arrivals of tourists - thousands	799,8	1435,8	696,2	1134,8	615,9	1282,6	426,8	639,7
5.	Number of overnights - thousands	2,084.6	3,311.6	1,556.4	4,050.3	1,677.9	2,129.6	1,486.2	1,682.8

Source: INS – (2012), pp. 230-235[5]

With a very generous nature and cultural heritage of great value, Romania has a high tourism potential and diversified.

Without attempting a clear separation between the forms of tourism in Romania, we consider useful a differentiated analysis of them [Antonoaie, 2002]. [1]

Most research studies concluded that the forms of tourism with the highest growth potential in Romania are: mountain tourism, health tourism, cultural tourism and rural tourism.

Net use index of accommodation capacity decreased from nearly 55% in 1990 to about 23% in 2010, which means that, in average, it remains unfilled accommodation capacity for nine months a year.

In this case, it is needed the adoption of several measures to attract domestic and foreign tourists in the tourism accommodation unit for increasing the accommodation rate, job offer and employment as well. [6]

Given the potential of the Romanian agritourism, it was proposed a marketing tool to promote hostels and attract tourists [CEDES 2009], [2]

RESULTS AND DISCUSSIONS

1. The Pilot project objectives

The Pilot Project “A thematic specialization of tourism and agritourism guest houses in Romania” requires the volunteer participation of tourism economic agents and it does not replace the present classification by degree of comfort in reception structures with accommodation, being complementary to it.

The project’s goal lies in public recognition, encouragement and economic agents stimulation which make efforts and obtain important results to develop their own competitively through quality [Eurostat 2010]. [4]

The goals of the pilot project “A thematic specialization of tourism and agritourism guest houses in Romania, are the following ones:

- A customization of the tourism offer highlighting the quality, variety and uniqueness of products related to the rural tourism;

- The improvement of tourism economic agents competitively by an increase of

products and services quality;

-An increase of the awareness on offer's diversity and quality in Romanian rural tourism, by promoting a good example of quality.

2. The project target group

Eligible applicants may be: economic agents who have tourism and agritourism guest houses authorized by the current law.

The proposals of thematic specialization categories for tourism and agritourism guest houses in Romania as well as the criteria are presented in the Appendix 1, which were subject to public debates by the National Authority for Tourism during June the 10th and July 30, 2013.

Any comments or suggestions for improving the criteria will be taken into consideration, analyzed and utilized for improving the project procedures and solutions.

The benefits for taking part at the project are:

-The accomplishment of a bilingual material (brochure and CD) to present specialized guest houses;

-The promotion of specialized guest houses on the Ministry web page;

-Granting a diploma where in one may write "Tourism guest house recommended by the National Authority for Tourism that is specialized"

3. Product touristic and agrotouristic innovation

Marketing research was conducted by applying questionnaires among owners of hostels in Romania and tourists.

As a result of research, there were emerged different types of pensions which are presented in Fig.1.

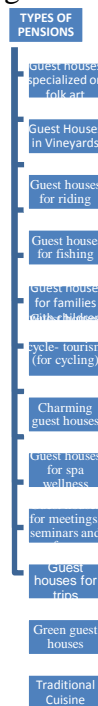


Fig. 1. Types of pensions (personal contribution)

The types of pensions by classification criteria are presented in Table 2.

Table 2. Types of pensions and criteria for the classification

Nr. crt.	Types of pensions	Criteria for the classification
1.	Guest houses specialized on folk art	The structure should be classified; The structure has a specialized workshop, where one may practice/ evidence the folk art (by example: popular painting craft; clay craft; wood carving craft; folk craft); At the tourists demand, the guest house owner may hold work sessions to show the craft process of product; It is recommended that the owner to hold and present information about craftsmen in the area; The structure has an available parking; The structure has a special area for the display of products related to folk art; The road to guest house should be signposted;
2.	Guest Houses in Vineyards	The structure should be classified; The structure should be situated in a winegrowing area; The vineyard environment is reflected into the internal and external design of the structure; Free informational materials to discover details about wine and grape varieties are available to guests; The structure is equipped with dedicated spaces to keep and taste own wine varieties; At guests request, the owner should arrange visits to the cellars where the wines are kept, at some mansions ore castles in the area; the owner should also organize tasting sessions, trips to vineyards, especially during the harvest season and so on; The internal design should be appropriate to the area and it is recommended to use in decorating the rooms, products and materials related to rural live (rustic wooden tables, chairs and so on); The road to guest house should be signposted.
3.	Guest houses for riding	The structure should be classified; The internal design should be appropriate to the area and it is recommended to use in decorating the rooms, products and materials related to rural live (rustic wooden tables, chairs and so on); The guest house should have horses, stables, horse feed, specific tools for taking care of the horses and riding equipments, or it should be placed at a distance of about 5 km of a herd of horses; At the guest house should be at least a person trade in riding and can provide information to clients ; At guests request, the owner should assure the clients lessons for teaching and training the riding; The road to guest house should be signposted.
4.	Guest houses for fishing	The structure should be classified; The structure should be placed in areas where one may practice fishing (near the rivers and lakes). They have spaces for keeping boats, fishing tools, spaces for fish processing and storage; The internal design should be appropriate to the area and it is recommended to use in decorating the rooms, products and materials related to rural live; The structure has available parking; It is recommended the guest house to have specialized magazines for tourists; The road to guest house should be signposted.

5.	Guest houses for families with children	The structure should be classified; The guest house should have a playground; The menu must be suitable for children needs The furniture should be proper for developing some indoor games for children, but also other activities such as painting or colouring; In the guest house there should be high chairs for children, a surrounded playground with at least four elements, T.V and so on ; The road to guest house should be signposted.
6.	Guest houses specialized in cycle- tourism (for cycling)	The structure should be classified; The guest house is recommended to provide the possibility to rent bicycles, free of charge or surcharge; The structure should offer the clients a parking for bicycle, bike repair services, information about routes and cycle lanes and so on; The guest house offers maps, informative materials and information about tourism routes; The road to guest house should be signposted.
7.	Charming guest houses	The structure should be classified; The design is innovative, harmonious, spectacular in using forms, materials, colours, light and space without functions neglect; Gardens are designed in a particular way, using attractive furniture The road to guest house should be signposted.
8.	Guest houses for spa wellness	The structure should be classified; The guest house should have certain facilities including sauna, herbal baths, massage, swimming pool or it should be placed on a distance of about 5 km away of a treatment or wellness base ; Into the accommodation rates are also included pool and sauna access; At the guest house there is at least a person trained in wellness and available for answering the clients questions about health; The menus are very well balanced and there is at least a vegetarian one; Into the rooms should be displayed information about health and wellness philosophy; There are at least 50% of rooms for non- smoking people; The road to guest house should be signposted.
9.	Guest houses for meetings, seminars and conferences	The structure should be classified; The structure should have a conference hall with a minimum of 25 seats; In the conference hall should be tables, chairs, computers, a flipchart, a screen for video projection, free internet access; The structure should have access to public transportation; The structure should have a space that can be used as office work and be properly equipped with fax, internet access; The road to guest house should be signposted.
10.	Guest houses for trips	The structure should be classified; The structure is situated in regions where one may go into trips; Trails are well marked around the structure; Tourists will find information about cabins, huts, weather, public transport and so on ; The structure provides clients the opportunity to serve a healthy breakfast, and those who leave early in the morning, coffee at thermos and possibly a package; The road to guest house should be signposted.
11.	Green guest houses	The structure should be classified; The structure should be placed into a distinct, natural, quiet and private; The structure should have a yard, with a well-designed garden; The structure should use alternative energy sources; The structure has own plant and animals production; The road to guest house should be signposted.
12.	Traditional Cuisine	The structure should be classified; At the guest house are offered local and traditional menus and drinks; The house speciality, the ingredients it contains and its history are presented into the guest house promotion brochure; Regarding the tourists' demand, the guest house owner should organize activities for harvesting medicinal plants, forest fruits or mushrooms; Regarding the tourists' demand the guest house owner should organize a picnic at the edge of the forests; The guest house menu must provide clients at least five categories of specialities; The guest house should provide new and old cookery books, receipts or literature; The road to guest house should be signposted.

Source: Personal contributions

CONCLUSIONS

For Romania, tourism is one of the branches of the economy, which together with agriculture could contribute to increase of GDP per capita.

For this purpose, there are needed innovative and sustainable strategies in these sectors [Cretu R, 2012].

The pilot project presented in this paper is an innovative and durable solution, its role is to identify the types of touristic and agroturistic guesthouses which meet in a much larger market, based on consumer demand for tourism products and bidders.

In this paper, there were identified several criteria for sustainable and innovative agro guesthouses and specialized subject areas, depending on supply and demand.

The Pilot Project "A thematic specialization of tourism and agritourism guest houses in Romania" requires the volunteer participation of tourism economic agents and it does not replace the present classification by degree of

comfort in reception structures with accommodation, being complementary to it.

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THE NEED TO IMPROVE PRACTICAL INFORMATION SYSTEM IN AGRICULTURE AND SPECIALIZED INDUSTRY

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Abstract

In Romania, the establishment of the market economy has required the elaboration and implementation of agricultural, alimentary and nutritional policies, based on scientific criteria, to ensure that the structure of Romanian agriculture would come close to that of the European Union agriculture. Agricultural policy needs to be coherent, flexible and directed towards the economic, social and environmental protection performance. Worldwide practice shows that empiric experience of economic agents does not suffice, but requires plenty of scientific knowledge. The hereby study undertakes to carry out a radiography of the production potential of agricultural operations in Romania and to demonstrate the need for improving practical information systems in agriculture and specialized industry.

Key words: agritourism, innovation, management, strategy, sustainable development

INTRODUCTION

Romanian agriculture is characterized by reduced efficiency and multiple issues of economic and social nature.

There are numerous Romanian agricultural holdings but their size does not allow the use of appropriate technologies that is the consistent use of material, human and financial resources.

According to the information released by "Structural survey in agriculture" in June 2011, as a result of the General Agricultural Census in 2010, Romania had 15,866 thousand hectares of land for agriculture in 2010, of which only 13,298 thousand hectares were effectively in operation. [19]

Out of the agricultural land in operation, 7,445 hectares were individual agricultural operations and 5,853 were agricultural operation established as agricultural entities. This means that 55.99% of the land used for agriculture in Romania is under individual ownership, which does not allow the implementation of appropriate technologies. (Lungu, 2011), [www.ins.ro 2015] [16]

MATERIALS AND METHODS

Of the agricultural area in use in Romania, 62.45% is used as fields, 33.79% as grazing and meadow lands, 2.39% for permanent cultures and 1.37% for home gardens.

Table.1. Agricultural area in use divided by possession categories in Romania, 2010 (Thousand hectares)

Agricultural area in use	2010	
	Value	%
Fields	8,305	62.45
Home gardens	182	1.37
Grazing land and meadow-land	4,494	33.79
Permanent cultures	317	2.39
Total	13,298	100

Source: Structural survey in agriculture, 2007, General Agricultural Census, 2010 [19]

According to the same source, the average agricultural surface per agricultural holding is 3.4 hectares. An individual agricultural holding has an average surface of 1.9 hectares, while an established agricultural entity has 190 hectares on the average (Table 2).

Table 2. Agricultural exploitations in numbers and average surface in Romania in 2010

Indicators	2010		
	Number	Thousand hectares	Average size (ha)
Agricultural holdings, of which:	3,856,245	13,298	3.4
Individual agricultural holdings	3,820,393	7,445	1.9
Agriculture established entities	30,669	5,852	190

Source: Structural survey in agriculture, 2007, General Agricultural Census, 2010 [19]

In agriculture, an important structural issue is the estimation of the economic size of an agricultural holding. This depends on the optimum level of combining production factors per holding. Among the production factors, territorial dimension and exploitation intensity are determination factors or factors with major impact with regard to the economic dimension.

The most commonly used indicator in the structural analysis of agriculture exploitations in European Union is the standard gross margin (MBS). This is used in order to estimate the technical and economic potential of cultures and animal species by country and characteristic areas, in order to evaluate the economic dimension of agricultural exploitations.

Table 3. Economic dimension categories

Category	UDE
I	Less than 2
II	From 2 to 4
III	From 4 to 6
IV	From 6 to 8
V	From 8 to 12
VI	From 12 to 16
VII	From 16 to 40
VIII	From 40 to 100
IX	From 100 to 250
X	>250

Source: Decision 94/376/CE [17]

The determining unit of the economic dimension (UDE) established by Decision 94/376/CE is of 1,200 Euro. The economic

dimension categories in UDE are presented in Table 3.

RESULTS AND DISCUSSIONS

From a technical and economic perspective, the Romanian agriculture has three different categories of development as shown in Fig.1.

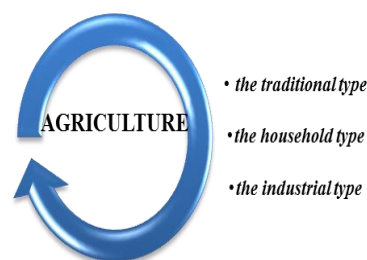


Fig.1. The main development patterns of agriculture

(i) *The traditional type*: individual exploitations where the owner earns his living from other economic fields and round it up with the agricultural income.

(ii) *The household type*: family associations with average technical level, having their area organized in specialized farms;

(iii) *The industrial type*: limited liability agriculture companies, specialized (vegetables, cattle, mixed holdings).

Although they might seem efficient and productive in time, many of these agriculture exploitations do not last long.

Agriculture work has turned into a low qualified job. It has specialized in growing mainly three cultures that is wheat, corn and sunflower or raising exclusively an animal species. (www.madr.ro 2015) [17]

Depending on the UDE number, agricultural exploitations can be divided into three different types:

(a) Small size (up to 8 UDE) - economic size categories I, II, III, IV;

(b) Middle size (8 to 40 UDE) – economic size categories V, VI, VII;

(c) Large size (over 40 UDE) – economic size categories VIII, IX, X.

In the small exploitations in Romania, the entire agricultural surface is represented by fields. The characteristic organization pattern consists of individual households.

The cultivated area is owned as property by

the head of the household and it is generally used for growing cereals, oleaginous plants and nutriment.

Many of these exploitations have a mixed profile: both vegetal and animal.

As far as equipment are concerned, these exploitations have the minimum required so they use mechanical works. From an equipment standpoint, these households have tractors, ploughs, harrows, seeding machines, trailers, hoes.

Labour consists of the family members or people hired on a temporary basis in order to carry out works at the right moment.

This type of agriculture exploitations have a low average efficiency per hectare that changes from one year to another due to weather conditions, lack of an irrigation system and other technological links. Production is mainly designed for internal consumption and capitalization through direct sales on the market.

The cost of production factors, as well as the average level of production result into a considerably increased amount of the total costs.

These households benefit of the state subsidy per hectare which allows making some profit per hectare. In many cases, they do not benefit of subsidies due to failing to provide in due time the required documents. (Popescu, 2010) [10]

Many of these family type exploitations are organized to generate profit, some of them achieving impressive results in this direction.

These farms specialize on cultures with low costs and a marketing bay pretty similar to that of big agricultural exploitations.

In order to stay profitable, these farms need to protect the agricultural area from the industrializing effect and focus on high quality works. (Zahiu, 2001). [13]

As far as middle size agriculture holdings are concerned, the entire land consists of fields. The characteristic organization pattern consists of the family agriculture association and of limited liability entities.

As far as family agriculture associations are concerned, part of the land is owned as property by the members of the association and another part of the land is rental.

As far as limited liability entities are concerned, the entire area of land is rented. The production structure is heterogeneous for this type of operations in terms of growing cereals, oleaginous plants and nutriment. From an equipment standpoint, they are very well equipped but during optimal harvesting periods they equally use third parties service providers.

For family agriculture associations, labour consists mainly of the family members, while for limited liability entities labour is made up of the companies' administrators and field specialist members.

For both organization patterns, during high peak agricultural season they also use temporary labour. This exploitation type uses equally the subsidy per hectare which leads to increasing the profit per hectare [Luca 2012]. [6]

The large agriculture exploitations are mainly organized as limited liability entities. The main production profile consists of growing cereals and oleaginous plants, but it can equally be vegetal or mixed.

They are very well equipped with machinery and equipment and ensure on their own the technological works.

Labour consists of the companies' administrators, field specialists and temporarily hired workers during high peak periods of the agricultural works.

These entities benefit of the subsidy per hectare which leads to increasing the profit per hectare. (Luca et al., 2012)[6]

Along with the economic development, the size of the agricultural exploitation tends to increase, theoretical reasons being described in Table 4.

Since the 1970s, the agriculture of European countries¹ has registered a downward trend. (Luca et al., 2012)[6]

In 1975 there were 5.8 million exploitations over the 5 member states, while in 2007 their number has considerably diminished, down to 2.6 million, with pronounced decreasing rates over the last few years. (Ionescu et al., 2007). [5]

¹Luca, L.- coordinator, Ciongă, C., Giurcă, D., (2012), *Reinforcement of the agricultural exploitation*, Economic Publishing House, Bucharest, pages. 66-67

Table 4. Reasons for the increase in size of the agricultural exploitations

	Who and what generates the reason	Results
A set of material and economic elements	Types of soil, agricultural and weather conditions, relative prices of the production factors, intermediary inputs, prices at the farm's gate, technology used	Balance size of the operation; choosing cultures; the use of production factors
Land / labour ratio	The number of grownups that can do work	Balance size of the exploitation
The characteristics of the agricultural input	Input acquisition, specialized labour	Size of the agricultural households
Management abilities	Development requires developing new competencies	Impact on the size of the agriculture exploitation
Scale economy lined to processing and selling	Contract associated costs depend on the scale of developing the activity	Potential impact on the efficient size of the farm
Accumulation and implementation of technological progress	Changing household size, agricultural and ecologic conditions, transport costs	Variations of the balance size of the agricultural exploitation

Source: Luca, L.- coordinator, Ciongă, C., Giurcă, D., (2012), Reinforcement of the agricultural exploitation, Economic Publishing House, Bucharest, pages. 66-67 – adapted [6]

Industrialization of the agricultural products

Francois Perroux was saying that "industrialization is a cumulative process that structures social assembly by intensive use of the machinery systems and allows the accumulation of goods that human community benefits of at decreasing costs". (Francois Perroux, 1975, Politique du développement et lacunes du calcul économique », *Mondes en développement*, (10), 191-202.). [9]

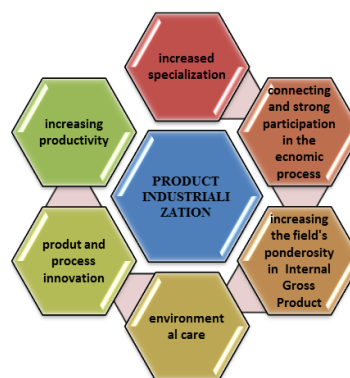
This needs to be considered from a double perspective:

-From a wide perspective, it admits the idea of increasing productivity, decreasing physical effort and the drive effect generated by aggregates;

-From a narrow perspective, industrialization = substitution of imports, that is ensuring the agriculture products needed for consumption, of vegetal or animal nature, from own resources;

The industrialization of agriculture products has an impact on society changes, mainly on the labour market, due to the increased level of specialization, increasing the processing level of agricultural products, but it can also ensure industrial durability by means of enforcing environmental friendly measures. (Gagiu, 2010) [4]

The positive aspects of the products industrialization are summarized in Fig.2.



Source: personal opinion

Fig.2. Positive aspects of products' industrialization

In order to capitalize these opportunities it is necessary to combine macro-economic, micro-economic and institutional factors.

Out of the macro-economic factors having an impact on the product's industrialization, we can list the following:

-Existing or created competitive advantage (abundance of labour, low level of salaries, duration of the working day etc):

-State's intervention policies that need to be: promoting, prospecting, scheduling, protecting, forecasting, reducing uncertainty;

-Companies' strategies on medium and long term.

Micro-economic factors aim at the innovation process both of the system as well as of the products, so that they become competitive on any market, as it is well known that industrial

thinking differs from marketing thinking. (Stoica, 2012) [11]

Institutional factors have a decisive impact on the development of the product industrialization, with the mission of creating appropriate institutions that are capable of stimulating this complex and complete process [Bodea 2010] [2]

CONCLUSIONS

„The implementation of optic fibre in the desert does not make it any greener, but the absence of modern communications cuts off the economic development in any oasis" Parker said.

A green and efficient agriculture is a difficult to accomplish challenge given the circumstances of the rapid growth of innovation in the production technique.

All it requires is as the enterprise should be familiarized both with the constantly changing frame conditions and possessing a great deal of knowledge². [2]

On one hand, this knowledge must consider the specific conditions of the agricultural exploitation and on the other hand to equally include eternal information, in order to carry out the schedule, but especially for the decision making process.

In time, it has been observed that agricultural work becomes more efficient if it is done on big areas of land through producers' associations.

Such is the case of the Netherlands, the most efficient country in the whole world in using their agriculture potential, which despite the fact that it has a six times smaller surface of land compared to Romania, is the second exporter of agriculture products in the world, after USA.

Although the field area of the Netherlands is ten times smaller compared to Romania, this country keeps its leading position due to the agriculture activities performed by holding companies, based on cooperation contracts concluded between producers, collectors of primary agriculture products, transporters,

consulting (technical, economic, legislative). (Ghita, 2014)[3]

In Romania, the association between producers in the vegetal field (growing cereals) with producers in the cattle field (animal breeding) and product industrialization has proved its efficiency (e.g. the Agro-industrial plant in Curtici), but the number of such entities is very low.

The use of computerized systems in agriculture exploitations of a holding type has a series of advantages and disadvantages that are summarized in Table 5.

Table 5. Advantages and disadvantages of using IT technology in agriculture exploitations

Advantages	Disadvantages
Quality/accuracy of the information	The cost of hardware and software equipments
Making calculations in a fast way	Incompatibility of the equipments with the profile of the agriculture exploitation
Internal and external communication	Need for specialized personnel
Well defined and organized working tools	Data collecting efficient system
Increasing the potential of the farm	Cost for personnel training

Source: Technical and scientific report, CEEX Contract, Module I, Stage II, Manager: Pătărgăeanu S., R., ASE, Bucharest 2007, page 8. [8]

At an agriculture exploitation level, one must manage both scheduling as well as the output of the main economic indicators, on a long period of time, as well as the quality of the data inflow and generating summarizing reports... [Tudor 2013]. [11]

Therefore a series of requirements for a modern program for keeping track of the crop's technological record can be drafted for agriculture exploitations with vegetal profile, a record regarding animal's displacement for the cattle breeding sector, a record of the finished products for the products' industrialization, etc. [Aldea 2011]. [1]

² Ghiță, I., **Agriculture IT**, Master's degree notes : European agriculture economy, page 50

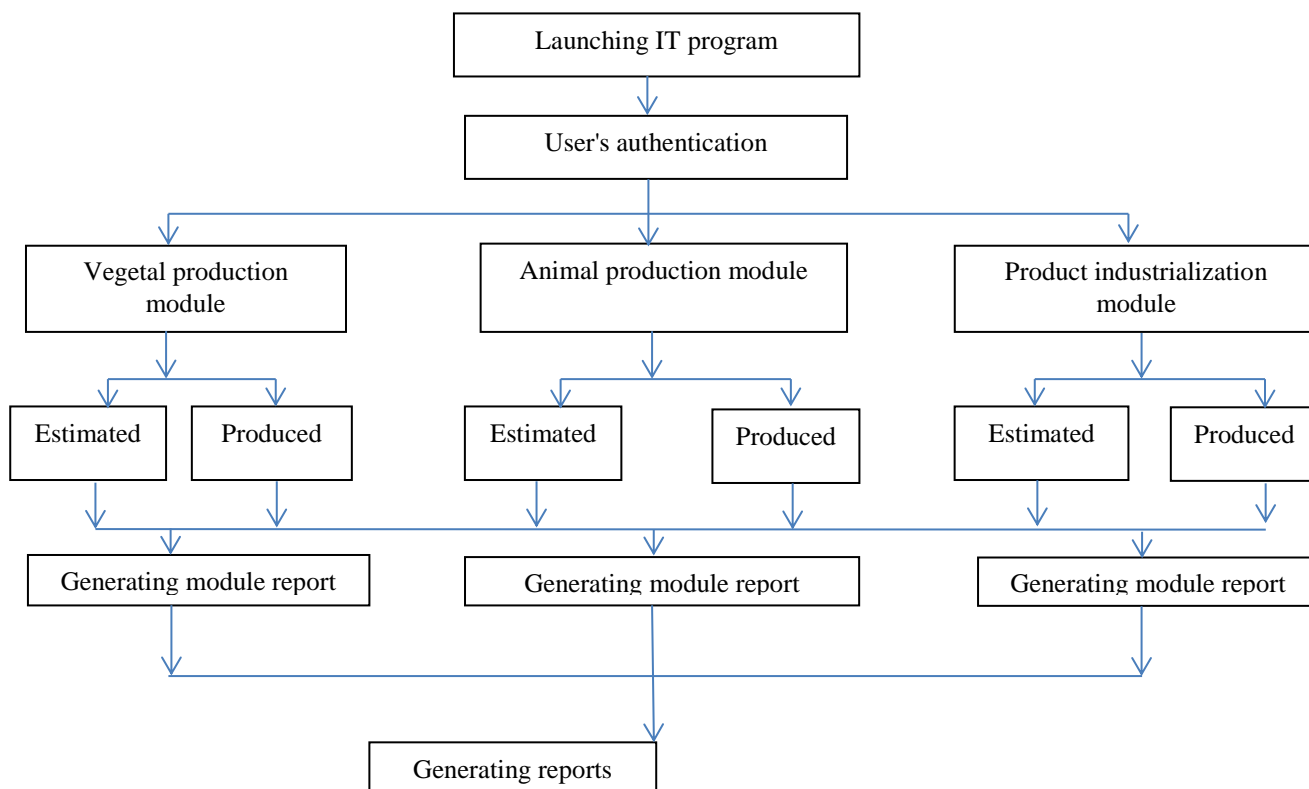


Fig.3.IT and accounting program of a complex agriculture exploitation - summarized version
 Source: personal contribution

Software requirements³ for the vegetal sector: summarizing document regarding nutriments, nutriments' management and optimization as well as their nature; cooperation between various economic entities; labour record and the production capacity of the equipment; integrated monitoring system; tractor's dashboard computers; mini-weather radios to warn on weather conditions; subsidies' record; rental follow-up, etc.

Software requirements for the animal breeding field: record per each animal, planning function monitoring; feeding schedule, weight gain; nutriments stock record, etc.

Software requirements for the agriculture product industrialization sector: raw materials management from the vegetal and animal breeding sectors; record of the product input from other economic entities; record of the value added indicators; revenue and costs; activity performance indicators, etc.

The software can be summarized as shown in Fig.3.

It is obvious that information sources and the existence of a computer in the agriculture exploitation have a major importance towards the future IT development in the rural area, in terms of the importance of opening for what's new and understanding the need for such software in the future.

³ *Knowledge Based Approach in Research Projects and Programs Evaluation* authors: Bodea C., Ciobotar N., Bodea, V., in Lztras, M.D., Ordonez De Pablos, P.; Ziderman, A., Rouldtone, A.; Maurer, H.; Imber, J.B.;(Eds) *Organizational Business and Technological Aspects of the Knowledge Society, 3rd World Summit on the Knowledge Society*, WSKS 2010, Corfu, Greece, September 22-24, 2010, Proceedings Part II, Series: Communication in Computer and information Science, Vol. 112, Springer-Verlag Berlin Heidelberg 2010, pp.326-335
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"MAGIC FORMULA" OF THE JOINT AUDITS IN RAISING REVENUE THROUGH WEEDING OUT CORRUPT PRACTICES (BASED ON ROMANIA AND MOLDOVA CASES)

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Abstract

Around one trillion Euros is lost to tax evasion and avoidance every year in the EU. In this context, governments have increasingly been tempted to turn to cross-border audits to secure needed resources and expertise to assist in ensuring international compliance with various taxes and other sources of revenue. However to manage international tax compliance revenue authorities are faced with the significant problem of corruption. The aim of this paper is to examine whether joint audits have to be applied in order to increase the efficiency of revenue collection. In order to narrow the field of investigation, the article focuses primarily on the situation faced by the Romania and Moldova.

Key words: interstate tax audit, Joint audit, multilateral control, multistate joint audit, simultaneous examination

INTRODUCTION

The tax audit landscape presents daunting challenges. The following key factors are driving those challenges: the accelerating pace of global enforcement and global information exchange across jurisdictions; the rapid development of digitalization and the growth trend in the number of taxpayers and volume of cross-border goods and services traffic; the evolution of electronic commerce and sophisticated financial arrangements; the increasing number and size of enhanced relationship tax compliance programs, etc.

Those challenges facilitated development of aggressive tax planning and tax fraud strategies with regards to looses in tax revenue due to profit shifting by multinational firm and wealthy individual. According to the report of OECD [21]: "Tax avoidance and tax evasion threaten government revenues throughout the world. The US Senate estimates revenue losses amount to 100 billion dollars a year and in many European countries the sums run into billions of Euros." The increased variety and quantity⁴ of international tax conflicts, due to taxpayers'

engagement in international tax evasion or aggressive tax avoidance, have prompted contemplation of a more enhanced collective cooperation among states over international tax. Perhaps not surprisingly, therefore, OECD and EU member states have seen a surge of issues associated with significant cross-border transactions rising in recent years. It is worth keeping in mind that international cross-border approach of Romania, Moldova and other European countries is affected by EU practices. In this regards, the question of appropriate and effective tools and policy, within European context, is at the heart of this quest.

Based on the literature review, it was noticed that a few research results exist on the joint audit. Actually no empirical studies of joint tax audit exist at all. However there are many

has been confirmed by the most recent OECD's statistics, over the past five years (see OECD, "Mutual Agreement Procedure Statistics for 2011" (April 4, 2013), available at <http://www.oecd.org/ctp/dispute/mapstatistics2011.htm> According to OECD's evidence, the amount of MAP caseload among OECD member states has remarkably increased by 63% between 2006 and 2011 (from 2,352 to 3,838) and continue to grow each year; and the time to complete a MAP case has also increased from 22,1 months in 2006 to approximately 25,39 months in 2011, although this represents 2,09 months reduction in the average completion time (from 27,3 months in 2010).

⁴ The amount of tax audits and disputes with international references is constantly growing in a globalized world. This significant increase

studies that have indicated that audits are an effective tool for deterring tax fraud.

In responding to the changes indicated above and recognition of effectiveness of audits, group judgment and decision-making quality, and negative impact of corruption, countries (many of which are members of the OECD's Forum on Tax Administration - FTA) are pressed to move from unilateral tax audit models to "simultaneous" audit models and further towards "joint audits" in the hope that this approach will allow for the effective tax system which is expected to be more efficient and productive. Movements for the further development of joint audits will allow business community and tax administrations to improve tax compliance and fight tax evasion, tax avoidance and corruption at the international level.

MATERIALS AND METHODS

The aim of this paper is to examine whether joint audits have to be applied in order to increase the efficiency of revenue collection in Romania and Moldova. This research is relevant for three groups of persons: governments and policy makers, consultants and companies, and academic staff and researchers. Firstly, we characterize the historical background and growing interest for cross-border tax audits in order to highlight the main advantages of providing joint tax audits (Section I). We also identify the conditions under which entering into a joint audit is beneficial to both the tax authority and the taxpayer (Section II). We provide and analyse statistical information on the tax revenue, tax burdens from point of view of time to comply, tax rates, nr. of tax payments and nr of taxpayers per auditor, as well as shadow economy, corruption, inclusive taxpayers registration indicators; tax capacity and tax effort (Section III - IV) in order to stress and demonstrate the needs for joint audits in an European Community of States and their role on weeding corrupt practices.

In order to narrow the field of investigation, the article focuses primarily on the situation faced by Romania and Moldova, as well as other European countries competing in

international markets. In doing so, a large amount of statistical data was collected, synthesised, and analysed. This paper is a combination of a descriptive study and analysis of statistical information. Also, we analysed non-stashed and data concerns' drawn from the OECD, World Bank, IOTA information and other sources of technical expertise. The reference section provides a full list of the reference sources.

RESULTS AND DISCUSSIONS

I. The Growing Interest for cross-border Tax Audits

Taking into account increasing trade of cross-border activities and investments in both business entities and individuals that are operating more globally, and challenges in tax environment from traditional methods of ensuring compliance at national level to more coordinated action of ensuring compliance at international level, we decided to examine the forms of cross-border tax audits. Analysis of the cross-border tax audits will allow for better understanding of states⁵ and taxpayers' goals, their historical evolution will enable better perception taxpayers' and tax authorities' needs for more coordinated actions.

To meet the needs of a government, tax audits vary widely in sophistication, professionalism and coverage. Thus audit procedures considered unacceptable by one country may be standard for another. To highlight the advantages of cross-border tax audits, we divide them in three categories, according to interest of parties in these tax audits:

- Multistate joint audits, in which the interests of taxpayers in checking tax administrations of several states are investigated;
- Interstate tax audits, in which interest in such an inspection comes from at least two or more states involved in the process of initiating a tax audit;
- Joint tax audits, where either a taxpayer may request a proposal for a joint audit to a

⁵ States - states of the same jurisdiction or states of different jurisdiction.

participating country, or the participating country may suggest joint audit cases.

Multistate Joint Audits. A multistate Joint Audit is an audit conducted by the Multistate Tax Commission (MTC)⁶ of the United States that audits multistate business for several states at once. The audits encompass sales and corporate income taxes. They are initiated by the taxpayer, who must write a request for a joint audit by the Commission on behalf of participating states [5].

The decision to perform an audit is made by the MTC audit committee that provides an audit authorization form to each state, if they agree to perform the audit. The states have the option to participate in the audit or to refuse. Preference for participation is given to taxpayers having nexus⁷ with ten or more states participating in the MTC joint audit program and who meet one or both of the following criteria:

-The taxpayer's audit will involve issues that would benefit from consistent interpretations among several states;

-The taxpayer has recently registered for tax purposes with at least 10 participating states, has never been audited by those states, and seeks the guidance on compliance that an audit would provide.

In deciding whether or not to place the requesting taxpayer in the program's audit inventory, the MTC Audit Committee will consider the follow factors: 1. Does the taxpayer meet or exceed the preference criteria above?; 2. Are audit staff resources available within the MTC Joint Audit Program?; 3. Does the taxpayer have a sufficient size and geographic scale of operations to justify the use of MTC Joint

Audit resources for an audit?; 4. Are at least seven states willing to participate in the audit? According to Multistate Tax Commission data, 25 states of US participate in the Joint Audit Program (23 for income tax audits, 19 for sales & use tax audits, and 1 observing state).

Interstate tax audits. Interstate tax audits are made by tax administrations of several states on the tax liability of one or more related taxable persons by the process of:

-*Simultaneous examination:* an arrangement between two or more states. Examinations are made simultaneously, each authority on its territory, as part of its legal competence of the tax affairs of one or more taxable persons. Some of the factors for case selection include the common tax payment compliance regulations, complementary or related interest, with a significant exchange of any relevant information that they obtain. A legal basis for such examinations offers a wide range of tools for cross-border tax cooperation and can be found among others in: Article 12 of Council Regulation (EC) No. 1798/2003 of 7 October 2003 on the exchange of information in the field of value added tax and repealing Regulation (EEC) No 218/92⁸; Council Regulation (EC) 2073/2004 of 16 November 2004 on administrative cooperation in the field of excise and Directive 2004/56 EEC of 21 April 2004, which amended Directive 77/799 EEC on mutual assistance by the competent authorities of the states or based on the provisions, in accordance with the Article 26 of the Convention on avoiding double taxation and preventing tax evasion⁹; Article 5 of the CIAT Model Agreement on Exchange of Tax Information; Article 8 of the joint Council of Europe and OECD Convention on Mutual

⁶ The Multistate Tax Commission (MTC) was created in 1967 through the Multistate Tax Compact, an agreement created and ratified by each member state. The objectives of the Commission are to help make state tax systems fair, effective, and efficient; encourage the adoption of uniform tax law and regulations; reduce state compliance burdens on business; and protect state fiscal authority.

⁷ A **nexus** in general means a connection. The term nexus is used in tax law to describe a situation in which a business has a "nexus" or presence in a state and is thus subject to state income taxes and to sales taxes for sales within that state. Nexus describes the amount and degree of business activity that must be present before a state can tax an entity's income. If a taxpayer has nexus in a particular state, the taxpayer must pay and collect/remit taxes in that state; See <http://biztaxlaw.about.com/od/glossary/n/g/nexusdef.htm>

⁸ Regulation (EEC) No. 218/92 provides for the appointment of individual tax officers to exchange information directly with tax officers to exchange information directly with tax officers in other member states.

⁹ OECD (2010) Update on the Model Tax Convention on Income and on Capital OECD Paris, www.oecd.org/dataoecd/23/43/45689328.pdf and in October 2008, the United Nations also introduced the standard on information exchange for tax purposes in the UN Model Tax Convention, <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan002458.pdf>

Administrative Assistance in Tax Matters¹⁰ and Article 12 of the Nordic Convention¹¹.

-Multilateral control: a coordinated control of the tax liability of one or more related taxable persons organized by two or more participating countries with common or complementary interests which includes at least one Member State. The coordinator of the multilateral surveillance programme Fiscalis of the European Commission supervises the multilateral control¹². The objectives of the Fiscalis programme are to ensure the proper functioning of the internal market by supervising the compliance of Community fiscal rules, protecting national and Community financial interests, combating of tax avoidance and tax evasion, including its international dimension, and enhancing the cooperation between Member States, and reducing, to the extent possible, the (administrative and taxable persons alike) burden of the implementation of Community legislation. The interstate tax audits encompass VAT and excises, income tax and capital gains tax, and insurance premiums. They are initiated by one of the EU Member States who invites other Member States to participate.

If a Member State decides to accept the invitation, tax authorities of that state take part in the initial meeting¹³ for such examination. After the initial meeting, Tax auditors of Member States who agree to the audit provide an intra-Community audit plan based on the agreements made, according to the competences and possibilities their own laws and regulations offer.

Joint Tax Audits. As outlined above, audits of multinationals and globally active high net worth individuals have traditionally been carried out separately or through

simultaneously tax audits. Due to having to go through a similar exercise at least twice, traditional audits can lead to an increased burden on businesses, individuals, and governments. For this reason joint audits are seen [25, p.195] “as one way of reducing this burden”.

Joint tax audits are described as two or more countries joining together to form a single audit team to examine an issue(s) /transaction(s) of one or more related taxable persons (both legal entities and individuals) with cross-border business activities, perhaps including cross-border transactions that involve related affiliated companies organized in the participating countries, and in which the countries have a common or complementary interest; where the taxpayer jointly makes presentations and shares information with the countries, and the team includes Competent Authority representatives from each country [21].

The joint tax audit has been recognized by revenue bodies, taxpayers, and practitioners as preferential for both taxpayers and the tax authorities because it could allow the involved parties to focus on the issue, understand the facts in a more urgently manner, and thereby allow for expeditious resolution of any disagreements.

According to Joint Audit Participant’s Guide one of the advantages of joint audits in contrast to more traditional audits is that either a taxpayer may request a proposal for a joint audit to a participating country, or the participating country may suggest joint audit cases.

In deciding whether to perform a joint audit, the Competent Authority considers many factors including the following:

- Information available in two or more countries will allow a better risk assessment;
- Similar or related transactions of multinational companies will allow for deterrence of unnecessary complexity of multiple entities or respective taxpayers and clearer structured transactions;
- Willingness of multinationals for greater certainty and an enhanced relationship with revenue bodies on a global basis;

¹⁰ OECD & Council of Europe (2008) The Convention on Mutual Administrative Assistance in Tax Matters. www.oecd.org/dataoecd/15/43/2082215.pdf with Supplementary Protocol (2010).

¹¹ Nordic Convention. Convention of 7 December 1989 between the Nordic Countries on mutual administrative assistance in Tax Matters. The Nordic countries are: Denmark, Faeroe, Greenland, Finland, Iceland, Norway and Sweden

¹² formed on the basis of Decision 888/98/EC of the European Parliament and of Council of 30 March 1998.

¹³ The purpose of this meeting is to determine, the joint auditing strategy (risk analysis), the objectives of the Interstate tax audit and the objects to be audited.

-Tax risk connected to specific business sectors or non-compliance taxpayer;

-Two or more jurisdictions agree that a joint audit would expedite factual development and issue resolution on double taxation or transfer pricing methods.

-The residency of the taxpayer is not clear, etc.

The 2013 IFA country reports show that up till 2013 there have been only a few procedures or pilot projects, with the notable exception of Finland, which is conducting five to ten joint audits a year. These reports also show that the cases most suitable for joint audit programmes are those dealing with transfer pricing, a taxpayer's residence determination, analysis of complex tax structures, examination of entities operating in tax systems where it is possible to follow money flows and identification of aggressive tax planning schemes [16].

As demonstrated by practices described in this section, tax administration is marked by a considerable degree of international cooperation even if it is known [15] that tax laws and policies of different countries are far from congruent.

There are many reasons for governments to engage in joint audits, including sharing of aggressive tax planning, risk profiling, compliance practices and collecting additional revenue. Even though that exist a variety advantages, tax authorities are still "feeling their way along with joint audits", as has been noted by Michael Danilack, deputy commissioner (international), IRS Large Business and International Division about IRS [33, p.1300].

II. Recognizing the Need for Joint Tax Audit: strengths and opportunities

As anticipated, the first countries to lead the way in joint auditing have been JITSIC members, with the US participating in joint audits with Australia as well as the UK, noting their commonly shared language. Engagement between countries that speak the same language is a natural place to start, and facilitates active participation and joint meetings for information gathering and taxpayer questioning purposes [13].

However some tax practitioners see a real

possibility that joint audits will be used more widely in the EU, due to relatively active communication lines (e.g. between Belgium, France and Netherlands) or Fiscalis programme in the near future.

The joint audit project was carried out by representatives from 13 OECD countries (Australia, Canada, Denmark, France, Japan, Korea, Mexico, Netherlands, South Africa, Spain, Turkey, the UK, and the US). The group was asked to do so because revenue authorities displayed their willingness to enhance cooperation and coordination to achieve a reduction in tax avoidance and tax evasion, enforcement of transfer pricing regulations, enhanced confidence in the tax systems, as well as the development of strategies and competencies. As a consequence of the work from this group "Joint Audit Report" and the "Joint Audit Participant's Guide" were published in September 2010. The OECD report focused on legal framework for joint audit, challenges for conducting joint audits, case selection, and management of a joint audit.

A joint audit refers to a review process in which several states share the responsibility for conducting an audit report of one or more related taxpayers in a single Competent Authority team. Usually a joint audit is drafted to help compile an audit report on multinationals that operate across borders, but doesn't exclude the possibility to conduct auditing on high welfare individual taxpayers. There are a number of strengths and opportunities why the legal instrument of a Joint Audit deserves special attention. Moreover, it has been believed that "everyone stands to gain from this approach" [13, p.12]. The most important aspect in this regard would be appear to be the following:

First, it can help split up the work of an audit across multiple competent authorities, which may reduce the overall time needed to complete the auditing process. The taxpayer benefits from them bring less administrative burden, resulted from one exam team conducting joint audits instead of two or more audits, which must be addressed separately. Timeliness of audits and government interactions are mutually beneficial for all

parties involved in tax audits. Furthermore, competent authorities could resolve more tax issues without resort to litigation.

The joint tax audit has been recognized by revenue bodies, taxpayers, and practitioners as preferential for both taxpayers and the tax authorities because it could allow the concerned parties to focus on the issue, understand the facts in a more timely manner, and thereby allow for expeditious resolution of any disagreements [27]. In other words, the advantages of joint tax audits are that they make international legal business easier.

Second, it may improve the accuracy in quality of work. An essential characteristic of the joint audit is the auditor's provision of intensive mutual supervision. Moreover proper technical qualifications, practical experience (e.g. experienced personnel in the fields of transfer pricing, double taxation, aggressive tax planning), and expertise in the matter are necessary and required of auditors involved in each participating country to ensure high quality joint audit reports. However, furthermore, important decisions cannot be made by a single auditor; this method reduces the risk of mistakes.

Third, it guards against conflicts of interest among participating parties, especially in the case of the developing countries where low tax morale persist, as it prevents future targeting of taxpayers. Allowing independent review of reports by international auditing members, it may help to diminish inspectors' potential to protect corrupt taxpayers from audit. Providing joint examinations, countries will respond to high wealth taxpayer corrupt behaviors through legitimate and educated ways.

Fourth, it may decrease or minimize taxation costs, by applying direct contacts, direct exchange of information and the competences of Competent Authorities requested for a joint tax audit which will allow for real-time and less expensive collection of information. Decreasing the costs of collecting taxes will help reduce the budgets deficit and increase social trust in good governance.

Fifth, various studies¹⁴ have indicated that audits are an effective tool for deterring tax fraud. Consequently, joint audits can help in identifying further areas of collaboration where improvements to tax administrations' supervision exerted on risk-based audit selection can be made. On one hand, revenue administrations will focus on high-risk taxpayers, particularly those who have undertaken a significant amount of tax planning combined with having processes and systems that are not robust. On other hand, companies will undertake risk process and control reviews to lower their risk rating to avoid being rated high risk by revenue authorities.

Having in their disposition more than 600 multilateral tax information exchange agreements¹⁵ and formal coordination on cross-border joint audits, global tax administrators are more equipped to pursue tax underpayments than in any other time in history. To catch the offenders [18] and [19], they will be mining e-file data submissions, cross-referencing data with XBRL-based financial disclosures, and using powerful analytics to accurately determine the audit risk of companies so they can focus their audit resources on companies with the highest potential return.

Sixth, structured cooperation in joint audits may enhance the impact of national tax compliance administrations' programs and revenue collection, detecting and redressing individual cases of noncompliance. As commissioner Douglas Shulman noted (2009) "joint audits would be a part of a global effort to crack down on cross-border tax evasion, spurred in the last year by tax-evasion cases involving banks in Liechtenstein and Switzerland" [7].

Seventh, increased global enforcement and global information exchange across jurisdictions encourage companies to work more effectively with revenue administrations. The OECD's proposals for

¹⁴ See: Spicer and Thomas (1982); Alm and McKee (2006); Devos (2013)

¹⁵ On the global front, the OECD notes that over 80 countries have committed to "international co-operation in tax matters." Since 2008, the number of multilateral tax information exchange agreements between countries has grown from only 44 to over 600.

enhanced relationships with large companies¹⁶ underscore that trend. Voluntary engagement on enhanced tax compliance programs helps companies to understand tax authorities experiences in order to identify and address risk issues in an effort to identify and address potential controversy. The control of tax risks and prevention of errors is a joint duty of both revenue administration and taxpayers. It has noted by Jack Grocott [14, p.15] that “with more communication between countries, multinationals are founding that revenue bodies in different countries are showing more consistency and transparency in their treatment of similar issues” and recognized by Forum [20, p.8] that “taxpayers who behave transparently can expect greater certainty and an earlier resolution of tax issues with less extensive audits and lower compliance costs”. In addition to this a new supervisory burden method will result in “right”¹⁷ amount of taxes payments and relevant state budget revenues.

III. The Even more Compelling Need of Joint Audits in Romania and Moldova

Looking for better national resources mobilization, the tax administrations are focus on increasing compliance by making it easier for taxpayers to comply with the least time or less tax compliance costs and improving the authority’s ability to identify and collect revenues from noncompliant taxpayers. In this regards, on one hand Romania and Moldova seem to have a good records of the total tax rate and time to comply indicators comparing with EU 28 (e.g. 2013 time to comply indicator in Moldova, EU-28 and Romania is 181, 192 and 200 hours accordingly and total tax rate 40,4%, 42,7% and 42,9%). On another hand their systems are steel cumbersome from point of view of the

number of tax payments indicator.¹⁸ Accordingly to PwC: Paying taxes 2013 data Romania and Moldova are far to make their tax systems easier to comply having 41 and 31 tax payments per year comparing with 12 average in the EU-28. Multiple tax payments greatly increase the “pressure” and labor intensity per tax inspector, which can be efficiently split by working in a team.

When comparing the burden of taxation for international business, it is not sufficient to look at tax rates, numbers of tax payments, time to comply. The number of auditors available to enhance tax compliance also requires a careful review. According to Intra-European Organization of Tax Administrations (IOTA) data the number of active taxpayers per tax auditor staff is relatively high in Moldova (3200) comparing to EU-27, which was 2330 taxpayers per auditor (Romania indicator shows only 1200 taxpayers per auditor).

However the chances of being subject to a tax audit in Romania. To start with, few people are registered taxpayers – less than 20 percent of the population is registered in Romania, in contrast with over 80 percent of the respective citizen populations in Switzerland, Denmark, Sweden, Finland, Norway, Iceland and 50% in Moldova. Certainly we can find the dual impact of migration to affect the number of the active taxpayers¹⁹ here. For example, about 20 percent of the population represents migrants. At the same time, those citizens represent about 35 percent of all national registered taxpayers, which can substantially change all indicators of the official reports. A similar situation exists in almost all former communist and Balkan countries from European countries.

¹⁶ There are several reasons why enhanced relationship tax compliance programs are focused on large enterprises: First, a small number of large taxpayers account for the majority of gross income and profit taxes paid. According to the World Bank (2011, p.39) less than 1 percent of large enterprises are responsible for 60-70 percent of domestic tax collections. Second, large businesses have a complex tax situation. As a result of their tax corporate strategies, which involve complex issues of legal interpretation and calls for a specific treatment of risks, the transactions of the large taxpayers segment are placed, typically, in a gray area between tax evasion and tax avoidance.

¹⁷ The debate of right is not over ‘to pay or not to pay’, but, rather, about what and where should be paid.

¹⁸ The Total Tax Rate measures the tax cost (as a percentage of profit) born by the standard firm in the second year of operation, expressed as a share of commercial profit. The time to comply indicator captures the number of hours it takes to prepare, file and pay (or withhold) three major types of taxes: profit taxes, consumption taxes and labor taxes, including payroll taxes and SSC for a case study company. The number of tax payments reflects the total number of taxes and contributions paid, the method of payment, the frequency of payment, the frequency of filing and the number of agencies involved for a standardized case study company during the second year of operation. The Paying Taxes Indicators are calculated annually by PwC, the World Bank and IFC; see PwC. Paying Taxes 2013. The Global Picture at: <http://www.pwc.com/gx/en/paying-taxes/download-order.jhtml>

¹⁹ Active taxpayers are registered taxpayers who are paying taxes.

The differences in the number of active taxpayers per tax auditor staff can be explained not only by relatively high and low rates of personal taxpayer registration and workers international mobility, but also by a high rate of tax evasion (shadow economies²⁰ in more than 28% of nations)²¹ and high levels of the corruption (score below 5) in almost all former communist and Balkan countries (Table 1).

Table 1. International comparison of size of the Shadow Economy and Corruption Perception Index

2013, GDP per capita in \$		Size of the Shadow Economy (in % of GDP)			
		Less than 10%	10% - 20%	20% - 30%	More than 30%
Corruption Perception Index	Less than 3				*Ukraine (3.930)
	3.01 - 5		Slovakia (17.706) Czech Republic (18.871)	Romania (8.874) Italy (34.715) Greece (21.857) Croatia (13.401) Turkey (10.721)	*Georgia (3.597) *Moldova (2.239) *Macedonia (4.931) *Albania (4.565) *Bosnia and Herzegovina (4.620) Bulgaria (7.328)
	5.01 - 7	Austria (49.039)	Portugal (13.435) Spain (29.150) EU-28 (33.358)	Lithuania (15.649) Estonia (18.852) Latvia (15.187) Cyprus (24.867) Malta (22.892) Poland (13.435) Slovenia (23.317) Hungary (13.388) *Israel(36.926)	
More than 7	United Kingdom (39.372) Netherlands (50.816) France (44.099) Luxembourg (112.473) Switzerland (81.276)	Belgium (45.538) *Iceland (45.416) Sweden (58.014) Norway (100.579) Finland (49.055) Denmark (59.129) Germany (44.999) Ireland(48.608)			

Source: Based on Transparency International's (2007-2013) surveys²², Elgin, C. and Oztunalz, O. (2010) and Schneider (2013) data

* Latest data are: Iceland – 2011; Israel – 2007; Albania, Bosnia and Herzegovina, Georgia, Macedonia, Moldova and Ukraine – 2008

Table 1 presents the size of shadow economies, the corresponding Corruption Perception Index and level of economic development rankings of 28 EU member states and 11 associated countries in 2013. A first glance at the results reveals that shadow economies are complex phenomena present, to a large extent, in all types of economies,

²⁰ Measuring the shadow economy is one method of determining the extent of tax evasion, because it provides information of the extent non-compliance. In this regards Joint Audits are seen as an efficient tax administrative tool that will discourage egregious tax planning, as it allows for identification of a fuller set of facts earlier, for all jurisdictions involved.

²¹ A good portion of the migrant-net-profit is a result of the high cash flow volatility and the taxpayer's conscience of paying taxes. Low tax morale and weak ability of governments to collect their taxes may result in a higher tax evasion rate, thereby increasing the share of the shadow economy in both destination countries and countries of origin.

²² No region or country in the world is immune to the damages of public-sector corruption; the vast majority of the 183 countries and territories assessed score below five on a scale of 0 (highly corrupt) to 10 (very clean). While no country has a perfect score even in Europe, one-thirds of analyzed countries score below 5, indicating a serious corruption problem (EU-28 – score average 6). - See more at: <http://cpi.transparency.org>

starting with 7.5% in Austria and ending with more than 40% in Georgia, Moldova, and Ukraine (EU-28 – average of shadow economy is 18.90%). While a clear negative trend can be observed over 2007 through 2013, it is evidence that one of the big challenges for every government is to adopt efficient incentive-oriented policy measures to make shadow economies less attractive²³.

Many academic papers²⁴ study relationships between corruption and shadow economies, viewing them as complements and highlighting different mechanisms of how they can interact. The corruption often appears to be compared with an extra tax added to the regulatory burden of the official economy. Consequently, the increase in demand of bribes lead to more activities in the shadow economy.

Corruption²⁵ is among the greatest causes of the shadow economy's size and impact. This means that anticorruption measures may be ineffective if the reciprocal relationship between corruption and the shadow economy is not addressed.

In a cross-country analysis, the relationship between corruption and the shadow economy²⁶ appears to be positive. In more than one half of the countries analyzed, an

²³ The gap of shadow economy (max 35%) between analyzed countries is very high. However, it has to be pointed out that it is not only corruption that is driving up the shadow economy. For example Georgia has nearly managed to rule out corruption in the public institutions, being ranked 12th out of 43 countries in the European region, but the share of the shadow economy is still the highest among all analyzed countries. Changes in leadership and the existence of two separatist territorial entities (Abkhazia and South Ossetia) in the country facilitate the increase of this share. Similar situations are recorded in most former socialist countries, where there is a large discrepancy between the ruling oligarchy clans and the poor population, and the middle class is nonexistent or very small derived from the first. On the contrary, developed countries, especially the Nordic countries, register a small share of the shadow economy, except the PIGS countries (Portugal, Italy, Greece and Spain). For more statistical information see 2014 Index of Economic Freedom, Edited by Ambassador Terry Miller, Anthony B Kim, and Kim Holmes, Washington: The Heritage Foundation & Wall Street Journal, Nr.1, 2014, 490 p. <http://www.heritage.org/index/book/executive-highlights>

²⁴ Johnson et al. (1997, 2000), Shleifer (1997), Hindriks et al. (1999), Friedman et al. (2000), Hibbs and Piculescu (2005), Dreher and Schneider (2010), Buehn and Schneider (2012).

²⁵ As Phan Anh Tú (2012, p.17) noted 'the definitions of corruption developed by the World Bank and Transparency International are commonly used' they define it as "the abuse (misuse) of public power (entrusted power) for private gain." To continue the idea of defining *corruption* we will use this concept in meaning of the abuse (misuse) of potential tax inspectors to protect taxpayers from audit for private gain.

²⁶ This statement is mostly true for post-socialist countries.

increasing trend in the Corruption Perception Index is observed between 2007 and 2013; while this is promising, but not enough to reduct the damages of public-sector corruption.

IV. Joint audits weed out corrupt practice

It is fairly well known that tax collections are usually the main source of financing a suitable basis for development, relieve poverty, supply public services, and promote a wealthy social infrastructure for long-term growth. This kind of revenue must be a stable, predictable and independent source of financing for every country.

However, governments are loosing a significant amount of revenue, because of the inefficiency in collecting taxes (Table 2).

Table 2. Countries' Tax Capacity and Tax Effort

2011 (tax capacity – real tax revenue as % of GDP)		Tax Effort			
		60.1% - 70%	70.1% - 80%	80.1% - 90%	More than 90%
Tax capacity (as % of GDP): tax and social contributions/ tax effort	Less than 35%	Albania (10.9%)			
	35.1% – 40%	Bulgaria (13.9%)	Moldova (8.4%)	Israel (6%)	
	40.1% – 45%	Lithuania (17.3%) Romania (14.7%) Slovakia (16.1%) Turkey (13.6%) Switzerland (16%)	Croatia (9.2%) Greece (9%) Poland (10.8%) Montenegro (9.3%) Serbia (9.3%) Spain (9%)	Hungary (8.6%) United Kingdom (7.8%)	France (2%) Italy (0.9%)
	45.1% – 50%	Estonia (17.1%) Ireland (17.5%) Latvia (17.7%)	Czech Republic (13.8%) Germany (10.4%) Iceland (13%) Luxembourg (12.3%) Portugal (13.2%) Slovenia (13.9%) Ukraine (10.7%) EU level	Norway (6.2%) Netherlands (9.5%)	Austria (3.1%) Finland (3.4%) Sweden (2.7%)
	50.1% – 55%			Belgium (6.6%)	Denmark (4.4%)
	Over 55%	Cyprus (19.5%)			

Source: Based on Fenochietto and Pessino (2013)²⁷ data

* (data for Bosnia and Herzegovina, Georgia, FYR Macedonia and Malta are not available)

Table 2 demonstrates that countries with the highest tax collection effort like France, Italy, Austria, Sweden, etc. recorded the highest tax collection and vice versa on the opposite side

²⁷ Fenochietto and Pessino estimated countries' tax effort and capacity using three models (half normal (HN), truncated normal (TN) and truncated normal heterogeneous (TNH)). We are using results of TNH model because it is including corruption and inflation to represent inefficiency /distinguish 'observable' heterogeneity, which is more relevant to our research. The mean of inefficiency depends on level of corruption and the decay on the level of inflation. Distinguishing 'unobserved' heterogeneity is interpreted as heterogeneity that should be controlled before estimating the gap (the difference between tax capacity and tax effort).

notices Albania, Bulgaria and other former socialist countries. Simultaneously we can see a trend that the share of the shadow economy is inversely proportional to tax effort (e.g. the higher the effort is, the lower is size of the shadow economy). More than that, tax effort is proportional to the annual increase in fees collected (e.g. Italy has the highest rates of increase per year in revenue collection derived from tax audits (3.24%) with an effort of over 90% and Belgium with 2.7% vs. effort of 80.1% to 90%, while Slovakia, Switzerland and many other countries, with the lowest tax effort, recorded a decrease of up to -1.92%). From another point of view we can observe that more than one half of the analysed countries are losing up to 20% of their tax revenue²⁸. Moreover, countries ranged between 60.1 to 70% tax effort can be found in the list of the countries with the corruption perception index between 1 and 5 and the shadow economy over 20%. Thereby we can conclude that there is a real potential both to enlarge the tax base and the volume collected, entirely on the group and on each country separately. Certainly in the terms of globalization, and elimination of borders in the EU framework and partly to neighboring countries, the shadow economy should not be eliminated by a country or person and require a comprehensive action programs aimed to reduce its weight, and joint audits have a role to play in this regard.

It is believed that the critical negative factor in efficient tax collection is corruption in revenue administration.

Numerous studies have identified the negative impacts on tax revenue that are due to corruption. For example, Dos Santos (1995) discussed the negative impact of corruption on tax audits' collections; Tanzi and Davoodi (1997) found that countries' institutional qualities have significant relationships with their tax revenues, corruption being a proxy for this quality; Tanzi (1998) suggested that the *Code of Good Practices on Fiscal*

²⁸ However it can be observed that countries with high level of development are near their tax capacity. According to Fenochietto and Pessino (2013) this is particularly the case of Austria, Belgium, Denmark, Finland, France, Italy and Sweden (with tax effort higher than 90 percent). They also explain it through the crucial determinant of higher level of tax revenue of the demand for public expenditure.

*Transparency*²⁹, “if followed, would have the effect of reducing corruption”; Friedman et. al. (2000) provided evidence that countries with more corruption tend to collect fewer tax revenues relative to GDP; Iman and Davinan (2007) performed an empirical study of which taxes would yield more revenue by simply reducing the incidence of corruption in the revenue administration; Fenochietto and Pessino’s (2013) empirical analysis showed that less corruption is associated with a lower level of inefficiency in collecting taxes; and Barlow (2014) demonstrated that heightened integrity delivered increased profits.

Evidence from cross-European country comparisons has made it clear that corruption in revenue administrations is a serious problem. Advanced European economies, as a group, have a higher corruption perception index (greater than 7) than the rest of the economies analysed in the comparisons. Opposite results arise when EU accession countries are compared to other EU members states. However, even though the EU accession nations (many of which are now, or expected to be, members of the EU) made significant changes³⁰ to meet the requirements for EU accession, a comparison with the advanced economies show that EU accession countries are still faced with the significant problem of corruption (scoring below 5) (Table 3).

As shown in Table 3, corruption is hardly a problem exclusive to emerging countries. However, the higher is the level of corruption, the lower is the level of economic development – as measured by per capita GDP.

Table 3 demonstrates that the ex-socialist countries recorded the worst situation in terms of the corruption perception index (worst situation is in Moldova and Ukraine)³¹. It is

believed that countries like Romania, Bulgaria, Czech Republic, Hungary and other ex-socialist countries experienced considerable success in this respect thanks to EU accession and implementation of the judicial reforms and increase of the independence of the national anti-corruption centers (e.g. Romania has been convicted more than 10,000 civil servants for corruption, and a large number of oligarchs, who seemed to be untouchable.

Table 3. International comparison of Tax revenue and Corruption Perception Index

2011		Corruption Perception Index				
		Less than 3	3.01 – 5	5.01 – 7	7.01 – 9	More than 9
Tax revenue rate (as % of GDP)	Less than 25%		Albania Bosnia and Herzegovina Georgia FYR Macedonia			
	25.1% – 30%		Latvia Lithuania Romania Slovakia Turkey Bulgaria	Israel	Switzerland Ireland	
	30.1% – 35%		Croatia Greece Montenegro Serbia	Estonia Malta Poland Portugal Spain	Luxembourg Iceland	
	35.1% – 40%	Moldova Ukraine	Czech Republic Hungary	Cyprus Slovenia EU-27	United Kingdom Germany Netherlands	
	40.1% – 45%		Italy	France	Austria Norway Belgium	Finland Sweden
	Over 45%					Denmark

Source: Based on Transparency International’s, Fenochietto and Pessino (2013) and Eurostat data

The same situation can be found in Bulgaria and other countries). Another important factor on fighting corruption is the implementation of the national monitoring and evaluation system that provided a more effective collaboration among all state institutions involved in this process.

However, it has been noted that international tax frauds can be tackled only if financial transactions through countries will “be looked at as a whole and not in isolation,” and the fact that “integrity and confidentiality of information cannot be guaranteed in the

at the various levels and has a history of hundreds of years. Italy’s most “young” democracy of the developed countries that combines a plurality of ethnic and sociocultural groups, differentiated by language, traditions, customs, crafts, etc., each constantly trying to impose their supremacy and to “control” the country. Mussolini’s dictatorship facilitated some of them and tried to exterminate others, and access to any position was conditioned by material or immaterial obligations to those you’re promoted. At the same time we can see some progress in this respect, especially in the recent years.

²⁹ The *Code of Good Practices on Fiscal Transparency* was approved by the IMF Board in 1998. The latest version (2007) available on the IMF website at <http://www.imf.org/external/np/fad/trans/code.htm#code>

³⁰ These changes led to the adoption of many best practices in fiscal fairness, simplicity and transparency, which placed the EU accession countries ahead of other non-advanced economies in terms of fiscal compliance.

³¹ Presence of Italy in the group of the most corrupt countries may seem a surprise. Certainly the fight against corruption in this country is more like a silent war between state institutions and organized criminal groups, infiltrated practically all state and private institutions

exchange of information if there is corruption” [6] means that “the traditional concept of successive written requests and responses, in fact, does not suit multilateral auditing” anymore [9].

Joint audits may make it easier for states to respond to high wealth taxpayer’s corrupt behaviours. Various studies³² have indicated that audits are an effective tool for deterring tax fraud. Structured cooperation in joint audits may enhance the impact of national tax compliance administrations’ programs and revenue collection, detecting and redressing individual cases of noncompliance.

Moreover, it is critical to have effective and comprehensive anti-corruption compliance tools at the EU³³ at the supranational level that will demonstrate to member nations and its associates that anti-corruption is an important objective for high risk countries³⁴ and one that is taken seriously. Community cooperation can help engender both the will to fight corruption and the capability to do so.

Furthermore, recognizing the impact and breadth of “corruption’s damaging effects” is critical. The OECD has highlighted the role of tax auditors in combating corrupt practices of the private and public officials. In this context, the OECD Bribery and Corruption Awareness Handbook for Tax Examiners and Tax Auditors (2013) emphasizes that the role of tax auditors appears to be essential in order to assure the effective and vigorous application of laws. The recommendation made by OECD provides guidance to tax examiners and auditors to detect, deter, and prosecute all forms of corruption.

³² J. Alm and M. Mc Kee, Audit Certainty, Audit Productivity and Taxpayer Compliance, 59(4) National Tax Journal, 2006, pp. 801-816; K. Devos, The role of sanctions and other factors in tackling international tax fraud, Common Law World Review, Vol. 42, 2013; M. W. Spicer and J.E. Thomas, Audit Probabilities and the Tax Evasion Decision: An Experimental Approach, 2 Journal of Economic Psychology, 1982, pp. 241-245;

³³ According to the table 8 data, two third of analyzed countries face significant corruption problems Corruption Perception Index score below 7 comparing to the EU-28 which has an average of 6.

³⁴ According to OECD (2013), Bribery and Corruption Awareness Handbook for Tax Examiners and Tax Auditors - High risk countries include those which do not engage in effective exchange of information, have a low score on the Transparency International Corruption Perceptions Index or Bribe Payers Index, or have a high score on the Tax Justice Network Financial Secrecy Index).

CONCLUSIONS

The beginning of the new millennium is the right time to act. Many international problems can be addressed effectively only by an international cooperative effort. Even though the wheels of the joint tax audits turn slowly, there are reasons that may convince countries like Romanian and Moldovan to speed up the implementation of such audits:

- Commonly shared language - borders;
- Tax efforts are far from countries tax capacity;
- The higher is the level of corruption, the lower is the level of economic development – as measured by per capita GDP, etc.

This study investigates the theoretical ideas related to the circumstances that could accelerate the successful implementation of joint audit. However much progress must be achieved before sufficient evidence exists to support a joint audit approach.

Nevertheless, we expect to see more joint audits across European communities, in which governments and taxpayers must make a radical act sooner, rather than later, to achieve their goals in reducing taxation costs and corruption, and increasing litigation and the amounts at stake. Despite the lack of knowledge, which has been a cost due to maintaining political confidentiality and autonomy, it has been demonstrated, not only by empirical research but also by the experiences of tax professionals and governments, that the further development of joint tax auditing systems is vital. Further research is warranted to focus on the feasibility of this implementation and the concomitant cost.

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SENSORY PROPERTIES OF SOME WHITE WINES, FLAVORED WINES AND VERMOUTH TYPE WINES, PREPARED BY USING OWN RECIPES

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Abstract

In order to characterize, from sensorial point of view, the basic white wines White Fetească, Italian Riesling, Sauvignon Blanc, as well as flavored wines and vermouth type wines, obtained by addition of hydroalcoholic plants macerates to basic wines, tasting technique was used. It is known that sensory analysis is a method that can provide an overview of a wine. The main features analyzed were: appearance, color, smell and taste. Initial, wines presented specific features of grapes variety from which they belong, being characterized by harmony and complex flavor. The hydroalcoholic macerates were obtained by preparing two recipes (labeled I and II) of different mixtures of plants. Recipes I A in 45% alcohol and I B in 60% alcohol, had characteristics of appearance, color, taste and smell, very intense, specific, prevailing the taste of anise, fennel and coriander. The macerates prepared with recipes II A in 45% alcohol and II B in 60% alcohol (mixture of a few herbs and peel of citrus fruits) showed peculiarities of taste, odor, flavor less intense, prevailing the smell of nutmeg and citrus flavor. Recipes I A and I B of hydroalcoholic plants macerates decisively influenced the color, taste, flavor, smell and appearance of flavored wines. Recipes II A and II B influenced discreetly the sensory properties of flavored wines. Vermouth type wines obtained by addition of hydroalcoholic plants macerates + other ingredients (citric acid, alcohol, sugar), presented harmonious sensory characteristics, balanced, discreet, subtle, compared with flavored wines obtained only by the addition of hydroalcoholic plants macerates to the basic wines. The latter had a color, aroma, taste, smell, more intense, more rustic. Herbal recipes I B and II B (prepared in 60% alcohol), have strongly influenced the sensory properties of flavored wines, compared to recipes I A and II A (prepared in 45% alcohol).

Key words: flavored wines, hydroalcoholic plants macerates, vermouth type wines, wine sensory properties

INTRODUCTION

It is known that in Romania it is produced a wide range of wines, as well as beverages with various additives, based on wine. This is due to the many different areas of geographical, climatic, soil and grape variety cultivated, points of view. In the category of beverages derived from wine, an important place is occupied by flavored wines and vermouth type wines.

One of the ways by which Romania may have an interesting offer for exporting wines, in the current context of fierce competition in the field, is to develop a range of indigenous varieties wines, well-adjusted, of high quality. The advantage of our country is that we have large areas covered with indigenous varieties which are found only in our country, or in some neighboring countries.

In most EU countries, including Romania, the relevant in the field legislation, clearly stipulates that oenological practices must respect the integrity of the natural composition of wine, as well as the particularities and features given by origin and grapes variety [3,9].

Thus, granting the right to write on the label "wine with controlled nomination of origin" is made only by adherence to strict quality criteria.

These criteria relate to grapes culture technologies, winemaking and to minimal physical-chemical and sensory parameters [6, 8].

In this context, the quality of wines can be appreciated in compositional and sensory properties terms. Thus, the wines and wine-based drinks, used for trading purposes and consumption, must be accompanied by tests

reports with data relating to the composition indicators.

These indicators are: alcoholic strength, free sugar, total and volatile acidity, total and dry extract, free and total SO₂, microbiological picture (absence or presence of microorganisms, their types and number) sensory features (appearance, color, aroma, taste).

Sensory analysis is made by tasting, considered by winemakers as a basic method for assessing wines. Chemical and microbiological analysis are considered auxiliary methods that support the sensory examination of wines [1, 2, 10].

The purpose of our research is to highlight in a comparative way, concerning the sensory aspects, the modifications of wines quality from White Fetească, Italian Riesling and Sauvignon Blanc varieties (called basic wines), caused by the addition of hydroalcoholic plants extracts (flavored wines), or hydroalcoholic plants extracts plus other ingredients (vermouth type drinks) [4].

Our researches draw attention to analyzed quality wines type, to vineyard where they come from and emphasize the importance of wine and flavored beverages, which by their physical-chemical, nutraceuticals and sensory properties, have the quality of functional foods.

MATERIALS AND METHODS

A number of 31 samples were analyzed in terms of sensory characteristics as follows [3, 4, 5, 7]:

-3 wine specimens, namely: White Fetească, Italian Riesling and Sauvignon Blanc obtained in SC OSTROVIT SA, from Ostrov Centre Vineyard, harvest 2007;

-4 specimens of hydroalcoholic plants macerates prepared with 2 own recipes (I and II) which have been used to flavor the wine samples. The plants macerates were prepared in ethylic alcohol 45% vol., and 60% vol.

as follows:

- Recipe I A (45% alc);
- Recipe I B (60% alc);
- Recipe II A (45% alc);
- Recipe II B (60% alc).

- 12 samples of flavored wines (three varieties of wine x 4 versions), obtained by simple addition of hydroalcoholic macerates of plants to wine (Procedure I);

- 12 samples of vermouth type wines (3 types of wine x 4 versions), obtained by addition of hydroalcoholic plants macerates plus other ingredients (sugar, citric acid, alcohol) to wine (Procedure II).

Recipes for herbal mixtures contain:

- Recipe I - 16 plants (anise, cumin, thyme, yarrow, coriander, cloves, fennel, hyssop, wilde rose, marjoram, peppermint, chamomile, nutmeg, wormwood, balm mint, elder);

- Recipe II - 5 plants (anise, wilde rose, nutmeg, orange peel, lemon peel). Alcohol: plants mixture ratio was 1:10. Hydroalcoholic plants extracts were added to the basic wines at a rate of 3%, for obtaining the flavored wines, as well as for obtaining the vermouth type wines [4]. Additional ingredients for obtaining vermouth type wines were added so, as finally to obtain an alcoholic strength of 17% vol., a total acidity between 4.36 to 4.52 g/l and a sugar free quantity of 150 g/l.

The technique used for the sensory examination is tasting [7,9,10]. The main features analyzed to the mentioned samples were: appearance, color, smell and taste. For a fair assessment, were complied the conditions and specific stages of tasting technique.

For freshening of senses and maintaining gustatory capacity during tasting, it was used bread without salt, apples and unsalted cheese (curd).

RESULTS AND DISCUSSIONS

The relevant aspects of the sensory examination for the three varieties of wine, used as starting specimens for the preparation of flavored wines and vermouths type wines, are presented in Table 1.

It was noted that concerning the sensory properties, especially of taste, wine varieties were appropriate, but the savor tended to fade in descending order, as follows: Sauvignon Blanc, Italian Riesling and White Fetească, although there were no notable differences, from this point of view.

Table 1. The sensory properties of the basic wines

Wine variety	Sensory properties			
	Appearance	Color	Taste	Odor
White Feteasca	Clear, without suspended particles or sediment	Straw	Dry, vine taste, with traces of sugar, without defects	Without foreign Smell
Italian Riesling	Clear, without suspended particles or sediment	Yellow green	Dry, fruity taste, refreshing due to acidity, with traces of sugar, without defects	Without foreign Smell
Sauvignon Blanc	Clear, without suspended particles or sediment	Gold yellow	Dry, half- flavored, lively and fruitful with traces of sugar, without defects	Without foreign Smell

Sensory characteristics of the 4 hydroalcoholic plants macerates are shown in table 2.

In fact, the 4 hydroalcoholic macerates were

concentrated in plants extract. As a result, flavors, taste, smell and color were emphasized.

Table 2. The sensory properties of the hydroalcoholic plants extracts

No.	Type of alcoholic macerated	Sensory properties			
		Appearance	Color	Taste	Odor
1.	Recipe I A (45% alc)	Clear	Brown greenish	Rich flavor, bitter	Of various field plants
2.	Recipe I B (60% alc)	Clear	Brown greenish	Very flavored, more intensely bitter	Of various field plants
3.	Recipe II A (45% alc)	Clear	Cognac	Citrus flavor, slightly bitter	Citrus, nutmeg and anise
4.	Recipe II B (60% alc)	Clear	Cognac	Citrus flavor and taste firm bitter	Citrus and strong nutmeg and anise

All these extracts were characterized by a strongly bitter taste.

In I A and I B recipes prevailed the taste of anise, fennel and coriander, and in the next two, namely II A and II B, prevailed the taste of citrus and nutmeg.

Aroma was stronger for an alcoholic concentration of 60% vol., aspect that has been also met, in the case of flavored wines.

The sensory characteristics of the first 12 samples of wine, flavored only by adding hydroalcoholic plants macerated (procedure 1), are shown in Table 3.

It is observed as a general feature that the samples 2, 4, 6, 8, 10 and 12 (recipes I B and II B), regardless of the variety of wine from which they originated, showed a slight opalescence, had more intense colors, stronger tastes and more contoured smells than their counterparts, samples 1, 3, 5, 7, 9 and 11 (recipes I A and II A). It is possible that the opalescence was due to a slight fermentation process of samples 2, 4, 6, 8, 10 and 12, since the alcohol used in the recipe was of higher

concentration (60%) and the amount of fermentable compounds extracted from plants was also higher.

The same reasoning can be extended to explain the intensification of color, taste and smell of these samples.

Sensory characteristics of next vermouth type wines samples, marked with numbers 13 to 24, obtained by Procedure 2 with the addition of hydroalcoholic plants macerates + other ingredients (sugar, citric acid, alcohol, water) are shown in Table 4.

It is noted that the addition of ingredients "temperated" the sensory properties.

Thus, regarding the colour, the greenish tints disappeared, odours became discrete and subtle, flavours were balanced and became more harmonious.

It is observed the fact that in the vermouths type wines with addition of hydroalcoholic macerates in 60% vol. alcohol, the sensory properties were emphasized, which reveals a high concentration of plants extract in macerat.

Table 3. The sensory characteristics of the aromatic wines, obtained through procedure 1

No.	Type of flavored wine	Sensory properties			
		Appearance	Color	Taste	Odor
1.	White Feteasca + Recipe I A (45% alc)	Clear, without suspended particles or sediment	Yellow - dense	Flavored, slightly bitter	Discreet, plant field
2.	White Feteasca + Recipe I B (60% alc)	Quite clearly, without sediment (Slightly cloudy)	Yellow - dense	More intense flavor, stronger bitter	Well shaped plant field
3.	White Feteasca + Recipe II A (45% alc)	Clear, without or sediment	Straw	Discreet aroma, bitter	Discreet, citrus and anise
4.	White Feteasca Recipe II B + (60% alc)	Quite clear, no sediment, slightly cloudy	Straw	Shorter aroma and taste, sharper bitter	Ferm citrus and anise
5.	Italian Riesling + Recipe I A (45% alc)	Clear, without suspended particles or sediment	Yellow - green intense	More acidic, structured	Discreet, plant field
6.	Italian Riesling + Recipe I B (60% alc)	Clear, without sediment slightly cloudy	Yellow - green intense	Bitter	Well shaped plant field
7.	Italian Riesling + Recipe II A (45% alc)	Clear, without suspended particles or sediment	Yellow - pale green	Slightly bitter	Discreet, citrus and anise
8.	Italian Riesling Recipe II B + (60% alc)	Quite clearly, without sediment, slightly cloudy	Yellow - pale green	More flavored and bitter	Ferm citrus and anise
9.	Sauvignon Blanc + Recipe I A (45% alc)	Clear, without suspended particles or sediment	Yellow gold pale- green	Balanced, flavored, slightly bitter	Discreet, plant field
10.	Sauvignon Blanc + Recipe I B (60% alc)	Quite clearly, without suspended particles or sediment, slightly cloudy	Yellow Gold - intense green	Stronger flavor, bitter	Well shaped field plants
11.	Sauvignon Blanc + Recipe II A (45% alc)	Clear, without suspended particles or sediment	Yellow - gold	Bitter	Discreet, citrus and anise
12.	Sauvignon Blanc + Recipe II B (60% alc)	Quite clearly, without sediment, slightly cloudy	Yellow -gold	Stronger bitter	Ferm citrus and anise

Table 4. The sensory characteristics of the vermouth type wines, obtained through procedure 2

No.	Type vermouth	Sensory properties			
		Appearance	Color	Taste	Odor
13.	White Feteasca + Recipe I A (45% alc) + ingredients	Clear crystal	Straw yellow	Slightly bitter	Discreet, field plants
14.	White Feteasca + Recipe I B (60% alc) + ingredients	slightly opalescent	Straw yellow	More flavored	Discreet, field plants
15.	White Feteasca + Recipe II A (45% alc) + ingredients	Clear, without suspended particles or sediment	Yellow	Citrus flavor	Discreet, citrus and anise
16.	White Feteasca + Recipe II B (60% alc) + ingredients	slightly opalescent	Yellow	Citrus flavor	Discreet, citrus and anise
17.	Italian Riesling + Recipe I A (45% alc) + ingredients	Clear, without suspended particles or sediment	Yellow- green	Harmo-nious, flavored	Discreet, field plants
18.	Italian Riesling + Recipe I B (60% alc) + ingredients	Slightly opalescent	Yellow - green	Very flavored	Discreet, field plants
19.	Italian Riesling + Recipe II A (45% alc) + ingredients	Clear, without suspended particles or sediment	Yellow	Raw taste	Discreet, citrus and anise
20.	Italian Riesling + Recipe II B (60% alc) + ingredients	Slightly opalescent	Yellow	Taste and flavor more intense	Discreet, citrus and anise
21.	Sauvignon Blanc + Recipe I A (45% alc) + ingredients	Clear, without suspended particles or sediment	Gold- yellow	Very harmo-nious (balanced)	Discreet, field plants
22.	Sauvignon Blanc + Recipe I B (60% alc) + ingredients	Clear, without suspended particles or sediment	Gold -yellow	Stronger flavor	Discreet, field plants
23.	Sauvignon Blanc + Recipe II A (45% alc) + ingredients	Clear, without suspended particles or sediment	Yellow	Short flavor	Discreet citrus and anise
24.	Sauvignon Blanc + Recipe II B + (60% alc) + ingredients	Clear, without suspended particles or sediment	Yellow	Short intense flavor	Discreet citrus and anise

CONCLUSIONS

The wines used as basic material for obtaining the flavored wines and the vermouth type wines, showed flavor sensory properties, specific to grapes variety they belong, being characterized by harmony;

Hydralcoholic macerates differed significantly concerning the appearance, depending on the used recipe of herbs. Thus, the macerates obtained by recipes I A and I B (only plant mixtures) had characteristics of color, taste, smell-specific and very intense.

The predominantly tastes were the tastes of

anise, fennel and coriander. In macerates obtained with recipes II A and II B (mixture of fewer plants and citrus peel), although have been identified peculiarities of taste, odor, flavor, especially the smell of nutmeg and citrus flavor, they were not as intense.

All hydroalcoholic plants macerates had a bitter taste, more intense or less intense, depending on recipe.

The recipes I A and I B of flavoring plants influenced decisively color, taste, flavor, smell and appearance of aromatized wines, without being able to distinguish a specific fingerprint of certain plants (generally, it was felt only a smell of field plants).

The recipes II A and II B of flavoring plants influenced in a more discreet way the color, taste and appearance of aromatized wines, but it was able to distinguish specific flavors and odors (eg citrus and anise flavors).

The vermouth type wines prepared according to procedure 2 (with addition of alcoholic plant macerate + other ingredients) showed harmonious sensory characteristics, balanced, discrete, subtle, compared with flavored wines prepared according to procedure 1 (only with added hydroalcoholic macerates of plants), whose color, aroma, taste, smell, were more intense, more rustic.

The plants recipes I B and II B (prepared in 60% vol. alcohol), have strongly influenced the sensory properties of flavored wine compared with the recipes I A and II A (prepared in 45% vol. alcohol).

The flavored wines prepared with recipes I B and II B showed a slight tendency to ferment (slight opalescence) due to the high content of fermentable substances, extracted from plants by using a concentration of 60% vol. alcohol;

Sensory analysis is a method that can provide information on the origin and age of the variety of wine, namely a picture of it.

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University of Agricultural Sciences and Veterinary Medicine, Bucharest, Romania.

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QUALITATIVE PECULIARITIES OF THE FLAVOURED WINES AND OF THE VERMOUTH TYPE WINES, OBTAINED FROM THE SAUVIGNON BLANC VARIETY

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Abstract

In order to establish the dynamics of the physical-chemical parameters of flavoured wines and vermouth type wines, obtained by the addition of hydroalcoholic macerates from plants to the Sauvignon Blanc wine variety, we analyzed certain physical and chemical characteristics (D^{20}_{20} , Alcohol %, Total dry extract g/l, Free sugar g/l, Unreducing extract g/l, Total Acidity g/l $C_4H_6O_6$, Free SO_2 mg/l Total SO_2 mg/l) for 9 samples. Compared to the main wine parameters, the tested parameters had the following evolution: Alcoholic strength, Free sugar and Density increased in vermouth type wines, Total acidity decreased slightly in flavoured wines and more obvious in vermouth type wines. The total dry extract increased sharply in vermouth type wines and the unreducing extract decreased sharply in vermouth type wines. The amount of Free SO_2 was higher in flavoured wines, but Total SO_2 had lower values, both for flavoured wines and vermouth type wines, comparative to Sauvignon Blanc wine. Plants macerates added to the Sauvignon Blanc basic wine, influenced most of the physical-chemical parameters and provided new qualitative features to resulting beverages.

Key words: flavoured wines, hydroalcoholic plants macerates, quality parameters, Sauvignon Blanc, vermouth type wines

INTRODUCTION

Vermouth type wines are quite popular drinks in European countries, in USA and also in Asia. The obtaining technology of aromatized wines is known since antiquity, but modern research flavored wines producers are channeled towards getting richer plants extracts in active flavoring ingredients, and also in finding the most effective methods to extract these flavors [2, 3, 5].

Parts of plants (herbs, spices), such as: leaves, flowers, fruits, seeds, can be used to obtain the hydroalcoholic macerates which introduced in the basic wines, cause changes and improvement of the the sensorial and physical - chemical properties [1, 2, 4].

The aim of this paper is to highlight the changes of the physical-chemical quality parameters of Sauvignon Blanc variety wine, by simple addition of hydroalcoholic extracts of plants in the process of obtaining flavored

wines and hydroalcoholic extracts of plants mixed with other ingredients, in the process of obtaining vermouth type wines [2]. Currently, there are few studies concerning the physical - chemical characterization of the white flavoured wines and vermouth type wines, especially from Sauvignon Blanc variety. Our research topic is important because addresses to the study of wine industry products, which through their sensorial, physical-chemical and nutraceutical properties, have the quality of functional foods.

MATERIALS AND METHODS

In order to emphasize the qualitative features of own recipes prepared drinks, we performed measurements of some physical - chemical parameters for the next samples:

- a specimen of Sauvignon Blanc wine, called basic wine; we mention that the wine used as raw material has been obtained in 2007, at

S.C. OSTROVIT S.A., from Ostrov Wine Center.

- 4 specimens of flavored wines (samples 1, 2, 3 and 4) obtained by the addition of hydroalcoholic extract (filtered plants macerate) to the basic wine;

- 4 specimens of vermouth type wines (samples 5, 6, 7 and 8) obtained by the addition of hydroalcoholic extract plus other ingredients (sugar, citric acid, ethyl alcohol, water) to the basic wine.

In order to prepare the hydroalcoholic macerates from plants we used two recipes of herbal mixtures:

- *recipe I*, consisting of 16 plants (anise, cumin, thyme, yarrow, coriander, cloves, fennel, hyssop, wilde rose, marjoram, peppermint, chamomile, nutmeg, wormwood, balm mint, elder);

- *recipe II* consisting of 5 plants (anise, wilde rose, nutmeg, orange peel, lemon peel).

The macerates from plants have been prepared in ethyl alcohol 45% vol. (recipes IA and IIA) and 60% vol. (recipes IB and IIB), in ratio 1:10.

For the flavored wines and the vermouth type wines, hydroalcoholic extract was added to the Sauvignon Blanc basic wine in a proportion of 3%.

For the vermouth type wines, we added to 100 ml basic wine, the ingredients as follows:

- 21,22 g sugar, 0.12 g citric acid, 9.80 ml ethyl alcohol, 15,43 ml water for recipes IA and IIA;

- 21,22 g sugar, 0.12 g citric acid, 9.13 ml ethyl alcohol, 16.1 ml water for recipes IB and IIB

[2].

The following quality parameters were determined: d_{20}^{20} (picnometric method STAS 6182/8-71), Alcohol Content, % vol. (picnometric method, STAS 6182/6-70), Total Dry Extract g/l (densimetric method STAS 6182/9-80), Free Sugar g/l (iodometric method – Schoorl, STAS 6182/18-81), Unreducing Extract g/l (difference from Total Dry Extract value and total sugar value) Total Acidity g/l, $C_4H_6O_6$ (titrimetric method STAS 6182/1-79), Free SO_2 mg/l, (iodometric method), Total SO_2 , mg/l [6,7].

RESULTS AND DISCUSSIONS

The addition of hydroalcoholic plants extracts, required to obtain flavored wines and vermouth type wines, to the Sauvignon Blanc wine, led to significant changes in physical-chemical parameters, compared with reference values of basic wine.

Table 1. Physical-chemical measurements of the flavored wines and vermouth type wines

Sample no.	Sample type	Physycal and chemical analysis			
		d_{20}^{20}	Alcohol (vol%)	Total dry extract (g/l)	Free sugar (g/l)
Basic wine					
-	Sauvignon Blanc	0.9922	12.9	23.5	2.0
Flavoured wines					
1.	Sauvignon Blanc + recipe I A (45% alc)	0.9901	13.7	20.3	1.7
2.	Sauvignon Blanc + recipe I B (60% alc)	0.9891	14.4	19.8	7
3.	Sauvignon Blanc + recipe II A (45% alc)	0.9901	13.8	21.4	1.7
4.	Sauvignon Blanc + recipe II B (60% alc)	0.9889	14.5	19.8	1.7
Vermouth type wines					
5.	Sauvignon Blanc + recipe I A (45% alc) + ingredients	1.0414	17	165.4	150
6.	Sauvignon Blanc + recipe I B (60% alc) + ingredients	1.0421	17	165.9	150
7.	Sauvignon Blanc + recipe II A (45% alc) + ingredients	1.0414	17	166	150
8.	Sauvignon Blanc + recipe II B (60% alc) + ingredients	1.0415	17	166	150

Source: Own calculation

The results of the physical-chemical determinations of Sauvignon Blanc basic wine, as well as the results for the samples of flavoured wines and vermouth type wines, are highlighted in Table 1.

Table 2 Chemical measurements of the flavored wines and vermouth type wines

Sample no.	Sample type	Physycal and chemical analysis			
		Unre - ducing extract (g/l)	Total acidity (g/l) C ₄ H ₆ O ₆	Free SO ₂ (mg/l)	Total SO ₂ (mg/l)
Basic wine					
-	Sauvignon Blanc	21.5	5.19	40	145
Flavoured wines					
1.	Sauvignon Blanc + recipe I A (45% alc)	18.6	4.83	35	117
2.	Sauvignon Blanc + recipe I B (60% alc)	18.1	4.83	37	110
3.	Sauvignon Blanc + recipe II A (45% alc)	19.7	4.75	37	115
4.	Sauvignon Blanc + recipe II B (60% alc)	18.1	4.91	40	112
Vermouth type wines					
5.	Sauvignon Blanc + recipe I A (45% alc) + ingredients	15.4	4.52	37	87
6.	Sauvignon Blanc + recipe I B (60% alc) + ingredients	15.9	4.50	25	92
7.	Sauvignon Blanc + recipe II A (45% alc) + ingredients	16	4.52	27	90
8.	Sauvignon Blanc + recipe II B (60% alc) + ingredients	16	4.36	30	90

Source: Own calculation

The results of the chemical determinations of Sauvignon Blanc basic wine, as well as the results for the samples of flavoured wines and vermouth type wines, are highlighted in Table 2.

From the data obtained it is observed that the addition of plants hydroalcoholic extracts, as well as the necessary ingredients for the vermouth type wines, led to significant changes of physical - chemical parameters compared to the reference values of Sauvignon Blanc basic wine.

All flavored wines had slightly lower Density compared to the Sauvignon Blanc variety basic wine, because of the alcohol addition. All vermouth type samples showed higher Density, compared to the original basic wine, thanks to the addition of sugar and citric acid, according to the recipes used.

Total dry extract values decreased in flavored wines, whatever recipe we used, but increased sharply to vermouth type wines, compared with the Sauvignon Blanc basic wine.

Speaking of Unreducing extract parameter, its value decreased in all samples, compared with the value recorded in the basic wine. The decreases were less pronounced in the case of aromatized wines and more pronounced in the case of vermouth type wines.

Alcoholic strength, Free sugar and Total acidity are responsible for the quality of wine, mostly influencing its taste. Free sugar also influences the amount of Total dry extract. Flavoring the wine and its transformation into vermouth, also changes all these parameters.

We observed in figure 1 that the Alcoholic strength grew more in flavored wines with plants macerates in 60% alcohol, as was natural, in comparison with the Alcoholic strength of Sauvignon Blanc basic wine.

Also, the addition of plants hydroalcoholic macerates in flavored wines, therefore the addition of alcohol, increased the Alcoholic strength to 14.5%, compared with 12.9% in the basic wine.

The vermouth type wines presented an Alcoholic strength value of 17% vol, according to the classic recipe.

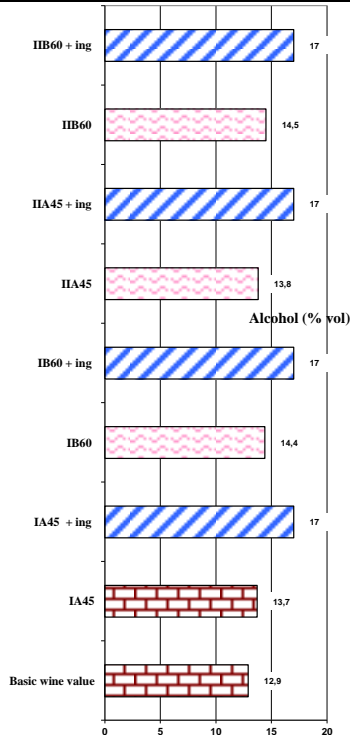


Fig. 1. The Alcoholic strength of flavored and vermouth type wines prepared from Sauvignon Blanc basic wine

The evolution of Sugar free parameter in flavored wines and vermouth type wines made from Sauvignon Blanc is shown in figure 2.

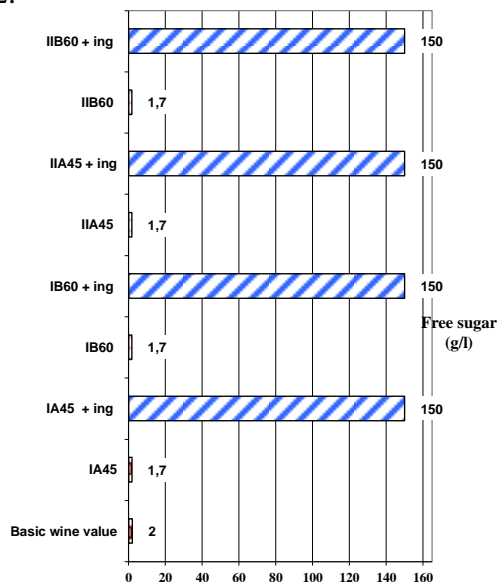


Fig. 2. The Free sugar of flavored and vermouth type wines prepared from Sauvignon Blanc basic wine

Sauvignon Blanc basic wine was sour than the reference mean, but Sugar free value

decreased pretty much in flavored wines, for all recipes. In vermouth type wines, Sugar free complied the standard limits, being placed at 150 g/l, whatever recipe.

The Total acidity dynamic of the beverages derived from Sauvignon Blanc, processed with hydroalcoholic plants macerates plus some ingredients is shown in Figure 3.

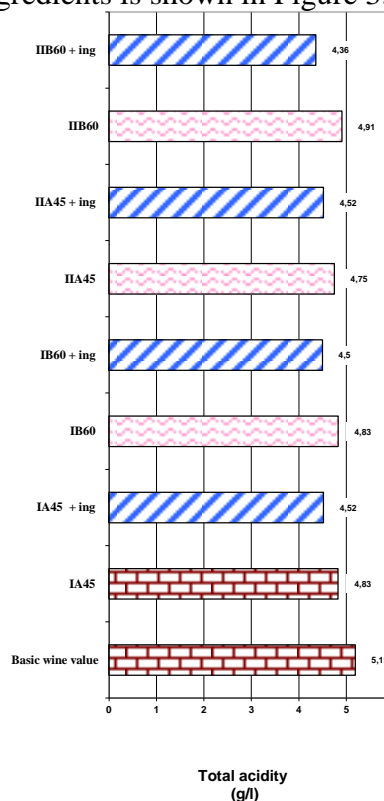


Fig. 3. The Total acidity of flavored and vermouth type wines prepared from Sauvignon Blanc basic wine

All flavored wines had a diminished Total acidity and vermouth type wines are even less acidic. We observed a great homogeneity of the values of this parameter, both in flavored and in vermouth type wines.

The Total dry extract increased sharply in vermouth type wines, being about seven times higher, compared to the basic wine (figure 4).

The Nonreducing extract decreased for all beverages prepared by us, compared to its value in the origin wine (figure 5).

Free SO₂ and Total SO₂ showed diminished values in potential nutraceutical drinks, the decrease being significant, especially in vermouth type wines (figure 6).

It could be seen that qualitative peculiarities of aromatized wines and vermouth type wines

are different to each other and to the wine from which they originated.

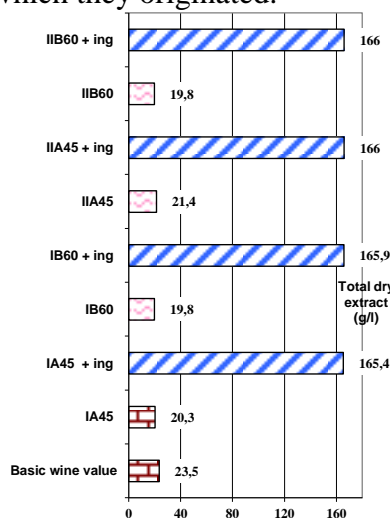


Fig. 4. The Total dry extract of flavored and vermouth type wines prepared from Sauvignon Blanc basic wine

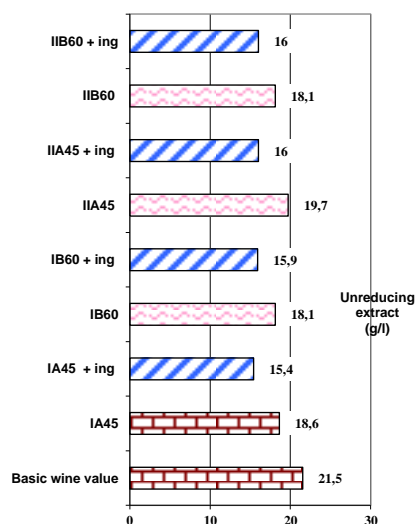


Fig. 5. The Unreducing extract of flavored and vermouth type wines prepared from Sauvignon Blanc basic wine

CONCLUSIONS

The addition of hydroalcoholic macerates to Sauvignon Blanc wine modified slightly the Density of the new drinks. In contrast, the Total dry extract increased seven times compared to its amount in Sauvignon Blanc wine and the Unreducing extract decreased in all types of new wines.

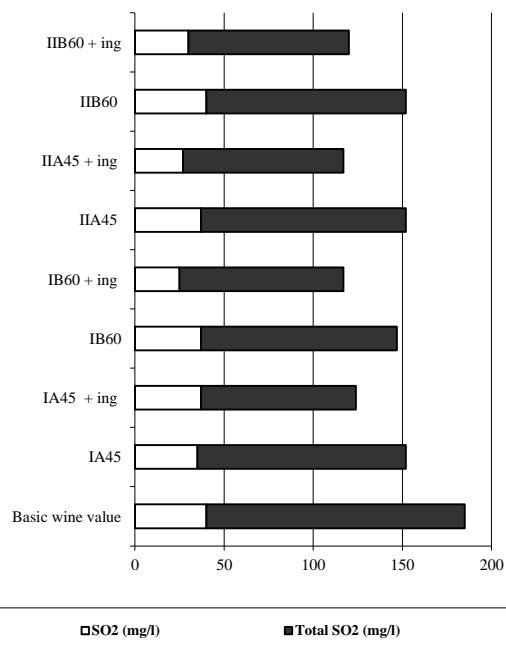


Fig. 6. The evolution of free SO₂ and total SO₂ in flavored and vermouth type wines prepared from Sauvignon Blanc basic wine

The Free sugar and Alcoholic strength parameters may be changed in the desired direction, depending on how much hydroalcoholic extract of plants, or alcohol, or sugar are added to the basic wine. In this regard, all vermouths reached in the standard Alcoholic strength of 17% and in the standard Free sugar of 150 g/l.

Also, hydroalcoholic plants macerates addition lead to the decrease of Total acidity, Free SO₂ and Total SO₂ values, for both flavored wines and vermouth type wines.

In conclusion, the nutraceutical beverages domain provides further a wide range of interdisciplinary research topics.

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STUDY ON WASTE WATER TREATMENT PLANTS

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Abstract

Biogas is more and more used as an alternative source of energy, considering the fact that it is obtained from waste materials and it can be easily used in cities and rural communities for many uses, between which as a fuel for households. Biogas has many energy utilisations, depending on the nature of the biogas source and the local demand. Generally, biogas can be used for heat production by direct combustion, electricity production by fuel cells or micro-turbines, Combined Heat and Power generation or as vehicle fuel. In this paper we search for another uses of biogas and Anaerobe Digestion substrate, such as: wastewater treatment plants and agricultural wastewater treatment, which are very important in urban and rural communities, solid waste treatment plants, industrial biogas plants, landfill gas recovery plants. This uses of biogas are very important, because the gaseous emissions and leaching to ground water from landfill sites are serious threats for the environment, which grow bigger and bigger during the constant growth of some human communities. That is why, in developed European countries, the sewage sludge is treated by anaerobe digestion, depending on national laws. In our country too, in the last years, efforts were made in the direction of treating wastewaters and management of waste in general. This paper can be placed in this trend of searching new ways of using with maximum efficiency the waste resulted in big communities.

Key words: biogas, anaerobe digestion, wastewater

INTRODUCTION

One of the actual problems of mankind, beside the global warming, the quest for new fuels and reducing pollution, is the management of waste water. That is why in the last years, in the entire world appeared many wastewater plants. A wastewater treatment plant is a physical plant where various physical, biological or chemical processes are used to change the properties of the wastewater in order to turn it into a type of water that can be safely discharged into the environment or that is usable for a certain reuse purpose [5]. The treatment of wastewater belongs to the over-arching term sanitation, just like the management of human excreta, solid waste and storm water. By-products from wastewater treatment plants, such as screenings, grit, sewage sludge, other sludge, odorous gases are also treated in a wastewater treatment plant. [1] A wastewater treatment plant generally requires electrical energy to function, except for certain types of constructed wetlands, but they can also produce energy in the form of biogas if anaerobic processes are used. City

wastewater collection and drainage systems called sewers became increasingly common through the 19-th century. The drainage from these sewers became known as sewage; and treatment of sewage evolved through the 20th century into a standardized sequence of primary treatment, followed by secondary treatment, and ending with disinfection. A typical municipal sewage treatment plant includes primary treatment, in order to remove solid material, secondary treatment to remove dissolved and suspended organic material, and disinfection to kill disease-causing micro-organisms. Larger municipalities often include factories discharging industrial wastewater into the municipal sewer system. Sewage treatment plants may be called wastewater treatment plants, when the standard municipal sewage treatment plant sequence of primary treatment, secondary treatment, and disinfection is presumed anaerobe digestion equate for treating the combined sanitary sewage and industrial wastewater collected by the sewer [7].

Agricultural wastewater treatment for continuous confined animal operations like milk and egg production may be performed in plants using mechanized treatment units similar to those described under industrial wastewater [3]; but where land is available for ponds, settling basins and facultative lagoons may have lower operational costs for seasonal use conditions from breeding or harvest cycles.[8]

MATERIALS AND METHODS

The researches and observations were made in an ecologic landfill near Sibiu.

Anaerobe digestion is largely used for treatment of primary and secondary sludge, resulted from aerobic treatment of municipal waste water. The system is applied in many countries in combination with anaerobe digestion treatment systems, where the anaerobe digestion process is used to stabilise and reduce the final amount of sludge. Most engineering companies providing sewage treatment systems have also the capability to provide anaerobe digestion systems. In European countries, between 30 and 70% of sewage sludge is treated by anaerobe digestion, depending on national legislation and priorities [2].

The anaerobe digestion treated sludge effluent can be further used as fertiliser on agricultural land or for energy production by incineration. There are still countries where the effluent is disposed on landfill sites. As this practice can have negative consequences for the environment due leakage of nutrients to ground water and emissions of CO₂ to the atmosphere, it is therefore found in most European countries.

Wastewater treatment plants

In wastewater can be found the following [9]:

- Suspended solids (physical particles that can clog rivers or channels as they settle under gravity)
- Biodegradable anaerobe digestion organics, which can serve as “food” for micro-organisms in the receiving body. Microorganisms combine this matter with oxygen from the water to yield the energy they need to thrive and multiply;

unfortunately, this oxygen is also needed by fish and other organisms in the river. Heavy organic pollution can lean anaerobe digestion to “de anaerobe digestion zones” where no fish can be found; sudden releases of heavy organic anaerobe digestions can lean anaerobe digestion to dramatic “fish kills”.

- Pathogenic bacteria and other disease causing organisms These are most relevant where the receiving water is used for drinking, or where people would otherwise be in close contact with it;

- Nutrients, including nitrates and phosphates. These nutrients can lean anaerobe digestion to high concentrations of unwanted algae, which can themselves become heavy biodegradable digestion organic materials. Treatment processes may also neutralize or remove industrial wastes and toxic chemicals. This type of treatment should ideally take place at the industrial plant itself, before discharge of their effluent in municipal sewers or water courses.

There are three levels of waste water treatment: primary, secondary, and tertiary.

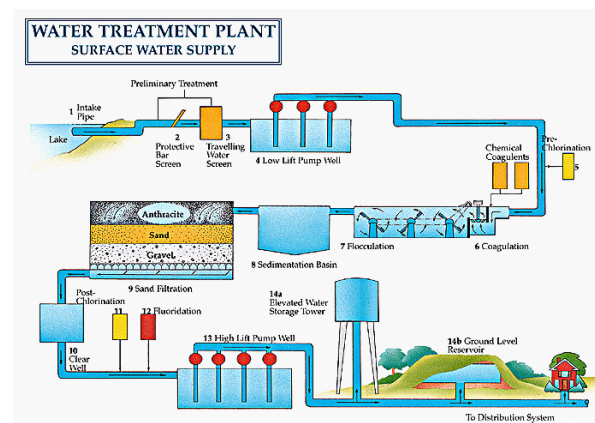


Fig. 1. The processes in a water treatment plant

Source: [6]

Wastewater treatment processes

Wastewater treatment processes are designed to achieve improvements in the quality of the wastewater [6]. In fig. 1 we can observe the flow processes in a wastewater treatment plant, which includes the 3 phases of treatment.

The three treatment processes are the following:

Primary or mechanical treatment is designed to remove gross, suspended and floating solids from raw sewage. It includes screening to trap solid objects and sedimentation by gravity, to remove suspended solids. This level is sometimes referred to as mechanical treatment, although chemicals are often used to accelerate the sedimentation process. Primary treatment can reduce the impurities of the incoming wastewater by 20-30% and the total suspended solids by some 50-60%. Primary treatment is usually the first stage of wastewater treatment. Many anaerobe digestion advanced wastewater treatment plants in industrialized countries have started with primary treatment, and have then anaerobe digested other treatment stages, as waste water anaerobe digestion has grown, as the need for treatment has increased, and as resources have become available.

Secondary or biological treatment removes the dissolved organic matter that escapes primary treatment. This is achieved by microbes consuming the organic matter as food, and converting it to carbon dioxide, water, and energy for their own growth and reproduction. The biological process is then followed by anaerobe digestion in additional settling tanks, to remove more of the suspended solids. About 85% of the suspended solids can be removed by a well running plant with secondary treatment. Secondary treatment technologies include the basic activated sludge process, the variants of pond and constructed wetland systems, trickling filters and other forms of treatment which use biological activity to break down organic matter.

Tertiary treatment is simply anaerobe digestion traditional treatment beyond secondary. Tertiary treatment can remove more than 99 percent of all the impurities from sewage, producing an effluent of almost drinking-water quality. The related technology can be very expensive, requiring a high level of technical know-how and well trained treatment plant operators, an anaerobe digestion energy supply, and chemicals and specific equipment which may not be available.

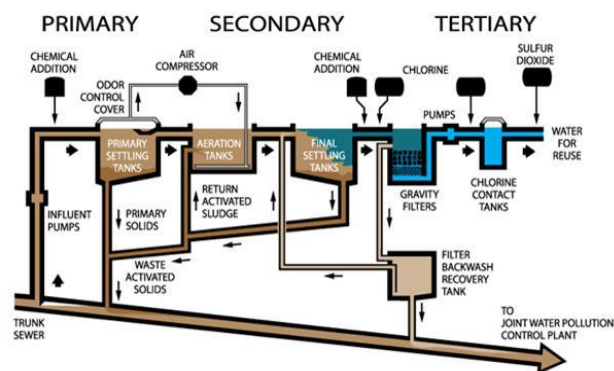


Fig. 2. The three phases treatment for wastewater
Source: www.lacsd.org

An example of a typical tertiary treatment process is the modification of a conventional secondary treatment plant to remove phosphorus and nitrogen.

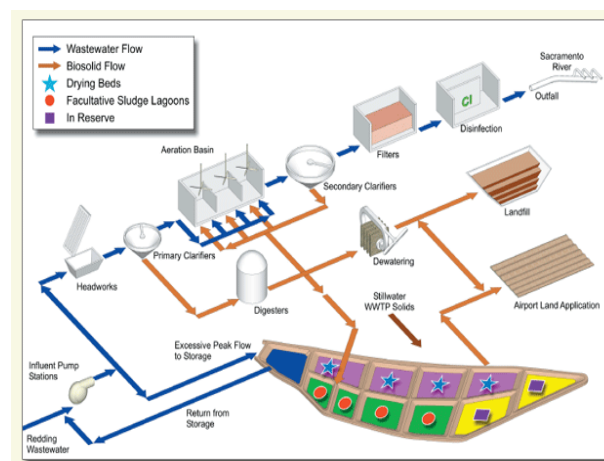


Fig. 3. The wastewater process flow in a wastewater plant
Source: www.clearcreekplant.com

Disinfection, usually made with chlorine, can be the final step before discharge of the effluent. However, some environmental authorities are concerned that chlorine residuals in the effluent can be a problem in their own right, and have moved away from this process. Disinfection is frequently built into treatment plant design, but not effectively practiced, because of the high cost of chlorine, or the reduced effectiveness of ultraviolet anaerobe digestion where the water is not sufficiently clear or free of particles.

Waste water purge

The wastewater resulted from waste fermentation in the storage is drained through collector shafts in the lowest tank, from where are pumped in the 3 leaching tanks and then in the own purging station. This purging station uses as purging technology the reversed osmotic procedure.

The purging technology consists of:

The collected levigate through the draining and control system is guided in the 3 compartments tanks, from where it is pumped in the purging station following the technological flow.



Fig. 4. Purge technology

Source: www.imtgbmh.de

Municipal solid waste treatment plants

In many countries, municipal solid waste is collected as mixed stream and incinerated in large power plants or disposed on landfill sites. This practice is actually a waste of energy and nutrients, as most of the organic fraction could be source separated and used as anaerobe digestion feedstock. Even bulk collected wastes can be further processed and used for biogas production.

In recent years, source separation and recycling of wastes received increasing attention. As a result, separate fractions of this plant are now becoming available for more anaerobe digestion advanced recycling treatment, prior to disposal. The origin of the organic waste is important in determining

which treatment method is most appropriate. Kitchen waste is generally too wet and lacks in structure for aerobic composting, but provides an excellent feedstock for anaerobe digestion. On the other hand, woody wastes contain high proportions of lingo-cellulose material are better suited for composting, as pre-treatment is necessary in order to be used for anaerobe digestion.

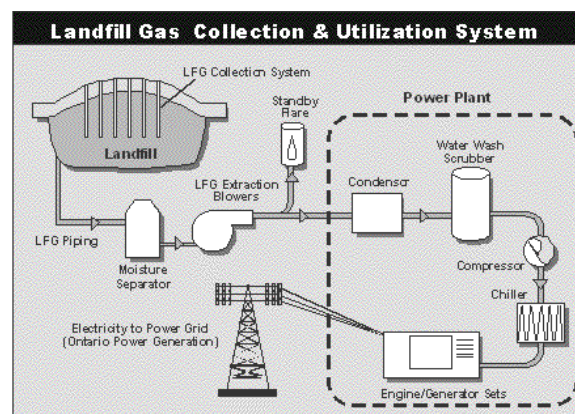


Fig. 5. Landfill gas collection system

Source: www.icleiusa.org

Utilisation of source separated organic fraction of household waste for biogas production has a large potential and several hundred anaerobe digestion plants, processing organic fraction, are in operation around the world. The aim is to reduce the stream of organic wastes to landfills or even to incineration and to redirect them towards recycling [4].

RESULTS AND DISCUSSIONS

All important cities and even some rural communities have landfills, because the management of waste is another big problem with which all communities are confronted. Landfills can be considered as large anaerobic digestion plants with the difference that the decomposition process is discontinuous and depends on the age of the landfill site. Landfill gas has a composition which is similar to biogas, but it can contain toxic gases, originating from decomposition of waste materials on the site.

Recovery of landfill gas is not only essential for environmental protection and reduction of emissions of methane and other landfill gases but it is also a cheap source of energy, generating benefits through faster stabilisation of the landfill site and revenues from the gas utilisation.

Due to the remoteness of landfill sites, landfill gas is normally used for electricity generation, but the full range of gas utilisation, from space heating to upgrade anaerobe digestion to vehicle fuel and pipeline quality is possible as well.

Landfill gas recovery can be optimised through the management of the site such as shredding the waste, re-circulating the organic fraction and treating the landfill as a bioreactor. A landfill bioreactor is a controlled landfill, designed to accelerate the conversion of solid waste into methane and is typically divided into cells, provided with a system to collect leachate from the base of the cell.

The collected leachate is pumped up to the surface and redistributed across the waste cells, transforming the landfill into a large high-solids digester.

Industrial biogas plants

Anaerobic processes are largely used for the treatment of industrial wastes and waste waters for more than a century and anaerobe digestion is today a standard technology for the treatment of various industrial waste waters from food-processing, agro-industries, and pharmaceutical industries. Anaerobe digestion is also applied to pre-treat organic industrial waste waters, before final disposal. Due to recent improvements of treatment technologies, diluted industrial waste waters can also be digested. Europe has a lean aerobic digestion position in the world, regarding this application of anaerobe digestion. In recent years, energy considerations and environmental concerns have further increased the interest in direct anaerobic treatment of organic industrial wastes and the management of organic solid wastes from industry is increasingly controlled by environmental legislations.

Industries using anaerobe digestion for wastewater treatment range from:

-Food processes: for example vegetable canning, milk and cheese manufacture, slaughterhouses, potato processing industry

-Beverage industry: for example breweries, soft drinks, distilleries, coffee, fruit juices

-Industrial products: for example paper and board, rubber, chemicals, starch, pharmaceuticals

Industrial biogas plants bring about a number of benefits for the society and the industries involved:

-Anaerobe digestion value through nutrient recycling and cost reductions for disposal

-Utilisation of biogas to generate process energy

-Improved environmental image of the industries concerned, through environmental friendly treatment of the produced wastes

It is expected that the environmental and socio-economic benefits of anaerobe digestion, complemented by higher costs of other disposal methods, will increase the number of applications of industrial biogas in the future.

CONCLUSIONS

Beside the well known uses of biogas, which was the subject of our previous researches, we studied another uses of biogas and anaerobe digestion substrate, such as: wastewater treatment plants and agricultural wastewater treatment, solid waste treatment plants, industrial biogas plants, landfill gas recovery plants.

In this paper we have presented the purging technology applied in this particular waste storage compared to that required in the literature on this domain. Utilisation of separated organic fraction of household waste for biogas production has a large potential and several hundred anaerobe digestion plants, processing organic fraction are in operation around the world.

These ecologic landfills which are now placed near the big towns and which represents the main material for biogas plants, can also be placed near rural communities, contributing to the future rural development, especially in our country.

The researches concerning wastewater belong to a large sphere of researches which have big benefits to the environment and to urban and rural communities, which aim to manage wisely water use, because water is a valuable natural resource, which deserves our full attention.

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DEVELOPMENT TRENDS OF BIOGAS

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Abstract

All over the world, researches are made in order to improve the technologies, the operational and process stability and performance of biogas plants, because the world markets for biogas increased considerably in Europe and all over the world. In this paper we studied the most important parameters related to a biogas plant, starting from a local ecologic landfill, a landfill which storages industrial and household waste. In this respect, we studied operational parameters, such as organic load and hydraulic retention time, and parameters for evaluation of a biogas plant. Also, we made a case study concerning the evaluation of used waters in the landfill under the aspect of pollution sources, way of treatment and evacuation mode of used waters. The existing biomass resources everywhere in the world can give us an idea of the global potential of biogas production, which is not exploited to its full capacity, especially in our country.

Key words: *biogas, landfill, operational parameters*

INTRODUCTION

In the last period of time, the world markets for biogas increased considerably because of the increasing need of energy of the urban and even rural communities. That is why many countries developed modern biogas technologies and competitive national biogas markets throughout anaerobe digestion of intensive substantial governmental and public support. The European biogas sector counts thousands of biogas installations, and many developed countries like Germany, Austria, Denmark are among the technical forerunners, with the largest number of modern biogas plants. Important numbers of biogas installations are operating also in other parts of the world. In our country, the biogas plants became more and more used, due to the ecologic landfills, which are placed near the important cities. In other more distant countries in Asia there are also considerable numbers of very small scale, family owned biogas installations. Most biogas plants in Asia are using simple technologies, and are therefore easy to design and reproduce. On the other side of the Atlantic, USA, Canada and many Latin American countries are on the way of developing modern biogas sectors

and favourable political frameworks are implemented alongside, to support this development [1].

Important research efforts combined with full scale experience are carried out around the world, aiming to improve the conversion technologies, the operational and process stability and performance. New digesters, new combinations of anaerobe digestion substrates, feeding systems, storage facilities and other equipment are continuously developed and tested.

Alongside the anaerobe digestion feedstock types, dedicated energy crops for biogas production were introduced in some countries and the research efforts are directed towards increasing productivity and diversity of energy crops and assessment of their biogas potential. Cultivation of energy crops brought about new farming practices and new crop rotation systems are about to be defined, where intercropping and combined crop cultivation are subject of intensive research as well [2]. In this European and world context, Romania begins to manage wisely waste and use this waste in order to create energy from biogas.

The existing biomass resources everywhere can give us an idea of the global potential of

biogas production. This potential was estimated by different scientists, on the base of various scenarios and assumptions. The overall conclusion was always, that only a very small part of this potential is utilised today, thus there is a real possibility to increase the actual production of biogas significantly. The European Biomass Association estimates that the European production of biomass based energy can be increased from the 72 million tones in 2004 to 220 million tones in 2020. The largest potential lies in biomass originating from agriculture, where biogas is an important player. According to this association, up to 20 to 40 million hectares of land can be used for energy production in the European Union alone, without affecting the European food supply [5]. In this world context, Romania also begins to valorise its biogas potential, because it is a cheap and ecologic source of energy.

MATERIALS AND METHODS

Encouraging the use of biogas among rural communities bring great benefits both from environmental point of view, by reducing emissions and mitigating the ecological footprint, and from human health point of view, by reducing the smoke, product of burning wet wood. Within this context, it is important for the researchers to design comprehensive strategies, looking triangular efforts among producers (beneficiaries), academia (government) and business (private), that go beyond the sum of shares sector performed in the territories, and achieve effective integration into the planning and development goals, defined from rural areas, is one of the major challenges faced in promoting the development of rural and indigenous [6].

Availability of a suitable site for the construction of the bio-digester is very important, it must take into account that most areas where it wants to impact are highly rural and hard to reach, so you must choose the best, you can also find suitable properties soil, groundwater and not very high spaces available for further application of organic

fertilizer produced. If possible, only work with substrates with high energy potential and avoid transportation costs of organic material are recommended. Another aspect which must be taken into consideration is marketing medium and long term products seeking to strengthen the subsistence economy of the indigenous communities involved, it is intended that once started and stabilized the production of biogas, every family will be able to exchange or sell gas and fertilizer hours, as a method of interacting with each other [6].

In this paper, we researched the most important operational parameters from a biogas plant, starting from a local ecologic landfill, a landfill which storages industrial and household waste.

Operational parameters

The construction and operation of a biogas plant is a combination of economical and technical considerations. Obtaining the maximum biogas yield, by complete digestion of the substrate, would require a long retention time of the substrate inside the digester and a correspondingly large digester size. In practice, the choice of system design (digester size and type) or of applicable retention time is always based on a compromise between getting the highest possible biogas yield and having justifiable plant economy.

The organic load

In this respect, the organic load is an important operational parameter, which indicates how much organic dry matter can be fed into the digester, per volume and time unit, according to the equation below:

$$BR = m * c / V_R \quad [1], \text{ where:}$$

BR - organic load [kg/d*m³]

m - mass of substrate fed per time unit [kg/d]

c - concentration of organic matter [%]

V_R - digester volume [m³]

Hydraulic retention time

An important parameter for dimensioning the biogas digester is the hydraulic retention time [3]. The hydraulic retention time is the average time interval when the substrate is kept inside the digester tank. Hydraulic retention time is correlated to the digester

volume and the volume of substrate fed per time unit, according to the following equation:

$$HRT = V_R / V, \quad [1] \text{ where:}$$

HRT- hydraulic retention time [days]

VR- digester volume [m³]

V - volume of substrate fed per time unit [m³/d]

According to the above equation, increasing the organic load reduces the hydraulic retention time. The retention time must be sufficiently long to ensure that the amount of micro-organisms removed with the effluent (digestate) is not higher than the amount of reproduced micro-organisms.

The duplication rate of anaerobic bacteria is usually 10 days or more. A short hydraulic retention time provides a good substrate flow rate, but a lower gas yield. It is therefore important to anaerobe digestion the hydraulic retention time to the specific decomposition rate of the used substrates. Knowing the targeted hydraulic retention time, the daily feedstock input and the decomposition rate of the substrate, it is possible to calculate the necessary digester volume.



Fig. 1. Storage cell in an ecologic landfill near a city
Source: www.greenprophet.com

Parameter list

A number of parameters (Table 1) can be used for evaluation of biogas plants and for comparing different systems.

There are two main categories of parameters:

- Operating data, which can be determined by measurement

- Parameters, which can be calculated from the measured data.

In order to evaluate the performance capabilities of a biogas plant a multi-criteria analysis should be performed. Evaluations based on a single parameter can never do justice to the process. In order to determine if a biogas plant can provide a return on investment, in an acceptable time frame, economic parameters must always be included [4].

Table 1. Parameters for evaluation of biogas plant

Parameter	Unit	Symbol	Determination
Temperature	T	°C	Measurement during operation
Operational pressure	P	mbar	Measurement during operation
Capacity, throughput	V	m ³ /d; t/d	Measurement
Reactor volume	VR	M ³	Determined by construction
Gas quantity	V per day/year	m ³ /d; m ³ /a	Measurement during operation and conversion to Nm ³
Retention time (hydraulic, minimum guaranteed)	HRT MG RT	d	Calculation from operating data
Organic anaerobe digestion		kg oTS / (m ³ * d)	Calculation from operating data
Methane concentration in biogas	CH ₄	%	Measurement during operation
Specific biogas yield		%	Calculation from operating data
Specific biogas production		m ³ / m ³	Calculation from operating data
Plant efficiency	H	%	Net energy drawn from gross energy
Specific treatment costs		€/m ³ Input; €/GV	Calculation

Source: [1]

RESULTS AND DISCUSSIONS

These parameters for evaluation of a biogas plant were verified in the local ecologic landfill in which we made our observations and measurements.. In this landfill, the waste received for storage must obey the environmental authorization. Thus, the following waste are permitted to be stored: city and trade waste, institutions waste, etc. The following waste are forbidden to be

stored: liquid waste, explosive waste, corrosive, flammable, oxidant waste, dangerous hospital waste, or other dangerous clinic waste.

The waste are received only if, during the whole period of storage, they have non harming influence on man and the surrounding environment. The waste is distributed in thin layers of maximum 1 m and then it is compacted. The compact density for household waste must be minimum 0,8 t/m³. In the following figure, it is shown the way of waste unloading in a landfill.



Fig.1. Waste unloading in an ecologic landfill
Source: www.ecologic-nc.com

We made a case study in a local landfill, researching some parameters which indicate the environmental quality.

The first category of parameters were those of water emissions.

Emissions sources

The emissions came from the heating system with gas petrol liquidified and obey the limits imposed by current legislation. The most important emissions found are:

- powders;
- carbon monoxide (CO);
- sulphur oxides (SO_x);
- Nitrogen oxides (NO_x).

The problems connected to biogas emission are solved based on the prognosis of landfill gas production. The degassing system is constructed in such a way to be sealed from

the environment and the drainage system of the rain waters.

CONCLUSIONS

In the last years, due to the situation of searching of new sources of renewable energy, the biogas plants are more and more used in Europe and in our country, because it is a source of energy which can be used both for rural and city communities. Also, the biogas production is in connection with the landfills, which manage the waste of large communities. In this paper, we studied some operational parameters, such as: Organic load and Hydraulic retention time, and some parameters which are used for evaluation of biogas plants, such as: temperature, pressure, reactor volume, gas quantity, methane concentration in biogas. In this respect, we made a case study in a local ecologic landfill, where we identified the pollution sources, the way of treatment and the evacuation way of used waters from this landfill.

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SEASONAL ADJUSTMENT AND FORECASTING OF THE ROMANIAN AGRICULTURAL EMPLOYMENT RATE

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Abstract

The economic policy directly related to employment and labour force aims the economic growth and the increase of the living standard using the best the capacities of economy: increasing productivity, reducing unemployment, using a larger proportion of working time. This paper aimed to use the statistical and econometric techniques to test and reveal trends in the evolution of the quarterly employment rate in agriculture, and on this basis to extrapolate the investigated characteristic.

Key words: autocorrelation function, Buys Ballot model, employment rate, seasonality, time series

INTRODUCTION

The activity of the economic agents in agriculture consists of a complexity of phenomena, characteristically interdependent and mutual conditioning. Indicators are used to determine and characterize the various economic phenomena and to determine the trends in agriculture dynamics.

In the broadest sense, any numerical expression obtained in an actual research process is called a statistical indicator. According to Biji, E.M. et al. (1998), each indicator must meet: the condition of content that is to characterize the related phenomenon (process) in a clear definition; the qualitative comparability condition (its content should have a single definition), in time (the dynamics) and space (the territory), meaning that an indicator should have the ability for its varying sizes to be compared between different periods on a national or international level. [1] The statistical methodology usually distinguished specific groups in the system of statistical indicators, as follows:

-By their composition, the indicators can be simple or elementary, when they express in absolute sizes statistical phenomena of a statistical collectivity or on a part of it and the related indicator, obtained by the processing or combination of simple indicators;

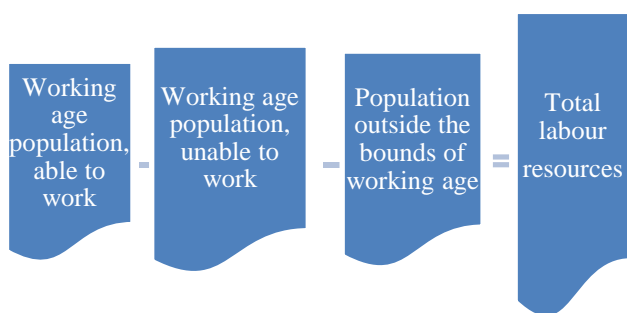
-According to the function they perform in a statistical analysis, indicators may be synthetic, offering a global knowledge of the phenomena and analytical indicators that highlight the group structure of a collectivity and the influence of some factors in its configuration in time and space;

-By their scope, statistical indicators show a growing variety, with the development of the scope of phenomena and processes in the economy.

Due to the complexity of the indicators it is necessary to develop specific methodologies to group data starting with the components, continuing with hierarchical management and decision-making levels and proceeding to the entire (Biji, E.M. et al., 1999) [2].

From the point of view of economic analysis, the indicator population is the basis for the calculation of statistical indicators that highlight the size, structure and use of labour resources. The labour resources existing at a given time in society show the number of people of working age, i.e. that segment of the population that holds all physical and intellectual capacities which enable it to carry out a useful activity (Capanu, I., Wagner, P., Secareanu, C., 1997). [3]

The human resources volume is determined based on the relationship:



Population, total	
Working age population	
Population outside the bounds of working age	
Working age population, able to work	Working age population, unable to work
Economically active population	Non-economically active population
Employment	Work reserves
Employees	Other categories of employed population

Fig.1. Population structure by participation in economic activity

In the context of the information included in the work resources balance, in the economic statistics, a number of derived indicators can be calculated to highlight how these resources were used, for example: general activity rate, the activity rate of working age population, the unemployment rate, the economic dependence rate, the maintenance rate etc. The present paper aimed to test and reveal the trends in the evolution of the quarterly employment rate for working age population (15-64 years) in agriculture, using statistical and econometric techniques, and on this basis to extrapolate the investigated characteristic.

MATERIALS AND METHODS

In the present paper the Buys Ballot model was used to study the variation in the

employment rate for the working age population in the agricultural sector. The model can be applied if the time series meets the following conditions:

- the evolution of trend is linear:

$$Y_t = at + b;$$

- the seasonality is constant:

$$s_j = s_t = ct,$$

where:

$$t = j+m(i-1);$$

$j = \overline{1, m}$ - the number of subperiods;

$i = \overline{1, n}$ - the number of periods;

s_j - the seasonality coefficients of subperiod j ;

$s_t = s_{j,i}$ - the seasonality coefficients of subperiod j in periods i ;

- the studied phenomenon undergoes a random perturbation u_t , its nature is a bruit blanc.

The three components work additively, resulting a model of the form given below:

$$y_t = at + b + s_j + u_t.$$

Writing $b_j = b + s_j$, it is obtained:

$$y_t = at + b_j + u_t.$$

Substituting in the model $t=j+m(i-1)$, using the least squares method, one could estimate the parameters a and b_j based on which we will determine the coefficients of seasonality, s_j , and the value of term b , their calculation formulas being the following:

$$\hat{a} = \frac{12}{mn(n^2 - 1)} \cdot \left(\sum_{i=1}^n i \sum_{j=1}^m \frac{y_{ij}}{m} - \frac{n+1}{2m} \sum_{i=1}^n \sum_{j=1}^m y_{ij} \right);$$

$$\hat{b} = \sum_{i=1}^n \sum_{j=1}^m \frac{y_{ij}}{nm} - \hat{a} \frac{nm+1}{2};$$

$$\hat{s}_j = \sum_{i=1}^n \frac{y_{ij}}{n} - \sum_{i=1}^n \sum_{j=1}^m \frac{y_{ij}}{nm} - \hat{a} \left(j - \frac{m+1}{2} \right)$$

The additive model can be equivalent to a multiplicative model after the logarithmic transformation because the linear relationship affects the parameters and not the variables:

$$\ln(y_t) = at + b + s_j + u_t$$

where:

$$a = \ln(1+a'); b = \ln(b'); s_j = \ln(s_j'); u_t = \ln(\eta_t).$$

Thus, the multiplicative model becomes:

$$y_t = b' \cdot s_j' \cdot \eta_t \cdot (1+a')^t$$

An additional condition, relative to the seasonal factors postulates the existence of offsetting seasonal movements:

$$\sum_{j=1}^m s_j = 0 \text{ - for additive model;}$$

$$\sum_{j=1}^m s_j = \sum_{j=1}^m \ln(s_j) = 0 \rightarrow \prod_{j=1}^m s_j = e^0 = 1 \text{ -for}$$

multiplicative model.

The forecast for phenomenon y in the forecasting horizon (T, T+Q) is based on the following relationship:

$$\hat{Y}_{T+h} = \hat{b} \cdot [j + m \cdot (i + h - 1)] + \hat{a} + \hat{s}_j,$$

where: $h = \overline{1, Q}$ - forecast period.

The data were represented by the considered indicator: the quarterly employment rate for working age population (15-64 years) in agriculture.

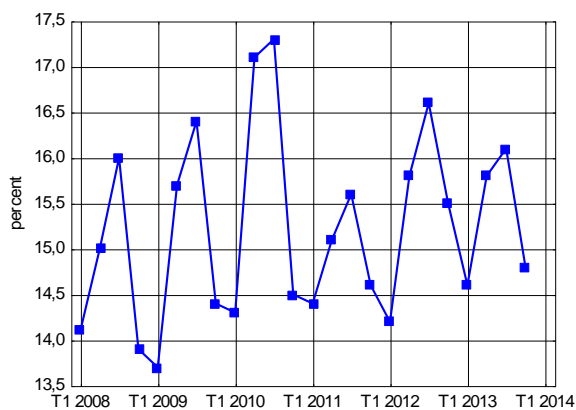


Fig. 2. The evolution of the employment rate for working age population in agriculture
 Source: Own calculations based on data released by EUROSTAT [5]

In the period 2008-2013, the average quarterly employment rate for working age population (15-64 years) in agriculture was 15.23 %. The absolute amplitude of the variation reached 3.6 %.

The coefficient of variation (6.67 %) reflected the absence of heterogeneity, the calculated mean being representative for the investigated series.

The flattening coefficient indicates a platykurtic distribution (Kurtosis= 2.17).

Table 1. Descriptive indicators

Series: The employment rate for working age population in agriculture. Sample: 2008Q1 2013Q4 Observations: 24	
Mean	15.22917
Median	15.05000
Maximum	17.30000
Minimum	13.70000
Std. Dev.	1.015737
Skewness	0.419574
Kurtosis	2.170509
Jarque-Bera	1.392224
Probability	0.498520

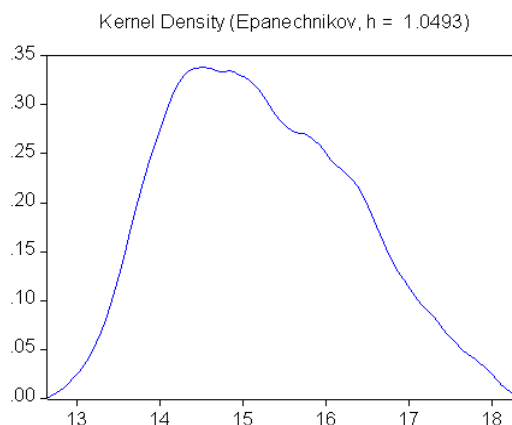


Fig. 3. The density of the distribution for the employment rate for working age population in agriculture

The Augmented Dickey-Fuller test was applied to test for the presence of a unit root in the time series.

The ADF test provided evidence of a presence of a unit root (p-value: 0.3453; where the null hypothesis assumes that the data is non-stationary, i.e. there is a unit root present in the data).

In order to notify that over the quarterly employment rate for working age population in agriculture has acted the seasonal component, we have calculated the autocorrelation coefficients and partial correlation with the help of Statistical programme – the ARIMA model. The obtained results confirm the presence of seasonality.

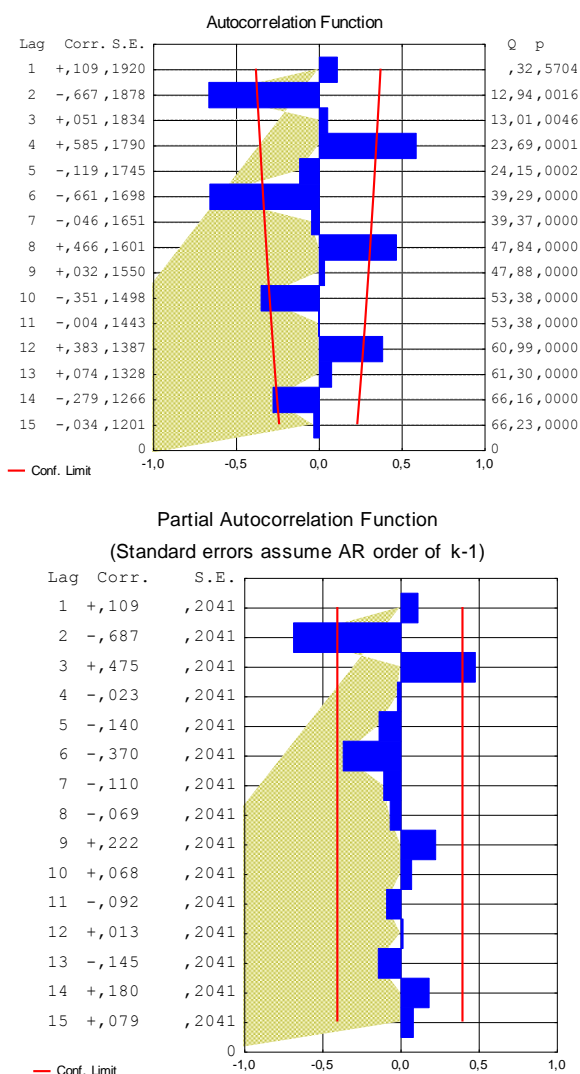


Fig. 4. The Corel gram of the quarterly employment rate for working age population in agriculture

RESULTS AND DISCUSSIONS

As a result of applying the Buys Ballot model for the quarterly data regarding the employment rate for working age population in agriculture in the period 2008-2013, the following average trend equation as logarithmic form has been obtained:

$$\ln(\hat{Y}_t) = 0.0017 \cdot [j + m \cdot (i - 1)] + 2.6999 + \hat{\varepsilon}_j$$

The obtained seasonal deviations are:

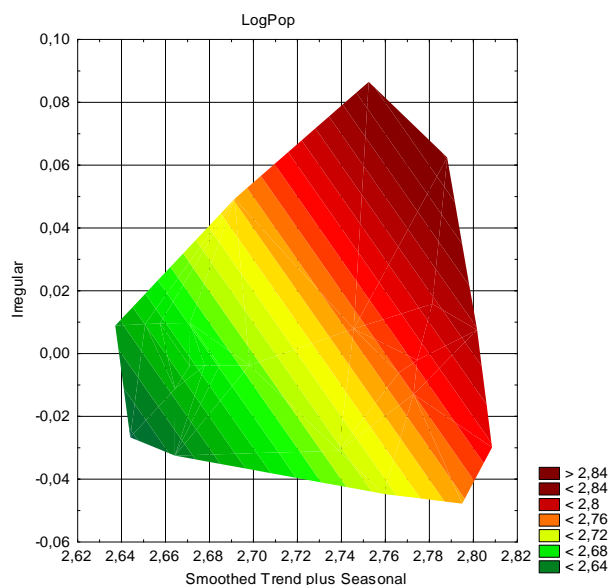


Fig. 5. Component of time series data

Seasonal deviations in the second and third quarters were positive (above the trend line). The intensification of agricultural works claimed an increased workforce, the development of the informal market also being signalled by the expansion of the practice of agricultural units to conduct recruitment activities using their own database, increasing the number of illegal employment.

Seasonal deviations in the first and fourth quarters were negative (under the trend line). Amid the reduction of the excess demand for labour force, the share of skilled unemployed in agriculture, forestry and fisheries in the total number of unemployed was on average 2.9 %. By gender, the indicator registered 3.38 % for men and 2.14 % for women.

Rural labour market in Romania after EU integration is characterized by a decrease of activity rate and an increase of unemployment. (Iorga A., Toma E., Muscanescu A., 2014). [4]

In the period 2008-2013, the average employment rate for population aged 15 years and over in agriculture amounted to 14.75 %, registering the highest values for the age group 55-64 years (19.97 %) and the lowest one for the age group 15-24 years (8.99 %). The gender gap of this indicator, calculated as the difference between the employment rate of

men (16.25 %) and women (13.35 %) was 2.9 % points.

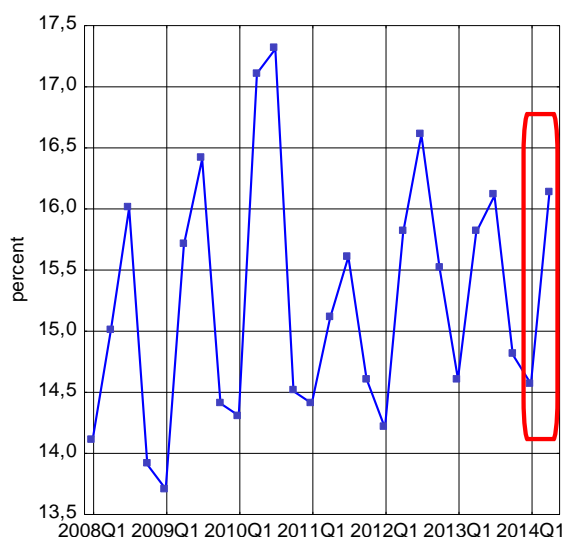


Fig. 6. The projection of the employment rate for working age population in agriculture for the first and second quarter in 2014

The model likelihood was checked up by using the variance analysis. The model is statistically valid, as long as the theoretical value for a significance level $\alpha = 0.05$ and 1, respectively 22 degrees of freedom, taken over from Fisher Snedecor distribution table is lower than the calculated F test value ($F_{\alpha, k, T-k-1} = 4.30 < F_{calc} = 73.93$). The correlation ratio is quite close to 1: $R = 0.88$. The econometric model explained 77 % of the total variance of the analysed phenomenon. For the first and second quarter of the year 2014, the point estimates of the expected levels for the investigated indicator - obtained by antilogarithmation were: $\hat{y}_{Q1/2014} = 14.56$ % and $\hat{y}_{Q2/2014} = 16.12$ %, respectively while the confidence intervals calculated for $\alpha=0.05$ significance level were: [13.54;15.66], [14.98;17.34].

CONCLUSIONS

The household labour force statistical survey conducted by the National Institute of Statistics highlighted the continuation of the economy restructuring process, with an impact on the structure of the employed population and unemployment.

Given that the job vacancy rate in the agricultural sector amounted to 0.35 % in 2013, 1.43 % points below the level recorded in 2008, there was a strong warning on the difficulties of the reintegration into the labour market of people with low qualifications.

In the short term, the solution proposed by specialists, i.e. the qualification of the underemployed rural population is difficult to implement, given that the incidence of underemployment in agriculture (the share of underemployed persons in the total employed population in the same category) in 2013 was 6.9 % compared to 6.8 % in 2012.

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RECENT TRENDS AND PROSPECTIVE EVALUATIONS ON THE PORK MARKET IN ROMANIA

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Abstract

The scientific paper had the purpose to identify and highlight specific trends of pork market both in Romania and in selected EU member states (Hungary, Bulgaria, Greece, Slovakia, Poland, Lithuania, Latvia). In the Romanian agri-food system, there is a correlation between pork production and purchasing power. Romania's pork consumption is still substantially below that of the European average of 46.4kg per capita. A positive aspect is the lifting of the ban on Romanian pork to the European Union. Therefore, it could be considered a boost of the food industry, as the trade system could be developed, satisfying local and overseas supply and demand. Taking into account the current tendencies for pork production and exchanges in European Union, one could find out that there is a reduction of livestock in the European Union. Pork production depends on country and it is linked to feed prices and reorganization. The analysis is based on statistical data regarding pork production, highlighting its evolution of pork production before and after our country's accession to the European Union, comparing pork production evolution at national level to the average one of other countries, during the period of time 2001-2012. There were also determined the adjusted values of the chronological series as well as the extrapolated ones for 2013 and 2014.

Key words: adjustment, extrapolation, pork production, time series, trend

INTRODUCTION

One of the main food sources in human alimentation is represented by meat. Nowadays, worldwide meat market is threatened by consumers' active reactions against some animal diseases. Nevertheless, developing countries consume approximately 28 kilos of meat per capita, unlike developed regions where the consumption has a value of almost 77 kilos per capita. Although Romania holds the 52nd place within the global classification regarding pork production, at national level this sector is well valued, the meat being consumed in generous quantities.

After consulting Romanian statistical publications, one could observe a consumption of 32 pork kilos per capita during a year, the highest value of consumption being recorded around the winter holidays. A big quantity of pork for consumption is imported into European Union member states. In the agri-food system of our

country, there is a correlation between pork production and purchasing power. Hereby, it will lead to a significant pass, from the production intended for self-consumption to the commercial one.

Romanian swine farmers must adapt to consumers requirements of quality. These must correspond to those of the European Union, being necessary a refinement of pig population in order to improve pork quality.

During the six years before Romania's accession to the European Union, pork production fluctuated at national level, reaching the maximum value of 522,432 tons in 2003 and the minimum one in the next year, respectively 364,075 tons.

Although in the last two years before the accession, 2005 and 2006, the trend of production was an increasing one, recording a growth of 16 per cent, respectively 18 per cent, in comparison to 2004 (Table 1). Along with the accession, pork production followed a decreasing trend, with a maximum value of

447,310 tons in 2007. Opposite to it, the year 2010 had the lowest value of production, namely 363,109 tons (Table 2).

Table 1. Pork production in Romania between 2001-2006

Year	2001	2002	2003	2004	2005	2006
Pork prod. (thousand tons)	438.7	457.6	522.4	364.1	422.6	432.9

Source: Food and Agriculture Organization of the United Nations

Table 2. Pork production in Romania between 2007-2012

Year	2007	2008	2009	2010	2011	2012
Pork prod. (thousand tons)	447.3	383.4	381.9	363.1	398.4	386.2

Source: Food and Agriculture Organization of the United Nations

During the analyzed period, 2001-2012, the highest values of the pork production were registered in Poland, in 2003, almost 2,200,000 tons. As seen in Table 3, the lowest registered values were in Latvia, specifically at the beginning of the analyzed period, approximately 28,000 tons.

Table 3. Pork productions of selected EU Member States (thousand tons)

Year	RO	HU	BG	EL	SK	PL	LT	LV
2001	438.7	595.0	237.0	134.5	151.5	1.849.0	72.9	28.0
2002	457.6	596.3	61.8	108.6	151.7	2.023.3	97.7	28.0
2003	522.4	521.9	70.6	108.1	181.4	2.192.8	105.7	32.8
2004	364.1	530.3	78.3	105.6	160.2	1.949.8	113.0	33.5
2005	422.6	423.6	73.6	105.3	129.1	1.948.6	120.6	35.4
2006	432.9	445.2	73.3	101.3	113.1	2.129.7	112.9	33.3
2007	447.3	470.1	74.0	105.5	113.8	2.152.1	116.2	37.1
2008	383.4	458.7	72.8	104.7	97.8	1.866.9	103.5	41.9
2009	381.9	455.1	71.8	104.3	84.0	1.600.8	103.0	46.3
2010	363.1	410.5	69.2	103.0	101.5	1.739.9	106.0	49.5
2011	398.4	425.0	71.6	103.9	71.3	1.715.0	93.9	53.8
2012	386.2	384.3	72.2	103.7	67.8	1.611.1	98.6	52.1

Source: Food and Agriculture Organization of the United Nations.

Both the pork production in Romania and the average pork production of E.U. selected countries have had a resembling fluctuation over the analyzed period (Table 4).

Table 4. Comparison between pork production evolution in Romania and the average one of selected EU Member States*

Year	Romania (Thousand tons)	Average production of selected E.U Member States (Thousand tons)
2001	438.7	438.3
2002	457.6	440.6
2003	522.4	467.0
2004	364.1	416.8
2005	422.6	407.3
2006	432.9	430.2
2007	447.3	439.5
2008	383.4	391.2
2009	381.9	355.9
2010	363.1	367.8
2011	398.4	366.6
2012	386.2	347.0

Source: Own calculation based on the data provided by Food and Agriculture Organization of the United Nations.

*Romania, Hungary, Bulgaria, Greece, Slovakia, Poland, Lithuania, Latvia.

They both pitched in 2003, as following: Romania with a production of over 520,000 tons and the average production of EU Member States registered a slightly lower value (467,000 tons). Between 2004 and 2007, they both recorded an increase, after which they had a significant decreasing tendency throughout the next five years.

In this context, the present paper proposes by the use of statistical techniques to extrapolate the pork production in Romania, based on data released by Food and Agriculture Organization of the United Nations.

MATERIALS AND METHODS

As a purpose of this scientific research, one can identify the estimation of pork production trend evolution.

In order to achieve this aim, calculations were made through methods and procedures for data adjustment, on the basis of chronological series.

Within a chronological series, one could identify the systematic components, as following: trend, cyclic and seasonal oscillations and residual variances (Antonescu C, 2002).

The main problem in the time series analysis is determining the trend. Therefore, cyclic, seasonal and residual oscillations will be eliminated and will be replaced with real terms that express the trend (Biji E.M. et al, 1999).

The adjustment can be made by mechanical methods, the most commonly used being: the average absolute change method and the average dynamic index method.

According to Lilea E. et al (2001), the absolute average change method is recommended when absolute changes with mobile basis are roughly equal or when the string of chronological series terms is similar to an arithmetic progression.

Thereby, variable's values are being modified relatively uniform and the chronological chart can be approximated by a straight line. The adjustment function for the absolute average change method is:

$$Y_t = y_1 + (t - 1) \cdot \bar{\Delta},$$

where:

$$t = \overline{1, n};$$

$$\bar{\Delta} = \frac{\Delta_{t/t-1}}{n - 1}$$

or

$$Y_{t_i} = y_0 + t_i \cdot \bar{\Delta},$$

where:

y_0 = the term chosen as a basis for the adjustment;

t_i = the time variable in relation to the basis for the adjustment (the position that said term has compared to the term chosen as basis).

The method of average dynamic index is recommended if the dynamic indexes with mobile basis are roughly equal or if the string of chronological series terms is similar to a geometric progression.

The adjustment function for the average dynamic index method is:

$$Y_t = y_1 \cdot \bar{I}^{t-1},$$

where:

$$\bar{I} = \sqrt[n-1]{\prod I_{t/t-1}}$$

or

$$Y_{t_i} = y_0 \cdot \bar{I}^{t_i},$$

where:

y_0 = the term taken as a basis for the adjustment;

t_i = the time variable in relation to the basis for the adjustment (the position that said term has compared to the term chosen as basis).

In order to choose the optimal method of adjustment, one has to determine the deviation sum of empiric and theoretic values.

The adjustment process by which this sum is minimal is considered to be the best (Biji E.M. et al, 1998).

$$\sum_{i=1}^n |y_t - Y_t| = \min$$

The extrapolation models are:

- for the absolute average change method:

$$Y_{t_i}' = y_0 + t_i' \cdot \bar{\Delta}$$

- for the average dynamic index method:

$$Y_{t_i}' = y_0 \cdot \bar{I}^{t_i'}$$

where $t' = \overline{n+1; n+k}$, k =forecast horizon.

Extrapolated values attend to errors generated by the following causes: future modification of influence factors; choosing the adjustment model.

Taking into account the hypothesis that factors influence is not being modified, extrapolation values are obtained by prolonging only the ones of time variable within the chosen adjustment model.

It is recommended that time horizon for which the extrapolation is determined not to exceed half of the analyzed series length.

RESULTS AND DISCUSSIONS

The data on pork production in Romania in the last six years before joining the E.U., and in the first 6 years after accession can be found in the Figure 1.

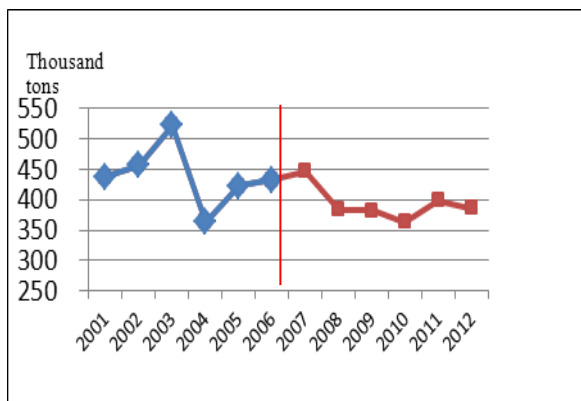


Fig. 1. The evolution of pork production before and after Romania's accession to the European Union
 Source: Food and Agriculture Organization of the United Nations

We calculated the adjusted values using the absolute average change method in Table 5. The results of the application of the average dynamic index method are presented in Table 6.

Table 5. The pork production and adjusted values calculated with the absolute average change method

Year	Production (thousand tons)	Adjusted values $Y_{t_i} = y_0 + t_i \cdot \bar{\Delta}$
2001	438.67	438.67
2002	457.62	433.89
2003	522.42	429.12
2004	364.08	424.35
2005	422.58	419.58
2006	432.86	414.80
2007	447.31	410.03
2008	383.40	405.26
2009	381.86	400.49
2010	363.11	395.71
2011	398.37	390.94
2012	386.17	386.17

Source: Own calculation based on the data provided by Food and Agriculture Organization of the United Nations

Also, for both methods, the deviations from the real values were calculated, as well as the sum of these deviations (Table 7). This sum is necessary to determine the best method of extrapolation.

Table 6. The pork production and adjusted values calculated with the average dynamic index method

Year	Production (thousand tons)	Adjusted values $Y_{t_i} = y_0 \cdot \bar{I}^{t_i}$
2001	438.67	438.67
2002	457.62	433.62
2003	522.42	428.64
2004	364.08	423.71
2005	422.58	418.83
2006	432.86	414.02
2007	447.31	409.26
2008	383.40	404.55
2009	381.86	399.90
2010	363.11	395.30
2011	398.37	390.75
2012	386.17	386.26

Source: Own calculation based on the data provided by Food and Agriculture Organization of the United Nations

Table 7. The deviations of the adjusted values according to the absolute average change method and the average dynamic index method

Year	$ y_i - (y_0 + t_i \bar{\Delta}) $	$ y_i - y_0 \cdot \bar{I}^{t_i} $
2001	438.67	438.67
2002	457.62	433.62
2003	522.42	428.64
2004	364.08	423.71
2005	422.58	418.83
2006	432.86	414.02
2007	447.31	409.26
2008	383.40	404.55
2009	381.86	399.90
2010	363.11	395.30
2011	398.37	390.75
2012	386.17	386.26
Total	316.16	317.15

Source: Own calculation based on the data provided by Food and Agriculture Organization of the United Nations

For the absolute average change method:

$$\sum_{i=1}^n |y_t - Y_t| = 316.16.$$

For the average dynamic index method:

$$\sum_{i=1}^n |y_t - Y_t| = 317.15.$$

The two amounts were compared and, according to the obtained result, the suitable method to extrapolate the values for the years

2013 and 2014 is the average absolute change one.

Thus, the model of extrapolation used in this case is:

$$Y'_i = y_0 + t'_i \cdot \bar{\Delta};$$

$$Y'_{t_{13}} = y_0 + t'_{13} \cdot \bar{\Delta}; \quad Y'_{t_{13}} = 376.62$$

$$Y'_{t_{14}} = y_0 + t'_{14} \cdot \bar{\Delta}; \quad Y'_{t_{14}} = 371.85$$

Table 8. Extrapolated values for 2013 and 2014

Year	Production (thousand tons)
2013	376.62
2014	371.85

Source: Own calculation based on the data provided by Food and Agriculture Organization of the United Nations

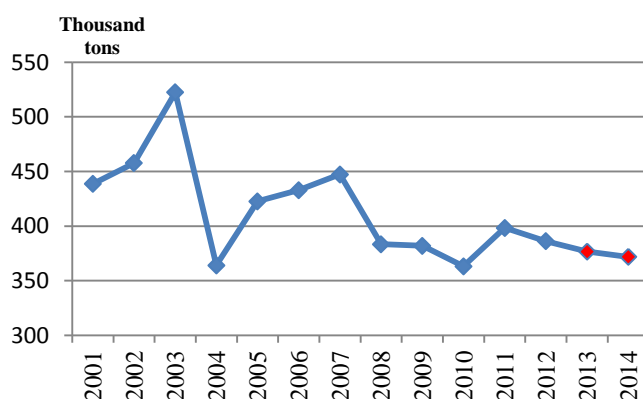


Fig. 2. The projection of the pork production in Romania for 2013 and 2014

Source: Own calculation based on the data provided by Food and Agriculture Organization of the United Nations

Figure 2 shows a visual interpretation of the extrapolated values in the evolution of pork production in Romania.

CONCLUSIONS

Romania's accession to European Union had a great impact on all the market branches, mainly for the agri-food one. Being known as a country with high agricultural potential, foreign investors were attracted by this sector. The opportunities given to Romanian farmers after the accession are huge. Even if there was a significant improvement in the food industry, much more must be done in order to

restructure it so as meat market meet the European Union's standards concerning quality and safety.

Trade is well developed now, imports being an important part of the economic increase. Romanian market imports pork because pigs in here provide only a quarter from the intern meat necessary.

In order to record an economic increase, meat sector has to meet the increasing demands of consumers.

The main objective of pork market is represented by the expansion of industrialized production, along with vertically integrated value chains.

Therefore, during the six years before Romania's accession to the E.U., pork production fluctuated at national level, in 2005 and 2006, the trend of production was an increasing one, recording a growth of 16 per cent, respectively 18 per cent, in comparison with 2004.

Along with the accession, pork production followed a decreasing trend, with a maximum value of 447,310 tons in 2007. Opposite to it, the year 2010 had the lowest value of production, namely 363,109 tons.

Pork production in Romania and the average one of the selected E.U. member countries pitched in 2003, as following: Romania with a production of over 520,000 tons while the average production of E.U. member states registered a slightly lower value (467,000 tons).

The module sum of the adjusted values (AAC) is lower than the one of the adjusted values (ADI) (317.17 tons >316.16 tons) during the analyzed period. Using the established method as best suitable, the pork production values were extrapolated for the next two years 2013 and 2014.

If the factors that influence the series did not suffer a major modification in the next two years, then it is safe to say that the extrapolated production for the years 2013 and 2014 are quite accurate.

As a final conclusion, Romanian farmers should pay more attention to farm management in order to expand their own business, to increase profitability year after

year, by using the available resources in more efficient ways.

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THE MATRIX OF ENERGY MANAGEMENT – AN EFFICIENT MANAGEMENT TOOL FOR FOOD INDUSTRY OF THE REPUBLIC OF MOLDOVA

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Abstract

The article analysed the evolution and current practice of engineering and economic approach regarding the issue of efficient energy management in food enterprises from the Republic of Moldova. The problem of reducing energy costs in addition to energy price growth factor has a major impact on managerial effort to reduce energy consumption. In this sense, the matrix of energy management is an effective tool for strategy and monitoring the efforts achieved in energy management in food enterprises, and the problem of minimizing energy costs is presented as an isoquant map described by classical production function.

Key words: efficient energy management, food enterprises, matrix of energy management, Republic of Moldova

INTRODUCTION

Currently, evolution of the phenomena from energy sector shows that energy consumption increases and energy efficiency and is one of the most effective way to support the improvement of an enterprise performance. Energy resources are an important part of material resources, once the oil crises affected the industrialized countries that import energy. The reactions of developed countries have been structured and developed the concepts of alternative energy, renewable energy, energy management and energy efficiency. All these concepts have had practical character and beneficial consequences on the entire economic activity in these countries. [10]

At global level, the issue of energy efficiency emerged in the early 70s, when the UK has paid attention to the issue of reducing energy consumption in the industry and public institutions. Since then, there have been many changes in the companies, all regarding energy savings, with positive results on energy efficiency. This was caused by the increase of prices from the energy and the need to improve competitiveness. Then the issue of energy efficiency has spread to

Western Europe, North America and Japan. In Romania, the priority of reduction energy consumption has emerged with a considerable increase in fuel prices after 1973 [10]; and in Republic of Moldova these concerns appeared until the 90s, when the planned economy has transformed into the market one. But a greater magnitude of this notion among entrepreneurs from food industry of Moldova appeared ten years later.

MATERIALS AND METHODS

In determination the quality management of energy consumption in the food enterprises from Moldova has been used the energy benchmarking methodology. For monitoring the efforts achieved in energy management in food enterprises has been used the matrix of energy management. In the analysis of energy costs minimization was used an isoquant map described by classical production function.

RESULTS AND DISCUSSIONS

With the substantial increase in the cost of energy, given the industry's consumption share of 30% in energy consumption structure, Moldova's energy efficiency is low

compared to European countries. Energy consumption in global food industry covers only a small part of the total cost of production (about 3%). As a result, until recently, Moldovan enterprises have been weak involved in energy management. Today, even if food industry remains a non-intensive energy industry, with increasing energy prices and environmental awareness it's also increasing the growing role of energy efficiency in Moldovan food industry.

According to experts V. Moroz, Poisic M. and Ignat A. [8], the main constraints for energy efficiency in the country are: high energy consumption, increasing energy prices, technology and equipment morally and physically outdated, lack of knowledge and skills in energy efficiency and renewable energy use, excessive dependence on imported energy resources (95% import energy). They also argue that the competitiveness of the food industry is directly affected by the used technology and low efficiency of the energy sector in the country has a negative impact on industry development of local agricultural raw material processing.

The following solutions are targeted to reduce maintenance costs, increase competitiveness and reliability:

1. To reduce energy consumption by reducing costs, namely:
 - Framing consumption in contracted values;
 - Tracking the specific consumptions in locations and areas, empowering local and central monitoring;
 - Taken measures from analyzed reports;
 - Manage energy consumption by systems;
 - Elimination of parasitic energy consumption and strengthening discipline use.
2. Increase competitiveness by:
 - Exact calculation of cost and energy intensity per location;
 - Efficient use of energy resources and utilities.
3. Increase the reliability and reduce maintenance costs through:
 - Analysis of the distribution quality of energy consumption;
 - Analysis of incidents in case of emergencies;
 - Prevention of major equipment faults by

monitoring consumption parameters and preventive maintenance.

The experience of energy management in the European food industry demonstrates that reduction of energy consumption can be achieved politically through technical measures (application of efficient engines, fuels and materials); replace and improve techniques and procedures; and also changing social aspect by decreasing various products consumption, including those imported.

It can be concluded that entrepreneurial effort of Moldovan industry focuses on production costs minimization and less on energy costs. Moldovan food industry faces many challenges that require a reassessment of current practices in production and trade, cooperation between firms along the vertical supply chain, government influence on business management activities to optimize the potential of production systems and balance the industrial structure in production.

The structure and dynamics of energy consumption in Moldovan food industry.

Generally, companies make major investments to meet working conditions, improve product quality, increase tools productivity and achieve energy savings. Increasing competitiveness among competitors within same field showed that introduction of advanced energy management led to consolidation and growth of companies and recall of those who have not taken adequate measures in time to reduce energy consumption.

The supreme argument for investment in energy efficiency is the ability to reduce spending on electricity and fuel, as an indicator that can be immediately seen on company profit, as well as a security measure to ensure competitiveness in the future, given rising energy prices. The European Bank for Reconstruction and Development (EBRD) recognizes the growing importance of energy efficiency and in 2009 launched line for Financing Energy Efficiency in Moldova (MoSEFF) in order to support energy efficiency investments in enterprises from Moldova.

Industrial consumption in electricity consumption structure in the country occupies

30%, where other sectors have an insignificant role, which helped to effective changes in the structure of the food industry in the period 2005-2012. Energy efficiency in Moldova is low compared to European countries due to substantial increase of energy costs.

Energy comprises only a small part of total cost of production in the food industry (about 3%) and as a result, food industry was quite reserved involved in energy management, remaining a non-intensive industry. However, with rising energy prices and environmental awareness, sectorial priorities have changed and pay a greater attention to the energy efficiency.

Currently, the food industry face a number of challenges that require a reassessment of current practices in production and trade, cooperation between enterprises along the vertical supply chain and "environmental awareness". In order to meet the above requirements, Moldovan food industry faces implementation of best solutions and seeks to optimize its potential according to the new models of increased competition. Challenge to increase food production keeps the pace with demand, preserving essential ecological integrity of production systems.

A tool to ensure evidence of energy consumption in production under diverse nomenclature is considered Energy Performance Indicators (EPI), which together with the use of measurement technique allows assessing organizations from various sectors and areas according to differential energy consumption for each type of production or comparing countries by technological level.

The use of Internet-Module allows monitoring the level of energy consumption over time and tsb-mobile applications for determining the quality level of energy benchmarking.

Calculation of EPI indicators and of system limitations are important in understanding energy benchmarking methodology, but the differences between companies of the same class can be quite representative, and only attracting more organizations in this system will allow a certain uniformity of data for certain classes of business, types of processes or production.

Based on present research study the author proposes the following 10 key measures of energy efficiency in industrial processes:

1. Continuous monitoring of energy consumption and technological parameters with performance measurement and control systems;
2. Upgrading of old production lines with new technologies, clean, low energy consumption and high productivity;
3. Industrial automation of processes;
4. Reduction of heat loss in soil, air and environment;
5. Reuse of secondary energy resources through technological processes utilization;
6. Heat production with performant equipment with fuels of low emission;
7. Preparation of contracts for the electricity supply at best rates by hourly load curves;
8. Efficient lighting installations and high quality lighting at jobs, depending on specific requirements of the technological processes;
9. Sizing motors under required capacity and use of modern devices for turn on, engine control and regulation;
10. Development of local CHP plants to produce electricity and heat simultaneously at low cost.

From the analysis of domestic food industry can be stated that food industry has a reserved involvement in energy management, considering necessary to revaluation of current practices in production and trade. By implementing energy efficiency programs in food companies, energy intensity per unit of output would decrease, which would lead to a significant increase of market competitiveness and food security of the country. It is also necessary to implement an incentive system of the industry, including data collection, popularizing and maintaining compliance efforts on rational energy consumption in industry.

To increase the efficiency of the food industry in Moldova, a managerial benchmarking mechanism is proposed which would allow improvement of information policies in the field, identification of best companies according to certain criteria and structural subdivisions; and to ensure evidence of energy consumption it would be appropriate

to use EPI energy performance indicators that would allow organizations to assess the level of different branches and areas according to differentiated energy consumption for each type of production or comparison of technological level of the countries.

Republic of Moldova imports about 94% of the resources needed to cover the country's energy consumption because of the lack of own energy resources. The Moldova's energy policy is aimed to promote energy efficiency and use of renewable energy available in the territory, which constitute a prerequisite for reducing dependence on imports. But a key impediment to economic development and competitiveness of domestic industry is the increased energy intensity.

The increase of energy efficiency in the industrial sector is contained in the National Programme for Energy Efficiency 2011-2020. According to this program, the industry is the third largest consumer of energy in Moldova, holding 10% of the total energy consumed (the primary objective of the program being heat supply of the population). [7]

In the scientific literature the concept of *energy management* is presented as the application of professional techniques in energy use.

It can be seen that energy is one of the most controllable costs as each of energy savings are accounted directly in the profits.

Here we can mention the concept of *energy efficiency* that is broadly related to a reduced increase of the absolute or specific energy bill; in a narrow sense the energy performance means the energy saving.

So, improvement of energy efficiency involves identification of energy flows, determination of most profitable measures to eliminate the losses, the prior estimation of the costs and profits and finding the most convenient sources of financing of such projects. [9]

George Vuc argues that an energy management program to work properly it must be effectively integrated into general management programs and procedures. Energy management is based on people – more people involved and motivated, more effective is the program.

Their involvement should be structured and planned anyway. However, the energy manager is the key; he must be trained to know how to act concretely in the company, but must also be supported by the administration in achieving the objectives related to energy efficiency. [10]

Economic implications of the implementation of energy saving policies.

Spending's concerning energy consumption are often regarded as constant costs, independent of the value of production; Thus, at enterprise level the economic implications on reducing energy consumption involves both opportunities and impediments as well (Table 1).

Table 1. Opportunities and obstacles on reducing energy consumption in food enterprises

OPPORTUNITIES	OBSTACLES
1. Increase the competitiveness	1.The importance of cost and energy consumption is not fully realized, both administration and employees of the enterprise
2. Increase the profit	2.Energy use in many forms: gas, oil, electricity, steam, compressed air;
3.Increase the job security for employees in the enterprise	3.All staff in the enterprise has the access to facilities that consume energy

Source: author's elaboration

The data from the Table 1 show that both opportunities and impediments concerning the reduction of energy consumption in the enterprises from food industry play an important role in shaping the energy policy.

Effective management of the energy consumption.

Application of a systemic method of management requires the commitment of administration and staff to conduct a series of specific actions over a period of time in order to obtain maximum benefit from the energy outlay.

In addition is quite difficult to assess quantitatively the quality of management in the process of administration of energy consumption in an enterprise from food industry.

Thus, we propose to analyze the energy management matrix.

The matrix of energy management is a structured model that correlates different levels of energy management with the main lines of possible actions concerning the management of energy consumption in an enterprise, involving: energy policy, organization, motivation, information systems, marketing and investment.

These levels may help in determination the quality management of energy consumption in the food enterprises from Moldova.

The energy management matrix based on UK's model is presented in the Table 2.

Table 2. The energy management matrix based on UK's model

Level	Energy politics	Organization	Commitment	Information Systems	Marketing	Investment
4	The active involvement of top management	Fully integrated with other forms of management	All staff have specific responsibilities for energy savings	Well-developed systems with daily reports	Extended inside and outside the institution	Positive discrimination in favor of green schemes
3	Effective policies but without administration involvement	Clear division of tasks and budgets	The majority of big consumers are motivated to save the energy	Monthly M & T system for centers or individual zones	Regular advertising campaigns	The same assessment criteria as for the rest of investments
2	Undecided politics	Assessment of tasks but not established responsibilities	Non-rhythmic or sporadic motivation	Monthly M & T system for different types of fuel	Sporadic actions of staff awareness	Only investment for payback period
1	Directions of unwritten actions	Assessment of tasks on different occasions	Relative staff awareness about the importance of economies	Invoice verification	Informal contacts for promoting economies	Only low-cost measures
0	No explicit policy	Any delegation of responsibilities on energy sector	Lack of awareness of the need to save	No accounting or information system on consumption	Any marketing or publicity	No investment in improving energy efficiency

Source: [2]

Note: The M&T system stands for computer systems to monitor energy consumption.

It should be noted that the Monitoring and Targeting System (M & T) has specialized programs for software that processes data on energy consumption, resulting in an operative and detailed energy analysis, which is followed by a stage involving the establishment of energy efficiency measures in the enterprise.

According to the data from the literature about 25% of enterprises are outside the lower and upper limits. It should be stressed that companies with higher scores continue to

strive to achieve improvements in management of energy consumption [10].

The producer and the problem of cost.

In the production process, producers' theory is used to determine the demand of inputs. Also is allowable as in the production process to substitute another input, and the producer will try to find a combination of inputs that will minimize the cost of production. For a general description of this theory, we use a mathematical approach to graphics and presentation.

We consider an enterprise with a single output that is produced with two inputs X_1 and X_2 . The cost of production will result in:

$$TC = c_1X_1 + c_2X_2, \text{ where}$$

$$St q_0 = (X_1, X_2)$$

and Lagrange expression would be:

$$L = c_1X_1 + c_2X_2 + \lambda (q_0 - (X_1, X_2))$$

the first condition for a minimum is:

$$\delta L / \delta X_1 = c_1 - \lambda \delta f / \delta X_1 = 0$$

$$\delta L / \delta X_2 = c_2 - \lambda \delta f / \delta X_2 = 0$$

that would result in:

$$c_1 / c_2 = (\delta f / \delta X_1) / (\delta f / \delta X_2) = RTS$$

$$(X_1 \text{ for } X_2)$$

Thus, to minimize the cost of any level of inputs, the company should produce outputs at that level of the rate of technical substitution equals to the price of return inputs. The solution of these conditions leads to the demand functions. Taking into account that a manufacturer uses capital and energy to produce outputs, resulting in the production function given in equation below:

$$Q = 10K^{0.5} E^{0.5}$$

Isoquant map for this production function may be represented graphically by Q at different levels (50 or 100) and then finding the combinations of K and E, which produces the outputs at the given level (Figure 1).

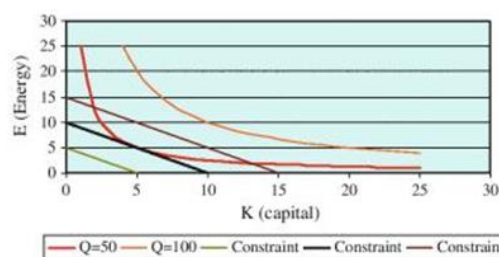


Fig.1. Selection of the optimal inputs for the enterprise
 Source: [1]

On suppose that price of capital and energy per unit is \$1 each. If K units of capital and E energy units are used in the production process, the total cost will be $K + E$. The cost lines constraints are presented as in Figure 1. As can be seen from Figure 1, the optimal choice would be the point where the cost line is tangent to isoquant. For a given level of outputs, the demand for energy inputs can then be determined.

While the above theoretical concepts provide an understanding of energy demand, these theoretical ideas are based on assumptions rather restrictive. While traditional econometric models explicitly follow the principles of economic analysis and forecasting energy demand, it is not only economic philosophy proposed in modeling of energy demand.

Although the price, the rationality and behavior in the neoclassical tradition greatly influence the econometric theories, sometimes other theories not always demonstrate the crucial role of these factors. Consequently, other behavioral assumptions and beliefs are used in some approaches as "bottom-up" approach or "economic engineering".

CONCLUSIONS

The article studied the evolution and current practice of engineering approach on the issue of economic and efficient energy management in food enterprises.

The problem of reducing energy costs in addition to energy price growth factor has a major impact on managerial effort in terms of reducing energy consumption.

The matrix of energy management can be used as an effective tool for strategy and monitoring the achievement of efforts of enterprise's energy management in the food industry and the problem of minimizing energy costs is presented as a isoquant map described by classical production function.

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OPPORTUNITIES FOR RELAUNCHING THE ROMANIAN BEEF CONSUMPTION IN THE CONTEXT OF THE NEW COMMON AGRICULTURAL POLICY – A COMPARATIVE ANALYSIS IN COUNTRIES WITH SIMILAR CONSUMPTION HABITS

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Abstract

The paper aims at identifying new opportunities for relaunching the Romanian beef consumption, from the domestic demand restructuring perspective, having in view the new Common Agricultural Policy (2014-2020). The research study on the evaluation of comparative aspects of beef consumption in Romania and other countries with similar consumption habits was based on the analysis of technical indicators (herds and meat productions, consumption) and economic indicators (incomes, expenditures), on the basis of information and data provided by the National Institute of Statistics – Tempo-online database, FAOSTAT Agriculture and EUROSTAT. The obtained results feature significant differences, with regard to the food intake/person coming from the Romanian beef consumption, both in quantitative and qualitative terms, compared to the other countries under investigation. The conclusion that can be drawn is that meeting the population's consumption needs with beef products from the domestic production and the creation of export availabilities, as well as the qualitative improvement of the Romanian consumption represent a main objective, which can be reached only by sectoral policy measures, these measures being already included in the new NRDP.

Key words: expenditures, meat consumption, production, productivity

INTRODUCTION

For the food industry in Romania, the meat and meat products market represents an absolute priority. This statement is based on both the natural and human resources involved and on the vital social and economic functions of this sector, such as the ensuring of the necessary raw materials for processing, of an active and profitable export of meat and meat products, of environment protection and maintaining the ecological equilibrium. The role of meat and meat products consumption and the need for its study implicitly is even more highlighted, if we list the multiple functions that it has in the society: utilitarian function, social function, mediation function, communication and integration with the environment in which people are living. By analyzing all these functions of the consumption of meat and meat preparations, the final goal is highlighted, namely the continuous increase of product quality [6].

The beef and baby beef does not really represent a traditional product in Romania and that is why only 15-16% of the total quantity of consumed meat in Romania belongs to this category, as the raising of bovines is rather linked to the production of milk and dairy products. However, having in view that about 35% of the cattle herds in Romania are of Simmental type, suitable for beef production, the future of beef sector seems to have good perspectives, beef having the greatest growth potential in all the other meat assortments, yet with a gradual consumption increase depending on the increase of population's incomes and food education level. [8].

MATERIALS AND METHODS

The research works on the assessment of comparative aspects concerning beef consumption in Romania and other countries with similar consumption habits were based on the analysis of technical indicators (herds

and meat production, consumption) and economic indicators (incomes, expenditures), based on the information and data supplied by the National Institute of Statistics – Temp-online database. For ensuring a high homogeneity of data regarding the comparative analysis of consumption in quantitative and qualitative terms, the site <http://faostat.fao.org/site/339/default.aspx> was used as main source.

RESULTS AND DISCUSSIONS

In Romania, in the period 2005-2012, *the bovine herds* decreased by 29.8%, compared to the decrease by only 3.6% in EU-27. From this point of view, Romania is on the last place in EU, with the highest diminution rate. At the opposite pole we can find Hungary and Netherlands, where the bovine herds were up by 6.4% in the year 2012 compared to 2005.

With regard to the livestock density in 100 ha land, our country is among the last countries in the European Union, being followed by Hungary and Bulgaria. [1]

Although bovine raising is a traditional activity of the Romanian population in the rural areas and mainly in the mountain area, the number of animals permanently decreased due to the small prices offered by the slaughterhouses and dairy units. Most small farmers raising bovines, as natural persons, who own 91% of the total herds, gave up the stock raising activity, so that in the period 2007-2012, the number of bovine herds was down by 655 thousand heads (23%).

Similarly to the milk sector, this animal raising and fattening sector is also extremely **fragmented**. Thus, from the total number of 237377 farms with fattening steers, 92% own between 1-2 heads, and 71% of the steer number is raised on these farms.

As regards *beef production* (carcass weight), in the period 2005-2012, Romania experienced a decline of 86.1%, being on the 27th place among the EU member states. From this perspective, in the year 2012, Romania was on the 19th place, with a beef production of 28.8 thousand tons, while countries like France, Germany, Italy and Great Britain exceeded this level by +30.6

times (Great Britain) and 51.3 times (France). [2]

The bovine slaughterings (carcass weight) in the slaughtering units decreased by 39% in the period 2007-2012. Both the total number of slaughtered bovines and the slaughtering of bovines on the specialized industrial units were down by 34% in the year 2012 compared to 2007.

As regards the structure of slaughterings by bovine categories, we can mention that a high percentage of about 30% is represented by the category “culling cows”, which reveals the poor quality of beef on the selling market.

The drastic diminution of herds in the mentioned period also entailed a diminution of live weight meat (by 29%), yet attenuated by the increase of the average slaughtering weight (by 18.5%), which is a most frequent situation in the case of the bovines raised on the household farms, under the conditions in which this indicator experienced only slight modifications for the bovines raised on industrial units. This decrease was also accompanied by price pressure induced by the beef imports from Western Europe (Austria, Germany, Italy, Hungary and France) or from South America.

Romania is one of the two countries from the Western Europe that has optimum natural premises for an adequate feeding of its population. Hungary is also in a similar situation in the EU (Popovici, Veraart, van de Kerk, 2008). [5].

With all this, the food consumption pattern of the population in our country is characterized by:

- the relative high share of food expenditures in total consumption expenditures (35-40%), twice higher than the EU average, with a deficient consumption structure (the consumption of inferior and cheaper vegetable products prevails, to the detriment of products of animal origin);

- the relative high share of food self-consumption in total consumption, with the highest value in EU-27 (more than three times higher compared to the EU-15 countries);

Referring to **beef consumption**, we can mention that in Romania that the demand is lower, due to the traditional preference for

pork, so that beef consumption represents about 10% of total meat consumption of 60 kg/capita, compared to 16.2 kg/capita the average beef consumption in EU-27 (2011).

Consumption had an ascending trend in the period 2000-2005 (+42%), while afterwards, under the background of purchasing power diminution and of the increase of domestic prices, consumption was down by 47% in the year 2011 compared to the year 2005.

The comparisons between the investigated countries with regard to beef consumption reveal significant differences (Figure 1). Thus, in Italy, with 25.4 kg/capita/year, which is on the first place, being one of the main European countries with the largest number of bovine farms and with the greatest beef export in the region, consumption is about 10 times higher than in Poland (2.4 kg/capita/year) and about 4 times higher than in Romania's (6.5 kg/capita/year).

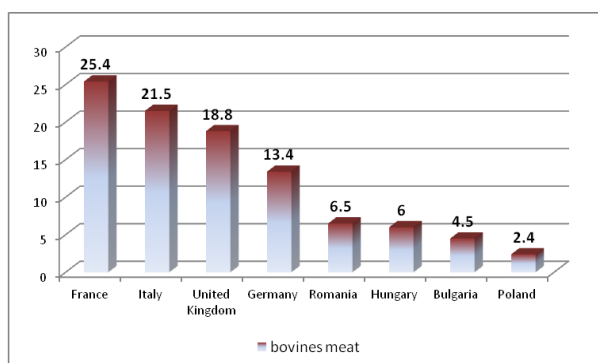


Fig. 1. Beef consumption, in countries with similar consumption habits – kg/capita/year – 2011

Source: <http://faostat.fao.org/site/610/DesktopDefault.aspx?PageID=610> [3].

According to FAO norms, calorie intake at the minimum normality limit, per capita, in a temperate climate and for average conditions of physical and intellectual effort is 2700 calories (2500 calories, under warm climate conditions).

Compared to the minimum FAO value, the average daily calorie intake, at national level, in the year 2012, was 3283, out of which 25.6% calories of animal origin, which reveals a deteriorated nutrition in qualitative terms [3] (Figure 2).

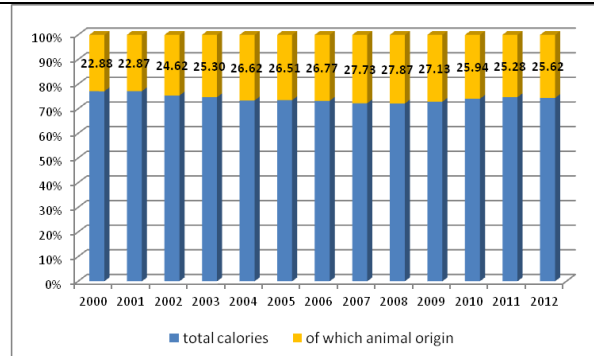


Fig. 2. Share of calories of animal origin in total calories; Source: National Institute of Statistics – Tempo-online [4].

While we cannot speak about bridging up the gaps in the food energy contents, expressed as average per capita, with regard to the structural-qualitative improvement, we must specify that Romania has a high share of food expenditures in the household budgets as compared to the majority of the developed states in the EU. [6] Thus, with regard to the expenditures for buying beef in total agri-food products, it can be noticed that although, in nominal terms, the expenditures for beef purchase increased by 30% in the period 2006-2013, as share in total agri-food products a permanent decrease, from 2.76% in 2006 to 1.98% in 2013 can be noticed, due to the higher growth rate, of 81%, allocated to the purchases of agri-food products (Figure 3).

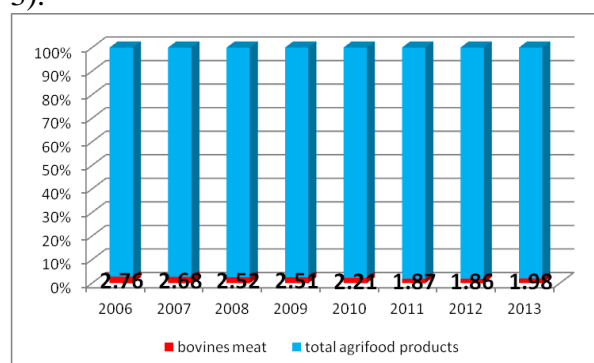


Fig. 3. The share of beef expenditures in total agri-food products - % -

Source: National Institute of Statistics – Tempo-online [4].

As regards the share of beef expenditures in total fresh meat, a diminution from 17.4% in 2006 to 12.3% in 2013 can be noticed, due to the higher growth rate (84%) than the growth

rate allocated to the purchase of beef, of 30% (Figure 4).

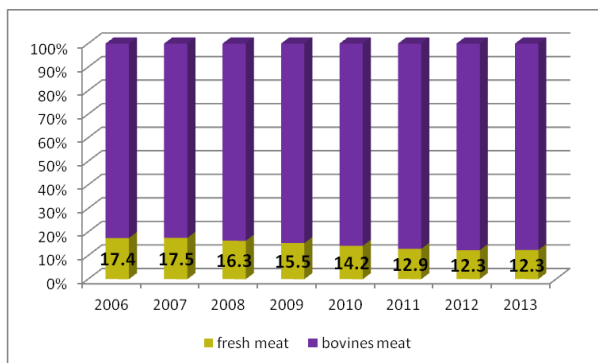


Fig. 4. Share of beef purchases in total fresh meat – % – Source: The National Institute of Statistics – Tempo-online [4].

The calorie intake from beef in countries with similar consumption habits (2011) reflects significant differences. Thus, on the first place we can see Italy, with 117 calories/capita /day (30.71% of total meat), which can be explained by the gastronomic traditions of this country, while Poland is on the last place, with 9 calories/capita/day. Romania’s consumption totals 28 calories from beef, (12.36% of total meat), due to the traditional pork and poultry meat consumption, to the detriment of beef consumption (Figure 5).

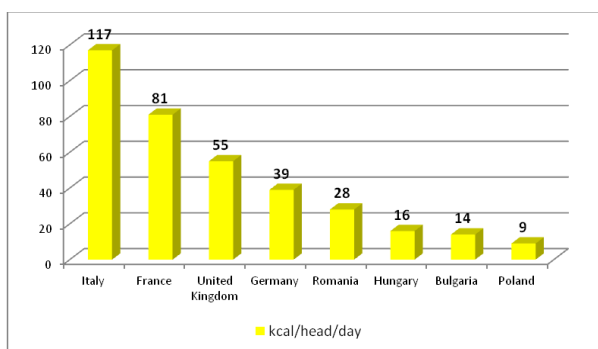


Fig. 5. The calorie intake from beef in countries with similar consumption habits – number – 2011 Source: <http://faostat.fao.org/site/610/DesktopDefault.aspx?PageID=610> [3].

The optimum level of the protein intake of animal origin envisaged by the experts in nutrition is 55-70 grams/capita/day [7]. A protein intake within these limits is an element of qualitative nature in itself. Taking this as reference, we can estimate that in Romania, the protein intake of animal origin of 53.4 grams/capita/day in 2011 and 52.2

grams/capita/day in 2012 is not satisfactory from the point of view of the real normal physiological needs of the human body.

The second element of qualitative nature, which can be held in view at this indicator, refers to the protein intake structure, i.e. the share of animal origin proteins in total daily protein intake. The specialists in nutrition consider that the optimum share of animal origin proteins in the daily total protein intake should be higher than 60%. In Romania’s case, in 2012, the proteins of animal origin represented 48.9% in the total protein intake, which confirms once again the general opinion regarding the inadequacy of the Romanians’ food consumption to the normal physiological needs of the human body (Figure 6).

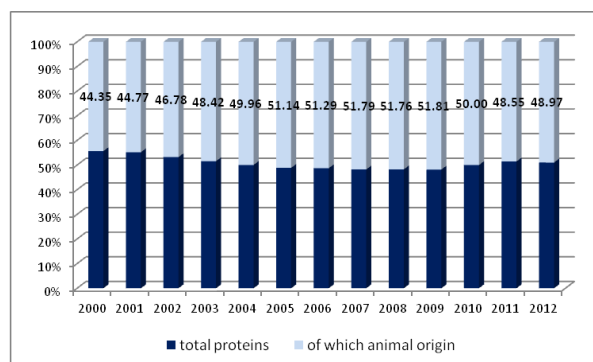


Fig. 6. The share of animal origin proteins in total proteins Source: National Institute of Statistics – Tempo-online [4].

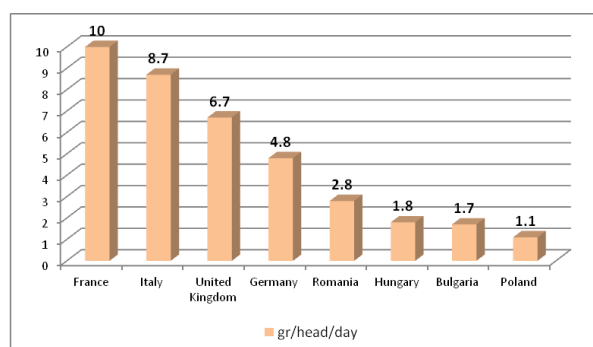


Fig. 7. The consumption of proteins from beef in countries with similar consumption habits – grams/capita/day – 2011 Source: <http://faostat.fao.org/site/610/DesktopDefault.aspx?PageID=610> [3].

As regards the protein intake from beef (2011), we can notice that the highest intake is in France (10 grams/capita/day) and Italy

(8.7 grams /capita/day). The intake of proteins from beef in total meat, in these countries, is 33% in France and 29.3% in Italy.

On the last place we find Poland, both as regards the protein intake (1.1 grams/capita/day), and the share in total meat (4%). In Romania, the protein intake from beef is 2.8 grams/capita/day and the share of beef proteins in total meat is 15.8% (Figure 7).

CONCLUSIONS

As regards the results of the quantitative and qualitative analysis of the Romanian beef consumption and comparisons to the other countries with similar consumption habits, the conclusions that can be drawn highlight the need for its the structural – qualitative improvement of beef consumption. This because beef consumption in Romania represents about 10% of the total meat consumption of 60 kg/capita, as against 16.2 kg/capita the average beef consumption in EU-27. At the same time, the share of proteins of animal origin is only 48.9% in the total protein intake, compared to minimum 60%, as recommended by the nutrition specialists.

Another important conclusion that can be drawn from the analysis of the situation in the meat production sector is that the consolidation of the producers' bargaining power with the processors can be possible only through organization and association into structures that can provide economic equilibrium to the whole production chain, from farm segment to the final sale segment.

The relaunching of beef consumption in Romania and the creation of export availabilities, as well as the qualitative improvement of the Romanian consumption, represent a major goal, which could be reached only by sectoral policy measures that must have in view the following:

- the establishment of competitive farms and the technological reshaping of the existing farms through the attraction of investments and use of structural funds in livestock raising;
- the improvement of beef production quality

both by the procurement of animals from improved breeds, adaptable to the conditions in our country and livestock breeding through the most recent selection and reproduction methods;

- the improvement of production performance, as well as of the raising and operation conditions, having in view to increase the relative share of animal production in the value of agricultural production;

- the nutrition and feeding improvement by ensuring nutrients with an optimum protein and calorie value for the bovines species.

In perspective, together with the removal of the milk quotas beginning with the year 2015 and the restructuring of the dairy cow herds, there will be 700,000-800,000 beef cows. These can be inseminated with seminal material from beef breeds, to cover the domestic market needs and for export to foreign markets. As an argument, it can be specified that the activity of beef cattle raising is much easier than the raising of dairy cattle, implying very low costs with the cattle sheds, while the animal feed costs are resumed to pastures in summer time and to hay in winter, and milk equipment costs are eliminated.

The policy measures addressed to the sector of beef cattle raising, in the present and in the future, must take into account providing solutions to the present fragmentation of the sector and to the low productivity compared to that in the Western European countries.

Thus, the following support schemes will be provided to the beneficiaries of the new NRDP 2014-2020, as agricultural producers, natural persons or legal entities, who own, raise and operate production animals, identified and registered in the national system:

Domestic policy measures:

- Stimulating the increase of animal herds and production*** – *de minimum support for the purchase of heifers from specialized breeds* (measure launched in 2014).

- Premia*** - *The national transitory aids (NTA)* in the livestock sector for the bovine species are granted from the state budget, through the MARD budget, to the farmers benefiting from complementary national direct payments in the previous year; the conditions for receiving this form of support are identical to those

authorized for receiving the payments in the previous year.

Support measures from European Funds (EAGF):

-Scheme decoupled from production in the milk sector –the coupled support for dairy cows (250 euro/head in 2015 - 325 euro/head in 2020) will be granted for minimum 10 and maximum 250 cow heads per beneficiary, for females of maximum 8 years old, from specialized and mixed breeds established by the National Agency for Breeding and Reproduction in the Livestock Sector (ANARZ), which calved at least once until the deadline for submitting the applications and have at least one product in the national farm register, registered in the Genealogical Breed Register with minimum 4500 litres of milk per lactation. The beneficiaries of payments must have a milk delivery contract for minimum 6 months.

-Scheme decoupled from production in the meat sector – the coupled support for beef cattle (300 euro/head in 2015-375 euro/head in 2020) is to be granted for minimum 10 and maximum 250 heads, 12-year old at maximum in cows, and maximum 6-year old in bulls for reproduction, at the deadline for submitting the applications and registered in the Genealogical Register.

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IMPLEMENTATION OF ISO 14001 IN BULGARIA

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Abstract

In the last years, the Bulgarian business organizations and government bodies were facing with the increased needs to implement new standards which could bring a higher benefit for companies and also not to affect the environment. The ISO 14 000 Family is based on standards for environmental management and gives the possibility to be applied in any type of organization, public or private sectors, administrations, etc . The main aim of the publication is to trace the implementation of ISO 14001 in Bulgaria by sectors and type of activities. As well this research offers the main reasons to the Bulgarian firms to implement ISO 14001. For reaching the aim, the study made a review of a) Evolution of ISO 14001 and its flexibility, in compliance with changes in the environment and business; b) Research of the firms which implemented ISO 14001 in Bulgaria, c) Content of the activities in the certification cycle. The used methods are according to the research system of the Bulgarian firms which implemented ISO 14001. Finally, some conclusions were drawn about the development of the ISO 14 001 in Bulgaria.

Key words: Bulgaria, certification, ISO 14000, ISO 14001

INTRODUCTION

Worldwide business organization units and government bodies are becoming increasingly aware of the need for environmental management, socially responsible behavior, sustainable growth and development. The implementation of standard ISO 14001 by stakeholders from business, industry, public authorities and non-governmental organizations shows concerns of the organization to reduce global pollution by controlling the impact of the environment with their activities, products or services.

In Bulgaria these processes has started in few of the key sectors, who are basically one of the biggest polluters. That's why is important the used standards in the country, to be achieved by general and comparable practices for environmental management. In addition, governments and regulators are increasingly looking for ISO standards to provide a legal framework to ensure consistency and coordination at national and international level. [3] For many organizations that seek to cooperate with international companies is essential to acquire certification of

compliance with European and international standards. ISO 14001 certification is recommended by regulatory authorities as a way of preventing environmental pollution. This will happen by increasing personal awareness and requirement for communication with the authorities in case of a problem, reducing the risk of liability. ISO 14001 does not define levels of performance in terms of the environment; it can be used by a wide range of organizations, regardless of their level current level. However, organizations are required to commit to compliance with applicable environmental legislation for them and continually improve their management of the environment.

Evolution of ISO 14001 and its flexibility, in compliance with changes in the environment and business

The environment is a topic dating back hundreds of years. In 1300 the UK Parliament adopts laws to curb the smell of the River Thames, which pollutes their airspace [1]. However, the real story of environmental management can be traced to the Industrial Revolution -18th and 19th century. Highlights of the development of ISO 14001 are as

follows:

(a)1973 – The core principles that would eventually influence the ISO 14000 framework were created and an action plan drafted.

(b)The UN Conference “Human Environment” held in Stockholm in 1972, Brundland Commission Report in 1987, the accepted principles concept of Sustainable Development /SD/[6]

(c)Several years later, in response to public support of more than 50 world leaders at the UN Conference on Environment and Development (UNCED) (located in Rio de Janeiro) in 1992 considered several different systems for environmental management, and a variety of national standards for environmental management

(d)In 1993 the European Commission published a regulation for environmental management and audit regulation of environmental management and audit (1836/93 / EC). It includes environmental management and audit scheme (EMAS). Experts from different backgrounds formed a committee charged with developing the ISO 14000 framework

(e)In 1996, the environmental management system ISO 14001 specification is adopted and published. Guidance on assessing the environmental performance labeling of eco-environmental followed the ISO 1400, which is the most successful environmental standard in the world.

(f)The standard was revised in 2004 and is currently being revised again and is expected to be published in 2015.

Since then, the 2004 version has been adopted by thousands of businesses in many countries around the world, including Bulgaria. More improvements are in the pipeline, and the standard is expected to continually evolve in order to help businesses minimise their impact on the natural world as environmental issues [5].

MATERIALS AND METHODS

The purpose of the study was to analyze the ISO standard 14001 in Bulgaria is to identify the need of its implementation in the units.

The main aim was to find out which are the main sectors in Bulgaria, which ISO 14001 could be implemented and the main reason to follow this step.

For reaching the aim, the following tasks were fulfilled:

-To study the implementation of ISO in Bulgaria according a research project [7]. For the current part, it was used the two-dimensional distribution of the data and on that basis it was made an analysis of the sectors capable to implement ISO 14001 and what is the main reason to implement it.

-To find out which the main reason for certification using questionnaire survey for the firms which implemented ISO 14001 in Bulgaria. In this part it is briefly described the content of the activities in the certification cycle in Bulgaria.

-To draw the conclusions, summarize and make recommendations to various companies, according to the results of the survey.

RESULTS AND DISCUSSIONS

Implementation of ISO 14001 in Bulgaria

In 2014 in Bulgaria - are recorded 616 firms implemented ISO 14001[4]. Nearly 50% (49%) of the firms are in “Construction (building) sector”, followed by “Public administration sector and defense; compulsory social security” (7%), “Real estate, renting and business activities (5%)”.

The complete distribution of firms certificate by ISO 14001 is shown in Table 1.

As it is seen from table one, construction sector is most certificated one. The summarized field of activities of the firms there is:

-High construction and associated infrastructure. construction of facilities. Winter maintenance and snow removal on roads and streets.

-High, low and hydro construction (buildings and structures, objects of technical infrastructure-water, sewage, hydraulic, energy, transport, etc.).

-Construction of civil, industrial and infrastructure projects, construction, repair and reconstruction of the transmission, distribution, industrial and building pipelines

for steam, hot water, gas, oil and other combustible fire resistant fluids.

-Performing works on the construction, repair and reconstruction of streets, roads and technical infrastructure objects - water supply, sewage, heating and related facilities.

-Design, construction and repair of roads, buildings, water and sewage systems, earthworks and other construction works. Production, transport and laying of concrete and mortars. Extraction, processing, manufacture and supply of aggregates. Transport services. Production of asphalt mixtures. Production of concrete and concrete products.

-Construction of diaphragm walls, piles, drilling wells, shotcrete and gunite, anchors, grout curtains, hydro, landfill for municipal and industrial solid waste, industrial and civil construction, hydro and tunnel construction; construction of hydropower, irrigation, water supply and sewerage facilities and systems; construction of sewage and drinking water

-Electrification of the rail, mining tram and trolleybus transport

-Construction, security services, landscaping and specialized cleaning and waste disposal.

-Production of aggregates, production and laying of asphalt-concrete mixtures, laying pavement, installation and repair of water and sewage networks and facilities, installation of horizontal and vertical markings, production of seedlings and planting.

-Activities including and associated with the construction and repair of runways, parking stands, paths of airports, highways, roads and streets, as well as provision of related engineering infrastructure. [8, 9]

With equal percentages of distribution (5%) are the sectors: real estate, renting and business services, manufacturing of electrical and optical equipment, trade, repair of motor vehicles, motorcycles and personal belongings and household goods, metallurgy and manufacture of fabricated metal products, machinery and equipment.

In agriculture, hunting and forestry, which is traditional for our country has only 4 companies that have managed to obtain 14001 certificates.

Table 1. Distribution of firms certification by ISO 14001 by sector in 2014

Sectors	%
Construction	49.10
Public administration and defense; compulsory social security	6.71
Real estate, renting and business activities	5.40
Manufacture of electrical and optical equipment	4.75
Repair and maintenance of motor vehicles, motorcycles and personal and household goods	4.75
Basic metals and fabricated metal products, except machinery and equipment	4.58
Manufacture of machinery and equipment without classified in subsector DL	3.93
Manufacture of chemicals, chemical products and fibers	3.27
Manufacture of rubber and plastic	2.62
Manufacture of other non-metallic mineral products	2.62
Manufacture of food products, beverages and tobacco	1.96
Transport, storage and communication	1.96
Manufacturing	1.80
Manufacture of pulp, paper, paperboard and articles of paper and paperboard; publishing and printing	1.15
Other activities, social and personal service	1.15
Yield without energy producing materials	0.98
Manufacture of textiles and textile products; production of clothing	0.82
Supply of electric and thermal energy, gas and water supply	0.82
Agriculture, hunting and forestry	0.65
Vehicle Manufacturing	0.65
Hotels and restaurants	0.49
Extraction of energy resources	0.16
Manufacture of coke, refined petroleum products and nuclear fuel	0.16
financial intermediation	0.16
Health and social activities	0.16

Source: Capital Market SA, own calculations, November 2014 [2].

Their main activities are:

- Construction and maintenance of park and decorative areas, sports fields and playgrounds, playgrounds, irrigation systems, landscaping and more.

-Activities including and associated with design and production of metal, wood and combination of wood and metal structures.

-Landscape architecture. Design, construction and maintenance of green areas and facilities in them. Production of ornamental shrubs,

flowers and trees. Construction works for metal, wood and composite metal and wood structures. Design and construction of playgrounds.

-Gardening, landscaping and maintenance of private and public facilities (parks, gardens, water bodies).

-Construction - Construction work and building repairs.

-Construction, reconstruction and modernization of sewage networks and hydraulic structures.

-Construction of energy and road infrastructure, landslides.

-Landscaping activities.

According to the collected data is seen that there are no in firms operating in agricultural sector which have ISO 14001 certificate.

In Bulgaria, there is operating a plurality of certification companies offering full cycle of activities on implementation of standard 14001.

Table 2. Reason of implementation of ISO 14001 in Bulgaria

Reason	Average	Mode
To reduce costs and save money through targeted approach to resource	2.17	1
To reduce its environmental responsibility	2.75	3
To ensure they meet customer requirements and relevant institutions	2.81	4
To improve the reputation of your company in the eyes of customers, partners and society	3.33	2
To reduce emissions, waste and wastewater	3.92	5

Source: Survey of project NID NI1-4/2014, Own calculations [10]

A sample of firms which has already implemented ISO 14001 was used as a study case to run this research and find out the main reason why it took the decision to implement this standard. The respondents had to mark the answers using a scale from 1 to 5, where 1 is the most important reason and 5 the less important reason.

A number of 50 respondents presented a

feed-back answered back, representing 0.081% of all firms having ISO 14001 in Bulgaria (Table 2).

From the data of table 2, one can see that for the most frequently occurring answer of the reason of implementing ISO 14001 with a highest importance (1) was pointed "To reduce costs and save money through targeted approach to resource", followed by "To improve the reputation of your company in the eyes of customers, partners and society" which has mode 2.

In the same time of calculating average of the given priorities of first place was "To reduce costs and save money through targeted approach to resource" with 2.17 points gained of the scale of importance.

On the second place was "To reduce its environmental responsibility" with rank of 2.75.

The less important reason for implementing ISO 14001 was the average rank of 3.92 and this was "To reduce emissions, waste and wastewater", which as well the mode was the highest possible, 5.

Content and implementation of the activities in the certification cycle in Bulgaria

Very often management system in a small company exists only in the head of the manager. But to ensure the welfare of the organization and resources to be used effectively, it is necessary to have written procedures, instructions, forms or records. This ensures that everyone is doing what they need to achieve goals[1], [10].

ISO 14001 certification is recommended by regulatory authorities as a way of preventing environmental pollution. This will happen by increasing personal awareness and requirement for communication with the authorities in case of a problem, reducing the risk of liability. The procedure described below is a combination [10] of data collected of 5 different certification firms operating in Bulgarian market. Certification activities go through the following stages:

-Preparation for certification - Creation of system documentation management, system implementation, internal audit and management review

-Request for certification - Send Request for Certification - Sending a request is not binding

-Contract - Based on the application, Certification firm submit a proposal for a contract with a specific price conditions. The price can not be shown because it varies a lot based on parameters of the businesses.

-Planning the audit - after signing a contract to plan and coordinate dates for audit

-Audit Stage 1 - Review the documentation of the management system and check the state of preparedness for an audit. The report of this stage can contain findings, requiring removal of deficiencies before an audit of Stage 2

-Audit Stage 2 - Evaluation of the implementation and effectiveness of the management system. The audit gather information and evidence of compliance with all the requirements of the applicable management system standard and the related field of human legal system and other external requirements.

-Decision - Based on the results of the audit deciding certification

-Certification is carried out by etc. "Certification bodies", "certificate authority" bodies or conformity assessment systems management.

-Each certification body is accredited to carry out certification requirements for certain standards in certain sectors for which it is proved that it has jurisdiction.

-Issue and service of ISO Certificate - Issue and service of certificate valid for three years

As well is possible some additional audits during the 3 years of the duration of the certificate, as pre-certification, transferring of the certificate, and etc.

Each organization which decides to be certificated by 14001 standards should prepare many documents related to the environment. These documents shall be submitted to the certifying company and after checks list can be issued the certificate procedure. On the Bulgarian Market are operating 52 certification firms. Most of them till now(November 2014) are having between 1- 4 firms for which they implemented ISO 14001 [11].

The leader place of the consultants firm is having successful certification cycle of 24 firms. Most common case is (106) the firm or organization to certificate the unit without using consultants. This is the case of 17% of all certificated units.

CONCLUSIONS

ISO 14001 is an internationally accepted standard that describes how most effectively to manage a business on the environment in which it operates.

It is designed to help businesses remain economically successful, despite their environmental responsibilities.

The system ISO 14001 provides the framework to achieve increasingly high customer expectations of corporate responsibility, as well as legal and regulatory requirements.

Sectors in which certificated companies are those that generate most major environmental problems, such as construction, road construction, extraction and distribution of petroleum products, metal processing and others.

Certified Systems of environmental management to ISO 14001 minimize the risk of environmental incidents. This creates conditions for lower insurance premiums, providing greater investor confidence, stable presence in the European and world market. Mostly large companies are certified by ISO 14001 because at this stage the procedure is quite expensive and connected with a lot of documents. As well the certificate must be renewed every three years.

In Bulgaria by ISO 14001 are certificated 611 firms, of which 50% in construction sector. The agricultural sector is on one of the last place and it has only 4 representations.

The most important reason for implementing ISO 14001 of Bulgarian firms is connected with possibility for reducing costs and save money through targeted approach to resource. The procedure is synchronized with the legislation in the country.

ACKNOWLEDGEMENTS

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EFFECT OF THE CRITICAL IRRADIANCE ON PHOTOVOLTAIC WATER PUMP DISCHARGE UNDER EGYPTIAN CONDITIONS

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Abstract

The present investigation aimed to study the effect of critical irradiance due to changing tilt angle of PV panel and tracking sun on submersible pump discharge. The authors used solar tracker and suitable tilt angle for the panel to increase the time interval during which the water pump operates. For the same irradiance collected by the PV, all systems pump the same amount of water, although they occur at different periods of the day. The pump itself 'does not know whether the electric power comes from any processes, as long as it has the same intensity.

Key words: Egyptian conditions, critical irradiance, photovoltaic, water pump

INTRODUCTION

Some photovoltaic pumping systems, depending on their electric power and water head, require, to start operating, levels of collected irradiance higher than what is known as critical irradiance level (I_c). That feature limits the daily operational time and the volume of water pumped. To reduce its influence the following technical means can be considered: (a) to use solar trackers; (b) to use suitable tilt angle for the panel; (c) to use reflector. (a), (b) and (c) increase the time interval during which the water pump operates [1 and 2]. The present study used solar tracker and suitable tilt angle for the panel to increase the time interval during the water pump operates.

MATERIALS AND METHODS

Experiments were carried out at Meet Eldeeba Rice Mechanization Center, Kafrelsheikh Governorate, Egypt, which lies at latitude $31.07^{\circ}N$ and longitude $30.57^{\circ}E$ during Winter 2011.

The PV array has a capacity of 140 peak Watt (4modules, 16.6V., 2.11A., 35 peak Watt for each) and mounted on sun tracking

device surface (Fig. 1) with tilt angles of 0.349, 0.523 and 0.872 rad (0, 20, 30 and 50deg) from the horizontal plane.

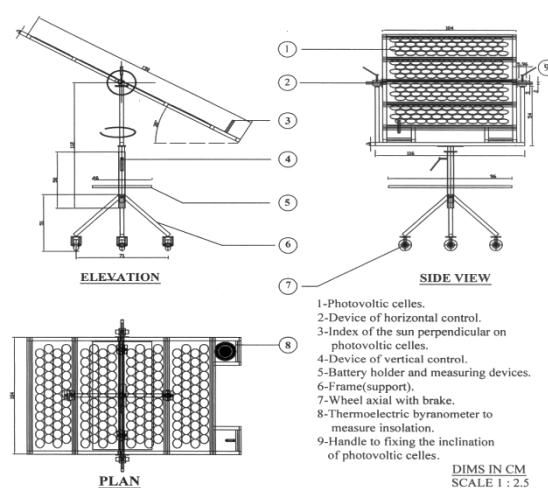


Fig. 1: Device of adjust the direction of the photovolatic cells horizontally and vertically with the direction of the sun

The PV array has got a tracking arrangement for orienting the panel towards East (from 9.00 a.m to 12.00 o'clock), South (from 12.00 to 15.00) and West (from 15.00 to 17.00) directions in Summer and Winter.

Submersible pump - model 02 made in Italy (Fig 2), delivery volume of 5679 l/h, high pumping capacity and reliability at a lower cost, delivery water head of 6 m, discharge

outlet diameter of 2 8.6 m m, 12 volts, 9 Amp, and DC motor driving a centrifugal pump type were connected to a PV array directly.



Fig. 2: Submersible pump

The experiments were divided to five processes as follows: 1) Panel tilted at suitable tilt angle [0.549 rad (20deg) in Summer and 0.872 rad (50deg) in Winter] and the panel tracking sun from East to West along day time. 2) Panel tilted at 0.523 rad (30deg) [latitude angle] and the panel tracking sun from East to West along day time. 3) Panel tilted at suitable tilt angle [0.349 rad (20deg) in Summer and 0.872 rad (50deg) in Winter] and panel was oriented toward south along day time. 4) Panel tilted at 0.523 rad (30deg) [latitude angle] and panel was oriented toward South along day time. 5) Panel positioned horizontally along day time.

RESULTS AND DISCUSSIONS

The effect of solar radiation on pump discharge at different heads in both Summer and Winter is presented in Fig. 3 and 4.

At the same value of radiation and the same water head, the discharge decreased by increasing in panel temperature because of the reduction in the panel output electric power. Some photovoltaic pumping systems, depending on their electric power and water head, require to start operating, levels of collected irradiance higher than what is known as critical irradiance level (I_c).

The minimum value of irradiance, is necessary to start the water pump operation (The critical irradiance levels). It is clear that the critical irradiance (I_c) increased by

increasing water head. In Summer, from Fig. 3, the critical irradiance at water heads of 2, 3 and 4m were 257.143, 328.571 and 628.571 W. In Winter from Fig. 4, critical irradiance has the same trend. It differed in magnitude due to panel temperature as it is discussed before. I_c increased by increasing water heads I_c values were 242.86 to 285.7 to 571.4 W at water heads of 2.3 and 4m, respectively.

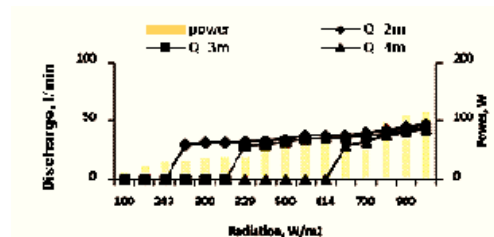


Fig.3: Discharge versus radiation and power at different water heads (Q) in summer

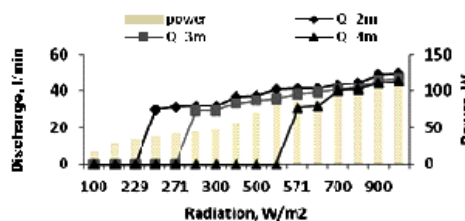


Fig.4: Discharge versus radiation and power at different water heads (Q) in winter

The discharge increased along day time from sunrise till noon when it reached its maximum value while it decreased with sunset. (Fig.5 and Fig. 6).

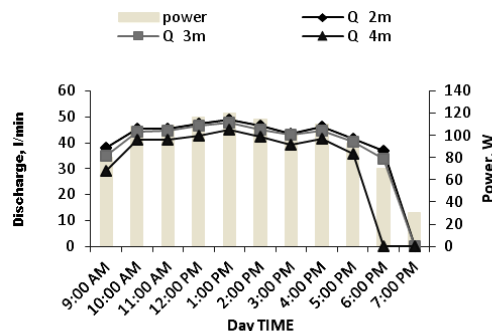


Fig.5: Discharge versus time and power at different water heads (Q) in summer, panel tilted at 0.349 rad (20deg) tracking sun from east to west

This naturally matched with solar radiation as usually water requirement increased during hot weather periods when the solar radiation intensity was high and the output of the solar array is at its maximum. On the other hand,

the water requirements decreased when the weather was cool and the sunlight was less intense.

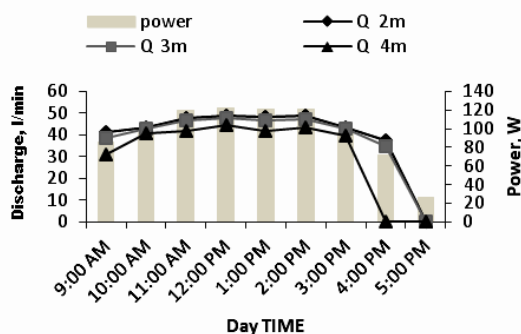


Fig.6: Discharge versus time and power at different water heads (Q) in winter, panel tilted at 0.0.872 rad (50deg) tracking sun from east to west

The critical irradiance level limits the daily operational time and the volume of water pumped. For the same irradiance collected by the PV, all systems pump the same amount of water, although they occurred at different periods of the day.

The time interval during which the water pump operates at five different water heads in Summer and Winter for five processes is presented in Fig. 7 and 8.

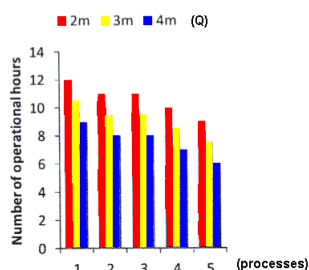


Fig.7.The relationship between five different processes and the time interval (n) during (z) the water pump operate at 2, 3 and 4m water head in summer.

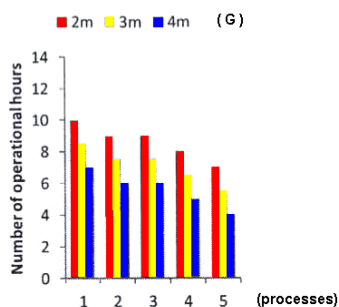


Fig.8. The relationship between five different processes and the time interval (n) during (z) the water pump operate at 2, 3 and 4m water head in winter.

From Figs. 7 and 8, it is clear that the interval time during the water pump operation decreased by increasing of water head. Also, it was longer in Summer than in Winter. The maximum time intervals were 12, 10.5 and 9 h in Summer and 10, 8.5 and 7 h in Winter for process one at 2, 3 and 4m head, respectively. The minimum time intervals were 9, 7.5 and 6 h in Summer and 7, 5.5 and 4 h in Winter for process No. five at 2, 3 and 4m water head, respectively.

CONCLUSIONS

The critical irradiance level limits the daily operational time and the volume of water pumped. To reduce its influence, solar trackers can be used with suitable tilt angle for the panel to increase the time interval during which the water pump operates. The best tilt angles were 0.349 rad (20 deg) Summer and 0.872 rad (50deg) in Winter. Its useful to track sun from East to West along daytime. The maximum time intervals were 12, 10.5 and 9 h in Summer and 10, 8.5 and 7 h in Winter for process one at 2, 3 and 4m water head, respectively.

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DETERMINATION OF STRATEGIES OF SUSTAINABLE DEVELOPMENT AND PLANNING IN TOURIST TRAVEL

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Abstract

This article analyzed the guidelines for sustainable tourism development and management. The link between protected areas and tourism is as old as the history of these spaces. Although their relationships are complex and sometimes conflicting, tourism is still an essential element to be taken into account in the establishment of protected areas and their management. These guidelines regarding sustainable development strategy has the aim to better understand the role and management of tourism in the protected areas. They provide both a theoretical framework and practical guidance to the tourism managers. The main goal is as tourism to contribute to the objectives of protected areas and not to undermine the motivation of these spaces.

Key words: management, strategy, sustainable tourism, sustainable development

INTRODUCTION

Developing sustainable tourism through its practical forms reconciles conflicting interests and objectives, promotes partnership and cooperation between decision makers, operators and consumers, and promote long-term general interest beyond the particular immediately.

What should be noted is the fact that, starting from any of the classification criteria to define all forms of tourism should contain the idea of sustainability. Ecotourism, rural tourism, scientific tourism, cultural tourism are only "vanguard" sustainable forms of tourism [1].

MATERIALS AND METHODS

The differences which occurred between the concepts of sustainable development and sustainable tourism are subject of a conceptual theoretical analysis. The comparative analysis of the two concepts requires to identify, propose and implement strategies in the field. The identification of the positive and negative effects of tourism development and planning areas in Romania allows to set up a series of proposals and strategies to fight against the negative effects of tourism facilities, tourism default. The need

to protect the natural resources, social and cultural rights which constitute the common heritage of humanity and to meet the needs of tourists and the local population has generated sustainable forms of tourism.

In this context, this paper presents a statistical analysis of capacity and tourist activity in the Alba County of Romania in order to establish the strategy for sustainable development.

RESULTS AND DISCUSSIONS

Sustainable Tourism - concept resulted from the efforts of many researchers - has emerged as a response to the need to more accurately quantify the negative effects that tourism generates in host communities. Although in many communities, tourism represents a path to development, it generated many negative effects especially on the environment and local culture [12].

The need for sustainable tourism development

In the recent decades, tourism has gained an important position among the activities and services in Romania' economy. The tourism industry in its complexity requires the interdependence between various sectors such as: accommodation, catering, transport, entertainment, communications, trade, plus

construction activities, machinery, land, etc [2,4].

Through its specificity, the tourism industry is directly related to the environment more than other industries. Tourism aims to promote particular areas, exotic, and different destinations. The tourism resources (natural or anthropogenic) are more varied and unspoiled, the greater their attractiveness. On the other hand, these areas are more fragile and require a special protection. Because tourism demand is increasing, specific infrastructure has been integrated into the environment, and some tourist destinations began to lose ground [3]. Pollution resulting from the implementation of specific tourism affects the environmental resources, disrupt the local life, and visibly degrade the natural heritage.

Based on the definition of sustainable development, *sustainable tourism is the development which imposes a proper management of resources in order to meet the economic, social and aesthetic requirements of the tourists, maintaining the ecological processes, biodiversity, cultural and structural heritage for the future generations of tourists* [2,5].

To achieve sustainable development of tourism pursues three essential objectives [6]:

- *Tourist traffic control*

- *Proper layout and equipment areas are tourist destinations*

- *Diversification of tourism products by introducing new forms of tourism integrated environment.*

Sustainable tourism should contribute to the preservation, protection and restoration of the planet's ecosystems to support sustainable production and consumption. Also, the formative and educational side of sustainable tourism should not be overlooked. Man should be aware about the role which he plays in managing and maintaining the quality of unspoiled nature.

Sustainable development is based on the following management principles [9,11]:

- *Establishing ecological limits, standards and norms of consumption, reducing unjustified consumption;*

- *Redistribution of economic activity and reallocation of resources and meeting the basic needs of life, at the same time assuring the economic growth;*

- *Maintaining optimum population, and population growth to be consistent with the potential exploitable ecosystems;*

- *Conservation and preservation of natural areas supporting the genetic heritage of flora and fauna;*

- *Legal access to resources, increasing technological effort and their rational use;*

- *Establishing a minimum rate of exploitation and consumption of the so called "endless" resources;*

- *Community control, the role of the local community on decision making regarding the local development;*

- *Ensuring the management of all resources to focus on quality.*

Based on the key points of sustainable development, *the impact of tourism activities include the following* [4]:

- To increase the viability of small towns with natural resources;

- Less productive agricultural land use, by making appropriate tourist facilities;

- Increasing cash income of residents while reducing grazing and forest exploitation;

- Increasing the economic power of the cities, by obtaining new revenue from local taxes;

- To encourage the traditional activities, particularly the small scale traditional industry;

- To develop a specific trade based on local economy and handicraft products;

- Revenues from tourism and specific trade could contribute to the modernization of the cultural objectives, and improvement of valuable landscapes;

- To increase income resulted from the activities of reception, accommodation, transport and food will have an important contribution to local development.

The analysis of the touristic capacity and activity in Alba County

This study case regarding an analysis of the capacity and tourist activity in Alba County of Romania was destined to establish some strategies for sustainable tourism development and tourism planning. The tourism potential

of the county can be expressed synthetically through the following statistical indicators: the capacity of tourist accommodation, tourist arrivals and overnight stays of the tourists.

The table below shows the evolution of these indicators in the period 2002-2012.

Table 1. Tourist accommodation capacity and activity in Alba

Year	Touristic accommodation capacity				Arrivals of tourists (thou tourists)	Arrivals of tourists (% *)	Overnight stays (thou)	Overnight stays (% *)
	Existing (no. places)	Existing (% *)	In operation (thou places-days)	In operation (% *)				
2002	1641	100	484.9	100	49.3	100	86.2	100
2003	1584	96.5	505.1	104.2	59.9	121.5	95.7	111.0
2004	1559	95.0	418.9	86.4	48.6	98.6	95.3	110.6
2005	1397	85.1	401.0	82.7	52.4	106.3	98.5	114.3
2006	1276	77.8	377.0	77.7	48.2	97.8	90.1	104.5
2007	1179	71.8	362.0	74.7	49.0	99.4	94.6	109.7
2008	1544	94.1	489.4	100.9	50.6	102.6	103.2	119.7
2009	1830	111.5	558.8	115.2	54.1	109.7	117.7	136.5
2010	1828	111.4	588.6	121.4	51.3	104.1	111.1	128.9
2011	2137	130.2	627.8	129.5	44.3	89.9	100.8	116.9
2012	2109	128.5	619.5	127.8	47.8	97.0	101.1	117.3

Source: <https://statistics.insse.ro/shop/>

* These data percentage represent reductions (-) or increase (+) compared to the base year (2002 = 100.0%)

In the year 2007, the "tourist accommodation capacity" in Alba County recorded the lowest value of the analyzed period from 2002 to 2012, representing only 71.8% of the existing level recorded in 2002. After this involution over five years, there has been a significant increase so that in 2012 tourist accommodation capacity was 28.5% compared with 2002.

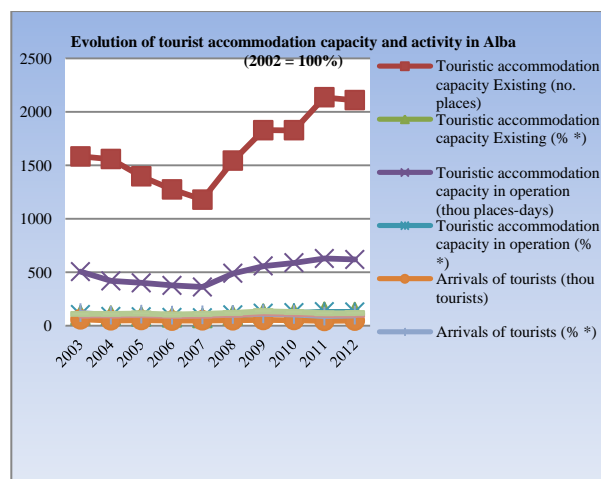
The "tourist accommodation capacity in operation" followed a similar pattern to that of existing tourist accommodation capacity, in 2012 being by 27.8% higher.

In the period 2002-2012, "Tourist arrivals" in this county registered variations from a year to another. In 2011 and 2012, the arrivals of tourists were lower than in 2002. The highest level of arrivals was achieved in 2005 and subsequently has never been similar. This is not likely to show positive results on the existing potential.

In 2006, the indicator "tourist nights" had the lowest values, and the highest level was recorded in 2009, representing an increase of 136.5% compared to the year 2002. In the last two years, the number of overnight stays decreased compared to the previous year.

The evolution of the accommodation capacity and activity in Alba County is shown in Fig.1. In Alba County, the comparison between the indicators "tourist accommodation capacity" and "tourist accommodation capacity in operation" led to the conclusion that there are significant differences between the seats used

in the tourist accommodation recorded in the receiving structures and the number of beds available for tourists at tourist reception.



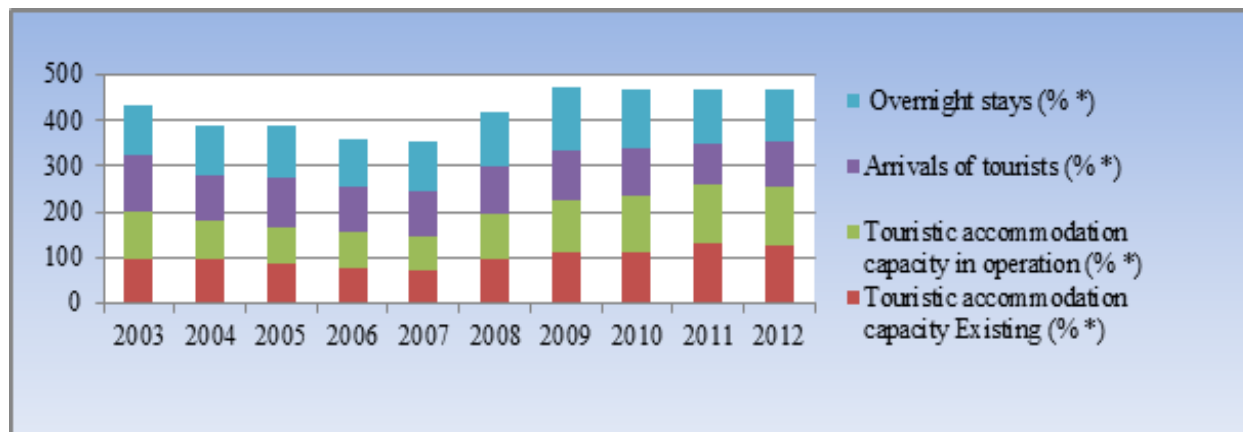
Source: based on the data <https://statistics.insse.ro/shop/>

Fig. 1. The capacity of tourist accommodation and activity in Alba County

However, the indicators of tourist traffic reflected a similar evolution between tourist arrivals and tourist nights. The "net use index of tourist accommodation capacity in

operation" in Alba County in the period 2002-2012 is presented in Fig.2. The graph below showed that the "net use clues capacity of tourist accommodation service" peaked in 2007, and in 2011 the minimum levels of the index were still very low, which suggests that there is a large discrepancy between supply

and solvent demand. The force of attraction of tourists in tourist destinations in the county is low. The county has a high touristic potential, but the road infrastructure, which is defective, prevent tourists coming to these places.



Source: based on the data <https://statistici.insse.ro/shop/>

Fig. 2. Indices of net use of tourist accommodation capacity in operation (%) in Alba

Based on the data trends and figures shown above, it can be concluded that there are serious limitations in the process of exploiting the existing potential, since the developments in recent years are not different from those in early 2002, and in some cases, such as tourist arrivals they are lower.

Harmful effects of tourism

Tourism can be the direct cause of constraints being placed on the environment by the pressure of tourists and the specific infrastructure. The problems are particularly acute given that tourism is experiencing a major worldwide destructive action on natural resources presenting a variety and intensity increasing from year to year. The concentration in time and space which characterized tourism activities in recent years had a negative impact on ecosystems [7]. Most affected there were the coastal regions, islands, aquatic ecosystems, historical sites and high value monuments, unique landscapes which were the attractions for tourist products from an economic perspective. In Europe, regions most ecologically threatened as a result of tourism activities are the Alps and the Mediterranean coasts.

Tourism, by definition, involves moving from

place to spend the vacation. This is done by public transport to a destination that is all the more attractive the more permanent residence away from the tourist. Generated by tourism, the motorized movement produces has a strong impact on the environment by pollution [8]. However, numerous studies have shown that tourists have a high interest for the access facilities to tourist destinations, making it the most sought after destinations which are the most polluted due to heavy traffic. The data showed that the most used means for transporting tourists is car unfortunately the most harmful. The train, which affects more than the environment, comes only on the 3rd position, while the 2nd position is occupied by air transport. Therefore, there are serious problems due to noise, fuel use, CO₂ generators and airport location without considering the effects on cities [9].

Another significant negative impact on the environment is the arrangements made for tourism. To meet the rising demand, the tourism buildings have been more and more developed. The accommodation capacities were not always taken into account in the design and implementation of construction organization. In this way, instead of green

spaces there have appeared urban curtains in the natural environment. The extensive tourist complexes have altered the original topography and also they often affected the landscape.

The tourism facilities did not affected only the landscape. Made with an irrational conception without environmental infrastructure (wastewater treatment plants, waste treatment platforms, etc.), tourism could generate pollution, affecting the existence of flora and fauna. In some areas, it has appeared the problem of water shortage, because the peak of tourism season coincides with the period of drought, and water supply was designed to serve less population [14]. For example, the island of Malta in the Mediterranean Sea, during the summer season receives three times more tourists than the native population, which raises the question of water supply, which is a scarce resource. To cover the needs, much of the revenues from tourism are geared towards the construction of a seawater desalination plant (energy-intensive facilities).

The massive presence of tourists and tourist facilities affect specific mountain ecosystems. The growing popularity of winter sports determined the resorts arrangement in wild places. Most buildings did not meet local architectural style or were not harmoniously integrated into the environment, and ski slopes destroyed large areas of lawn.

Running uncontrolled tourism activities, at random, without taking into account the standards development and exploitation can lead to environmental degradation and tourism resources. These issues are influenced by two main groups of factors [10]:

- *Factors that are a direct result of the economic development (industry, agriculture, transport and other fields);*
- *Factors which result from the use of environment for tourism and recreation.*

Although the tourism activities do not aggress environment, such as industrial plants, one could not hide the fact that tourism has negative influences on the environment.

Given the development of tourism activities in a rapid pace, the phenomenon of negative

impacts can be expressed by:

- *Increasing trend of structures and tourism services, instead of using complex existing facilities;*

- *Increasing urbanization of settlements;*

- *The extended influx of tourists leads to oversaturation of existing tourist infrastructure and diversification of pollution.*

In this context, especially in tourist areas which have the status of reserves and national parks, the question is under control and oriented to the development of ecotourism.

The tourist activities in a protected area should be consistent with load capacity of existing ecosystems and ecological peculiarities.

The effective management of tourist settlements and activities should become the cornerstone for maintaining the ecological integrity of such resources.

The guiding principle of the development of tourism in such a protected area should be to balance the exploitation of all natural human and cultural resources in a way which ensures a great satisfaction to tourists and balanced possibilities and sustainable development of tourism related settlements. Although at first glance tourism activities are perhaps less polluting, however, they gradually lead to environmental pollution [17].

Firstly, it is about the horizontal overgrowth of the tourist settlements under the direct influence of population growth and urban growth, with the disappearance of natural lands and forests, and not least of agricultural land by expanding infrastructure. Secondly, the intense tourist traffic with private high speed vehicles generates multiple forms of pollution (air, sound, soil compaction, etc.). The evaluation of the impact of tourism on the natural environment is reflected by the presence of the unwanted effects which may occur and affect the ecological balance of the ecosystem components [16].

Also, not forget that tourism development is linked by virtue of the multiplier effect of tourism activities, industry and agriculture, practiced near protected areas leads to irreversible environmental changes.

To reduce the negative impact on the environment, the development of

multidisciplinary collaboration can pave the way to sustainable development of all forms of tourism.

All forms of tourism (not only of the above) should follow the principles of sustainable development and implicitly, *the principles of sustainable tourism* [13]:

-tourist activity should be run by the local community, and it must maintain the control over the tourism development;

- tourism should offer jobs to residents in order to improve the quality of life of local communities and balance the existing economic activities in the area and the tourism activity;

- It was established a code of practice for tourism at all the levels: national, regional and local level, based on the accepted international standards. Also, can be set guidelines for tour operators, monitoring the impact of various tourism activities and the acceptance limits for different areas;

-educational and training programs are required to improve the protection management of natural and cultural resources.

In order to apply the concept of sustainable development it has been developed a number of criteria designed to demonstrate the usefulness of its application. So, all the administrative, economic, social sectors have a major impact on tourism.

The political and administrative sectors:

- Development strategies proposed at general and sectorial level;

- Programs, projects, activities proposed for travel or for certain forms of tourism;

- Priority objectives for tourism or tourism forms;

- Implementation of radical changes to the general forms of tourism or its components.

In the physical and territorial sectors:

- Accessibility to tourist resources;

- The degree of tourist accommodation;

- Public and private land for tourism;

-Communication paths which can serve tourism;

- General infrastructure and municipal level;

-Category of tourist attractions, ranked by quality and originality.

Economically

- The general investment and tourism;

- Costs and achievement of favourable tourism products and services;

- Direct and indirect effects of other economic sectors;

- The labour demand;

- General inflation;

- Development of tourism supply and demand.

In social and cultural

-The degree of development and population stability;

-Development of internal and external migration;

- The standard of living and housing;

- The existence of social problems;

- Level of satisfaction;

- Language and traditions.

In terms of perceptual and motivational

- Assessing tourists preferences, and motivations;

- Analysing the quality of the natural and cultural landscapes;

- Category of tourist activity;

- The level of dissatisfaction in tourism;

-Existence of environmental degradation.

In terms of ecological and environmental protection

-The occurrence of changes in natural processes (temperature, air circulation, water, wind, etc.);

- Analysis of the pollution forms;

-Presentation forms of risk (fires, landslides, debris flow, erosion, garbage, etc.);

- Forms of anthropogenic degradation;

-Assessment of wild biodiversity (flora and fauna, vulnerable species, etc.).

The negative socio-cultural effects of poorly planned mass tourism. By their nature, the

tourism activities involve the contact between locals and visitors, which may result in

changes in value systems, behaviour of lifestyle in general [15]. Between tourists and

the local population often arise some incompatibilities related to the behaviour of

tourists, regarding the respect for moral values, religion, customs, etc. *The negative*

effects were reflected on the traditions of the religious life; excessive use of cameras, the

colourful presence in religious tourists gives it a commercial aspect; music and traditional

dances disappear in favour of the show. It is

affected even linguistic identity, indigenous language, over time, marked and modified by the presence of tourists.

This conception of development of tourism activities is contrary to the requirements of sustainable development of the society. Sustainable tourism does not mean uniformity or destroying habits to meet tourists hungry for sensational, but respect for traditions, culture, social order and respect for the community.

In conclusion, the negative effects of tourism activities are due to the misconceptions in organization and leadership.

Tourism can be a carrier of positive effects, not only in economic terms, if tourism is properly planned and integrated in the sustainable development strategy of a country,

Specific Policies sustainable tourism

To avoid mistakes and achieve in practice Sustainable Tourism, World Tourism Organization document entitled "The 21st Agenda for the tourism industry" provides a series of action steps as a recommendation, but the priority for the authorities in the field, includes:

- evaluation of the economic, social, cultural and environmental impacts of tourism activities;
- training, education and public awareness about the necessity to ecological forms of tourism;
- sustainable tourism development planning;
- exchanging information and technology on sustainable tourism between developed and developing countries;
- developing new tourism products with the main objective to protect the environment;
- assessing the progress made towards restoring the relationship between tourism and the environment;
- promoting partnerships in order to achieve sustainable tourism;
- water resource management needed to human communities involved in tourism, both during off-season, but especially during the tourist season;
- treatment of waste resulting from tourism activity;
- involvement of tourism workers, local communities, tourists in solving

environmental problems;

-efficient management of accommodation.

A very important aspect is related to tourism planning, necessary for achieving sustainable tourism. Tourist scheduling and control measures aimed to save the natural cultural, and social heritage, in order to raise the quality of life of the local communities, providing quality for tourism products adapted to ecological requirements.

The control can be achieved by:

- Financial leverage which establishes the resource recovery costs and pollution charges, according to the principle "polluter pays";
- Technical measures which refers to the use by the entire hospitality industry of the best equipment, which affect the environment as little as possible;
- Legislative measures in terms of regulations, as the effects of tourism activities to be constantly supervised.

The complexity of tourism activities often requires an international cooperation and joining the efforts in appropriate measures to achieve sustainable tourism.

CONCLUSIONS

Although tourism industry gives more importance to environmental issues and more attention to sustainable tourism, the differences between the good intentions expressed by people when subjected to research and what they actually do on vacation, should not be underestimated.

There is no doubt that tourism, if well planned and managed, can help generate income for the local population and can accelerate the development of the region.

It becomes a major income source for many areas and many countries in the world. World Cultural and Natural Heritage attracts visitors from all over the world and becomes the engine of the local development.

But more attention should be paid to the physical and cultural impact of mass tourism including indirect losses arising where overcrowding occurs.

The relationship between the tourism industry and world heritage is so delicate that tourism is also a strong argument for establishing the

World Heritage property.

If people can not bear the social and environmental impact of the number of visitors, brought in the areas falling within the world heritage, more attention will be given to bring the world cultural and natural heritage to humans.

The future of sustainable development depends on the restructuration of the global economy and will require major changes in human behaviour, the system of values and lifestyle.

World cultural and natural Heritage should be used as well to sensitize people about the importance of building links between nature and culture, between different cultures.

Therefore, sustainable tourism is facilitating dialogue, debate, confrontation between different actors, to tap all the existing wealth and promote tourism projects addressing collective challenges of development planning.

In terms of effectiveness, the objective of the sustainability is to manage practices moulded on local challenges.

Sustainable tourism arising from sustainable development, expresses the need for reconciliation between territorial growth, human development, conservation, harmonization customer demand with the development of territories.

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SUSTAINABLE TOURISM DEVELOPMENT - IMPORTANT COMPONENT OF SPATIAL TOURISTIC PLANNING

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Abstract

Through its specificity, the tourism industry is directly related to the environment, more than other industries. Running uncontrolled tourism activities, at random, without taking into account the development and exploitation standards can lead to the environmental degradation and tourism resources. To achieve the travel activities the best possible is required, besides the natural, human and material resources, to satisfy the tourists' needs. Material and technical endowment of tourism is represented by: accommodation and food services, transportation, treatment and leisure facilities and is primarily conditioned by developing and modernizing the existing endowment. Thus, a highly attractive tourist area could not be on offer before having the facilities for receiving and retaining potential tourists. In order to decide on the tourism development of an area, it is needed an analysis of the tourist traffic to the existing tourist settlements. This paper achieved a study case on the tourism demand and supply in Bucharest, the capital of Romania. For this purpose, a series of tourism indicators regarding the tourism demand and supply have been calculated, analyzed and interpreted.

Key words: average length of stay, spatial touristic planning, tourism supply and demand, tourist traffic density, occupancy of tourist accommodation establishments

INTRODUCTION

Tourism aims to promote particular destinations, exotic areas and different objectives. The tourism natural or anthropogenic resources are more varied and unspoiled, the greater their attractiveness. On the other hand, these areas are more fragile and require a special protection [6]. The high tourism demand required a specific infrastructure which sometimes affect the environment, increasing pollution, disrupting local life, and visibly degrading the natural heritage [3].

The sustainability of tourism supposes a proper management of resources, in order to cover the economic, social and aesthetic tourists needs, at the same time maintaining the biodiversity, ecological processes, and cultural integrity of all systems for the future generations of tourists [2].

To achieve sustainable development of tourism, three objectives are essential: the control of the tourist traffic; the layout of appropriate tourist settlements in various areas

which are tourist destinations; the diversification of tourism products by introducing new forms of tourism integrated in the environment.

Sustainable tourism should contribute to the preservation, protection and restoration of the the Earth 's ecosystems to support sustainable development, production and consumption.

It also should not be neglected the formative - educational side of the sustainable tourism, by which man should be aware about the role he plays in managing and maintaining the unaltered quality of nature.

In this context, this paper aimed to analyze the tourist traffic in Bucharest, the capital of Romania, and the degree of capitalization of village tourism.

MATERIALS AND METHODS

The objective of this study consists of analysis of tourist development plans and strategies made and put into practice in Bucharest, the capital of Romania, in close connection with the analysis of tourist traffic in the city of

Bucharest.

In order to achieve the objectives of this study, there were used the statistical data regarding the tourist traffic in Bucharest, tourist density in relationships with the number of inhabitants and in the area of the village.

Also, to manage this research, a series of documents were provided by the representatives of the City Hall, the Ministry of Regional Development. It is about documents on tourism marketing, plans for integrated tourism development of the municipality and urban development, also the empirical data on tourist traffic in the area provided by the National Institute of Statistics.

For tourist traffic analysis, there were calculated and interpreted certain indicators of tourism demand and supply, such as: changing tourism demand, demand variation index, tourist accommodation capacity, global tourism demand index distribution, customer development index, hostel overnights development index, the average accommodation rate in tourism facilities, monthly tourist concentration coefficient, tourist density indicator in relation to population density indicator, in relation to the surface, the "tourist office" [4, 5, 6].

The analysis and interpretation of these

indicators of tourist traffic helped to make an idea about the development of tourism in Romania and mainly about tourism planning strategies which can be taken in this area.

RESULTS AND DISCUSSIONS

The analysis of tourist traffic on tourism supply and demand in Bucharest, the capital of Romania

Bucharest has 228 km² surface and 1, 912,515 inhabitants in the year 2012 (Table 1).

A number of 22,552 accommodation in touristic units of accommodation were in Bucharest in the year 2012. The distribution of these accommodation places by tourism accommodation units was the following one: 18,531 beds in hotels (83,17%), 18 beds in villas (0.07 %) and 4,003 beds in tourist hostels (16.76 %) (Table 2).

A number of 1,238,881 foreign tourists were accommodated in Bucharest in the year 2012, by 7.72 % more than in the year 2008, reflecting that the capital of Romania has become an interesting touristic attraction for people from other countries.

The distribution of foreign tourists by types of accommodation units was the following one: 98.39 % in hotels, 0.07 % in villas and 1.54 % in tourist hostels. (Table 3)

Table 1. Bucharest population, 2008-2012 (inhabitants)

	2008	2009	2010	2011	2012
Bucharest population	1,943,981	1,944,226	1,942,254	1,919,352	1,912,515

<http://www.insse.ro/>

Table 2. Total number of accommodation places in touristic accommodation units in Bucharest, 2008-2012 (No. of beds)

Types of tourist accommodation	2008	2009	2010	2011	2012
Hotels	16,469	17,520	20,187	18,632	18,531
Villas	18	18	:	18	18
Tourist Hostels	213	168	168	208	166

<http://www.insse.ro/>

Table 3. Total number of foreign tourists in Bucharest, Romania, by type of tourism accommodation unit

Types of tourist accommodation	2008	2009	2010	2011	2012
Hotels	938,182	899,824	1,024,893	1,180,760	1,218,955
Villas	184	110	:	589	923
Tourist Hostels	6,768	4,447	4,237	4,487	4,003

<http://www.insse.ro/>

A number of 553,912 residents visited Bucharest in the year 2012, of which 99.36 % were accommodated in hotels, 0.583 % in tourist hostels and 0.057 % in villas (Table 4).

The number of tourist arrivals totaled 669,969 in the year 2012, of which 99.78% were in hostels, 0.09 % in villas and 0.13 % in tourist hostels (Table 5).

Table 4. Total number of Romanian tourists arrivals in Bucharest, by type of tourism accommodation unit

Types of tourist accommodation	2008	2009	2010	2011	2012
Hotels	399,153	365,276	433,914	540,863	550,404
Villas	66	35	:	251	317
Tourist Hostels	3,468	2,928	3,525	3,668	3,191

<http://www.insse.ro/>

Table 5. Total foreign tourists arrivals by in tourist accommodation types of structures in Bucharest

Types of tourist accommodation	2008	2009	2010	2011	2012
Hotels	539,029	534,548	590,979	639,897	668,551
Villas	118	75	:	338	606
Tourist Hostels	3,300	1,519	712	819	812

<http://www.insse.ro/>

The visitors who visited Bucharest in the year 2012 recorded the highest number in the months of October, May, June, September and

November, reflecting the seasonality of tourism in Bucharest. They mainly applied to stay in hotels.(Table 6).

Table 6. Total number of visitors (Romanian +foreign) in Bucharest, by month in 2012

Types of tourist accommodation	Hotels	Villas	Boarding houses
January	77,288	64	306
February	77,288	74	324
March	103,001	57	344
April	93,600	64	343
May	119,582	90	380
June	113,643	83	412
July	101,614	84	284
August	95,741	48	287
September	112,419	84	409
October	126,516	107	386
November	115,154	79	333
December	81,367	89	195

<http://www.insse.ro/>

The number of overnight stays totaled 2,040,060 in the year 2012, of which 99.44% were in hotels and 0.44 % in tourist hostels. The data from the above tables, provided by

National Institute of Statistics were used to calculate, analyze and interpret the most important indicators of tourist traffic, as follows:

Table 7. Total number of overnight stays (Romanian +foreign) by accommodation unit types in Bucharest

Types of tourist accommodation	2008	2009	2010	2011	2012
Hotels	1,962,515	1,659,464	1,797,653	1,961,320	2,028,731
Villas	1,351	926	:	1164	2,306
Tourist Hostels	23,041	10,040	8,500	9,549	9,023

<http://www.insse.ro/>

Table 8. Total number of tourist overnight stays by accommodation unit type in Bucharest Romania

Types of tourist accommodation	2008	2009	2010	2011	2012
Hotels	874,044	734,530	794,525	870,534	884,551
Villas	475	307	:	355	566
Tourist Hostels	9,062	6,346	6,856	7,738	7,245

http://www.insse.ro/

Table 9. Total foreign overnight stays by accommodation unit type in Bucharest

Types of tourist accommodation	2008	2009	2010	2011	2012
Hotels	1,088,471	924,934	1,003,128	1,090,786	1,144,180
Villas	876	619	:	809	1,740
Tourist Hostels	13,979	3,694	1,644	1,811	1,778

http://www.insse.ro/

1. Index of global tourist demand change [3,4,5]:

$$\Delta CG_{0-i} = \frac{CG_i}{CG_0} \cdot 100$$

where: CG_i - global tourist demand in year „i”;

CG_0 - global tourist demand in year „0”

Years	Index of global tourist demand change (%)
2008-2009	104
2009-2010	113
2010-2011	115
2011-2012	94

The index of global tourist demand change registered the lowest value in 2011-2012, and the highest value in 2010-2011.

2.a) Index of global tourist demand distribution, between domestic and foreign demand [3,4,5] (domestic tourist demand):

$$\Delta CI_{0-i} = \frac{CI}{CG} \cdot 100 ; \Delta CE_{0-i} = \frac{CE}{CG} \cdot 100$$

where: CI - domestic tourist demand;

CE - foreign tourist demand.

CG – global tourist demand

Years	CI-Domestic tourist demand (%)
2008	42
2009	40
2010	42
2011	45
2012	49

The index distribution of global tourism demand for domestic demand had the lowest value in 2009, and the highest value in 2012.

2.b) Index of global tourist demand distribution, between domestic and foreign

demand [3,4,5] (foreign tourist demand)

$$\Delta CI_{0-i} = \frac{CI}{CG} \cdot 100 ; \Delta CE_{0-i} = \frac{CE}{CG} \cdot 100$$

where: CI - domestic tourist demand;

CE - foreign tourist demand.

CG – global tourist demand

Years	CE-Foreign tourist demand (%)
2008	57
2009	59
2010	57
2011	54
2012	59

The index distribution of global tourism demand for foreign tourism demand recorded the lowest value in 2011, and the highest value in 2009-2010.

3.a) Index of domestic demand variation in time [3,4,5]

$$ICI_{0-i} = \frac{CI_i}{CI_0} \cdot 100$$

unde: CI_0 – domestic tourism demand in the previous year;

CI_i – domestic tourism demand this year.

Years	Index variation in demand for domestic tourism (%)
2008-2009	91
2009-2010	118
2010-2011	124
2011-2012	101

The index of variation in domestic tourism demand recorded the lowest value in the years 2008-2009, and the highest value in the years 2010-2011

3.b) Index of foreign demand variation in

time [3,4,5]

$$ICE_{0-i} = \frac{CE_i}{CE_0} \cdot 100$$

where: CE_0 – foreign tourism demand in the previous year;

CE_i – foreign tourism demand this year.

Years	Index variation in the demand for foreign tourism (%)
2008-2009	43
2009-2010	110
2010-2011	108
2011-2012	104

The index of variation in the demand for foreign tourism recorded lowest value in the years 2008-2009, and the highest value was recorded in the years 2009-2010.

4. Index of demand variation in time for each accommodation facility [3,4,5]

$$\Delta CH_{0-i} = \frac{CH_i}{CH_0} \cdot 100 ;$$

Years	Hotels (%)	Tourist Villas (%)	Hostels Tourist (%)
2008-2009	160	100	78
2009-2010	115	100	100
2010-2011	92	100	123
2011-2012	99	100	79

Hotel: index of variation in time of tourism demand for hotels recorded with lowest value in the years 2010-2011, and the highest value was recorded in the years 2008-2009.

Tourist Villas: index of variation in time of tourist demand for villas had fluctuations in the period.

Hostels Tourist: index variation in time of tourism demand for tourist hostels recorded with lowest value in the years 2008-2009, and the highest value in the years 2010-2011.

5.a)The average length of stay globally [3,4,5]

$$S = \frac{ZT}{T} \text{ (days)}$$

where: ZT = travel days (365 days)

T = No. total tourists

Years	Calculating the average length of stay globally (days)
2008	3.86
2009	4.03
2010	3.54
2011	3.07
2012	3.24

The average length of stay, based on the total number of tourists in 2008 was about 4 days, and in 2012 about 3 days, which shows a decrease.

5.b)The average length of stay for each accommodation facility [3,4,5]

If we want to calculate the average stay per accommodation units, this means to use number of overnight stays recorded in the accommodation establishments instead of the number of days of travel, as follows:

$$S_H = \frac{NH}{T} \text{ (tourist days)}$$

where: NH - number of recorded overnight stay;

T - number of tourists arriving;

S_H - average stay in the hotel.

The total average length of stay = $Nr.$ Total overnight stays (Romanian +foreign) / No. Total foreign +tourists Romanian

The average length of stay of foreign tourists = no. overnight stays Foreign tourists / No foreign tourists

The average length of stay of Romanian = no. overnight stays Romanian tourists / No Romanian tourists

The total average length of stay (Romanian + foreign) = tourist days

Years	Hotels	Tourist Villas	Hostels Tourist
2008	2.09	7.34	3.40
2009	1.84	8.41	2.25
2010	1.75	-----	2.00
2011	1.66	1.97	2.12
2012	1.66	2.49	2.25

The average length of stay (Romanian) = tourist days

Years	Hotels	Tourist Villas	Hostels Tourist
2008	2.01	7.42	4.23
2009	1.73	8.25	2.43
2010	1.69	-----	2.30
2011	1.70	2.39	2.21
2012	1.71	2.87	2.18

The total average length of stay (foreign) = tourist days

Years	Hotels	Tourist Villas	Hostels Tourist
2008	2.18	7.19	2.61
2009	2.01	8.77	2.34
2010	1.83	-----	1.94
2011	1.60	1.41	2.10
2012	1.60	1.78	2.27

a).The average stay in hotel recorded the lowest value in 2011 and 2012, and the highest value in 2008.

The average stay in villas had lowest value in 2010 and the highest value in 2009.

The average stay in guesthouses recorded the lowest value in 2010 and the highest value in 2008.

b)The average stay of the Romanian tourists in hotels registered the lowest value in 2011 and 2012, and the highest value in 2008.

The average stay of the Romanian tourists in villas had the lowest value in 2010 and the highest value in 2009.

The average stay of the Romanian tourists in boarding houses recorded the lowest value in 2010 and the highest value in 2008.

c.)The average stay of foreign tourists in hotels registered the lowest value in 2011 and 2012, and the highest value in 2008.

The average stay of foreign tourists in villas had the lowest value in 2010 and the highest value in 2009.

The average stay of foreign tourists in boarding houses had the lowest value in 2010 and the highest value in 2008.

6. The monthly traffic coefficient [3,4,5]

The monthly traffic coefficient is calculated as a ratio between the number of tourists during the highest-traffic month (*LM*) and the number of tourists during the lowest-traffic month (*lm*)

$$C_{monthly} = \frac{LM}{lm}, \text{ where } C_{monthly} \geq 1$$

$$127009 \text{ (October)} / 77658 \text{ (January)} = 1.63$$

7. The monthly concentration coefficient [3,4,5] (year of study 2012)

was calculated by dividing the number of tourists recorded in each month by the total number of tourists during a year *A_t*. Value *C_c* ranges between 0.083 and 1.

$$C_c = \frac{LM}{A_t}$$

$$\text{January} = 77658 / 1223881 = 0.006$$

$$\text{February} = 77686 / 1223881 = 0.006$$

$$\text{March} = 103402 / 1223881 = 0.08$$

$$\text{April} = 94007 / 1223881 = 0.07$$

$$\text{May} = 120052 / 1223881 = 0.09$$

$$\text{June} = 114138 / 1223881 = 0.09$$

$$\text{July} = 101982 / 1223881 = 0.08$$

$$\text{August} = 96076 / 1223881 = 0.07$$

$$\text{September} = 112912 / 1223881 = 0.09$$

$$\text{October} = 127009 / 1223881 = 0.10$$

$$\text{November} = 115566 / 1223881 = 0.09$$

$$\text{December} = 81651 / 1223881 = 0.06$$

The tourist maximum concentration was recorded in October and the lowest monthly tourist concentration was recorded in January and February.

8. Share of accommodation capacity [3,4,5] (per each accommodation type) of the total accommodation capacity of Bucharest

$$I_{cc} = \frac{LC}{LH} \cdot 100$$

where: *LH* - total number of beds in hotels (pensions, ... etc.) per town or county;

LC - accommodation capacity in each type of accommodation unit (hotel, motel, guest house, inn, ..., etc.);

Years	Hotels (%)	Tourist Villas (%)	Hostels Tourist(%)
2008	98	0.1	1.27
2009	98	0.1	0.94
2010	99	-----	0.82
2011	99	0.09	1.10
2012	99	0.09	0.88

The share of accommodation capacity (for each type of accommodation unit) of the total accommodation capacity of Bucharest, recorded the highest percentage of about 99% in hotels. For villas and guesthouses percentages were very small compared to hotels.

9. Indicator of total accommodation capacity evolution [3,4,5]

$$I_{LC} = (\text{No. beds per current year} / \text{No beds per previous year}) * 100$$

$$\Delta LC_{0-i} = \frac{LC_i}{LC_0} \cdot 100$$

Years	ΔLC (%)
2008-2009	106
2009-2010	114
2010-2011	92
2011-2012	99

The accommodation capacity registered the highest increase of 14% in 2009-2010 and in 2010-2011 it declined by 8%.

10. Index of overnight stay evolution [3,4,5]

$I_N = (No. \text{ overnight stay per current year} / No. \text{ overnight stay per previous year}) * 100$

$$\Delta N = \frac{NH_i}{NH_0} \cdot 100$$

where: $N = \text{overnight stay}$.

Years	Index of overnight stay evolution(%)
2008-2009	84
2009-2010	108
2010-2011	109
2011-2012	103

The evolution of overnight stays recorded the highest growth in 2001, increasing by 9% and in 2008-2009 it decreased by 16%.

11. Occupancy indicator of existing accommodation units in Bucharest [3,4,5]

$Guc = [number \text{ of overnights (No tourist days)} / (no. \text{ beds} * no. \text{ working days})] * 100$

$$G_o = \frac{NH \cdot 100}{LH \cdot Z} = \frac{NT \cdot S}{LH \cdot Z} \cdot 100$$

where:

G_o - occupancy, percentage;

NH - number of overnight stays;

LH - number of beds in hotels;

Z - number of supply days = 365 days;

NT - number of tourists;

S - average length of stay.

Years	Occupancy indicator of existing accommodation units in Bucharest (%)
2008	32
2009	25
2010	24
2011	28
2012	29

Since 2008, the occupancy indicator of existing accommodation units in Bucharest fell every year.

12. Tourist density indicator in relation to population density in Bucharest [3,4,5]

$$D_{t_{i-0}} = \frac{T_{t_{i-0}}}{Population} \text{ (tourists/ no. inhabitants)}$$

where:

T_{i-0} - total Romanian + foreign tourists;

Pop - local population.

Years	Tourist density indicator in relation to population density
2008	0.48
2009	2.14
2010	1.88
2011	1.61
2012	1.56

In the period under review, tourist traffic density in relation to population Bucharest had a decrease of 0.58% of tourists / No. inhabitants in 2012 compared to 2008.

13. Tourist density indicator in relation to Bucharest area [3,4,5]

$$D_{t_{i-0}} = \frac{T_{t_{i-0}}}{Surface} \text{ (tourists/km}^2\text{)}$$

where:

T_{i-0} - total Romanian + foreign tourists;

S - town/village (county) area,

Years	Tourist density indicator in relation to Bucharest area
2008	4.1453
2009	8.5287
2010	8.5186
2011	8.4182
2012	8.3882

Tourist traffic density in relation to surface of Bucharest had the lowest value of 4,145 tourists/km² in 2012 and the highest value 8,528 tourists /km² was recorded in 2009.

CONCLUSIONS

By the pressure of tourists and the specific infrastructure, tourism can be a direct cause of constraints on the environment.

The destructive actions on natural resources have a large variety and intensity increasing from year to year.

The tourism concentration in time and space during the recent years had a negative impact on ecosystems.

The arrangements made for tourism have also a significant negative impact on the environment.

More attention should be paid to the accommodation capacities, which need to cover the tourists demand, but also to be integrated in the environment, without affecting the natural environment, the original topography and the beauty of landscape.

Tourism should not generate pollution and disrupt the existence of flora and fauna.

Also, tourism has to compile both tourists needs and also not to disturb the local population, and affect the traditions, moral values, customs, etc.

Bucharest, the capital of Romania is an example of how tourism should be integrated in the urban environment becoming a factor of economic development and promotion of Romanian values.

The number of tourists increased year by year, and the duration of stay as well, and more and more foreign visitors are interested to enjoy visiting the beautiful, cultural and historical places of the Romania's capital.

The accommodation units have increased their number and quality of their facilities year by year, hotels being the most preferred type for accommodation in Bucharest and Romania general.

The development strategy of tourism in Bucharest should be continuously improved in order to exploit the whole touristic potential of this old and modern metropolis of Europe.

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STRATEGIC OPTIONS FOR A SUSTAINABLE DEVELOPMENT OF THE RURAL TOURISM

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Abstract

The rural tourism registers a growing evolution in the rural economy of Romania in the last 10 years, thanks to the progressive involvement of specialists, of entrepreneurs and also of the factors of local responsibility. However, there are many steps to go before making a superior recovery of the tourism potential which characterizes the Romanian villages. This requires the identification, the development and the implementation of some strategic options based on natural resource, but geared towards the sustainable use of it. Thus, this paper addresses the rural tourism development from the perspective of a strategic management in order to adopt and implement those strategic options aimed at the sustainable development of the rural tourism. Specifically, in the rural area of Sibiu Depression took place a field research study after the case methodology, which has contributed to the demonstration of the requirements for a sustainable development of the rural tourism in the specific examined area. The result consisted of the formulation, elaboration and adoption with a view to the implementation of some relevant strategic options for a sustainable development of the tourism in the rural area of Sibiu Depression.

Key words: analysis, development, option, resources, rural, sustainability, tourism products

INTRODUCTION

The rural tourism development is based on the fact that economy is nowadays illustrated as a destroyer of its support systems, fixed assets of consuming the natural capital [1]. Thus, it is required a new approach that would lead to a change in the economic development based on the integration of environmental requirements in the evaluation of economic activities [1], being known the fact that "any of the trends in the environmental degradation can undermine the civilization as we know it" [13]. The rural tourism is no longer a novelty. The vast majority of the inhabitants of our planet, love country holidays more and more, both by its users (tourists) and as well as through its service providers (amfitrions/owners or their employees). Addressed to the Romanian rural space, this theme is supported by the great weight of approximately 92% of the country area held by it and of the fact that

the Land Fund shows a share of 62% of agricultural land (approx. 14.7 million ha, of which 66.3% arable land, 29.2% natural meadows and 4.5% fruit trees and vines plantations) which shows the suitability of the development of agricultural and handcraft activities (Strategic Framework). Important is also the fact that the approximately 29% of forests and other lands covered with forest vegetation in use, all these provide a potential which generates the development of rural tourism activities. The current theme is about the sustainable development of rural tourism and it holds an important place in the rural economy by providing the perpetuation of rural specific values and the satisfaction of some interests of those who provide travel services, namely of the requirements of those who are beneficiaries of the tourist services [9]. The rural tourism is an effective solution for harmonizing the requirements of the tourism with the requirements of the

environmental protection and of a sustainable development [10].

During the sustainable development of the rural tourism, an important role is held by the strategic evaluation of the rural space in order to surprise its specificity and the elaboration of the strategic options appropriate for a sustainable development of the rural tourism. It was organized a field research, concerning the strategic assessment of the development of rural tourism in Sibiu Depression. Sibiu Depression is situated in the centre of Romania, more precisely in the south-western part of Transylvanian Foothills Depression, and in the northern part of Carpathians, respectively in the north part of Cindrel Mountains and of Lotru Mountains whose altitude is between 380-602 m [14].

In order to achieve a sustainable development of the rural tourism, through this paperwork, we recommend the use of a strategic management by the responsible officials of our modern society in order to answer some "strategic" questions, such as: Where are we now?, Where are we heading to?, What are the changes and rhythms in the environment?, What course of action is contributing in order to attain the established goals and objectives? This is due to the fact that strategic management contributes to the diagnosis of the external environment and also to the knowledge of the influence factors on the activities carried out in the studied area. At the same time, the strategic management sets a number of decisions and actions necessary to implement the plans and programs [11] designed in order to achieve a sustainable development of the rural tourism in the researched area.

MATERIALS AND METHODS

The method of research concerning the sustainable development of the rural tourism in Sibiu Depression must be consistent with the objectives and the purpose of research. The major goal of the research is to develop some strategic options for developing a sustainable rural tourism in relation to the reality of the researched rural space. The purpose of research is to increase the

diversification of the rural economy in Sibiu Depression and also to improve the quality of life for all members of the rural communities, under the conditions of using in the endurance limits, the natural resources of the Earth.

The sustainable development of the rural tourism, starts from the study of the socio-economic reality of researched rural space, for which, most of the methodology schools recommends its using "in a parallel way and also in a complementar way of quantitative and qualitative methods for getting a plus of knowledge" [8]. They contribute to the formation of an overview and to identify the critical factors with impact on the rural area [2]. In this present work, in order to solve the multitude of problems, it is necessary to deal with the research methodology able to surprise the territorial specificities. The case study methodology [3], [5] [16], is recommended by the results obtained in many studies and research projects to a national and international level-Ruraljobs, Ruremplo, Top, Himilce Mard [7].

The socio-economic reality is highlighted by the use of several methods, both qualitative and quantitative, such as: the study of statistical data and the relevant literature (reports, studies, strategies, monograph), semistructural interviews with key local factors and of course PESTEL analysis, SWOT analysis, completed by focus group meetings. PESTEL analysis represent a process of a closer analysis of the components that influence directly or indirectly the researched rural development (the general external environment) and it acts through the analysis of the following factors: political, economic, social, technological, environmental, and legislative [4]. The method allows the identification and the understanding of the macroeconomic forces with impact on the development and it represents an important step in creating a new strategy, because it secures the framework within which it operates and where will be made decisions. S.W.O.T. analysis (Strengths, Weaknesses, Opportunities, Threats) represent the analysis of diagnosis which highlights the strengths and weaknesses of the internal environment, the opportunities and threats in

the external environment [6]. The purpose of the strategic alternatives generated by SWOT analysis is to enhance the strengths, in order to be able to exploit the opportunities, to counter threats and also to improve the weaknesses [12].

The approach concerning the data collection used during the field research is complex and it includes a variety of tools. It began with the application of a questionnaire-a quantitative research instrument, whose completion is based on quantitative data existing to a LAU2 level (municipality). This information was supplemented with raw data as a result of carrying out a process of collecting them for uncovered items with information in the official documents. The obtained information lead to a realistic picture, but not to all of the problems and opportunities for a sustainable development and for a diversification of the economic activities in the researched rural space. Thus, it was organized a structured interview with key local factors. The interview points out that through the formulation of some open questions, the local factors can identify opportunities and constraints concerning a sustainable development and diversification of the rural economy. The interview was organized in the form of focus group meetings for the purpose of highlighting some new issues from a limited number of subjects [8].

RESULTS AND DISCUSSIONS

The development of the rural tourism registers a continue increase in Romania of the past decade, but without a full recovery of the tourist potential, the specific characteristics of each zone, folklore, ethnographical regions and agricultural products which is dependent on.

The future, namely the market represents the rural tourism part because "through its environment/space where it unfolds and also through its personnel structure it provides a relaxing atmosphere, serenity, novelty, lack of templates and the human warmth of the hosts".

The approach of the research methodology to the case study, in this present study has

allowed getting some relevant information, in accordance with the objectives of the research and they led to the identification of the specific characteristics of the investigated area, as it is evidenced from the obtained results with the help of the PESTEL and SWOT methods, supplemented by focus-group meetings.

With the help of the results of the six major criteria's analysis, it was built the SWOT analysis leading to the identification of strengths and weaknesses, thus the external opportunities and threats of the analyzed territorial unit [15].

It has originally encompassed a number of strengths and weaknesses, respectively the opportunities and threats, but in some focus group meetings of local responsibility and other involved actors it was discussed the relevance of the opportunities and threats for each of their strengths and weaknesses in terms of a sustainable development of the rural tourism.

This shows that improving the physical infrastructure in order to exploit the appropriate hydrotechnical potential, of forest and of tourism created by the natural setting, it is considered an important factor of sustainable development of the rural tourism to which one may add the improvement of the tourist activities, the medical-social infrastructure improvements, namely improving the perpetuation of the traditions and customs. Sustainable development problems of the rural tourism are generated by the existence of the microregion Sibiu Depression of some weaknesses, such as: the lack of the necessary knowledge concerning the attraction of European funds, for the majority of the entrepreneurs, the lack of experience in using the modern marketing principles area; the lack of knowledge of the possibilities for leisure in the rural microregion; the lack of a clear direction in the rural and urban planning; the educational infrastructure of transport and poor communications; the lack of interbonding initiatives with other neighbouring regions; the lack of jobs for young people with higher education.

The sustainable development of the rural

tourism is influenced by threats, such as: the impairment of the tourism heritage through degradation or through inspired arrangement; the inability of local factors to create partnerships in order to attract funds, the poor development of the zones and of the recreational activities outside the guesthouses, namely the absence of some promoting policies and strategies of the obtained products in rural areas.

What could bring a plus to the sustainable development to the rural tourism may be a good valorisation of the opportunities manifested in the microregion: the advantageous geographical position of the area, the possibility to access national and European funds; the closed connection between "destinations of excellence in tourism"; close collaboration between the population of the area with industrial metal band; the existence of some elements of material and cultural heritage well preserved which is still waiting to be capitalized.

The results are relevant for the development with a view to the implementation of strategic options leading to a sustainable development and to a diversification of the rural economy. These are grouped as follows:

A. Strategic options which create favourable framework for a sustainable development of the rural and agrocultural tourism

SO 1. Promoting the development of the rural tourism and of the agrocultural tourism by attracting investment in the physical infrastructure and of communications in order to expand the use of the existing resources and also attracting additional resources.

SO. 2. Improving the educational infrastructure for a good knowledge, and for a good development of entrepreneurial skills .

B. Strategic options specific to the rural tourism development:

SO 3. Supporting the implementation and development of the sustainable rural tourism through the creation of a network in order to promote a sustainable tourism in general and also to support partnerships designed to lead to the vertical integration of the rural tourism, namely the emergence of some related activities.

SO 4. Promoting the recovery and

development of the traditions, the traditional agricultural activities and also the marketing of some area's specific products in accordance with the specificity of the rural localities and their tradition in folk art, folklore, plant breeding, gastronomy, hospitality etc.

SO 5. Supporting the development of information and consultancy services of the inhabitants of rural areas and of the local public administration's staff for the purpose of accessing funds for the development of the rural tourism of marketing tourist's products, of preservation and of promotion of the cultural heritage.

CONCLUSIONS

The case study of this paperwork addresses to the socio-economic reality of the rural space from Sibiu Depression from the point of view of a sustainable development of the rural tourism.

The natural and cultural heritage, mostly in a good condition of conservation in Sibiu Depression is determinant in the development of a sustainable of the rural tourism.

The rural tourism offers the chance of obtaining some additional revenue, of recovering the products from the private household, of the area resource, using the surplus of the space, products and labor, out of the monotony and boredom which leads to refreshment of economic activities in rural areas of Sibiu Depression.

The research of existing social and economic reality in Sibiu Depression leads to the identification of the factors of success and to the shortcomings expressed in organizing some tourist activities, thus in the effective promotion of the tourism potential and of the traditions.

There are also external factors that contribute to the development of these activities as well as those that hinder their development.

Sibiu depression is an area with a vocation for tourism that offers quality holidays and business opportunities and it may contribute to the increased interest of consumers of travel services so that it becomes a tourist destination for higher ranking.

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SUSTAINABLE DEVELOPMENT MANAGEMENT OF THE GRASSLAND AGROECOSYSTEM IN THE CONTEXT OF BIODIVERSITY CONSERVATION AND IMPROVEMENT OF PERMANENT GRASSLAND

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Abstract

The agricultural enterprise, seen from a sustainable development perspective, operates within an ecosystem, and aims to achieve a harmonious interpenetration and integration with it. The way in which this interpenetration and integration is realized depends on the level achieved by its performances, which requires the adoption of policies and strategies and the economic organization of biotechnical processes. The paper emphasizes an interdisciplinary approach to issues like management and sustainable development of the grassland agro ecosystem and shows that promoting ecological techniques in the grassland agro ecosystem can ensure its versatility. All these supported by obtaining appropriate pastoral values, namely biodiversity conservation and improvement of meadows, and knowing that Romania has a variety of floral structures with high biodiversity indices.

Key words: biodiversity, conservation, ecosystem, management, sustainable

INTRODUCTION

The chosen theme is topical and it is based on the premise that the sustainable development of the agriculture aims the increasing agricultural production in terms of maintaining the natural resource base, which means the adoption of a management facing the constantly changing needs of the people, amid to continue and/or to enhance the quality of the environment and the natural resources conservation [6]. The agricultural enterprise activity takes place within an ecosystem mostly artificial, which requires in the context of sustainability, its monitoring and directing followed by well-defined rules, so his bioproductivity remains steady or to grow [10]. The agricultural ecosystem is made up of specific subsystems, our attention being focused on the on the meadow agro-ecosystem and its main objective is to design and implement some viable economic measures

over a long period of time, able to ensure a high pastoral value, the conservation and the improvement of the biodiversity [3], [4], [7], [9], [12]. Economically viable measures are in addition to the specific agricultural management activities, and they are focused on boosting the biodiversity, ensuring an harmonious development and integrating the ecosystem in a friendly ambiental environment.

There is granted a decisive role in achieving a sustainable development of a meadow agro-ecosystem, regarding the permanent meadow diagnosis in order to capture its specificity and to design its economic sustainable measures in order to implement them over a long period of time, able to ensure a high pastoral value, concerning thus the conservation and the improvement of the biodiversity. It was organized a field research on the management of sustainable development of permanent grassland placed in Cindrel Mountains or

Sibiu Mountains, also known as Cibin Mountains or Sibiu Mountains belonging to Parâng Massive, of The Southern Carpathians. The name of Cindrel Massive is given after the highest peak, Cindrel, [1], [11] (2,245 m altitude). The grass vegetation of Cindrel Mountains differentiates four levels, according to the studies made by Anghel and his contributors, (1982) [2]: the grass field level (*Agrostis tenuis*); the red meadow level (*Festuca rubra*); the sheep meadow level (*Festuca ovina*); the horn and bulrush level (*Carex curvula* and *Juncus trifidus*).

MATERIALS AND METHODS

The experience was located atop the North-East of the Cindrel Mountains at an altitude of about 1438 meters, near the resort Paltinis, atop called Vălari in the floor of red meadow (*Festuca rubra*). The exhibition of the ground is southern, with a mild slope, about 5%. The area is surrounded by extensive forests of spruce and of expanses of natural meadows. Knowing that the meadows are used for hay and for pasture, too there have been carried out two similar experiences concerning their settlement, one for each mode of use. The research took place over a period of three years: 2010, 2011 and 2012 and they were focused on obtaining a high pastoral value, namely the preservation and improvement of the biodiversity through the promotion of some sustainable management measures with emphasis on fertilization.

The processing of the experimental results were done after current calculation methods, through the analysis of a trifactorial experience performed over the course of three years (2010-2012). The first experience that simulates the grazing, there were done three probe collections on a meadow of *Festuca rubra* when the plants have reached the height of grazing. The second experience is in the hay system, executing a scythe and a second cut hay. The dry matter is determined by the oven method.

The determination of floristic composition was made through the method of double meter for each of the groups of identified vegetation and it analyzes the grass vegetation through

the linear topographic map of the vegetation.

RESULTS AND DISCUSSIONS

The design and implementation of some measures aimed at restoring the grasslands in order to introduce them into the economic circuit and to ensure its multifunctionality, stressing the need for the conservation and for the improvement of the biodiversity as a starting point for diagnosing the condition of vegetation and of the productive potential which characterizes the grassland - subject to this study. Thus, it has been proceeded to the determination of the floristic composition, through the drawing up of floristic reports using the double meter method.

The floristic composition highlights the fact that the largest contribution belongs to the graminces (67%) within which the rule belongs to the *Festuca rubra* species, when speaking of the formation of the production and also of the celery layer. The proportion of fodder plants belonging to the family Fabaceae is a low one (17%) and it is realized by species such as: *Trifolium repens*, *Trifolium pratense*, *Trifolium alpestre*, respectively *Lotus corniculatus*, to which we add *Genista tinctoria*. The plants of other botanical families own a small percentage in the floristic composition and they are represented by: *Achillea millefolium*, *Alchemilla vulgaris*, *Taraxacum officinale*, *Leontodon autumnalis*, *Plantago lanceolata*, *Plantago media*. We can also meet worthless fodder plants, fodder, weak or even harmful plants in the grasslands. The woody vegetation in the form of shrubs is represented by *Vaccinium myrtillus*, *Vaccinium vitis-idaea*, *Juniperus sibirica*, *Pinus mugo* and so on and so forth. In conclusion, the floristic composition is poor and represented by species, with little forage value (Table 1) which amounts to a total number of 23 species of which 10 belong to the Poaceae family, five belonging to the Fabaceae family and 8 plant species that belong to other families.

This shows that although the pastures are an important forage resource, they are in a state of disrepair due to the possibility of a defective management in recent years and

there is the need to adopt a sustainable management leading to a raised pastoral value, namely to the conservation and to the enhancement of the biodiversity.

Table 1. The calculation of pastoral value

Species	% PC	IC	PC x IC
Gramineae	67.0		
<i>Festuca rubra</i>	30.0	3	90.0
<i>Antoxacum odoratum</i>	7.0	1	7.0
<i>Agrostis rupestris</i>	5.0	1	5.0
<i>Agrostis capillaris</i>	4.0	3	12.0
<i>Briza media</i>	4.0	1	4.0
<i>Cynosurus crestatum</i>	3.0	3	9.0
<i>Phleum alpinum</i>	3.0	2	6.0
<i>Poa pratensis</i>	2.0	3	6.0
<i>Nardus stricta</i>	6.0	X	X
<i>Festuca rupicola</i>	3.0	1	3.0
Leguminous			
<i>Trifolium repens</i>	17.0	4	12.0
<i>Trifolium pratense</i>	3.0	4	12.0
<i>Trifolium alpestre</i>	3.0	2	10.0
<i>Lotus corniculatus</i>	5.0	4	16.0
<i>Genista tinctoria.</i>	4.0	X	-
Other families	16.0		
<i>Achillea millefolium</i>	5.0	2	10.0
<i>Alchemila vulgaris</i>	2.0	2	4.0
<i>Taraxacum officinale</i>	2.0	2	2.0
<i>Leontodon autumnalis</i>	1.0	1	1.0
<i>Plantago lanceolata</i>	2.0	2	4.0
<i>Plantago media</i>	2.0	2	4.0
<i>Veronica chamaedris</i>	1.0	X	-
<i>Runex acetosela</i>	1.0	X	-
TOTAL	100		216
The pastoral value	X	X	43
The appreciation of pastoral value		middle	

The pastoral value of the analysed grassland was assessed as medium and it requires the application of certain works in order to bring an extra value to it and to conserve and improve the biodiversity of the grassland. The involved work consisted of the destruction of anthills and the removal of woody vegetation, autumn and spring fertilization, it is known the fact that "on mountain meadows the fertilization increases the proportion of grasses both by grazing exploitation and also by mowing, and the legumes increase in the mowing exploitation [5]".

Table 2. The calculation of pastoral value

Species	V1 = nefertilizat			V2 = manure 20 t/ha			V3 = N50,P30,K100		
	%PC	IC	PCxIC	%PC	IC	PCxIC	%PC	IC	PCxIC
Gramineae	67.0			62.0			70.0		
<i>Festuca rubra</i>	30.0	3	90.0	27.0	3	81.0	32.0	3	96.0
<i>Antoxacum odoratum</i>	7.0	1	7.0	3.0	1	3.0	4.0	1	4.0
<i>Agrostis rupestris</i>	5.0	1	5.0	6.0	1	6.0	4.0	1	4.0
<i>Agrostis capillaris</i>	4.0	3	12.0	8.0	3	24.0	9.0	3	27.0
<i>Briza media</i>	4.0	1	4.0	1.0	1	1.0	2.0	1	2.0
<i>Cynosurus crestatum</i>	3.0	3	9.0	2.0	3	6.0	3.0	3	9.0
<i>Phleum alpinum</i>	3.0	2	6.0	3.0	2	6.0	4.0	2	8.0
<i>Poa pratensis</i>	2.0	3	6.0	6.0	3	18.0	5.0	3	15.0
<i>Nardus stricta</i>	6.0	X	x	1.0	x	X	2.0	x	X
<i>Festuca rupicola</i>	3.0	1	3.0	2.0	1	2.0	2.0	1	2.0
<i>Trisetum flavescens</i>	-	-	-	3.0	4	12.0	-	-	-
<i>Poa annua</i>	-	-	-	-	-	-	3.0	2	6.0
Leguminous	17.0			21			12		
<i>Trifolium repens</i>	3.0	4	12.0	6.0	4	24.0	5.0	4	20.0
<i>Trifolium pratense</i>	3.0	4	12.0	4.0	4	16.0	2.0	4	8.0
<i>Trifolium alpestre</i>	5.0	2	10.0	4.0	2	8.0	1.0	2	2.0
<i>Lotus corniculatus</i>	4.0	4	16.0	6.0	4	24.0	3.0	4	12.0
<i>Genista tinctoria.</i>	2.0	X	-	0.5	x	X	1.0	x	X
<i>Oxalis acetosela</i>	-	-	-	0.5	x	X	-	-	-
Other families	16.0			17			18		
<i>Achillea millefolium</i>	5.0	2	10.0	4.0	2	8.0	6.0	2	12.0
<i>Alchemila vulgaris</i>	2.0	2	4.0	2.0	2	4.0	3.0	2	6.0
<i>Taraxacum officinale</i>	2.0	2	2.0	3.0	2	6.0	3.0	2	6.0
<i>Leontodon autumnalis</i>	1.0	1	1.0	1.0	1	1.0	1.0	1	1.0
<i>Plantago lanceolata</i>	2.0	2	4.0	2.0	2	4.0	2.0	2	4.0
<i>Plantago media</i>	2.0	2	4.0	1.0	2	2.0	1.0	2	2.0
<i>Veronica chamaedris</i>	1.0	X	-	1.5	x	X	0.5	x	X
<i>Runex acetosela</i>	1.0	X	-	1.0	x	X	0.5	x	X
<i>Potentilla erecta</i>	-	-	-	1.5	1	1.5	0.5	1	0.5
<i>Campanula abietina</i>	-	-	-	0.5	x	X	0.5	x	X
<i>Luzula luzuloides</i>	-	-	-	0.5	x	X	-	-	-
TOTAL	23	216		28	259.5		26	247.5	
Pastoral value	43			51.9			49.5		
The appreciation of pastoral value / UVM*ha⁻¹	Middle	1.12		good	3.02		middle-good	2.9	

An over seeding followed in order to achieve a mixture of forage plants that is suitable for a mixed operation because in this way it is achieved a considerable reduction in losses through leaching. In the practice of a sustainable management a particular attention

is paid to the biological resources and to the use of organic materials, insufficiently exploited resources [8].

The impact of these works on the explored grassland highlights an improvement of the pastoral value (Table 2.).

The floristic composition's evolution throughout the experimental period both in the explored variant, which was operated through hay and also cultivated through grazing, it highlights that "poaceele" hold the share between the groups of participating species, followed by fabacee and finally the group of plants from other botanical families

CONCLUSIONS

The process of sustainable development of the agro-ecosystem meadow is a complex and long one and it requires the application, in an organised way, of a complex number of measures and works, ensuring the protection of the soil and the sustainable reconstruction of degraded lands.

The diagnosis of permanent grassland is a prerequisite for a sustainable development of a meadow agro-ecosystem because it captures its specificity and it contributes decisively to the design of some viable measures from an economic point of view, capable of providing a high pastoral value for the conservation and the improvement of the biodiversity.

The recovery way has a decisive contribution to the sustainable development of a grassland, highlighting the joint recovery through the use of a mix of suitable forage.

The rebuilding measures implemented in the grassland which is the subject of the study, led to the modification of the natural productivity through the implementation of some viable economic measures.

The fertilizing with manure has proven to be an adequate management technique for conserving and enhancing biodiversity.

The changes in floristic composition stresses that the application of improvement measures of the natural permanent grasslands contribute to conserving and enhancing biodiversity acting both in the conservation plan and the improvement of the natural heritage and also

for improving the quality and profitability of the grassland production.

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THE IMPACT OF EXTENSION AND RURAL DEVELOPMENT CONSORTIUM VALCELELE ON THE RURAL SPACE DEVELOPMENT

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Abstract

Identifying the advantages that can be generated by an associative structure or functional agricultural cooperative in rural areas is always a useful and necessary step given the need to boost the sector's development of rural economies and rural development. Comparing statistics on social parameters such as unemployment and living standards and economic parameters such as turnover of businesses and household income, it was concluded that the structure in which it operates, agricultural association (consortium) has become economically attractive. This determines the appropriateness of continuing development of the reference zone and improving public and social services in the locations where there are associated farmers working in the consortium. Noticing the superior economic and social outcomes for associative or cooperative agricultural sector development, it is intended to lead development and implementation of public policies to support and promote the association in agriculture.

Key words: cooperation in agriculture, farm association

INTRODUCTION

After 25 years since the first settlement of associative structures in agriculture, the field of the association and cooperation in agriculture is underdeveloped, to be able to produce visible effects on the Romanian economy and society. "Compared to the interest given to them both cooperation and association are far from the desired level." [9] The reluctance of farmers to associate has been discussed and analyzed in several papers [1]. The conclusion is that the fear of losing land use decision according to their own desires and needs is the main cause of this reluctance, [7] and this is because the principles of association and cooperation in agriculture have not been sufficiently explained to owners of agricultural land or to those who exploit agricultural land holding in any form. "It should be noted that after the experience with agricultural production cooperatives in the communist period, real cooperative principles are difficult to popularize and apply in Romanian agriculture, requiring a learning curve through pilot projects. The success of cooperatives in Western Europe is based on very detailed

contracts between the cooperative and its members, the rights and obligations of both parties are clearly defined and penalties in case of non-compliance, may be taxed in reasonable time." [2]

Also it was not explained any positive influence that association and cooperation in agriculture can have it both in terms of the economic performance of the business and the social and economic environment of the communities in which these organizations operate. This paper highlights some of the results of the influence of associative structures in agriculture, respectively, Extension and Rural Development Consortium Vâlcelele on local communities from which the majority of associate members come from.

MATERIALS AND METHODS

To achieve a result that reflects the influence of the association structure in question on the countryside reference point, the data were collected from the National Statistics Institute, the County Agency for Employment Calarasi, the majors of the localities Dragos Voda, Cuza Voda Vâlcelele and for comparison

Dichiseni, related to the total population, the turnover of economic activity that concerns agriculture, the turnover of all economic factors, unemployment rate in Calarasi County and the associated municipalities researched area from which most of associate members in Extension and Rural Development Consortium Vâlcelele come from. Also the database online Tempo was consulted. The data were collected for the year 2013, being analyzed by comparison, the results were interpreted to highlight the positive or negative results, where applicable, produced by the associative structure activity in the studied area.

The records of the Consortium and its register of activities were researched in order to highlight the economic results and actions for the transfer of knowledge to farmers who are members assigned.

RESULTS AND DISCUSSIONS

Extension and Rural Development Consortium Vâlcelele was established in 2005 following a project funded by the World Bank and the Ministry of Agriculture, Forests and Rural Development, implemented by the Academy of Economic Studies. The consortium is an NGO-type associative structure which originally had a number of 33 members, currently reaching 96 members, farmers managing farms between 1 and 2,600 ha. Although the Consortium works on the principles of an NGO, in practice it behaves like a real agricultural cooperative structure. In this regard, we orientate the specialty doctrine "agricultural cooperatives are a form of cooperative in which farmer members associate to achieve a higher rate of earnings from mass production, allowing you to maximize gains from cultivating larger areas of land with lower costs. Members of such cooperatives make joint capital, land and labor. This is beneficial for cooperative members in several ways, such as mass production; maximizing production; top of the line technologies and fertilizers; sharing of resources, land and labor; appropriate land irrigation; sufficient financial resources to cover daily expenses, etc. "[6]

There are 3 villages in Calarasi County where most farmers are part of the investigated consortium, prompting intention to compare the economic and social influence in these localities with economic performance and social status of county.

The purpose of the Consortium is "identifying markets for agricultural products of the members in Romania and abroad, organizing seminars and roundtables with processors, suppliers of inputs, loan officers and representatives of local authorities in order to facilitate contact directly between them and farmers, advising on European legislation and the organization of seminars, conferences, debates and courses to promote legislation on agriculture and rural development."

Extension and Rural Development Consortium Vâlcelele was involved in several EU-funded projects bringing added value to economic and social activities in the area and associate members.

The three localities under study totalized 8,769 inhabitants representing 2.7% of the total county population. In these localities there are 114 businesses distributed as follows: 39 in agriculture, 8 in industry, 30 in trade, 7 in building, 11 in services, and 7 in transport.

The above data showed that a relatively less extensive rural area, with a population of about 9,000 inhabitants economic activity is quite intense and it does not consist only in agriculture but also in industrial and construction activity which has an important part also in transport and services that were developed based on performing agricultural activity in the area.

In 2012, Extension and Rural Development Consortium Valcelele has met with great success some social objectives since the Calarasi county unemployment rate was 6.98% and in three villages under study the situation was as follows: Vâlcelele 2.02%, Cuza Voda 1.9%, Dragos Voda 5.3%.

In 2013, the social indicators mentioned above had the following level: the county unemployment rate fell to 3.66% and in the localities it was noticed an unemployment rate of 1.90% in Cuza Voda, 0.95% in Vâlcelele, and 5.05% in Dragos Voda Commune.

In 2013, the turnover of the operators in the area totaled Lei 233,437,080 (Euro 52,933,578) representing 3.1% of the turnover of all the operators in the county. In terms of number of employees in the county there were 27,282 employees and in localities under study there were 604 employees of the company from this locality, representing 2.21% of all the employees.

Although it seems that the indicators are small, one would not overlook the fact that the zone is a rural area and the reality showed that most economic activity is concentrated in and around the urban areas. Taking into account the fact that a part of the working population businesses operates in the urban areas (located at about 30 km distance), then the conclusion is a positive one, and unemployment in the studied rural areas being more than satisfactory. The above leads to the idea that the living standard of the population in the area is higher than the national average, the statistical results of the year 2013 [4] showing that national farming families were the most disadvantaged rural families.

Developing economic environment in the area dominated by agriculture was possible and that the role of the association structure to ensure the transfer of knowledge to the farmer association was made so that the knowledge acquired to be used by farmers associated with writing projects to attract European funds, projects that have received funding and are bringing added economic value to the zone. The literature is considered "an important milestone in the construction and operation of cooperatives is the transfer of knowledge" [8] Examples of EU-funded projects in the studied area:

1)ILDU SRL, project entitled "Purchasing the machines and agricultural equipments at SC ILDU SRL, Valcelele, Calarasi county" eligible value of Euro 1,850,675.

2)ILDU SRL, project entitled "Expansion and modernization of grain storage capacity (silos)" eligible value of Euro 2,800,000.

3)Vâlcelele Village project entitled "Cooperation for economic and social development and support for the introduction of innovative methods in the agricultural

sector in the border region" eligible value of Euro 381,159

4)Partner Consortium Vâlcelele Extension and Rural Development, HRD project "Employment in agriculture subsistence-balancing solution for the internal market work" worth Euro 500,000

5)Partner Consortium Vâlcelele Extension and Rural Development, HRD project "Initiatives for social economy structures" worth Euro 500,000.

The data presented above showed that it is necessary to set up strategies for the modernization of the Romanian agriculture and countryside. The association should be considered a priority [5] taking into account the fact that it is one of the important ways for increasing farm size.

A strategy to promote the associative and cooperative to occupy an important role is necessary taking into account the benefits of such a structure could bring to the economy, communities and farms taking into account the fact that in recent years it was registered a decrease in participation of farmers or agricultural cooperative associations [3].

It is gratifying that this objective is in the attention of the Romanian authorities, establishing a formal document which agriculture requires, a coherent vision, a strategy directed towards increasing performance of the Romanian farms and of the Association. National subsidies, especially in the budgetary poverty, should be allocated only for that purpose "[10].

Regarding the economic benefits of farmers from participating as partners in the consortium, it could be mentioned:

- inputs cost is smaller by 40 or 50 % for the members of an associative or cooperative structure towards individual agricultural manufacturer. This is due to the purchasing of large amounts of seeds, pesticides and fertilizers.

- in 2013, the cost of fuels purchased by Consortium, especially the price of diesel was by about 15 coins cheaper than the pump fuel price. Individual farmers derived profit also from price reduction according to purchased quantities, but not more than 7 coins per litre.

- taking into account the funding, the cooperative and associative members had the advantage of using bank products at smaller rates (as an average of 1 %). Raiffeissen Bank, BRD GSG, and Transilvania Bank offered this kind of products in 2012 and 2013.

-agricultural production capitalization is more advantageous for Consortium than in the case of individual manufacturers, ensuring a better price and a higher profit for the members.

CONCLUSIONS

The Romanian rural area is in a state of stagnation in terms of both economic and social development, public policies designed and implemented so far failed to boost this environment.

The data analysis presented in this paper showed that a possibility which should not be ignored for increasing rural development is the encouraging of small farmers to participate in associative structures and agricultural cooperatives.

It is obvious that in the area where the farmers associated in Extension and Rural Development Consortium Vâlcelele operate, the local economy has performed over the average in the county, attracting economic diversification, increasing the number of businesses and thus increasing the number of employees and lower unemployment in the area.

It also showed that the turnover of economic agents in the area is above the county average which highlights the opportunity to continue developing economic activities in the area. Even public services are positively affected because the amounts received as local taxes are higher than the county average relative to population.

We should not omit the fact that the transfer of knowledge, which has been achieved through the Consortium, has created a real competition in the area for writing projects with European funding and determining both infrastructure development and agriculture on the European money.

As a conclusion, there is a structure which

could join many farmers in the area to represent their interests and facilitate business contacts. It has an important role in the development of rural areas in which it operates, both in economic and social terms.

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POSITION AND PERSPECTIVES OF DEVELOPMENT OF THE FOOD-PROCESSING SECTOR IN MONTENEGRO

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Abstract

One of the structural characteristics of Montenegrin food production is a higher share of primary agriculture in gross domestic product than of food-processing sector. According to the data obtained from MONSTAT for 2012, food sector registered share of 1.7% in GDP. Unfavourable structure of companies and insufficient level of technical equipment also have negative effects to competitiveness of food industry. It was noticed there are shortcomings in the food quality control system. The most relevant branches of food industry are: dairy and meat industry, fruit and vegetable processing and production of beverages, and milling-bakery industry, etc. The results of poll conducted for the needs of analyzing conditions of food industry in Montenegro, show that the main priorities of food industry, for the following period are contained in raising competitiveness in terms of offering high-quality food at adequate prices and acquiring status of raw material buyer from domestic agricultural producers.

Key words: agricultural, competitiveness, development, food industry

INTRODUCTION

Montenegro has the area of 13.812 square km. According to the census from 2012, Montenegro has 620.029 inhabitants. The highest number of inhabitants lives in the Central (47.3%) and the lowest in the Coastal Region (24.0%). The largest area is in the Northern Region (52.9%) and the highest population density is in the Coastal Region (93.5 inhabitants per km²). [5] During the period 2008-2012 an evident growth of GDP and GDP per capita had been recorded until 2012, followed by a slight stagnation in 2012. The unemployment rate slightly increased and export and import growth reduced, as well as growth of foreign direct investments. Share of primary agricultural production and food industry in the GDP of around 10% emphasizes their importance for the Montenegrin economy [1]. According to the data of MONSTAT for 2012, agriculture, hunting and forestry and fishing made 237.8 million € or share in GDP of 7.7%, i.e. a growth of 3.2% was recorded. Montenegro still has a high share of agriculture, without hunting and forestry, in the GDP in comparison to EU where the primary sector has share of 1.8% in the GDP and less than

6% in the overall employment [8]. According to the MONSTAT data for 2011, gross added value for food products, beverages and tobacco in 2011 amounted to 58.9 mil €, out of which 96.4% referred to food products and beverages. According to the statistical data, number of employees in the food and beverage industry in 2008 amounted to total of 4.745 employees, whilst in 2009 this number reached 5.195 employees. However, the number of employees significantly decreased in 2012 to 3.731 employees (table 1).

Table 1. Employees by the classification area of activities, 2008-2012

Indicator	2008	2009	2010	2011	2012	2012/ 2008
Total	166,221	174,152	161,742	163,082	166,531	100.1
Processing industry	24,335	21,824	16,563	14,368	13,041	53.6
Production of food products and beverages	4,745	5,195	3,817	3,451	3,731	78.6
Production of tobacco products	940	592	242	184	205	21.8

Source: MONSTAT

The average salary of employees employed in food and beverage industry had constantly grown until 2011, but recorded a decrease in the following year by 5.6% in comparison to

the previous year. During the observed period, the highest growth was recorded with food products and beverages (73.5%) and the lowest growth was at the level of business (19.3%) (Table 2)

Table 2. Average salaries by the classification area of activities, €/employee, 2008-2012

Indicator	2008	2009	2010	2011	2012	2012/ 2008
Total	609	643	715	722	727	119.3
Processing industry	615	613	699	734	773	125.7
Production of food products and beverages	438	527	525	805	760	173.5

Source: MONSTAT

The most important branches of food industry are: dairy and meat industry, fruit and vegetable processing and wine production. Individually, dairy sector has the highest share in the agricultural value (around 23% of evaluated value). Only 15% of the primary milk production is processed in dairy plants. Production is concentrated to the Northern region. Distribution of dairy capacities is concentrated to the Central region [2]. Total domestic meat production is around 17.110 tons per year or around 40% of the total meat consumption in the country. Coverage of 100% of domestic demand is achieved only regarding the sheep and goat meat production. Out of 320 agricultural-industrial companies, around 20% of them operate in meat production [4]. Volume and value of fruit and vegetable production are estimated to around 290.000 t/ year and the total annual value is around 117 million €. The area of key importance for vegetable production is the Central Region (Zeta Valley and Malesija). The sector is much dispersed, insufficiently specialized, most production is for its own needs and surplus is placed onto the market [3]. It is estimated that around 44,000 family holdings and business entities conduct agricultural production or around 90% of the total number of family holdings [6]. There are around 100 processing plants, whereof 10 of them have a significant share and role in the market, whilst the others are of lower capacity and do not have a significant presence at the

market. Production of primary raw materials (industrial fruits and vegetables) is of limited volume due to unsolved problems regarding the buy-up, due to high prices, not standardized production, difficulties with packaging, etc. The average area of vineyards at family holdings does not exceed 0.10 ha. The total grape production is between 35.000 and 44.000 tons a year, where JSC "13. JUL - PLANTAZE" has higher share (60%) and small producers have 40%. Domestic wine production in 2010 was estimated to 17.99 million lit. Total area under vineyard amounts to 3.900 ha and production value is 34 million €. Number of registered grape and wine producers is 122. Larger entities of milling industry have the capacity whose optimum utilization could satisfy most of Montenegrin demand. The available production capacities of bakery plants fully satisfy demands of domestic consumption. Capacities of tobacco production are concentrated to one company. Production of concentrated feeds is based on imported raw materials. Montenegro has one brewery and 6 newly-constructed spring-water bottling plants, as well as several plants for production of non alcoholic beverages [7].

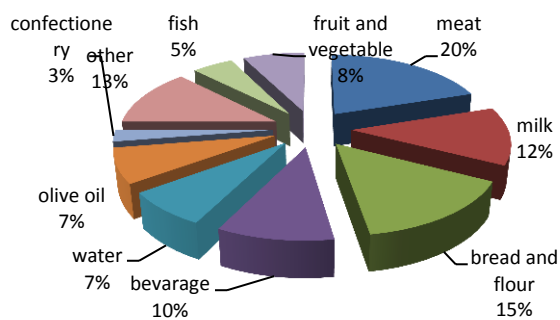
MATERIALS AND METHODS

With the aim to analyze conditions and to collect information regarding the future operations in the area of domestic food industry, a poll was conducted through cooperation between the Chamber of Commerce of Montenegro (CCMN) and the Biotechnical Faculty on the sample of 40 companies. Available data were presented in tables and graphs and growth rates and indices were used for the purpose of analyzing the trends observed developments. Available date of the Statistical Office, Ministry of Agriculture and Rural Development and the Central Bank of Montenegro were also used for the paper.

RESULTS AND DISCUSSIONS

The poll was conducted on 40 business undertakings from Montenegro. Nine companies undertook the poll in the Northern

region – 5 small, 3 medium and 1 large-sized company; in the Central region – 14 small, 9 medium and 2 large-sized companies, and in the South region – 24 small and 13 medium-sized companies. Out of 40 companies that undertook the poll, 32 operate as limited liability companies (82.5%), 7 of them are joint stock companies (17.5%) and one is a non-governmental organization (2.5%). Out of total number of companies that undertook the poll, 62.5% of companies perform only production activity, whilst 37.5% of companies possess, in addition to production facilities, the retail facilities. An overview of structure of examined companies in respect to their activities is given in the graph 1.



Graph 1. Overview of examined companies in respect to activities

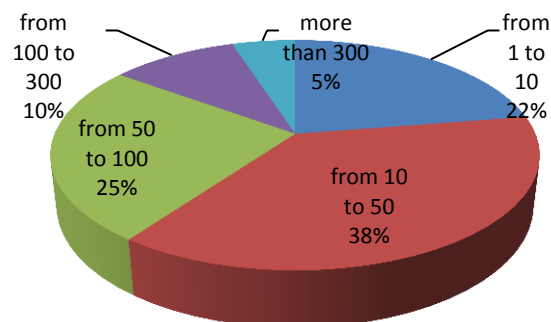
The examined companies are mostly privately owned, whereof 82.5% of them have ownership share higher than 90%. One company is state owned and one is NGO.

Before the end of 2012, 22.5% of the examined companies employed 10 workers, 37.5 companies had 10 to 50 employees, 25% of companies employed from 50 to 100 employees, while 10% of them had between 100 and 300 employees and 5% had over 500 employees (graph 2).

The total number of employees in 40 companies that undertook the poll was 5.200 employees in 2012.

Around 75% of examined subjects have obtained some of internationally recognized standards, while 25% of companies answered that they do not possess any standards. Standard ISO 9001 was obtained by 37.5%, ISO 14001 was obtained by 15%, and ISO 22000 was obtained by 15% companies. HACCP certificate was obtained by 72.5% of

examined subjects and Halal certificate was obtained by 5% of companies.



Graph 2. Structure of companies by number of employees

During the period from 2010 until 2012, 15% of examined companies registered income of over 1 million €, 80% of questioned companies had income between 1 to 10 million €, whilst only few companies (5%) had income over 10 million.

The income growth rate with the questioned companies amounted to 20% during the observed period. The main reason for growth are: increased export and opening of new retail facilities, better positioning at the market, upgraded production capacities, opening of new markets, etc. The main reasons for decreasing trend are: economic crisis, unfair competition and insufficient working capital.

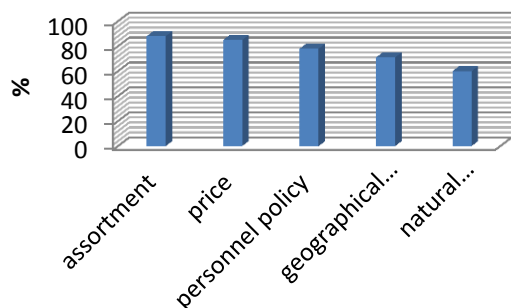
Around 50% of examined subjects expanded their product range during the analyzed period. Incomes from export contribute to total income with 28%. The largest export market for 50% of examined subjects is the CEFTA region market, respectively the markets of Serbia and Kosovo and 10% of the examined companies export to the market of the European Union and 7% of companies export to other markets. As regards to the supply of main inputs, 11% of companies supply inputs only from the domestic market. 27% of companies supply their inputs only from foreign markets, whilst 62% of companies supply inputs from domestic and foreign markets.

A very-intensive strategy of distribution on the domestic market was developed by 67% of examined subjects, 17% had a moderate-

intensive strategy, 5% had regional and 10% had local distribution. 55% of export companies conduct export to foreign markets independently, without agents or distributors from such markets. Leaders at the domestic market were 51% of examined subjects, 37% of them were companies- followers, 8% were leaders at the local market and 2% barely had access to the market.

The target group of consumers that seek for moderate price and good quality is preferred by 52% of examined companies, followed by 12% of companies that target the group of consumers that seek for supreme quality and accept high prices and 10% of companies target the group of consumers that seek for low prices and a standard quality, whilst 25% of companies did not have a specific consumer target group.

Around 85% of companies deemed to have competitive prices for their products, whilst 78% of companies considered their human resource policy as their advantage. 60% of companies answered that their natural resources are their advantage (graph 3).



Graph 3. Advantages of domestic business

During the previous five-year period, 88% of examined subjects invested into new plants and machines, while 78% of them implemented new standards (*ISO, HACCP*). Companies pointed out the following as rather significant problems: payment delays (71%), level of interest rates (48%), access to favourable loans (42%), etc.

The questioned companies plan to establish the following in the next three years; to establish a hygiene or *ISO* standard (58%), invest into new machines (43%), present new products (39%), etc. Over 90% of examined companies agree that the Government should

promote customer loyalty to domestic food producers, support export activities of domestic food companies (91%), introduce food quality schemes (certificate of origin) (87%), etc...90% of questioned companies gave a positive answer to joint presentations at fairs.

CONCLUSIONS

Relation between the primary agriculture and food industry is unsatisfactory from the aspect of its share in the GDP of Montenegro. Furthermore, lack of better vertical and horizontal connection between primary production and food industry is pronounced. Foreign trade deficit of food primarily emphasizes dependence of domestic processors from import of inputs. Regional discrepancies in terms of number of inhabitants, area and population density additionally contribute to tighter connection between domestic producers and food processors. The main characteristics of Montenegrin food sector are unsatisfactory sector structures and insufficient raw material base due to insufficient level of technological equipment, low level of product finishing and low level of market placement for a significant number of agricultural products. The most important branches of food industry are: dairy and meat industry, fruit and vegetable processing and wine production. Results of the poll implemented with the aim to analyze conditions of the Montenegrin food industry indicate that the main priorities of the food industry, as the generators of development in primary agricultural production and regional development of Montenegro in the following period are raising of competitiveness in terms of offering a high quality food with adequate prices and gaining the status of buyer of raw materials from domestic agricultural producers.

ACKNOWLEDGEMENTS

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BARRIERS TO THE IMPLEMENTATION OF INSTRUMENTS ASSISTING SUSTAINABLE DEVELOPMENT OF AGRICULTURE

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Abstract

This paper provides identification and assessment of barriers to the implementation of the instruments of the Common Agricultural Policy (CAP) that support sustainable development of agriculture. This issue has been studied on the example of individual farms of south-eastern Poland, which benefited from programs to support sustainable agriculture in 2004-2013. The introduction of agriculture on the path of sustainable development depends on institutional factors (including political), which can induce farmers to take into account the environment and future generations in their microeconomic decisions. It has been shown that the most important barriers to the efficient and effective implementation of programs in support of sustainable agriculture are financial and information and education constraints.

Key words: sustainable agriculture, sustainable development, farms, Common Agricultural Policy

INTRODUCTION

The issue of sustainable agriculture is widely addressed in economic literature, but the main emphasis is put on the need to care for the natural environment resources, as well as on the necessity of balancing economic, social and environmental governance [28]. Much attention is paid to the theoretical aspects of sustainable agriculture and practical difficulties in its implementation [25, 26, 28], as well as the global (ecological and demographic) and regional challenges of the process [1, 9, 11, 15]. Also continues an uninterrupted debate on the role of the Common Agricultural Policy (CAP) and its various instruments in the sustainable development of agriculture [7, 10, 13, 14, 16, 22]. Interdisciplinarity and multifaceted concept of sustainable agriculture causes appearance of different problems in the evaluation of its implementation, because such an assessment requires the use of metrics that allow to specify the scale and scope of the implementation of sustainable development, taking into account each of the spheres, and also - at different levels - from single farm to the agriculture as a sector of the national and

the global economy [2, 16, 27, 28]. The literature addresses the problem of barriers in the implementation of agricultural practices for sustainable agriculture [20, 24], while relatively little research touches barriers to implementation of CAP instruments in support of sustainable development at farm level [8, 12, 19].

Sustainable development of agriculture should be seen as an ongoing process of finding the optimum balance between the economic, social and environmental targets [16, 17, 21]. Agriculture is on the path of sustainable development, if these objectives are achieved relatively seamlessly (simultaneously and harmoniously) and at the appropriate level, i.e. above a certain threshold requirements for the economic, social and environmental governance. Sustainability is also related to a specific, relatively homogenous agro-system whose balance consists of micro balances achieved at farm level.

A key role in the introduction and maintenance of agriculture on the path of sustainable development is played by a state (government policy, Common Agricultural Policy) and the institutional system of agriculture shaped by the state. We can refer

to the model with the induced development and innovation (Fig. 1).

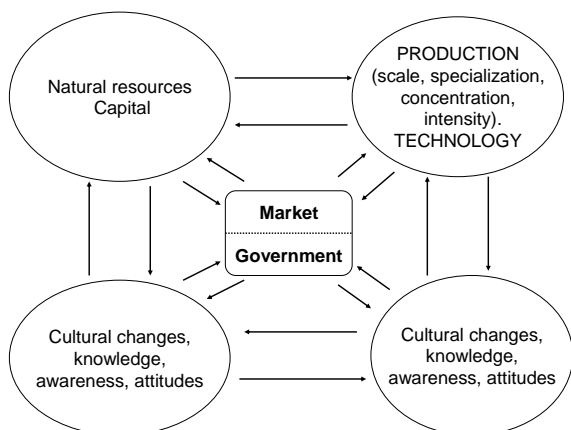


Fig. 1. Location of the state policy in the system of relationships that shape the development of agriculture
Source: author's own based on [4]

In this model, the state (government) and the market are in the center of the chain of links and interactions with elements like natural resources, capital, production and technology, cultural changes and other informal and formal institutions (regulations, organizations, etc.). Changes take place in accordance with the logic of the market, which forces manufacturers to be driven by the imperative of economic efficiency and competitiveness. The problem is that externalities are not valued by the market, and many of the benefits of sustainable agriculture is postponed, and often related to future generations. Therefore, securing the interests of the "dumb" market participants, i.e. the nature and future generations can only be made by a political factor (government) [28]. It is the government (state policy more broadly, in the EU - CAP) who has the ability to correct decisions of market participants and influence the scale and way of use of natural resources, scale and concentration of production, or the type of applied technologies (e.g. in the direction of intensification in agriculture). This is done among others, by the impact on the factor capital and formal and informal institutions (creating cultural change, knowledge, increase of environmental awareness). But here comes the problem of scale and ability of the state to influence these processes, the hierarchisation of objectives, selection of instruments, and the

effectiveness of their targeting and implementation. This issue is very broad and complex. One of the topics that deserve special attention are the barriers and constraints faced by the implementation of tools (programs, activities) to support the sustainable development of agriculture.

MATERIALS AND METHODS

The aim of the study is to determine the farmers' barriers to the implementation of the activities supported from CAP funds, and leading to the sustainability of farms. CAP instruments include not only financial support, which has to reward farmers for their services to the environment and society, but also to support by information and advisory services, carried out by different institutions in agriculture environment. Recognizing the limitations and barriers to implementation of CAP instruments extends knowledge of the sustainable development of agriculture, and can also be used to modify the support system of agriculture.

The empirical material was gathered through questionnaires of farms in the Podkarpackie Region (South-Eastern Poland), using different CAP instruments that support sustainable development of agriculture in 2004-2013. The study was conducted in 2014 on a sample of 131 randomly selected individual farms.

Podkarpackie region is rich in natural surroundings (protected areas, landscapes), it is characterized by difficult business conditions in many areas (foothill and mountain areas), the fragmentation of the agrarian structure, characteristic social conditions in rural areas (overpopulation, unemployment and labor migration, and on the other hand a relatively favorable age structure and educational structure of the agricultural population) and the predominance of family farms. Similar structural and social conditions in agriculture are found in other parts of the EU, hence the findings may be of interest from the perspective of other regions of the EU.

RESULTS AND DISCUSSIONS

In the examined group of farms with agri-environmental programmes (AEP) a total of 72 farms (55%) benefited in 2004-2013. Frequently farmers chose package 8 - Protection of soil and water, which was used by 26% of households, then package 1 - Sustainable Agriculture and package 2 - Organic farming (Table 1). The support structure of households according to the amount of funds was similar to the total in the country (Fig. 2).

Table 1. Characteristics of the surveyed households by the use of CAP instruments that support sustainable development of agriculture in 2004-2013

Packages of the agri-environmental programme (AEP)	% farms	Other instruments	% farms
1. Sustainable farming	11.5	- Afforestation of agricultural land	6.8
2. Organic farming	10.7	- Afforestation of non-agricultural land	3.0
3. Extensive permanent grasslands	6.1	- Support in less-favoured areas (LFA)	37.4
4. Protection of endangered birds species and natural habitats outside Natura 2000 areas	8.4	- Diversification into non-agricultural activities	2.3
5. Protection of endangered birds species and natural habitats in Natura 2000 areas	3.8	- Establishment and development of micro-enterprises	1.5
6. Preservation of endangered genetic plant resources in agriculture	-	- Participation of farmers in food quality schemes	1.5
7. Maintenance of genetic resources of endangered animal species in agriculture	2.3	- Advisory and consulting services for farmers	8.4
8. Water and soil protection	26.0	- Other (support for environmental investments)	5.3
9. Buffer zones	3.1	Total farms	51.1
Total farms benefiting from AEP	55.0	- Including the use of more than one instrument	9.2
- Including the use of more than one package	14.5		

Source: own research

Relatively more funding went to farmers under the package 2 - organic farming, and package 4, and 9, which is related to the abundance of protected areas and fragmented and ribbon-shaped structure of the fields in the region. In contrast, relatively less funds was acquired by farmers as part of the package 8, as a result of country area lower than average in the of the surveyed

households, and thus a smaller agricultural area (UAA) covered by support. 14.5% of the surveyed farmers benefited from two or more AEP packages, combining, for example, a package of 2 - Organic farming and package 3 - Extensive permanent grassland. The surveyed farms (67 units, ie. 51.1%) also benefited from other activities in support of sustainable development of agriculture (Table 1). Some farmers (6.1%) were using at the same time AEP and other activities to promote sustainable agriculture, while a total of 22.9% of the units have benefited from more than one support instrument.

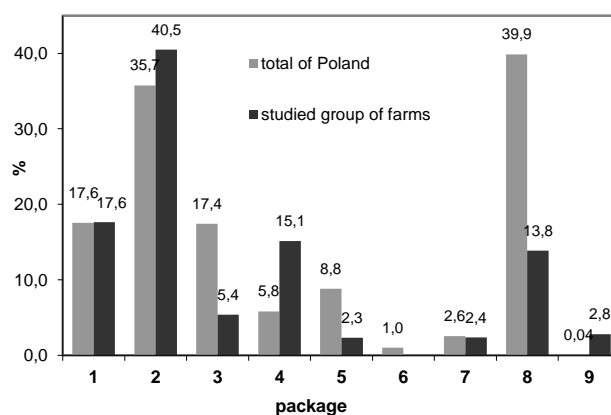


Fig. 2. Structure of financial support farmers under the AEP (2004-2013)

Source: own research and statistics of Agency for Restructuring and Modernization of Agriculture

The implementation of the concept of sustainable agriculture at the farm level is influenced by a number of internal (characteristics of farmers and their farms) and external factors (economic and institutional environment, the characteristics of agricultural production space, the instruments used to promote sustainable agriculture). These features can stimulate farmers to implement steps to balance the farms, but also can create barriers. These barriers affect dysfunction of incentive mechanism for sustainable development, which consists of: the right knowledge and information, which further translates to the perception of the concept of sustainable development, openness to good practice, the right attitude of the farmer and the tendency to change towards sustainable management (Fig. 3).

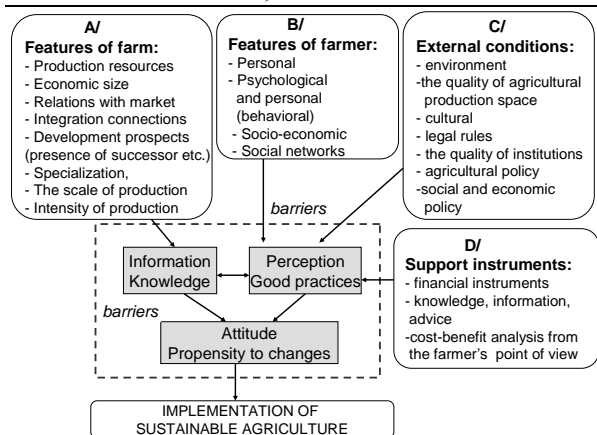


Fig. 3. Effect of endogenous factors (A, B) and exogenous (C, D) for the implementation of sustainable agriculture for farmers

Source: own study based on [3, 18]

Research shows that the implementation of sustainable agriculture takes place in a large-area units and those that use the possibility to increase the resources of the earth by way of lease (Table 2). These farms have more diversified production than the average farm in Podkarpackie province, as evidenced by a lower proportion of cereals in crop structure and a higher proportion of households engaged in plant and animal production. At the same time the tested units, against the background of agriculture of the region are characterized by greater intensity of agricultural production, as evidenced by

animal density per 100 ha of arable land, and the use of mineral fertilizers (Table 2).

Both stocking and the dose of mineral and organic fertilizers, together with plant protection products in the vast majority of households, however, do not exceed the standards in sustainability analysis of farms [27] (the average rate of livestock in SD/ha was 0.7, and nitrogen efficiency standards were exceeded only by 4.5% of households).

It should be emphasized that, as in the whole region, including in the sample, there is a high percentage of households having permanent grassland and they do not conduct animal production (39.7% and 45.8% without ruminants), which violates one of the basic criteria of sustainable agriculture.

The surveyed farmers are younger compared to the average age of the users of holdings in the Podkarpackie province.

For the most part, they have a lot of experience in running the farm (the average length of service is 19 years) and have a good preparation for the profession (57% of them have agricultural education). In addition, at least 3/4 of farmers had secondary education, while in the region the result was 38.1% (Table 2).

Table 2. The selected features of the surveyed units on a background of the total farms in Podkarpackie

Specification	Investigated farms:		Total Podkarpackie region*
	total	implementing AEP	
Average area of arable land per farm (ha)	17.9	26.6	4.1
The share of permanent grassland in area of agricultural land (%)	26.2	30.1	30.3
Percentage share of cereals in cropping area	70.5	69.2	73.6
Agricultural holdings which lease land (%)	47.3	65.6	11.2
Average livestock units per 100 ha of AL	56.4	51.1	17.6
Cattle stock in head per 100 ha of AL	33.5	26.3	17.5
Agricultural holdings applying:			
- Mineral fertilization (%)	71.8	68.7	66.5
- Organic fertilization (%)	60.3	68.7	53.8
- Plant protection products (%)	79.4	82.8	68.2
The average level of mineral fertilizer NPK kg/ha AL	110.2	72.5	61.0
The average age of head of farms (years)	45	47	52
At least secondary education (% of farmers)	76.3	78.1	38.1

* Data from the *Agricultural Census 2010* for farms > 1 ha of AL

Source: own research.

These characteristics of farmers and their farms can be considered as favorable to implementation of sustainable agriculture, while their opposite variants (eg. a small area of the farm, the farmer's advanced age, poor

education, lack of animal products), it should be considered as barriers to this process.

In view of the multiplicity of factors affecting the implementation of the concept of sustainable development by farmers (Fig. 3),

we want to focus further on the barriers that hinder the effective interaction of CAP instruments in support of sustainable agriculture (part D in Fig. 3). When asked about this, farmers recognized financial barriers as the most important (Table 3), but this category of restrictions includes:

- too low - in the opinion of farmers - subsidies that do not fully compensate for the loss of financial benefits (lower revenues, higher production costs) resulting from the conduct of extensive, ecological production;
- lack of own funds for the implementation of investment projects related to the sustainable development of the farm;
- liquidity problems arising from periodic delays in obtaining payments and expenses associated with the implementation of pro-environmental actions.

Financial barriers were indicated by 45% of respondents in the first place, and generally up to 91.6% of the respondents (farmers could point to the 3 barriers defining the rank of importance). These results are different compared to studies conducted in north-eastern Poland in the years 2006-2007 by M. Mickiewicz et al. [19] and in the years 2008-2011 by J. Kaminski [12]. These studies have shown that at the stage of implementation of agri-environmental program of the first edition (2004-2006), and in the early years of the second edition of the AEP (2007-2013) farmers faced the problem of insufficient knowledge of the program, which resulted in their distrust of the potential benefits of the pro-environmental actions. They lacked a fito-sociological knowledge, qualifications required in grassland to the appropriate package and a variant of AEP. The problem was also limited access to agri-environmental advisors and experts, for example ornithologists and botanists, necessary for the implementation of the package and bird habitat. Complicated and time-consuming process of joining AEP was made worse by frequent changes in the rules on the packages and changes in the methodology for compiling a nature [12]. Farmers indicated as the most important barriers and bureaucracy, therefore, the lack of adequate (detailed)

information and consultancy packages AEP. Research in 2014 shows that still bureaucratic barriers and issues related to certification and expertise are up to date, but financial constraints are the most important for farmers. The problem of too low payments was indicated by nearly 3/5 of the respondents (58.8%), in particular those who implemented AEP action. In contrast, the lack of own resources was pointed out as a barrier by farmers who benefited from the support of pro-environmental investments and investments to improve the quality of production or its diversification and the search for alternative sources of income (diversification of agricultural activities, the creation and development of micro-enterprises). As we know, EU grants only cover part of the cost of eligible projects of this type (50% or slightly more), and the financial outlay for their implementation are usually high. In view of the lack of capital, farmers have to resort to bank loans or other return financing instruments (e.g. lease), the cost of which (despite a fall in interest rates) are still high. A lack of equity was also indicated by many farmers who implement AEP package (25%) or other pro-environmental actions. These activities are not directly related to support investment in the farm. However, organic production, implementation of agrotechnical processes, ensuring animal welfare, afforestation etc., requires expenditures for equipment, repairs, purchase of livestock, plants, sometimes hiring foreign labor or third party services. Therefore, financial constraints are important in the implementation of such projects.

The significance of bureaucratic barriers in the implementation of activities in support of sustainable development of agriculture is pointed out by many researchers [8, 19]. Also, in these studies, they occupied a prominent place in the hierarchy of constraints (including 3/4 of them pointed to farmers). These barriers were divided into 3 different groups, according to the stage of the action (Table 3). At the application stage, respondents pointed out that "the application forms are too large and complex and require professional help from outside". They also

raised the problem of prolonging the application procedures and the uncertainty of obtaining support, which "blocks the implementation of specific projects."

Table 3. Barriers in implementing activities in support of sustainable development of agriculture

A kind of barrier (problem)	Response rate of farmers (%):		The restrictions hierarchy indicator W_{ho} for farms:	
	in first place	total	implementing AEP	other
Financial constraints (low payments, lack of own financial resources for realization of tasks)	45.0	91.6	1.00	1.00
Bureaucracy - at the application stage	19.1	68.7	0.75	0.78
Insufficient advice and specialized training	17.6	65.7	0.77	0.74
Bureaucracy - implementation of the action (project)	12.2	62.6	0.71	0.67
Bureaucracy - control and settlement of project	18.3	58.0	0.92	0.89
Problems with certification and expertise	24.4	52.7	0.86	0.78
None (deficiency) relevant knowledge and information	9.9	50.4	0.61	0.74
No visible effects of measures	8.4	49.6	0.50	0.71
Agrotechnical problems	17.6	42.1	0.74	0.68
Limiting the flexibility and freedom of action	9.2	40.5	0.64	0.65
Inefficient use of resources	11.5	32.1	0.64	0.69
Unfavorable balance of non-financial outlays /effects	6.1	29.8	0.61	0.74
Others	0.8	1.6	0.02	0.01

Source: own research

At the stage of implementation of activities, respondents pointed to difficulties such as:

- strict rules for the implementation of many agronomic and environmental activities,
- discrepancies between the beneficiary and the institution of control in terms of the accuracy of the tasks, the area covered by the support, etc.,
- too detailed checks,

- unclear rules for the many activities,
- nuisance of agri-environmental performance records,
- the need to involve too much time to complete all the formalities.

Bureaucratic barriers at the stage of ex-post and settlement mean in turn:

- ambiguity and variability of the control and billing,
- excessive control and billing accuracy,
- disparity of sanctions for any misconduct,
- excessive number (frequency) of controls.

Nearly 2/3 of the farmers could see the barrier of lack or scarcity of specialist advice and training, in particular on the ecological production systems, unconventional - environmentally-friendly technology, and on instruments to support the sustainable development of agriculture.

Barriers in obtaining the relevant certification of farm or an ornithological expertise or botanical were pointed to by respondents leading organic production, farmers who participated in food quality schemes and implementing habitat and bird AEP packages. Among others, the limited number of certification bodies and experts, nuisance and protraction of procedures, and their complexity, as well as the constant changes in regulations was pointed out.

Further barriers and restrictions apply to agricultural technology (Table 3). Farmers complained about the increase in expenditure of labor and objectified related to the implementation of the required agrotechnical (especially for package - soil and water protection and the necessary secondary crops sowing here), which was associated with an increase in the cost of agricultural production.

It was pointed out that the sowing catch crops that need to leave for the winter and plowed until after March 1, cause, especially on soils located in humid, late spring sowing the next crop. In addition, climatic and soil conditions often make it difficult for the timely implementation of the required agrotechnical, resulting in the risk of failures and troubles in the event of control.

Farmers also raised the problem of reducing the flexibility and freedom of action (Table

3). It is associated with agrotechnical requirements, but also the requirements for the protection of plants and fertilization, stocking and maintenance of animals (including breeding specific breeds) or afforestation. These requirements (rules) are a natural consequence of attending a given program (package), but in the opinion of farmers are sometimes too "stiff" (e.g. in terms of deadlines of agrotechnical activities). In the context of multiple AEP packages, the farmer is obliged to carry out specific procedures, maintain a constant permanent grassland surface, or agricultural land on the farm for at least five years. Such an obligation cannot be changed during the implementation, which raises certain production and economic risk (changes on the market, natural disasters, etc.). Farmers do not interpret the balance of costs/benefits of the implementation of the principles of sustainable agriculture only as monetary value. Being aware of the specific benefits of halting soil erosion processes, and improving soil fertility, they see also some drawbacks, e.g. the danger of dehydration (as a result of an excessive number of agrotechnical activities). Also, greater workload (not only directly related to the production, but also with the "red tape") and the aforementioned risk are an important element of the calculation of costs / benefits. As a result, some of the farmers, at the end of the operation, had not applied for additional support (25.4%).

Yet another limitation identified by the respondents (32.1%) is an inefficient use of resources of the farm. Such statements were voiced by farmers implementing some AEP packages, in which, they undertook to reduce or withdraw from the use of pesticides and fertilizers, reduce the number of cuts or leaving part of the meadows in the non-mowed state. These statements should be combined with other related "no visible effects of individual actions" (Table 3), which often came from the same respondents. It seems that some farmers are not fully aware of the benefits arising from the implementation of environmental actions or are not convinced as to the validity and effectiveness of the treatments. Some believe

that the environmental benefits do not correspond to the scale associated with a package of treatments and land use restrictions. Farmers have a pro-manufacturing orientation, and pay less attention to the environmental benefits, hence, for example, the extensive use of permanent grassland, which leads to negative - from the point of view of productivity - changes in sward meadows and pastures, is perceived by them as an inefficient use of resources. In this context, it is better than ever to promote the idea of AEP as a tool to safeguard the valuable natural habitats and biodiversity supporting tool [12]. As you can see, this awareness is not common even among farmers implementing actions for the environment. Producers' interest in certain variants of agricultural AEP (bird or habitat) is motivated mainly by the amount of financial support.

Another barrier, exalted in the hierarchy, is the lack of adequate knowledge and information about the application to AEP and implementation of specific actions. This problem is closely related to the bureaucratic barriers, the more complex application procedures and the rules of the program, the greater the need for adequate information. As shown, the problem of the quality of information - it is a challenge for the advisory bodies and others - also applies to the nature and effects of actions in support of sustainable development of agriculture.

To illustrate the differences in the weight of individual barriers in implementing the cross-holdings of AEP and implementing other forms of sustainable agriculture, were used synthetic indicator of hierarchy restrictions W_{ho} . Therefore, each variable (barriers) was assigned point values depending on the position in the ranking of barriers indicated by the respondents (first - 3 points, the second - 2 points, etc.). By adding up the points for each variable the normalization transformation of these values using classical unitarisation has been made [23]. Its general the formula takes the form:

$$z_{ij} = \frac{x_{ij} - \min_i \{x_{ij}\}}{\max_i \{x_{ij}\} - \min_i \{x_{ij}\}}; i = 1, 2, \dots, n; j = 1, 2, \dots, m$$

where $z_i = W_{ho}$ - a measure that specifies the significance of a given variable (barriers) in the hierarchy of barriers.

As a result of the normalization formula variable values belonging to the interval [0; 1] were obtained. W_{ho} ratio equal to 1 is the value of a variable that has gained the highest position (weight) in the hierarchy of respondents.

W_{ho} indicator values show that farmers using AEP bit more than the others felt the bureaucratic barriers at the stage of the operation and its settlement and control, as well as the barriers associated with obtaining certificates and expertise (Table 3).

This shows that especially in this program, it would be desirable to simplify the application procedures and other administrative requirements (reporting, documentation).

It would also be needed to facilitate farmers' access to expert and nature bodies. In turn, farmers pursuing other activities in support of sustainable development (e.g. diversification, environmental investments) felt strongly bureaucratic difficulties at the application stage, as well as barriers to information and education (Table 3).

They were also more skeptical in the context of the effects of these measures and more negatively perceived non-financial balance of the cost/benefit of pro-environmental actions.

If they are to effectively and efficiently implement the principles of sustainable development, farmers must be aware of the essence of this process. Therefore,

respondents were asked to assess the meaning and effectiveness of policies for sustainable development of agriculture, not in terms of costs and benefits to the farms, but objectively in the context of general social objectives. Farmers' statements indicate that every second of them assesses support to sustainable agriculture as a necessary and effective (including 49.7% of the total population), but only 9.2% of the midst of them declare that nothing should be changed in this policy (Table 4). In contrast, 40.5% of respondents, despite a positive opinion in the context of the desirability and effectiveness of support believes that modifications are needed.

The group of farmers calling for major changes, also includes those who perceive the meaning of the policy, but they low-evaluated its effectiveness in its present form (3.1%).

It is significant that 45.6% of farmers have no opinion on the matter, so eagerly benefit from financial support from the various instruments of the CAP, but it cannot determine their usefulness and effectiveness in the context of general social interest.

These results indicate the great challenge facing institutions that should acquaint the public with nature and the desirability of promoting the sustainable development of agriculture.

Since the direct beneficiaries of instruments of this policy do not quite see it a social sense, so how effectively can taxpayers and consumers be convinced about the legitimacy of agricultural support?

Table 4. Evaluation of the effectiveness of the meaning of actions that support sustainable development of agriculture - in the opinion of the respondents

Type of response:	The percentage of farmers:		
	Total	Implementing AEP	Benefiting from other activities
There is no sense of such activities	1.6	-	3.0
I rate a low efficiency and effectiveness of such activities	3.1	1.6	4.5
Actions are necessary and effective, but must be modified, because they are not very efficient	40.5	62.5	19.4
Do not change anything	9.2	15.6	3.0
I do not have opinion on the subject	45.6	20.3	70.1
Most often mentioned proposals for change: 1/ increase financial incentives for farmers (compensation for lost profits and costs); 2/ simplify procedures and documentation; 3/ simplify the conditions for implementation of the program; 4/ better information and advisory support from the institutions.			

Source: own research

CONCLUSIONS

Key players in sustainable agriculture policies are agricultural producers, since they are directly involved in the processes that determine the effectiveness and efficiency of the implementation of this concept. Among the various instruments of influence of political factor (the European Union, the national government) on the evolution of agriculture towards the direction proximal to the model of sustainable development, financial instruments are crucial.

They can most effectively modify the system of farmer's objectives by affecting the level and structure of income distribution and thus affecting the correction of the internal balance of cost/benefit from the application of the principles of sustainable agriculture.

The financial incentive is a key stimulant for farmers to undertake pro-environmental actions, while financial factors constitute the most important barriers to the implementation of sustainable development of agriculture. Apart from them, important factors are those located on the side of knowledge and information, not only on the principles of sustainable agriculture and conditions for access to the various instruments in support, but also on the idea of sustainable development.

A very big problem for the farmers are still all kinds of bureaucratic barriers that impede access to the instruments of the CAP, as well as the efficient and effective implementation of pro-environmental actions and the principles of sustainable agriculture.

They prove that sustainable development of agriculture requires a certain institutional order.

It is the institutional system (organizations, instruments, regulations and rules of operation), which could correct market failures and state policy, which are obstacles to achieving economic, social and environmental.

The effectiveness of such a system will depend on overcoming or mitigating barriers that come from the external environment or directly from the farm, affect the incentive mechanism for farmers to take actions that lead to balancing farms.

The elements of this mechanism include information and knowledge, awareness of the objectives of sustainable development of agriculture and willingness to change in this direction.

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ASSESSMENT OF WORKLOAD ON MUSCULOSKELETAL SYSTEM OF MILKERS IN MECHANICAL MILKING THROUGH THE USE OF JOB STRAIN INDEX METHOD

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Abstract

During the last years, as a result of the technological development, farming started to include new solution like a machinery or other devices. However, it has also led to the emergence of new risk factors for which agricultural workers are not often well prepared. In fact, moreover to common occupational hazards, farmers can now face specific risk connected with many various tasks performed in farms. Workers in the agricultural sector are exposed to various risk factors such as manual lifting and handling loads, milking or tractor driving. Based on these circumstances the studies were conducted where the main objective was to investigate a workload during milking. The analysis was conducted on 20 farmers in their own farms during the morning and evening milking with the herringbone and carousel milking systems. The analysis of muscle load was conducted with Job Strain Index method. The JSI is a tool used to evaluate the risk level of a job for developing a disorder of the hand, wrist, forearm or elbow. The highest values of muscle tension and force were observed in the forearm muscles during the attachment of teat cups to the udder. The research shows that the milking work in the herringbone parlour generates a higher risk of problems to the musculoskeletal system of the milker.

Key words: agriculture, milking, musculoskeletal system, work load

INTRODUCTION

Data from the European Agency for Safety and Health at Work shows that disorders of the musculoskeletal system are the most common diseases in the European Union. Among European workers around 25% complain of backache, about 23% of the respondents complain of muscle pain. Many diseases of the musculoskeletal system which get reported in Poland recently constitute 25% of all occupational diseases [1]. In Polish farming, for example, several dozen fatal accidents occur every year and a number of different kinds of problems closely related to the performed work are recorded [4].

It is therefore necessary to make a thorough approach to the subject of load imposed on musculoskeletal system in attempt to shape appropriate - physical and psychosocial working conditions for farmers. No analysis of the dynamic workload of Polish farmers using electromyography or Job Strain Index

method has been carried out to date. The methods allow for a very precise analysis of the load imposed on the human movement system over consecutive operations [2]. Milking of cows is a very good example of the farmers' work that can be precisely analysed. It is featured by a high frequency of repetitions, distinctive body posture of the milker during subsequent operations wrists and hands are positioned during subsequent milking operations [3],[6]. Women are particularly vulnerable to the musculoskeletal system disorders. This very common problem arises from the fact that workstations are designed, in most cases, based on the anthropometric measurements of men. Working in such conditions often causes discomfort, reduced productivity and higher energy expenditure. It has been found out in the studies conducted so far that some women working continuously for 8 hours feel pain in hands, wrists and the neck [7].

The aim of the study was to measure the

burden applied on musculoskeletal system of milkers while milking cows in a "herringbone" type milking parlour (herringbone system) and the rotary milking parlour (rotary system) using the Job Strain Index method. The milking process consists of the following consecutive steps: preparation of equipment for milking, washing the udder, pre-milking massage of the udder, taking a sample of milk, proper milking, post-milking, post-milking massage, and cleaning the milking equipment. The oblique arrangement of work stations in the "herringbone" milking parlour gives the milker better access to the udder. Milking operations are performed as per the pipeline system; preparation for milking the next cows and setting up the milking appliances. In the analyzed rotary milking parlour, the cows during milking are set on a rotating platform, side by side, facing the middle of the device. The operating staff for such a milking parlour consists of a group of several people working on the outside of the platform. Milkers have limited access to the cows' udders because the connection of the milking appliances is performed between the legs of the animals in an uncomfortable position [6]. The average number of milked cows in the tested "herringbone" parlours was 65 animals (10 farms). For the rotary type parlour the average herd size was 128 cows (3 farms).

MATERIALS AND METHODS

The applied JSI method is used to evaluate the total load on the musculoskeletal system of the upper limbs (hands, wrists, forearms and elbows). The burden may arise from the repetition of movements, external force and body position during work. The estimation of the totalised index in the JSI method will allow assessing the risk of symptoms in the musculoskeletal system for a specific work [6]. Several criteria and rules must be satisfied to properly determine the totalised JSI. For this reason some indirect indicators (IE, DE, EM, HWP, SW, DD) are determined, which accurately characterize the course of the operations performed by the worker under test. The general formula for the index

calculation is as follows [5]:

$$JSI = IE \times DE \times EM \times HWP \times SW \times DD$$

where:

IE- Intensity of Exertion

DE- Duration of Exertion

EM- Efforts per Minute

HWP- Hand/Wrist Posture

SW- Speed of Work

DD- Duration of Task per Day

The risk of disorders in the motoric system of a worker in the tested workstation is evaluated according to the scale set out in Table 1.

Table 1. Criteria for risk evaluation in JSI method

Index value	Risk of disorders
JSI<3	Low
3≤JSI<5	Average
5≤JSI<7	High
JSI>7	Very high

Source: The author's own analysis based on [7]

The intensity of exertion (IE) in the formula is determined by the percentage of the force which is generated by a working person against the maximum force values for the person (Table 2).

Table 2. Intensity, duration and frequency of efforts as per JSI method

Scale	IE - force; %MV C	Factor IE	DE[% duration exertion]	Factor DE	EM [number/min]	Factor EM
1	<10	2	<10	0.5	<4	0.5
2	20-29	3	10-29	1	4-8	1
3	30-49	6	30-49	1.5	9-14	1.5
4	50-79	9	50-79	2	15-19	2
5	80<	13	80-100	3	20<	3

Source: The author's own analysis based on [3]

For the purpose of measuring IE the electromyography (EMG) was used, which measured the muscle's maximal voluntary contraction percentage (% MVC) - generated in the muscles of the milkers forearm.

The duration of exertion (DE) is calculated as the percentage ratio of the duration of all the

efforts against the total observation time for the tested person. In turn, the effort frequency should be understood as a number of efforts observed per unit of time, usually per one minute (EM) [2].

It is important to determine the hand and wrist position (HWP) in the JSI method. Angular values are relevant for the evaluation of the burden for the hand position against forearm. As in the previous cases they are qualified in a scale of five. Another element examined within the presented method is the speed of work (SW), which depends primarily on the conditions under which the work process is performed (Table 3).

Table 3. Hand position, speed of work, and duration of the operation in Job Strain Index method

Scale	Hand position description [HWP]	Factor HWP	SW characteristics	Factor SW	DD [hour]	Factor DD
1	Very good	1	Very slow	1	<1	0,25
2	Good	1	Slow	1	1-2	0,5
3	Correct	1,5	Average	1	2-4	0,75
4	Bad	2	Fast	1,5	4-8	1
5	Very bad	3	Very fast	2	8<	1,5

Source: The author's own analysis based on [2]

The last calculated factor is the duration of activity during the day (DD). The duration time is specified in hours, according to the values in Table 3.

The study involved a group of 20 farmers (8 women, 12 men). It was performed on private farms; each measurement was repeated 2 times. All tested persons were healthy. Each person had a relevant experience as they had been milking for at least four years. There were right-handed and left-handed persons in the studied population.

RESULTS AND DISCUSSIONS

The first factor taken into account to assess the burden is the intensity of effort measured as %MVC for farmers' forearms during subsequent milking operations. Figure 1 presents the average values (%MVC) for the muscles of the left and right forearm by

gender.

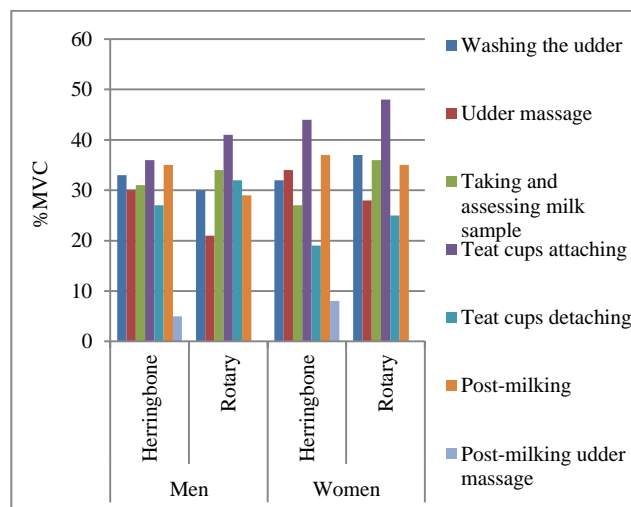


Fig.1. Average value of maximal voluntary contraction percentage (%MVC) for the muscles of forearm during each milking operation
Source: The author's own analysis

The %MVC distribution shows that maximum value of burden for muscles occurs during attaching teat cups, especially in case of women. At that operation the percentage of the maximum muscle tension exceeds 40% MVC.

No burden is recorded during teat cups detaching operation on the rotary milking parlour due to the automated finishing of milking. In the case of herringbone parlour the muscle tension for this operation does not exceed 10% of MVC.

According to the JSI method, the effort per minute rate observed during the milking operation was less than 4 (EM<4). Duration of exertion, defined as the percentage ratio of the duration of all the efforts against the total observation time for the milkers' work (DE ratio), amounted to 83.3% for milking in the herringbone parlour and 87.5% in the rotary milking parlour. An important element in the assessment of physical burden of farmers is the speed of work. The speed is assessed on the basis of the behaviour of the tested person, the duration of the subsequent operations and the factors related to the work environment. Figure 2 shows the example assessment of the speed of milkers' work. Axis x determines subsequent milking tasks by the number, while the y-axis determines the rate values (1-

5) describing the speed of work.

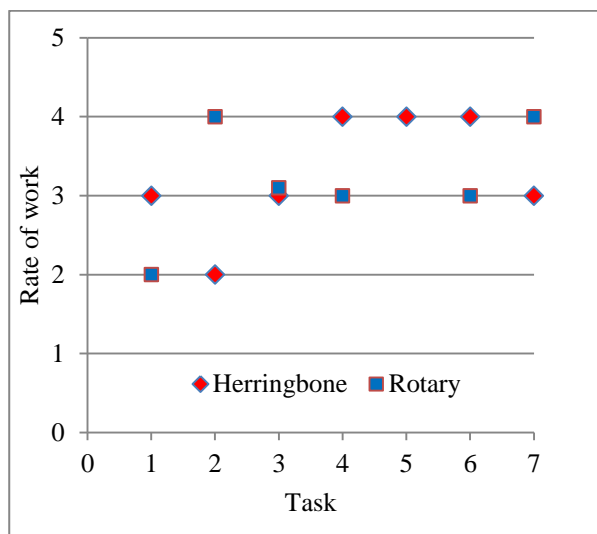


Fig.2. The observed rate of work of milkers while performing subsequent tasks SW (1-7); 1 - Very slow, 2 - Slow, 3 - Average, 4 - Fast, 5- Very fast. Tasks; 1- washing the udder, 2- udder massage, 3-taking and assessing milk sample, 4- teat cups attaching, 5- teat cups detaching, 6- post-milking, 7- post milking udder massage

Source: The author’s own research

The data showed that the rate of work of milkers was higher for operations of attaching, detaching teat cups and post-milking in the herringbone parlour compared to the same operations measured in the rotary parlour.

It is important to consider the position of the body of the assessed person in the assessment of the work safety level.

For this purpose, bending angles were measured against optimal positions of selected parts of the motoric system.

Table 4 shows the values of bending angles (°) against optimal positions for hands. The highest value of hand bending angle was measured during udder massage (18°), and the lowest during pre-milking. The highest values of bending while moving hands counter-clockwise were observed while washing udders (-35°), which was also accompanied by a high bending angle of fingers (35°).

The values refer to the right-handed individuals.

On the basis of the received indices (Table 5) respective multipliers were obtained, which allowed computing total load

levels of 6.22 for the herringbone parlour and 4.62 for rotary milking parlour.

Table 4. Values of hand bending angles (°) against optimal positions; standard bending angle value in brackets

Task/ Movement	Flexion	Extension	Radial deviation	Supination	Bent fingers
Washing the udder	-15 (3.5)	10 (2.1)	-14 (2.3)	-35 (7)	35 (5.5)
Udder massage	-18 (2.1)	5 (0.4)	-10 (3)	-25 (4.8)	20 (4)
Taking and assessing milk sample	-5 (0,2)	15 (3)	-20 (4)	-18 (3.9)	70 (10)
Teat cups attaching	-8 (1)	12 (2.1)	-15 (3.3)	-12 (4)	75 (12)
Teat cups detaching	-	-	-	-	-
Post-milking	-14 (2.4)	15 (2)	-20 (4)	-10 (3)	65 (8)
Post-milking udder massage	-15 (3)	8 (1)	-18 (4.2)	-22 (6)	24 (5.7)

Source: The author’s own research

Table 5. Values of multipliers ascribed to each milking task as per Job Strain Index

Milking system	Herringbone					
	IE	DE	EM	HWP	SW	DD
Washing the udder	3	1	0.5	1	1	0.5
Udder massage	3	1		1	1	0.25
Taking and assessing milk sample	6	1		1	1	0.5
Teat cups attaching	6	1		1.5	1.5	0.25
Teat cups detaching	6	0.5		1	1.5	0.25
Post-milking	6	0.5		1	1.5	0.25
Post-milking udder massage	3	0.5		1.5	1	0.25
Milking system	Rotary					
Washing the udder	3	1	0.5	1	1	0.5
Udder massage	3	1		1	1.5	0.5
Taking and assessing milk sample	6	1		1	1	0.5
Teat cups attaching	6	0.5		1	1	0.25
Teat cups detaching*	-	-		-	-	-
Post-milking	6	0.5		1	1	0.25
Post-milking udder massage	6	0.5		1	1.5	0.25

Source: The author’s own research

* task performed automatically

This result translates to respectively high and average level of risk of developing disorders in the musculoskeletal system.

In the first case, breaks while milking should be introduced, especially when milking is performed by one milker (Table 6).

Table 6. Assessment of risk of developing disorders in the musculoskeletal system for the milking parlours under study as per Job Strain Index

Index value	Risk of developing symptoms	Total score - Herringbone parlour	Total score - Rotary parlour
JSI<3	Low		
3<JSI<5	Average		4.69
5<JSI<7	High	5.72	
JSI>7	Very high		

Source: The author's own research

Similar assessment by the JSI method was conducted for a number of other professions. The analysis primarily focused on forearms, wrists and hands of individuals under test. In the case of the waiter profession for example, it was found that the highest burden generating activities were those that required working in an upright position with arms exposed to external load greater than 5 kg where activity required at least 8 repetitions per minute.

Particular attention was paid to the extreme position of upper limbs, specifying the limit angles for their bending. In the case of the analyzed waiters' profession the overall JSI index value exceeded 20.

This result was much higher than that for the milkers. The difference might result from work organisation in both professions. In the case of waiters their activities were carried out for a period of 8-hour shift, while milking was usually divided into two four-hour cycles.

It is therefore necessary to minimize the burden for the motoric system so as to avoid overloading which leads to discomfort and often to irreversible problems.

CONCLUSIONS

The JSI method was applied to thoroughly analyse the burdens to the motoric system of milkers who performed milking

in herringbone type parlour and rotary milking parlour.

The research showed that the milking work in the herringbone parlour generates a higher risk of problems to the musculoskeletal system of the milkers.

The risk ensues from a high frequency of repetitions of attaching the milking equipment and above all from the weight of the equipment.

The high value of the totalised index also results from the variable body position of the milker necessitated by the construction of this type of the milking parlour. In this case the milker covers longer distances than during milking in the rotary parlour.

It is therefore essential to change the milking work organization by introducing shifts or breaks.

Otherwise individuals working as milkers will suffer from discomfort and pains in the motoric system.

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THE ANALYSIS OF THE ECONOMIC DEVELOPMENT OF SOUTH-MUNTENIA REGION

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Abstract

The organizational and economic characteristics of South-Muntenia Region are included in the general scope of the regional policies in Romania, highlighting the economic specific of the region due to the relief, region's economy, demographic problems and labor, economic development of industry, agriculture and services and tourism region. The general characteristics of the industry are: complexity and diversity of the region industry, covering all areas of components, relying on the richness and variety of the existing natural resources; the industrial areas are located and generally belong to large communities, such as municipalities and towns, which are concentrated in the three Northern counties: Prahova, Dâmbovița and Arges. The region industry is partly under the influence of the decline in the national economy.

Key words: agriculture, development, economy, industry, region, tourism

INTRODUCTION

South-Muntenia Region is situated in the South-East part of Romania, bordering to the North, Centre Region, to the east South-East Region, to the South, Bulgaria, the limit being given by the natural border – the Danube River. The presence in the South of the region of the Danube River provides it the opportunity to have communications with the eight countries that border the Danube, and through the Danube-the Black Sea channel it has access to Constanta Harbor – the main maritime gate of the country. [3]

The variety of the forms of relief and the geological complexity of the region makes its natural resources to be very varied. The mountain and hilly area in the North part of the region focus on the natural resources of the subsoil (petroleum, natural gases, coal, radioactive mining, salt, sulphur, accumulations of gypsum for the energy, chemical industry and construction materials.

Along the subsoil resources, a remarkable importance with direct influences in the development of certain economic sector, have the soil resources. Thus, the agricultural surface concentrated mainly in the South counties of the region has 71% of the total

surface of the region, of which 80.2% represents arable land.

The region has important and rich water resources (3.4% of the region surface), resources which by their use in various sectors, have a remarkable role in the economic development of the region.

The wildlife of a great variety provides another natural wealth of the region. The lands occupied with forests and wood vegetation have 19.3% of the region surface, representing an importance source of wood mass and an appropriate area for the hunting fauna.

The economic sectors with tradition in South Muntenia Region are: production of chemical and petroleum equipment, production of chemicals, production of Dacia vehicles, agricultural production and mountain tourism. [4]

MATERIALS AND METHODS

In this paper, the data provided by the National Institute of Statistics and Romania's Yearbook 2013 and Regional Statistics regarding South-Muntenia Region and its economic sector have been processed.

The data regarding the economic sector of the

region referred to the period 2004-2011.

The analysis was carried out both at the regional and national macro-economic level.

RESULTS AND DISCUSSIONS

The industry of the region, largely based on the traditional activities and spatially oriented according to the location of the natural resources, covering all component areas, from the extraction and processing of oil and gas to the construction materials.

The industrial activities were conducted in the region within 13,817 enterprises in 2010, their structure is presented based on the main industry sectors in table below.

Table 1. The structure of enterprises in the industrial sectors, year 2010

Type of activity	Total number of enterprises
Total of which:	13,817
Extraction industry	186
Processing industry	7,804
Electric power, heating, gas and water	126
Constructions	5,701

Processed based on: Romania's Statistical Yearbook, 2012, [5]

The Industry is the most important economic sector of the region, given that the industrial enterprises have achieved 46.62 % of total turnover in the region in 2010. In the region, there are 11 industrial, scientific and technological parks (one third of the total of parks in Romania), 5 of which are located in Prahova County.

Table 2. The evolution of the foreign direct investments in the development regions, in 2011 (Euro Million)

Reference area	2011	Share (%)
Romania	55,139	100
North -East	1,627	2.95
South -East	2,970	5.38
South Muntenia	4,059	7.36
South West Oltenia	1,806	3.27
West	3,987	7.23
North West	2,454	4.45
Center	4,215	7.64
București-Ilfov	34,021	61.72

Processed based on Direct foreign investments in Romania, INSSE, 2012, [5]

The data presented in the above table

highlighted the foreign direct investment in Romania in 2011, which were 266.62% more investments than in year 2004.

The development of the region in the recent years was due to the completion of major foreign direct investments, which led to a substantial increase in productivity, bringing both modern technology and best practices. The high level of investments in the region is due to the capital increases (from Dacia - Renault automobile industry, Petrotel- - Lukoil, Unilever), new green field investments such as those made by Saint Gobain (glass industry) to Tenaris Silcotub etc.

Services. The services sector showed a positive trend in the recent years in some areas. Currently, it covers a wide range of activities, oriented to areas such as banking, insurance, transport, real estate, post and telecommunications, tourism, education, health and social care, consultancy etc. At the regional level, in 2010, 9,287 active local units functioned, the labor being represented by 50,886 employees and the turnover was Lei thousands 4,785.

In the recent years, a positive trend represented the activities in banking and insurance sectors.

Private sector. Essential factor for the functioning of the market economy, the private sector in the regional economy has evolved relatively slowly being oriented primarily to the small units within the sectors of producing consumer goods, attractive in terms of speed of rotation of capital and access prospects on internal and foreign markets. The acceleration of the privatization process in the recent years had a significant impact on the development of the whole regional economy, favoring the creation of a healthy, competitive business sector.

The lack of an overall development strategy of SME sector, correlated with the needs for economic and social development of the region, led to the creation of SMEs generally in the urban area and less in the rural areas.

Tourism. The region has a growing local tourist potential, becoming one of the most important economic sectors, its contribution to the socio- economic revival of the region is

substantial. The main tourist attractions are represented by the resorts in the Prahova Valley, which posses a hospitality network largely able to cover the needs of accommodation and an adequate tourism infrastructure. The spa tourism in the region is provided by three spas (Slănic-Prahova, Pucioasa and Amara), the accommodation, the treatment facilities and the quality services largely satisfying the requirements of the tourists. The tourist attractiveness of the region is given by the existence of some values and cultural-historical monuments as well as natural parks located in the Bucegi and Piatra Craiului Mountains. The South of the region and especially Danube area has a tourism potential which was not used so far, but it represents an opportunity for the tourism development .

Environment. Environment issues and care for it requires taking concrete steps to protect and the need to preserve the biodiversity. The environment protection requires responsible management of pollution control measures. The environment quality, according to the assessment of the pollution level of the individual components (air, water, soil, forests, etc.) within the region differs from one area to another, being determined by their specific and particularities. The northern region due to the high degree of industrialization by polluting activities is characterized by problems in all environment components, with a negative impact on quality of life and living conditions. The poor technical condition of the treatment plants and industrial wastewater and the use of obsolete technologies determine the existence of advanced biological and microbiological pollution of the rivers collectors. The south area, due to the low level of industrialization, is less affected by pollution, but instead it supports the action of limiting environment factors, such as soil erosion, nutrient-depleted and chemical pollution, whose negative effects on agricultural productivity living standards and quality are obvious. The extensive use of chemicals for the soil and crops treatment in the context of practice over time of intensive agriculture negatively affected the groundwater quality, its pollution

level is quite high.

A particular problem was represented and it its represented now by the household and non-household waste storage, the region having a small number of proper storage facilities located mainly in the urban centers. A sensitive and ever-present aspect is the climate change, the resulting effects having implications on the lifestyle and on the development in general. Phenomena such as global warming, floods, involve the strategic planning of prevention and mitigation actions they produce. The environment and quality of life are key issues in the development of the region. Considering them, it involves directing the specific measures in order to improve the overall environment quality

The agricultural activities

The agriculture is present in all counties in the region, because there are favorable natural conditions and great potential for the development of agriculture [1]. The presentation of the elements of the agricultural structures in South-Muntenia Region, is based on statistical data for the period investigated, aiming the overall knowledge of the development of agriculture and influence factors in order to develop the strategy elements of the rural development, plus non-agricultural activities in the rural area.

Table 3.Agricultural branch production in South Muntenia region in 2011 (Lei Million current prices)

Total agricultural production	Crop production	Animal production	Agricultural services
14,604.8	10,973.5	3,516.8	114.5
Fixed base indices, 2010=100			
110.4	116.6	96.2	-

Source: Romania's Statistical Yearbook,2012, [5]

In 2011, the agricultural production achieved in South Muntenia region accounted for Lei Million 14,604.8, of which 75.13 % was carried out by crop sector and 20.07 % by animal sector.(Table 3)

In the same year, the cultivated area in this part of Romania was 1,877,798 ha, of which cereals 1,228,195 ha, representing 65.40 %.

Table 4. Crop production by main crops in 2011 (tonnes)

Crop	Production	Crop	Production
Cereals	5,188,962	Dried pulses	21,290
Wheat	5,166,432	Peas	20,538
Rye	2,293,514	Beans	732
Barley	408,810	Potatoes	344,624
Oats	39,389	Oilseed crops	983,353

Source: Romania's Statistical Yearbook, 2012, [5]

The economic efficiency of the agricultural activity is determined by the interdependent links established between land -ownership-use. The non-agricultural economic activities in the rural area have as specific obtaining crafts works: pottery, weaving, wood and metal etc. In some areas a range of crafts developed, by which building materials are produced: bricks, tiles, lime, boards, shingles, etc. In the mountain and pre-mountain areas, a number of specific occupations became over time, crafts, such as: grazing, apiculture, sericulture, hunting, fishing, and mining and crafts [1]

The enumeration of the non-agricultural activities carried out in the rural area of the region show their diversity as an expression of vocational occupations based on a long tradition of the domestic economy developed in the form of crafts, converted to complementary or alternative economic activities and specific agricultural activities of the respective areas (plains, hills, meadow, mountain).

The modernization of the agricultural production, but in particular, the financial support given for the activity diversification in the rural area contributed to the emergence of some new non-agricultural activities, such as production of construction materials specific to certain areas (shingles, tile, brick, wrought iron), by exploiting the local natural resources (wood, clay, sand, clay, reed, rush, wicker, straw, animal skins), the revitalization of some re-dimensioned domestic activities at economic level of profitability. These non-agricultural activities allow the expression in practice of the entrepreneurial spirit of the inhabitants in the rural area, the recovery and preservation of traditions (fabrics with floral, zoomorphic motifs, cookware, utensils, household goods ceramic, wood and basketry) and cultural and social values (recipes,

traditional food) of the local communities.

CONCLUSIONS

The agriculture has special natural conditions in order to become competitive and efficient, but it can not occur due to the inadequate technical equipment and the operating mode that is practiced.

A key element for the economy is the development of tourism and in order to increase the number of tourists, it is needed to improve the tourist services and the development of information centers and tourist promotion. Highlighting the Danube value, with its wild islands, the flora and fauna of the Delta lakes and ponds, full of fish, and hunting in hardwood forests, all would account for the development of sports tourism sector in an unique natural and ecologic environment.

The economic and human potential, the geographic position and the high degree of urbanization and industrialization, especially specific to the North area of the region, were factors which contributed to the attraction and appearance of the foreign investments. At the same time, the business opportunities offered by the region, determined the orientation and decision of some well known foreign companies to invest in it.

The economy of the Region can be developed by bringing together all these sectors in the current context.

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PROSPECTS OF USING THE LOCAL ORGANIC WASTE IN THE AGRICULTURE OF THE REPUBLIC OF MOLDOVA

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Abstract

Land use in agriculture of Moldova led to the acceleration of decomposition of accumulated organic matter, and therefore to the loss of carbon. High carbon losses from agricultural soils become a problem with appropriately sized, as this phenomenon affects not only agriculture, but accelerates the degradation of the environment. In the last 20 years, the amount of organic fertilizers decreased 60 times and consists 0.01 t/ha, the area of alfalfa has decreased 4-5 times, on the large areas the crop residues are burned. As a source of remediation the soil organic matter can serve local organic waste: manure of rural households, sewage sludge, wine lees, vinasse, cereal waste, fermented straw etc. Application of organic waste in agricultural practice for soil fertilization contributes to the maintenance a balanced circuit of carbon and nutrients. Each tone of organic waste applied as fertilizer supplements humus reserve with 85-100 kg/ha, with nitrogen 8-9 kg/ha, stimulates increasing production potential and improves the soil fertility. The effect of organogenic waste application is expected for a period of 4-5 years. Along with increasing the soil fertility and reducing the negative impact on the environment, applied waste can provide, depending on the production schedule and application specific, income from 1 tone of fertilizer: 89-928 MDL, with a recovery period of expenses - 1-3 years.

Key words: degradation, humus, Moldova, soil, organic waste

INTRODUCTION

The current state of arable soils fertility of the Republic of Moldova caused to the long period of their use in agriculture. Humus content reached the level of 3% on average of the whole plowing area. The mean values of soil organic matter losses were about 0.5 t/ha per year. As a result of soil use in the intensive agriculture during 140 years the original natural soil fertility remains around 50-60% [1]. At the bases of soil conservation, humus stability of agriculture soils are crop rotation, which should return a large part of the mineralized soil humus. The use of organic fertilizer, favoring the accumulation of humus in the soil ensures the preservation and improvement of soil fertility. Currently, the amount of applied organic fertilizers in agriculture decreased to 0.01 t/ha [2].

To create a good basis for restoration of soil fertility is very important source of accumulation of organic matter are local organic fertilizers. In the context of a balanced rotation, in terms of the regeneration of soil

fertility, they own the compensatory role of humus deficit.

MATERIALS AND METHODS

The research aimed to highlight the local sources of organic matter in order to use them for the remediation of the degraded soils properties.

In this study were used: mixed manure of rural population households, dehydrated sewage sludge, straw, wine lees, etc.

The research was conducted in field experiments at the experimental stations of the Institute "N. Dimo".

For chemical analysis, the traditional methods were used.

In the solid waste samples were appreciated the following indicators: moisture, ash, carbon, total forms of NPK, N-NO₃, N-NH₄.

RESULTS AND DISCUSSIONS

In conditions of the Republic of Moldova, a significant proportion of organic waste

belongs to the livestock sector, processing enterprises and agricultural industries. Livestock complexes are the most common supplier of organic fertilizers. Another important source of organic waste are crop residues (straw, leaves, green manure, etc.), waste of sugar and wine factories, urban waste.

Waste livestock sector consist of cattle, swine, sheep, goats and horses manure. Livestock manure accounts over 80 percent of total organic fertilizers currently available to Moldovan agriculture. According to the Statistical Yearbook (2013) now in Moldova about 90 percent of livestock rural households support themselves. The quantity of waste in the years 1985-1990 was about 12 million tons per year. The amount of organic fertilizers decreased from 9.7 million tons in 1990 to 7.5 million tons in 2000 [2]. During 2002-2014 the livestock, including cows, decreased by 52%, decrease rate constituted in average about 4% annually (Fig.1.).

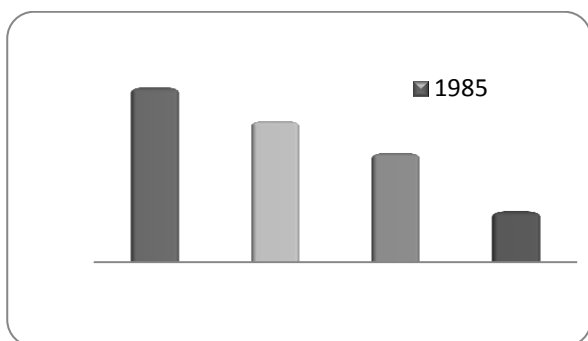


Fig. 1. Dynamic of accumulated organic waste

In the last five years at country level is produced 3.3-3.7 million tones of manure, on average 3.5 million tons (Table 1).

Table 1. Quantity of manure accumulated annually in the country

Indicators	2009	2010	2011	2012	2013	Average
All categories of households, thousand tons	3,374	3,638	3,732	3,544	3,342	3,526
Population households, thousand tons	3,104	3,347	3,433	3,196	2,982	3,213
The share of the total amount, %	92.0	92.0	92.0	90.2	89.3	91.1

In recent years, on average by 1 hectare of arable land the application of organic fertilizers amounts 0.02 tons. For establishing non-deficit balance of humus in the soil it is necessary at least to double the volume of

organic waste. Cattle manure consists 62% of the total amount of animal waste, pigs - 14%; sheep - 15%, horses - 8%, poultry - 1%. The annual total amount of organic waste contains 630 tons of humus, 27 tons of nitrogen, 14 tons of phosphorus and 34 tons of potassium [6]. This potential of organic fertilizer being introduced per 1 hectare of arable land will provide in the soil - 0.4 tons of humus, 16 kg nitrogen, 8 kg phosphorus, 20 kg potassium [1]. The quantity and quality of livestock waste accumulated at the level of districts are various and depends on the species, origin of litter and feed quality. Currently, the vast numbers of animals are in the private sector, that's why the solid manure prevails over other forms of organic fertilizers.

The *litter cattle manure* contains an average: 53% of water, 0.56% of nitrogen, 0.33% of phosphorus, 0.65% of potassium. Organic matter content is 17.3%. Nitrogen mobile form does not exceed 10% of the total, the ratio of carbon to total nitrogen is 17.9 [6]. One ton of litter cattle manure contains 5.6 kg of nitrogen, 3.3 kg phosphorus, 6.5 kg potassium (Table 2). The *semiliquid cattle manure* (without litter) comprises 82% of water, 0.39% nitrogen, 0.27% phosphorus, 0.46% potassium. Organic matter - 11.2%. In 1 ton of manure consist: 3.9 kg nitrogen, 2.7 kg phosphorus, 4.6 kg potassium [4].

Decomposed cattle manure in dose of 40-60 t/ha is very effective for row crops. It is recommended to use it for growing crops (wheat, barley) at a dose of 20-30 t/ha [1].

Table 2. Content of NPK in the organic waste

Type of waste	NPK, kg
Cattle manure (litter)	15.4
Cattle manure (semiliquid)	11.2
Pig manure (litter)	22.7
Pig manure (semiliquid)	11.0
Sheep manure (litter)	31.7
Sheep manure (semiliquid)	23.5
Poultry manure (litter)	43.9
Poultry manure (semiliquid)	32.5

Pig manure. *Litter swine manure* contains: 57% of water, 0.82% nitrogen. 0.71 phosphorous, 0.74 potassium and 24.4% ash. Organic matter content is 18.3%. The ratio of carbon to total nitrogen is 12.9. One ton of

litter pig manure contains 8.2 kg of nitrogen, 7.4 kg phosphorus, 7.4 kg potassium [7].

The *semiliquid swine manure* contains 84% of water, 0.5% nitrogen, 0.29% phosphorus and 0.24% potassium. Organic matter content - 11.7% [4]. One tone of manure contains 5.7 kg of nitrogen, 2.9 kg phosphorus, 2.4 kg potassium (Table 2).

Sheep manure. According to the content of nutrients it is close to pig manure. Litter and semiliquid sheep manure contains relatively little water (from 40% in the litter to 53% without litter) and a large amount of nitrogen (0.45% - litter and 0.92% - without litter), phosphorus (0.45 and 0.36%, respectively), and potassium (1.77 and 1.07%), [7].

Poultry manure. Litter poultry manure is the most valuable organic fertilizer on the content of therein nutrients and organic matter. It is characterized by increasing the availability of nutritive substances needed for plant nutrition. Litter poultry manure contains more potassium and phosphorus, and less nitrogen compared with semi liquid (without letter manure). It is characterized by a higher content of dry substances and organic matter, respectively, but poorer in minerals. One ton of poultry manure with litter contains 16.3 kg of nitrogen, 14.5 kg of phosphorus, and 13.0 kg of potassium (43,9 NPK). One ton of poultry manure without litter contains 22.2 kg of nitrogen, 7.4 kg phosphorus, and 9.9 kg of potassium (32.5 kg NPK). Mineral nitrogen is 35.5% of the total content [2,6,7].

This type of fertilizer can be applied at different periods, at various cultures in a dose of 7-12 t/ha. To reduce the loss of nutrients and to increase the efficiency of this fertilizer should be used in chicken houses a bed of straw and sand in a ratio of 20-30% of the litter. It may also be used for bedding the ash or superphosphate (5-6% by volume).

Crop residues, which are not alienated from the cultivated land (stubble, roots, straw, sunflower stems, corn cobs) return only half of mineralized soil humus to produce a crop and partly nutrients used by plants. The biggest part of the nutrients from the soil alienated by main products [1].

Straw, irrespective of the type of use (as forage or as bedding for animals, for the

production of compost, or directly as a fertilizer) must get into the soil and serve to restore its fertility. Countrywide, are collected annually 1.1 million tons of straw. From this quantity, about 400 thousand ton have not some vital destination, stronger than the restoration of soil fertility. About 25% of this mass is maintained as stock of fodder, which after 1-2 years is losing its quality. Old straw can be used as livestock bedding, for production of compost, or directly as a soil fertilization. One ton of straw can synthesize 200 kg of humus, the amount secured by 2-3 tons of manure [7].

Direct use of old straw as fertilizers involves primarily shredding and distributing it on the field in dose of 3-4 t/ha. With straw spreader entered 30-40 kg/ha of nitrogen in order to optimize the ratio between carbon and nitrogen. Under the current circumstances created in agriculture using straw as organic fertilizer is appropriate, accessible and provides a process that does not require large cash expenditures to increase soil fertility and crop yields. According to the organic matter content 1 ton of straw is equivalent to 3.5-4.0 tons of manure. Through a household management of plant residues can make up to 52 percent of annual loss of humus [4].

Sediments of urban wastewater. The chemical composition of urban sediments varies and depending on the structure of the economic sector, technology of producing and purifying of wastewater. Due to the high content of organic matter and variety of nutrients the waste is considered an organic fertilizer and is used in many countries for crop production. But due to the high content of heavy metals its application is limited and requires special preparation. Every year at all stations for wastewater treatment accumulates about 350-400 thousand tons of sludge with humidity 35-55%. About 20 years ago, the annual amount of sewage sludge (sediments) was about 700 thousand tons with a moisture content of 65-75% [8].

Urban wastewater sludge contain the same amount of organic matter (15-18%) as the litter manure and 2 times more the total nitrogen (0.85%), 3.0-4.5 times phosphorus (1.2%), 2-3 times less potassium.

Municipal sediments, compared to other organogenic wastes contain high available phosphorus and mineral nitrogen. Applying the sediments in relatively small doses (15 t/ha) would provide plants 30-60 kg of mobile phosphorus in the first year of application.

The widespread use of urban sediments in agriculture may be limited in their high content of the composition of some heavy metals and the presence of pathogenic agents. The maximum permissible concentration in the urban sediments (Pb, Cr, Ni) does not exceed the allowable limits, and therefore, it does not preclude their use as organic fertilizer. Municipal sediments in comparison with other organic waste richer in micronutrients (Zn - 700 mg, Mn - 410 mg, Cu - 319 mg, B - 140 mg, Co - 16 mg, Mo - 11 mg/kg of dry mass) required for plant nutrition, especially on eroded and weakly productivity soils [2, 4].

Sediments obtained at stations for wastewater treatment weakly expressed in pathogenic agents, with a strong as their infestation (dangerous), this limiting factor can be easily overcome by composting with other organogenic material. Using sediments of municipal wastewater as organic fertilizers contributes to obtaining high yields and at the same time, improve the environmental situation in the cities of the country.

Sewage sludge are rich in organic matter and elements that necessary for plant nutrition, especially phosphorus. In most cases they can be applied to perennial and annual crops without special training. Application rates are determined by the content of phosphorus, which quantitatively dominates and balancing the ratio between nitrogen and phosphorus is achieved by the use of nitrogen fertilizers.

In the case than heavy metals exceed the tolerance limits is recommended to compost these sediments with manure, sludge from ponds or soils with rich content of humus. The ratio between the components should ensure reduction in the concentration of heavy metals in compost to acceptable values.

Taking into account the restrictive factors that must be followed when using sewage sludge, in each case requires their complex testing before they can be used to fertilize the soil.

Waste of sugar factories. Every year in the country accumulates over 250-300 thousand tons of sugar factories waste. Chemical composition of these waste largely depends on the technology used in processing of sugar beets. Obtained by special technology, waste at the local factories is poor in organic matter and nutrients, but contains a lot of calcium. This waste is most suitable for calcium amelioration of saline soils.

Waste, resulting in a mixed technology, characterized by a more favorable agrochemical parameters. It contains 3,66-4,70% of organic matter, 0,56-0,90% of nitrogen, 0,42-0,90% of phosphorus, 0,12-0,38% of potassium. Mobile forms of phosphorus constitute 20-43 mg/100 g, exchangeable potassium - 40-70 mg/100 g [5]. Using the waste from sugar factories for soil fertilization leads to the enrichment of the arable layer of the most important nutritive elements, a full mobilization of potential fertility, increase crop yield. The sugar waste is used on the gray and podzolic soils, leached chernozem, under cereals crops (corn, winter wheat). It is advisable to use these waste in neighboring with sugar factories farms.

This waste is an extremely good material to make compost by mixing with sewage sludge, manure and other organogenic waste with high humidity. Direct use of sugar waste as fertilizer or after composting, effectively as agronomic and economic point of view, giving the opportunity to resolve environmental problems in its storage.

Sludge accumulated in the ponds. The country has more than 3500 watersheds, including 1200 severely silted or destroyed. In ponds deposited a large quantities of silt brought from the neighboring slopes. Lake silts are mainly represented by the fertile layer of soil exposed to erosion. Compared with eroded soils, they have a higher fertility and are interest as a material for restoring the fertility of eroded soil by earth-covering. Lacustrine silts in most cases have a thickness of 2.5-3.5 m, contain 2.5-5.5% of humus, much richer in mobile forms of phosphorus than soils prone to erosion, exceeding in this regard full-profile soil [1]. A significant part of silt are rich in potassium available to plants

The main limiting factor that should be taken into account when using lacustrine silts in earth-covering the eroded soils, is high salt content, which is most often found in sediments in the south of country. Comprehensive testing of lake silt involves identification of factors that may limit their use in earth-covering of eroded soils, such as physic-chemical properties, sanitary, content of pesticides.

The most effective way to use ponds silts is composting with organogenic waste rich in organic matter. Composts of lake silts with manure contribute to a radical restoration of fertility of heavily eroded soils.

Data on the current state of humus of arable soils showed that the annual loss of mineralization organic matter exceed 1500 thousand tones. Crop residues remaining in the soil, make up only 800 thousand tons of humus, accounting deficit of 700 thousand tons of humus per year [2].

Involving the local sources of organic matter in agricultural purposes, available in stock, would cover the deficit of humus and maintain the soil fertility, which, as already mentioned unsatisfactory. Available resources are currently used in very small quantities. Hence, improving soil fertility, even in the case of full utilization of these resources is impossible without optimum crop rotation in order to increase the amount of organic matter accumulated in the soil.

Humus loss from erosion cannot be compensated by organic fertilizers. This problem can be solved by the application of measures to combat this phenomenon.

Liquid waste. Cattle effluents contain significant quantities of nutrients in a readily available form for plants, in particular potassium and nitrogen.

Liquid wastewater from pig complexes contain 0.3-6.1 g/l of organic substances. One cubic meter of wastewater contains an average 0.79 kg of nitrogen, 0.1 kg of phosphorus and 0.80 kg of potassium [5].

The amount of organic matter in the wastewater facilities for breeding and fattening of cattle is 0.7-9.8 g/l. In 1 m³ its contain 3.9 kg of organic matter, 0.78 kg nitrogen, 0.23 kg of phosphorus, 1.18 kg of potassium [7].

Wastewater of poultry farms are characterized by a high content of organic matter and mineral substances and nutritive elements. In 1 m³ contained an average 5 kg of organic matter, 0.9 kg of nitrogen, 0.1 kg of phosphorus and 1.4 kg of total potassium. It should be noted that poultry waste are rich in micronutrients, mg/kg: B-20, Mn-200, Co-1, Cu-16, Zn-96, Mo-2 mg/kg of dry matter.

Waste water from the manufacture of alcohol from molasses contains high amounts of mineral and organic substances. In 1 m³ contained 4.0-7.3 kg of organic matter, 0.5-1.3 kg of total nitrogen, 0.3-0.9 kg of ammonia nitrogen, 0.023-0.043 kg of total phosphorus, 0.3-0.9 kg of sodium and 2.5-3.4 kg of total potassium [5].

Waste water from the manufacture of sugar have a lower concentration of organic matter and mineral substances. In 1 m³ of wastewater contain 0.5 kg of organic matter, 0.2-0.3 kg of nitrogen, 0.01 kg of phosphorus, 0.5-0.7 kg of potassium [4].

Irrigation quality of wastewater does not meet the requirements for their use of soil irrigation, so they can be used to a limited extent to crops fertilization.

Using the wastewater as crops fertilizer requires a comprehensive study of the chemical composition in the prevention of contamination of soils and agricultural products with harmful substances.

Currently at the wineries and sections for obtaining alcohol from grain accumulates as waste material about 40-80 thousand tons of wine lees, 50 thousand cubic meters of vinasse and 50-60 thousand cubic meters of cereal grains molasses. The total waste of the wine industry is impressive and ever growing. Mineral residue constitutes 2.0-2.7 g/dm³ that characterizes them as liquids with high mineralization index. Cereal vinasse is characterized by higher salinity potential. But the greatest danger of saline and alkaline contamination of soils can cause the abusive incorporation and uncontrolled discharge of wine lees [2, 5].

Simultaneously, these wastes contain the primary elements necessary for plant nutrition and soil fertility, which are required recovered strongly. In 100 cubic meters of wine yeast

contains about 190 kg of total nitrogen, as much phosphorus and approximately 550 kg of total potassium. Less concentrated in nutrients, but not negligible, are dreys and vinasse. In 1000 cubic meters of vinasse contained up to 120 kg nitrogen, 190 kg phosphorus, 100 kg of potassium. It is appreciated more in line with the needs of plant the primary elements of dreys concentration, where in 1000 cubic meters containing up to 230 kg nitrogen, 110 kg phosphorus and approximately 80 kg of potassium. These wastes no one way is not used, there is no liquidation regulations.

Wine industry waste (vinasse and wine yeast) have a minor negative impact on the physical properties of leached chernozem. Their application leads to soil compaction which attenuates to doubling the dose of amendment. Not found a further increase in bulk density from repeated application of waste. Negative trends were in both the structural-aggregate composition and hydrostability. But they are not dangerous and values fall within the class of "good" quality of soil structure in accordance with the percentage of aggregates diameter from 0.25 to 10 mm.

Application the dose of 47 m³/ha of cereal waste improved structural indices of 0-20 cm layer of leached chernozem. Dose of 94 m³/ha had a negative impact on these indices, increasing small content of hydrostabile aggregates. In order to improve agrophysical indices of cambic chernozem recommended dose is 47 m³/ha [7].

Rational use of organic fertilizers. Each farm (or peasant association), regardless to land surface or number of lots must be constantly concerned about the problem of conservation of humus in the soil, using all local organic waste. Each producer has to keep in mind that annual losses of humus in the field rotations, currently used, reaches 1-1.2 t/ha, excluding erosion loss, with consist an average of 0.6-0.7 tons/ha. Crop residues cover only half of the humus deficit in soils. In orchards and vineyards the humus loss account 2.5-3 t/ha. For full compensation of humus loss in crop rotations, it is necessary to use an average 10 t/ha of organic fertilizer. This is only possible in farms that having at least one cow per 1

hectare [3]. Organic fertilizers are applied under the row and perennial crops during plowing. The rest of the succeeding crops use of organic fertilizers aftereffect. It is essential that in each commune, on the basis of contracts, foresaw to economic conditions for farms - provide with fodder, and peasant farms - with manure.

CONCLUSIONS

To stabilize the humus content in arable soils and soils under permanent crops, it is necessary to applied annually 20-22 million tons of organic fertilizers. Existing sources of organic matter can provide 12 million tons of organic fertilizers.

The deficit of organic fertilizers, equal to 10 million tons, could be neutralized by changing the structure of sown areas, categories of land use, crop rotation optimization, full use of all sources of local organic wastes.

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EDUCATION AND HEALTH: IMPORTANT FACTORS IN THE DEVELOPMENT OF RURAL COMMUNITIES

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Abstract

Rural development and diversification of rural economy depend on the level of education, knowledge and qualification. Though improving and maintaining the proper level of basic infrastructure is an important element in the social and economic development of the rural area, it is professional training that represents the “engine” of good development. Education and training are essential for rural communities, but there are obvious discrepancies from the point of view of school infrastructure. Though we can say that the number of schools in the rural area is above the necessary one, education quality is low because, on one hand, of the poor educational infrastructure and, on the other hand, because of the level of training of the teachers. Most of the schools need to be renovated, to be refurbished, to be reequipped and to be supplied with teaching materials. Infrastructures and facilities proper to professional training and to primary education are important tools for the conversion of agricultural labour force into non-agricultural labour force.

Key words: education, health, rural area, urban area

INTRODUCTION

The low level of education reflects in the quality of labour force in the rural area and it is a restrictive factor for economic development. Diversification of economic activities is not supported by workers with training specific to the different types of trades, since the educational system was not adapted to the specific requirements in the rural area.

MATERIALS AND METHODS

The research methodology consists in a bibliographical study based on scientific documenting following the steps below: information, data collection, source study, and source grouping.

RESULTS AND DISCUSSIONS

The situation in the rural education during the last 2-3 decades has generated real concerns. Rural education has always been disfavoured compared to education in the urban area. Gaps between the urban and the rural from the

point of view of education deepened rapidly after 1990. The dynamics of education in the rural area cannot be linked to a certain political regime. Development of the rural education knew the strongest dynamics in a capitalist regime and continued in the first decades of the communist regime. The decline of the rural education started in the last decades of the communist regime and continued in a trendy communist regime.

Romanian villages are very diverse from an economic, cultural, and educational point of view. One cannot make clear statements valid for all rural communities. Local educational gaps can be measured and areas lacking or enjoying educational facilities can be mapped in detail.

The **level of school attendance** can be measured by the number of years graduated by somebody. From this point of view, **the level of school attendance in the rural area is limited to secondary school in most children.** High-school attendance rate is higher in localities with high-schools.

Access of young people from the rural area to higher education is a long-lasting phenomenon. In the second half of the 19th

and in the first half of the 20th the access of the young people from the rural area to higher education increased rapidly.

At the end of the '70s and in the '80s, the access of young people from the rural area to higher education decrease dramatically. During the last years of the communist regime, the share of students from the rural area decreased below 25%. This was signalled by sociological research of the time. It was also acknowledged at political level, but no corrective measures were taken.

After 1990, the decrease of the access of young people from the rural area to higher education speeded up, reaching less than 5% in certain universities and even 1% in some others. This was signalled several times by specialists in the field of education. The Governmental programme meant to support through state scholarships young people from the rural area had a lesser impact than expected. This happened not because of lack of funds, of political will or of lack of expertise in managing programmes, but because the possible beneficiaries of such programs are absent from universities. Many universities have used only a small number of scholarships because there were no young people from the rural area attending the courses of those universities. The governmental programme for young people from rural area is a very important tool in ensuring equality of chances in higher education. [2]

In the rural area, there is an **increase of the rate of school abandonment**. In many cases, secondary school attendance is initiated but is not completed, the children interrupting their studies after the first elementary classes and rarely resuming their studies after longer periods of interruption. [1]

Moreover, many changes that have taken place in education, new legislative regulations in the field of education and restructuring of the national education system has led to the reorganization of the schools network in Romania. Therefore, in the period 2008-2011 as a result of measures taken in the national education reform, educational unit number decreased by 1017 (respectively 12.4%). The new configuration of educational network was

correlated with the size of the school population and the conditions offered by the existing material basis in order to provide a quality educational process.

School population decreased (especially in rural areas), reaching school/ academic year 2011/2012 to be 11.6% lower than the school / academic year 2008/2009. [6]

It is worth mentioning that this restructuring process has further negative effects among the rural population, since by destroying the village primary schools, increased school dropout because students don't have means of transportation to the center of the village.

The **increase of relative and absolute illiteracy rate** also has high levels. Even if they attend school for a few years many children cannot read or write. At the same time, there is **increase of the rate of absolute illiteracy**. The same phenomenon is present in some working areas as a result of industrial decline. [3]

The **increase of illiteracy in isolated rural areas is more pregnant**. Illiteracy has never been completely eradicated in isolated rural localities. However, this tends to go back to the levels characteristic of rural education development initiation. In some localities, schools have disappeared because there are no longer children to attend them. The number of school children is so low that the functioning of the schools is no longer profitable. On the other hand, moving schoolchildren to larger localities where there are schools is difficult because of the lack of transportation means or because of the impossibility of reaching them during the periods of time with bad weather.

During the last two decades, there have been **discrepancies between the levels of access to modern educational tools and to information technology and communication**. The school laboratories in the rural area are rather rare; teaching materials are old or they simply lack. Information technologies and communication have penetrated the rural area less than the urban area. The access to these technologies and the ability of using them are essential elements for the educational process and for the training of the labour force. Public investments in information technologies and

communication were concentrated mainly in high-schools from urban areas. The budgets of local communities are not enough to achieve such investments. Where there are certain facilities, they have been made with huge efforts from the teachers and the parents.

The number of rural families having a computer is insignificant compared to the situation of the families in the urban area. The gaps in this field tend to deepen more and more.

The gaps between school attendance quality in the rural area and school attendance quality in the urban areas are deepening. The rural area is divided from the point of view of the quality of the educational programmes. There are localities that ensure a relatively good quality of school attendance (sometimes above the national average or above the level of some urban schools). This is the case of the schools that can rely on trained, competent teachers that love their profession and who can compensate the lack of finance and material equipment with their efforts. In many villages, schools have no trained teaching staff. The educational process is achieved at low standards and the level of education of the schoolchildren is low. This is why the rate of schoolchildren abandoning school after graduating from secondary school is high.

The decline of rural education is caused mainly by the following causes:

- demographic decline; poverty;
- return to traditional agriculture;
- decrease of learning motivation;
- degradation of school infrastructure;
- lack of trained teaching staff;
- lack of policies concerning the rural area.

The decline of rural education at present has negative, serious consequences that can result, in time, in the following:

- reducing the chances for local development;
 - high levels of latent unemployment;
 - uncontrolled migrations and appearance of miserable suburban cultures;
- accumulating potential of social deviance and criminality. [4]

The rural area benefits from health assistance much below the levels in the urban area. In most communes, there are

only primary health services. For specialty services, inhabitants of the rural area need to appeal, as a rule, to medical assistance units in town and municipia. The quality of the medical act in the rural area is relatively low, mainly because of the poor equipment (buildings and apparatuses) which is generally old or even lacking.

Distribution network health units by residence reveals that health network has grown mainly in urban areas where they found: 91.8% of the total number of hospitals, 93.7% of that of medical clinics, 86.6% of the total independent general healthcare centers, 58.3% of independent practices family medicine, 75.6% of the pharmacies, 91.2% of diagnostic and treatment centers, 98.4% of specialized medical centers, 86, 0% of independent dental practices, medical healthcare facilities, 97.4 % of the independent medical experts , 95.8 % of medical laboratories , 95.4 % of dental labs and all institutes and institutions without beds, tuberculosis sanatoriums, clinics, blood transfusion centers, mental health centers, medical students and student dental offices.

Simultaneously, the 2 TB sanatoriums and 8 of the 9 hydro sanatoriums works also in urban areas.

Table 1. Distribution of the main categories of health workers by residence and by ownership of the healthcare organization in 2012.

Medical staff	Total	Public	Private
Physicians	53,681	40,956	12,725
- urban area	48,192	37,470	10,722
- rural area	5,489	3,486	2,003
Of which: family physicians	13,767	8,339	5,428
- urban area	9,216	5,456	3,760
- rural area	4,551	2,883	1,668
Stomatologists	13,814	3,157	10,657
- urban area	12,017	2,568	9,449
- rural area	1,797	589	1,208
Pharmacists	15,435	831	14,604
- urban area	13,146	805	12,341
- rural area	2,289	26	2,263
ancillary medical staff	125,141	95,484	29,657
- urban area	112,063	87,059	25,004
- rural area	13,078	8,425	4,653
Of which: nurses	112,368	85,851	26,517
- urban area	100,506	78,356	22,150
- rural area	11,862	7,495	4,367
auxiliary medical staff	59,440	55,717	3,723
- urban area	52,304	49,287	3,017
- rural area	7,136	6430	706

Source: Activity health units, 2013

In rural areas works 59.4 % of medical-social units and 66.3 % of the work points of pharmacies and drugstores, as well as the 2 sanatoriums.

In 2012, the degree of medical insurance by a qualified medical staff is generally low, the number of physicians is relatively small compared to the number of inhabitants (1,417 inhabitants to one physician in rural area, compared to 397 inhabitants to one physician, in urban area). [6]

Medical units in urban areas have 89.8% of all physicians, 87.0% of all dentists, 85.2% of pharmacists, 89.5% of medical staff and 88.0% of auxiliary health workers. 25.6% out of all the physicians, are general practitioners, 66.9% of them activate in urban areas and 33.1% in rural areas.

If in 322 communes (12% of the total number of communes) the presence of doctors is satisfactory compared to the number of inhabitants (1 doctor per 600 inhabitants, particularly in areas in the neighbourhood of towns), in **148 communes (6%) there is no doctor**, and in 378 communes (14%) there is 1 doctor for over 3,500 inhabitants. Areas lacking proper health services are mainly in eastern Romania: in the Region North-East (counties of Botoşani and Vaslui and, partially, the eastern part of the Bacău County) and in the Region South-East (the mountain area of the counties of Vrancea and Buzău, central Dobrogea and particularly the Danube Delta).

As a result of the low quality of medical assistance, the average duration of the life of an inhabitant of the rural area is 2 years shorter than that of an inhabitant of the urban area. At the same time, in the rural area infant mortality rate reaches very high levels; in almost the entire rural area of the region North-East, in Dobrogea from the region South-East, in the plain area in Southern Romania, in the regions South and South-West, infant mortality is above 27%, i.e. 35% more than that of the urban area. [5]

CONCLUSIONS

While urban Romania has evolved rapidly these last years towards the level of life and

civilisation of the European Union, **the Romanian village is still some kind of medieval village of modern Europe.** Compared to the rural localities in Austria, Germany or even Hungary, Romanian villages seem to be part of the Middle Ages.

The lack of health services, the degradation of the rural education, the lack of infrastructure (mainly facilities), **the ageing of the population** caused by the massive exodus towards urban areas or even foreign countries make up a dark image of the Romanian village 3 years after it acceded the European Union.

Because of the large share of the rural population – **almost 1 in 2 Romanians live in poverty** – Romania has a low GDP per capita. Even for the urban area, the GDP range Romania among other Central-European and Eastern-European countries.

The population categories most exposed to poverty in Romania are the children, the lonely old people, the agriculturists, the unemployed people, and the retired agriculturists. **The poverty risk is higher in the population from the rural area** and in the population in the regions North-East, South-East and South-West.

The Romanian village could supply lots of reasons for **investments** due to its resources. One of them could be the low price compared to the urban area which could favour the initiation of production activities.

Another target of investments in the rural area could be **agritourism**, since Romania has numerous genuine natural attractions.

The gap between regions and between rural and urban areas from the point of view of its infrastructure and of its medical and pharmaceutical facilities is huge and it results in inequalities in the access to health services. Thus, 88.8% of the hospitals, 91.7% of the medical practices, 92.3% of the diagnosis and treatment centres, 98.1% of the specialised medical practices, and 79.5% of the total pharmacies are in the urban area. Medical units in the urban area concentrate 88.6% of the total doctors, 87.3% of the dentists, 88.5% of the pharmacists, and 89.8% of the nurses. [7]

But there is a quantitative and qualitative

gap between the rural and the urban: secondary school graduates attend higher education more than those from the rural area, who make an option for a professional training.

School abandonment is low in both areas, but on the whole of the educational system it becomes more and more important, ranking among the highest in the European Union. Higher education attendance rates show a continuation of the inequality determined by social origin.

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RESEARCH ON THE INFLUENCE OF REGIONAL POLICY DEVELOPMENT OF RURAL COMMUNITIES

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Abstract

Regional development is a new concept whose opportunities are enhancing and diversifying economic activities, enhancing investments in the private sector, contributing to unemployment reduction, and last but not least improving the standard of living. To assure the development policies in economy, agriculture, forestry, tourism, regional planning, infrastructure, and education etc., it is needed to take into account the specific conditions of the rural regions, Romanian villages and to observe the principles of subsidiarity and solidarity. In this context, the paper aimed to point out the opportunities for the development of rural communities through regional development.

Key words: regional development, regional policies, local resources

INTRODUCTION

The development of rural communities is conditioned by two important activities: **local development**, that aims at developing a locality and its neighbourhoods and **territorial development** that covers the major investments in infrastructure at regional level. Regional development can be seen as the process through which a community becomes more responsible of the issues and of the potential it has, thus managing to better organise and plan its resources. [1]
Regional development represents the process through which they try to change the conditions and factors acting at community level so that, as a result of these changes, the community reaches higher levels of standards of living.

MATERIALS AND METHODS

This research was performed using methods, procedures and techniques of the traditional and modern. In the category of traditional scientific approach are based on the first analysis and synthesis with which they have been using other methods or processes: observation and description.

RESULTS AND DISCUSSIONS

Some European regions and towns have been faced with serious crises of local economies while others have discovered new advantages of the market. In this situation, it was necessary to restructure and adjust local productive systems, linking them to new technical and economic conditions.

Among other opportunities of regional development are: development of enterprises, the market of labour force, attraction of investments, transfer of technology, development of small and medium enterprises, improving the infrastructure, the quality of the environment, rural development, health, instruction, education, culture.

Rural development has a distinct place within regional policies and it concerns the following aspects: eradicating / diminishing poverty in rural areas, balancing economic opportunities and social conditions between the urban and rural environments, stimulating local initiatives, and preserving spiritual and cultural heritage.

Rural development began to exist in Romania in 1998 when the first law concerning it was issued. In order to prepare decentralisation of the decisions at central level in Romania they established, through voluntary association,

eight regions of development (NUTS 2), specific territorial entities with no administrative status.

The region represents within the policy of regional development of the European Union, the fundamental element in academic and practical approaches of founding strategies and policies of economic and social development at territorial level. [6]

The structure of Romania’s territory per regions is shown in Table 1. [3]

Table 1. Romania’s distribution by region

Geographical area	Counties	Area (km ²)	Population (thousands of inhabitants)	Density (inhabitants/km ²)
1. North-East	Bacău, Vaslui, Neamț, Iași, Suceava, Botoșani	36,850	3,302	89.6
2. South-East	Constanța, Tulcea, Brăila, Buzău, Vrancea, Galați	35,762	2,545	71.2
3. South	Teleorman, Giurgiu, Călărași, Ialomița, Dâmbovița, Prahova, Argeș	34,453	3,136	91.0
4. South-West	Olt, Dolj, Gorj, Mehedinți, Vâlcea	29,212	2,075	71.1
5. West	Caraș-Severin, Hunedoara, Timiș, Arad	32,034	1,828	57.1
6. North-West	Cluj, Sălaj, Bihor, Bistrița-Năsăud, Maramureș, Satu Mare	34,159	2,600	76.1
7. Centre	Brașov, Covasna, Sibiu, Alba, Harghita, Mureș	34,100	2,360	69.2
8. Bucharest	București, Ilfov	1,821	2,272	1,247.8

Source: Own processing after Romanian Statistical Yearbook 2013

Romania’s administrative regions are represented by the counties, administrative structures similar to NUTS 3. They were established through the Law no. 2/1968 concerning the administrative organisation of Romania. At present, Romania has 41 counties plus the Municipium of Bucharest. At county level, the entire central public administration has its own decentralised services. This explains why the documents of programming and financing from the State budget that belong to central public administration are represented by counties (NUTS 3) and communes (NUTS 5). [2]

Rural area covers the totality of communes in Romania. In Article 5 of the Law no. 2/1968, the commune is defined as “the administrative territorial unit covering the rural population united by common interest and traditions. A

commune is formed by one or more villages depending on economic, social, cultural, geographical, and demographic conditions. Organising a commune ensures economic, administrative, cultural, and social development of rural localities”.

A new definition of the rural area was stipulated by the Common Order no. 173/160/93 from March 2004, of the Ministry of Agriculture, Forests, and Rural Development, the Ministry of Administration and Interior, and the Ministry of European Integration. The normative act, observing the principles of the European Charta of Rural Area defining the notion of rural area through its territorial component, relating the geographical area to the structure of the land fund and to dominating characteristics concerning the population and nature of the activities carried out in those geographical areas, different from those of the urban population.

In 2014, European Union had 503 million inhabitants, ranking third in the world's population after China and India. On the one hand, Europe's population increases naturally (births exceeds the number of deaths) and on the other hand, due to net migration (the number of people who are established in the EU is higher than the number of those who leave). Romania ranks seventh in the EU -28 in terms of population size.

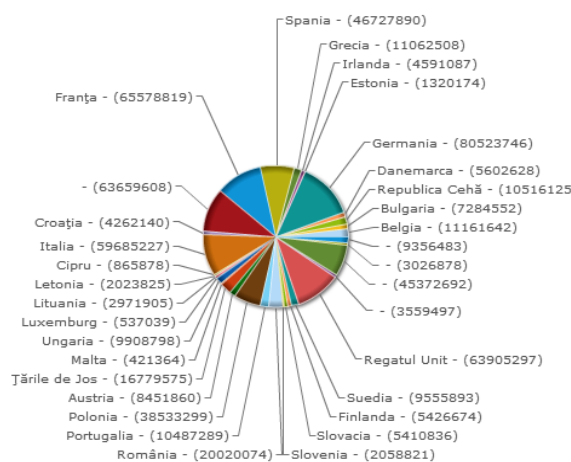


Fig.1. The population of the countries EU-28, 2014

The European Union has an area of over 4 million km².

In size, France is the largest country of the

Union, and the smallest Malta, Romania being on the 9th place in the area.

In order to assess realistically the level of regional development of Romania it would be useful to compare the situation of Romania with the situation of other European Union member nations that are our model of economic and social development.

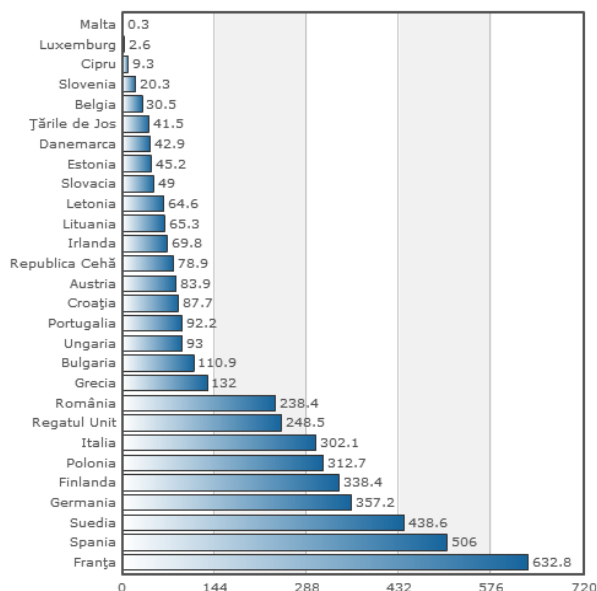


Fig. 2. EU-28 states surface, thousands km², 2014

The main indicators concerning the regional development of our country compared to those of the other member-nations of the European Union are shown in Table 2.

Table 2. Main indicators concerning the regional development of Romania compared to those of the other member-nations of the European Union

Specification	Unit of measure	Ro	EU
Total population	Thousands inhabitants	20.02	505.66
Total area	Km ² /	238.40	4.49
Population density	inhabitants/km ²	83.9	112.5
Population structure per age groups	%	100	100
• 0-14 years	%	15.8	15.6
• 65 years and over	%	16.1	17.8
GDP/inhabitant (ppc)	Euro/inhabitants	12,800	25,600
Structure of occupied population	%	100	100
-agriculture	%	29.0	4.6
-industry, constructions	%	28.6	24.9
-services	%	42.4	68.6
Unemployment rate	%	7.0	10.4
Natural increase	‰	-3.6	6.8

*Only the population from localities whose density is below 100 inhabitants/km²

Source: Own processing according to Eurostat and Romanian Statistical Yearbook 2013 [3,4]

In general, to point out the discrepancies, the differences are quantified through the use of macroeconomic indicators such as total GDP or GDP per capita, calculated at regional level.

The most common indicator is the GDP per capita, used mainly due to its double meaning: (1) measure of the volume of results in economic activity; (2) incomes from economic activity in a certain region.

Regional policy aims at supporting poorer geographical areas in order to reduce the differences between the communities of the same country – or of the same area, in the case of the European Union – from the point of view of the population welfare. If we want regional policy – as part of the public authority policy – to reach its goals, we need those institutions to manage one’s own resources and resources allotted by the other central and local authorities with a view to local development and to territory management. [5]

The European Union regions with a low GDP per capita are less developed and have in common the following features:

- geographical distance and infrastructure improper for present requirements;
- old or not profitable industrial structures;
- an old agricultural sector;
- social mutations, urban or rural

depopulation, with negative consequences on both society and economy, and on the environment. [7]

Domestic regional policies should be seen within a frame in which specific objectives are developed in agreement with the one’s own needs and potential.

Components of rural development

Projects of rural development should contain a few mandatory components concerning the **institutional development**, the **economic development**, the development of localities and territorial management and administration.

Institutional development concerns the capacity of an institution of using efficiently human, material and financial resources in order to reach the goals.

The level at which they project institutional development depends on the given situation;

in exhaustive regional policy, at country level, this development refers to the following:

- economic agents, as deconcentrated structures or as suppliers of public services in different management types;
 - a central public authority;
 - local public authorities;
 - project management units that can be either one of the above mentioned positions or a combination between two or more of them.
- Institutional development works aim at several types of projects whose goals are:
- resource management;
 - long- or medium-term development strategies;
 - planning implementation actions of the projects adapted.

Economic development through macro policy will be more productive through the territorial (regional) component because:

- the success of economic and structural reforms depends on local and regional entrepreneurship;
- macro policies are implemented also through the dynamism of the local communities (with strategies adapted to these communities) since social cohesion is better exercised at local level.

Local development includes economic, social, cultural, and political aspects whose achievement is due to endogenous development (from bottom up).

Territory management and administration has two main aspects: Territory management can be **strategic**, which aims at developing and managing the territory medium- or long-term, and **operational**, which solves short-term issues.

Projects aiming at territorial development should be:

- complex (a diversified system of aspects);
- multi dimensional (economic, social, environment protection);
- sustainable (for the future generations).

The goals of territorial management are:

- a balanced economic and social development, with respect for specificity;
- quality of human life and community;
- a responsible management of natural resources and of environmental protection;
- rational land use.

Managing territory covers regional policy (land planning), i.e.:

- land ordering;
- valorising rationally natural resources;
- achieving economic growth;
- increasing life quality.

Land planning covers:

- area analysis (scientific aspect);
- land planning (normative aspect) is a technical and administrative process meant to reach some previously defined goals. .[8]

CONCLUSIONS

The policy of regional development aims at improving, long-term, regional economic conditions.

The main goal of this policy is reducing territorial differences and achieving a balance or ensuring a certain inter-regional equity.

Rural development is a complex process of harmonious development of all areas of a country or of a unique European area, capable of ensuring the territorial differences and of achieving a relative balance between the levels of economic and social development of different areas, taking into account the sustainable management of natural resources and the protection of the environment.

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POTENTIAL FOR WASTEWATER MANAGEMENT USING ENERGY CROPS

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Abstract

In most countries within Europe there are numerous small rural Waste Water Treatment Works (WWTWs) often serving a small number of people equivalents (PEs). It is usually impractical and expensive to upgrade such WWTWs and yet they are often delivering potentially highly polluting effluent into streams and rivers. Short Rotation Coppice (SRC) willow, grown as an energy source, may be an ideal crop for the bioremediation of a variety of effluents and wastewater streams. As part of an EU funded (INTERREG IVA) project called ANSWER (Agricultural Need for Sustainable Willow Effluent Recycling) four Proof of Concept irrigation schemes were established ranging in size from 5 to 15 ha. One of the larger of these at Bridgend, Co. Donegal, Republic of Ireland was planted in spring 2013 and has been irrigated with municipal effluent since June 2014. Over 19,000 m³ of effluent has been applied to the willow thus preventing 617 kg N and 28.5 kg P from being discharged to a neighbouring stream. Using SRC willow for the bioremediation of effluent from small rural WWTWs offers a sustainable, cost-effective and practical solution to wastewater management in many countries. There may be also potential to use willow for the bioremediation of landfill leachates, within the footprint of the landfill site.

Key words: bioremediation, municipal effluent, *Salix* spp., willow

INTRODUCTION

With the implementation of the Waste Water Frameworks Directive [3] increasing pressure is placed on water utilities and the agri-food sector to put in place sustainable approaches to wastewater management and the prevention of damage of environmental water quality due to both point and diffuse sources of pollution. In most European countries there are numerous small inefficient water treatment works often serving only a few 10s of people equivalents (PEs). In the Republic of Ireland there are over 500 such plants (Fig 1) with 206 treating water from fewer than 100 PEs [14]. In Northern Ireland there are 776 small (<250 PEs) Waste Water Treatment Works which represents 70% of the total wastewater treated in N. Ireland (NIWater, personal communication). These WWTWs are often old and usually situated in rural settings. The cost of upgrading them is prohibitive. Water

utilities are therefore seeking approaches and technologies whereby they can manage the wastewater in a sustainable way while improving waste water discharges and reducing potential risks of pollution.

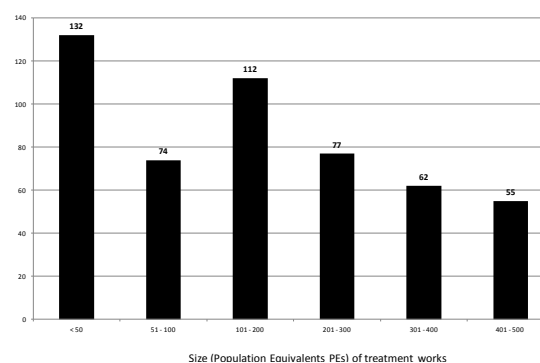


Fig 1. Number of small WWTWs treating effluent from less than 500 PEs in Republic of Ireland in 2012 [14].

Phytoremediation (bioremediation) is the use of plants to 'treat' wastewaters [12]. The plants utilise the nutrients and prevent their

leaching into groundwater or their run-off into streams and ditches etc. Renewable energy crops and in particular Short Rotation Coppice (SRC) willow (*Salix* spp.) and poplar (*Populus* spp.) are particularly well suited for bioremediation of effluents and other wastewater streams [13]. SRC willow is fast growing, takes up large volumes of water and can utilise the nutrients, in particular nitrogen (N) and phosphorus (P). Willow can also, in some situations, be very effective in the bioremediation of heavy metals, in particular cadmium (Cd) and zinc (Zn).

The bioremediation process is illustrated in Figure 2. When effluent is applied to the surface it percolates through the soil. The

willow roots act as a biofilter. The water is taken up by the plants, driven by evapotranspiration, and the soluble nutrients are utilised. There are also numerous soil mechanisms particularly in the rhizosphere by which nutrients including N and P are either absorbed or metabolised. In any effluent irrigation system such as this the concern is that nutrients will leach through the soil and contaminate the groundwater. However, in numerous studies carried out in Northern Ireland [15], Sweden [8, 9], Canada (Michel Labrecque, personal communication) and elsewhere there has been virtually no evidence of nutrient leaching.

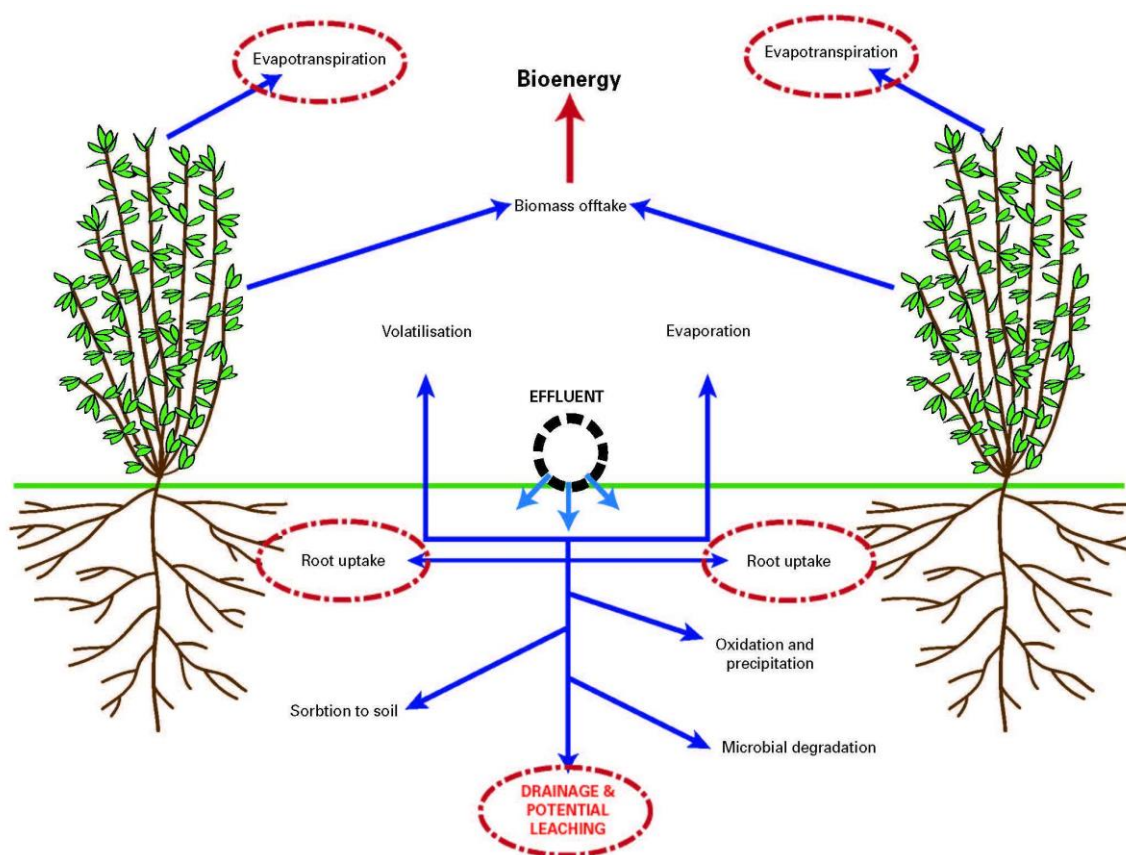


Fig. 2. Principles of SRC willow bio-filtration system.

SRC willow is grown as a source of biomass for the production of renewable energy. With significant UK government incentives, particularly in the form of the “Renewable Heat Incentive” (RHI) high quality wood chip for heat production has been profitable. The current (early 2015) slump in oil prices to unusually low levels means that heat

production from alternative sources, including wood chips are significantly less competitive. However, it can be anticipated that oil prices will start to rise again, possibly later in 2015 or into 2016 [6]. Despite these pressures on renewable (wood) energy costs there are still many benefits from growing SRC willow. There are significant

carbon (C) savings and reductions in damaging greenhouse gas emissions to be made helping mitigate against climate change. Furthermore if the benefits of using a plant based system for the phytoremediation / bioremediation and management of potentially very damaging wastewaters is added, the technology clearly has application in many countries and regions of the European Union.

The work described in this paper comes primarily from a European project called "Agricultural Need for Sustainable Willow Effluent Recycling" (ANSWER). The ANSWER project was part funded by the European Union's European Regional Development Fund (ERDF) through the INTERREG IVA Cross-border Programme, managed by the Special EU Programmes Body (SEUPB). The primary objectives of the project were to study the use of SRC willow for the bioremediation of municipal effluents and landfill leachates and to establish commercial scale proof of concept schemes to treat effluent from small non-compliant WWTWs [10]. The project was led by the Agri-Food & Biosciences Institute, which is an agricultural research organisation. Other partners included colleges of further education, local government county councils and water utilities. Details of the partners and their contributions to the project can be found at

<http://www.afbini.gov.uk/index/research/hp-work-area-environment-land/answer/answer-events.htm>

MATERIALS AND METHODS

As part of the ANSWER project four commercial scale effluent irrigation schemes were established:

- Bridgend, Co. Donegal, Ireland (55° 2' N: 7° 22' W)

There were approximately 14 ha of land in three fields adjacent to a small WWTWs processing effluent from approximately 500 PEs. The land was flat and with the exception of one of the fields (approximately 2 ha) was reasonable, adequately drained agricultural soil. Before installing the irrigation system it

had been grassland and so SRC willow had first to be established.

- Clontibret, Co. Monaghan, Ireland (54° 12' N: 6° 50' W)

There were approximately 6 ha in two fields within 300 m of a small WWTWs processing effluent from approximately 200 people. One of the fields had a slope. Before installing the irrigation system it had been grassland and so SRC willow had first to be established.

- Knockatallon, Co. Monaghan, Ireland (54° 18' N: 7° 8' W).

There were approximately 5 ha in two fields besides a small WWTs processing effluent from approximately 100 people. One of the fields had a severe slope while the other area was relatively flat. The soil conditions were poor and drainage in some areas significantly impeded. Before installing the irrigation system it had been grassland and so SRC willow had first to be established.

- Dromore, Co. Tyrone, Northern Ireland (54° 30' N: 7° 27' W).

There were approximately 15 ha in three large blocks which were just over 1 km from a rural WWTWs. This works is handling effluent from over 2,500 PEs but a proportion of the effluent (approximately 15 - 20%) will be drawn off to be applied to the SRC willows. The effluent will be applied to already established (6+ years) willow.

It is envisaged that the utility will utilise this SRC treatment module to investigate the efficacy of pumping effluent to the SRC Willow during different scenarios as follows:

1. During the WWTW peak loading times (three times in 24 hours), to reduce the flow through the treatment works.
2. When the flow in the river is lower - to reduce the impact of discharge on river water quality.
3. When there are elevated nutrient levels in the discharge - to reduce the impact of discharge on river water quality.
4. Ultimately, at a future date, to investigate the effect that the extraction of primary effluent (reducing the flow through the works) has on the overall running of the WWTW, the discharge quality and overall energy usage and carbon emissions.

The development of each of the schemes

incurred its own particular issues and complications while undergoing planning, establishment, commissioning and maintenance of the willows and irrigation system. More details about each scheme are to be found in the ANSWER project report [11]. For the purposes of this paper the focus will be on one of the schemes: Bridgend, Co. Donegal which will be described in more detail.

In late December 2011 land belonging to Donegal Creameries was identified in close proximity to the Bridgend Treatment Works. In spring 2013 approximately 14 ha was planted with willow using the current industry best practice [7] in order to give a final plant density of around 15,000 plants ha⁻¹. When the plants were established the irrigation pipe-work was laid during winter and spring 2013/14 in every fourth double row with emitter orifices every 10 m (Photo 1).



Photo 1. Irrigation pipe, with outlet point, laid in an actively growing SRC willow planta

The irrigation system consisted of a storage facility, pump, valves, filter, flow meters, rising main, header pipes and irrigation pipe work. The 90 mm rising main stretched the entire length of the plantation, approximately 1.4 km into which 25 independently controlled solenoid valves were incorporated (Fig.3). Each valve, controlled by the central computer system, enabled individual zones to be independently irrigated according to a pre-programmed irrigation protocol.

The WWTWs was upgraded and in compliance with the Environmental Protection Agency requirements a holding tank was installed (Photo 2).

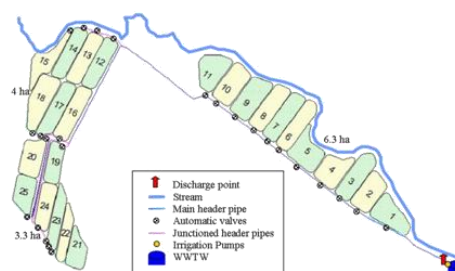


Fig. 3. Irrigation zones at Bridgend willow site.

At the time of construction remote recording equipment was installed to make it possible to monitor the activities (pumps, flows, tank levels, environmental indicators) at the site in real time.



Photo. 2. Holding tank at Bridgend WWTWs, Co. Donegal, Republic of Ireland

This is a very new technology and there were genuine concerns from both local communities and the regulatory authorities. Throughout the whole planning process the Local Authority Environment Section investigated the proposal thoroughly in order to ensure compliance with environmental regulation and good practice. Local community groups were consulted and their questions and concerns addressed. These questions were predominantly associated with gaining an understanding of what the schemes were about, the potential benefits, the proximity to houses and watercourses and potential for odours. The irrigation system was constructed with these risk abatement factors taken into account and incorporated irrigation area restrictions and methodologies. Potential risks (the consideration of sensitivity

of location with regard to site suitability, groundwater vulnerability, and proximity to populations and protected areas including water supply sources) associated with the irrigation of treated waste waters to a SRC willow plantation were considered. There are several relevant pieces of European legislation which were taken into consideration. These include:

- S.I 31/2014 - European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014
- SI 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (as amended)
- SI 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010 (as amended)
- Article 8(1) of the Planning and Development Regulations, 2001 (S.I. No. 600 of 2001)

There are other significant areas of legislation such as the Ground Water Regulations, the Urban Wastewater Treatment Regulations, Environmental Impact - uncultivated semi-natural areas regulations, Shellfish and Bathing Waters Directives which may all be relevant but relate more directly to specific situations.

The national (Irish) Environment Protection Agency (EPA) was fully engaged at all stages of the process and so before committing to regulation on the surface irrigation of municipal effluent to SRC willow the EPA made a careful assessment of the possible environmental risks associated with the practice. Particularly important in these deliberations was access to robust independent science investigating the technology, especially research that had been carried out in Ireland where the maritime climate and relatively heavy rainfall could have been an important factor. Confidence on behalf of the regulators in Ireland (EPA) and Northern Ireland (NI Environment Agency) was largely based on many years of research conducted by the Agri-Food & Biosciences Institute (formerly the science service of the Department of Agriculture and Rural Development for NI).

RESULTS AND DISCUSSIONS

Bridgend, Co. Donegal, Ireland: The average daily effluent inflow to the WWTWs was approximately 80 – 90 m³. Before the commencement of the ANSWER project the design capacity of the treatment works was for 250 PEs. The inflow was subject to aeration followed by settlement and discharge to a small adjacent stream, which at times, especially during dry periods and limited stream flow rate, had a negative impact on water quality. As part of the overall upgrading of the WWTWs incorporating irrigation of effluent to willows, the EPA required the construction of a 400 m³ holding tank. This was put in place to store effluent during periods when irrigation to the willows was not possible. Currently the inflow is still subjected to aeration and settlement at which point it enters a sump from which it is pumped to the holding tank. The effluent being applied to the willows is drawn from this tank. In circumstances where the effluent cannot be irrigated to the willow plantation e.g. climatic conditions such as frozen land, snow, heavy rain or as a result of equipment failure, the holding tank will fill to 95% at which point the sump uplift pump will stop and the effluent will discharge to the stream as it had prior to the construction of the SRC willow treatment scheme.

Each of the zones is irrigated for a specified time which is preset depending on its distance from the irrigation pump (flow rate), soil conditions and the hydrology of the site. As the distance from the pump at the treatment works to the furthest irrigation zones increases, so the pressure and flow rate will drop. Hence the distant zones will require longer irrigation periods in order to apply equal volumes of effluent. As the system is currently set, approximately 5 m³ zone⁻¹ day⁻¹ of effluent is applied which enables a maximum total daily application volume of around 130 m³. This equates to 0.9 mm applied to the whole plantation daily and will be reduced accordingly, to match the inflow to the works. At present there are three irrigation cycles per day applying approximately 43 m³ each. In accordance with

the Nitrates Directive, it is recognised that the application of effluent to the SRC willow plantation will be performed in a uniform manner and is not permitted when the soil is waterlogged, likely to flood, has been frozen for 12 hours or longer, is snow-covered or when heavy rain is forecast within 48 hours. The effluent being applied at each of the four ‘proof of concept’ sites described above is similar, although the material currently being used at Knockatallon is essentially a primary effluent (Table 1).

Table 1. Effluent discharge quality from WWTWs

	Bridgend (mg/l)	Clontibbret (mg/l)	Knockatallon (mg/l)	Dromore (mg/l)
NH ₃ -N	10.6	32.3	27.2	1.1
Total-N	31.6	32.3	27.2	11.3
Total-P	1.5	4.7	3.6	1.6
SS	50	33	78	17
BOD	22.4	43.0	85.0	10.0
COD	93.0	130.0	180.0	n/a
pH	7.3	n/a	n/a	7.5

The management of the irrigation protocol is vitally important to assure that the hydraulic capability of the site is not exceeded, in which case flooding and / or surface run-off could occur. Equally important is to manage the nutrient loading and as such this technology is clearly a crop fertilisation approach and in no way any kind of waste disposal activity. Of particular importance in this respect are N and P. Nutrient guidance for SRC willow is given within the Willow Best Practice Guidelines [7]. At the level of irrigation at each of the sites the nutrient applications are all within the recommended guidelines (Table 2). The application rates represent yearly nutrient loadings within recommended crop requirements. By keeping the nutrient loading well within crop requirements the risk of N leaching to the groundwater or significant P build up in the soil are minimal.

The Bridgend irrigation system was commissioned in May 2014 and after a short commissioning period the irrigation rates were adjusted to manage the inflow of the WWTWs. (Fig. 4). By the end of December 2014 the total volume of effluent irrigated to the site was 19,537 m³. This represents

around 38% of the inflow to the treatment works.

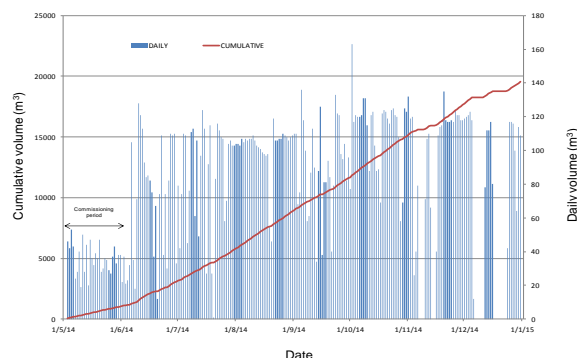


Fig 4. Daily and cumulative irrigation volumes (m³) at the Bridgend WWTWs, Jun–Dec. 2014

There were some problems during the commissioning phase and on the 8th October it was found that one set point in the controls was causing a regular overflow to the river. It is anticipated that these figures will improve very significantly in subsequent seasons. Nevertheless, the total nutrients recycled to the willow were 617 kg N and 28.5 kg P. This means that during the period this quantity of N and P were not being discharged into the stream with the associated benefits of reducing environmental water pollution. Also the amounts being applied to the willow was well within the crop requirements, outlined above, and so will be removed from the site when the willows are harvested [7].

The efficacy of the system is being carefully and regularly monitored. Water samples are extracted from a number of deep boreholes around the site every two months and analysed for BOD, suspended solids, nitrate-N, phosphorus and total coliforms, to ensure no contamination of the groundwater has occurred. The soil is analysed periodically to detect any change in soil nutrient status, in particular any build up of P or the accumulation of heavy metals. The stream water will be monitored regularly and an improvement in water quality over time is anticipated.

Potential applications: There is an urgent need to find cost-effective and sustainable approaches to wastewater management.

This is important to ensure compliance with the EU Water Framework Directive as well as

to limit the use of fossil fuels and help reduce Green House Gas (GHG) emissions.

Table 2. Estimated nutrient and hydraulic loading at four willow sites irrigated throughout the year

Loading	Bridgend		Clontibbret		Knockatallon		Dromore	
	Total	ha ⁻¹	Total	ha ⁻¹	Total	ha ⁻¹	Total	ha ⁻¹
Est. Population Equivalents (PEs)	500		200		105		520	
Area willow irrigated (ha)	14		7		5		15	
Hydraulic loading (m ³ ha ⁻¹)	31,025	2,216	12,410	1,773	6,515	1,303	32,266	2,151
Suspended solids (kg ha ⁻¹ yr ⁻¹)	1,551	111	410	59	508	102	549	37
Nitrogen (kg ha ⁻¹ yr ⁻¹)	980	70	401	57	177	35	365	24
Phosphorus (kg ha ⁻¹ yr ⁻¹)	46	3	58	8	23	5	50	3

In most developed countries water utilities are the single greatest energy user, mainly electricity. Irrigation of municipal effluent to SRC willow is an ideal technology to achieve these objectives. SRC willow is well suited for small rural Waste Water Treatment Works which have a high probability of being close to land suitable for growing willows. In Ireland and the UK, environmental regulation is likely to make willow irrigation more onerous and expensive for WWTWs over 500 PEs, however, there may be certain circumstances whereby the use of SRC willow can reduce the volumes to be treated by conventional means, enabling certain WWTWs to attain discharge compliance. This is a solution for small scale problems and the area of willow needed may be relatively small. NIWater (the water utility in Northern Ireland with responsibility for water management) established a 1 ha proof-of-concept willow plantation in 2013 treating effluent from a treatment works for approximately 25 PEs. The system has been running for over 18 months and during that time NO effluent has been discharged to the neighbouring stream, there has been no evidence of surface run-off into the stream and there has been no impact on the groundwater.

As the technology is still in its infancy in most parts of Europe the irrigation schemes tend to be over specified as it is difficult to anticipate unusual rainfall events which may lead to a potential risk of run-off or adverse impact on neighbouring buildings etc. While the hydrology of any given site, in Ireland, will probably determine the volumes of effluent applied it should be noted that irrigation rates

are also calculated on crop need i.e. this is not regarded as a disposal mechanism, it is a crop fertilisation approach. This is particularly important in respect to N and P. In Northern Ireland, based on the UK Fertiliser Recommendations Manual [4] the application of 180 kg N ha⁻¹ yr⁻¹, calculated from potential off takes, is currently agreeable. If the N is applied in conjunction with phosphorus (unbalanced crop requirement ratio e.g. biosolids or effluent), this may result in an accumulation of P in the soil which needs to be monitored. While this will probably not be a limiting factor for the municipal effluents being used at the four schemes described in this paper, it may be if wastewaters from industrial processes (e.g. agri-food, meat, milk processing facilities etc.) are being used. Solid organic fertiliser can be applied to P index 2 soils however this should cease when soils reach P index 3. The rate of P application will depend on the source of organic waste and the regulatory instrument it falls under. A level of 24 kg ha⁻¹ yr⁻¹ is a current workable estimate.

In order to illustrate the potential economic benefit of adopting this type of technology we present the following worked example. Note that the example does take into consideration any boiler, combustion or supply chain inefficiencies:

On the island of Ireland, there are over 1,000 small (<500PE) rural WWTWs. If it were assumed that just 10% are suitable for SRC willow for wastewater management and that the average plantation size is 6 hectares then there could be a total area of SRC willow in excess of 600 ha. Based on typical yields (10 odt ha⁻¹ yr⁻¹) and an energy content of 5,300

kWh t⁻¹ then there is the potential to generate a total heat output of approximately 32 GWh yr⁻¹. With the current estimated heating oil price at €57 l⁻¹ (10.5 kWh⁻¹) this amount of energy has a value of €1.8m. In Ireland it is possible to grow, harvest, dry, store and transport SRC fuel for around €100 odt⁻¹. The current cost of wood fuel for small / medium scale biomass boilers is in the region of €181 odt⁻¹, i.e. approx €145 t⁻¹ delivered at 20% moisture content. Hence, the annual production of 6,000 odt of SRC willow biomass could release €490,000 into the local economy.

In Ireland, especially in rural areas the predominant fuel counterfactual is oil, all of which is imported. Hence if the oil is displaced by wood fuel, the end user would also make savings compared to their existing oil fuel bill. For example a school heated by a 99 kW boiler running for 2,500 hr yr⁻¹, if oil is replaced with willow woodchip there could be a reduction in their annual fuel bill of almost €5,000. Hence, if 50 schools were heated with wood fuel, then there could be an additional benefit to the economy of €250,000 per annum. Furthermore, such projects could be installed and accredited under the Renewable Heat Incentive (RHI) as currently exists in N. Ireland [5]. An RHI scheme is proposed to be introduced in the Republic of Ireland by the beginning 2016. If the rate were similar to N. Ireland (6.3 pence (€0.08) per kWh of heat used) then based on the figures presented above, the school would receive an annual rebate of €19,800) meaning that for the 50 schools this would add up to almost €1m of additional wealth creation to the all Ireland rural economy.

If SRC willows were deployed on just 10% of these scenarios, it should be possible to significantly improve water quality with the additional benefits of enabling the development of a value chain and the boosting of the economy by about around €1.7m per year.

The cost of establishing a SRC willow irrigation scheme is significantly less than building a new or upgrading old inefficient treatment works. Often landowners are seeking alternative land use and potential

opportunities for agricultural diversification. In some situations the water utility may pay the land owner a gate fee or stewardship fee which is an extra income stream. A major benefit of these solutions for point source pollution is the symbiotic development and support of a value chain for the production of carbon neutral bioenergy in the form of biomass from SRC willow. Wood is regarded as a carbon neutral fuel, as any CO₂ released during combustion was assimilated when the plants were growing.

The ANSWER project has enabled the establishment of four commercial scale irrigation systems treating effluent from actual WWTWs in order to enable them to meet EU and national standards for water quality. While the schemes are at an early stage of their development and will require careful management and monitoring over the next number of years it is still considered to be a sustainable and cost effective approach to wastewater management.

Landfill leachate: One of the most difficult wastewater sources to handle is landfill leachate. Landfill leachate disposal is a problem that is set to become a major issue for many European countries. Cost effective and environmentally sustainable solutions are required to address this growing issue. Council Directive 1999/31/EC [1] has set the goal of reducing biodegradable landfill waste by 35% of the waste produced in 1995 (80% of all waste was sent to landfill in 1995) by 2020.

However directives on recycling targets and packaging waste Directive 2008/98/EC and Directive 94/62 [2] were reviewed in July 2014 and further proposals were planned to phase out landfilling for recyclable wastes all together by 2025 (Plastics, paper, metals, glass and bio-waste). These measures are having an effect on landfill composition and the reduction of materials entering landfill. Existing landfills need to insure the transfer of spent materials back to the environment in a sustainable way.

High levels of ammonia (NH₃) are a major challenge for conventional WWTWs, however SRC willow has the potential to contribute a solution to sustainable and

affordable management of a wide range of wastewater streams.

If carefully managed, the high ammonia levels can be accommodated allowing willows to cope with significant levels of leachate. At present in Ireland the EPA is not prepared to approve leachate application to normal agricultural soils or unlined sites. Hence current landfill leachate schemes using SRC willow are confined within the footprint of the existing landfill site. When the site is closed it is covered with a geo-textile membrane, primarily to capture methane (CH₄) gas and to prevent ingress of rainfall which would exacerbate the volumes of leachate production. If the cap is then further covered with soil it can be planted with willow.

There are several other factors which may need to be taken into consideration which may preclude planting willows. These include the presence of a network of gas collection pipework or inadequate depth of soil. Nevertheless, when plants have established a good root structure leachate being produced at the base can be applied on the top. The willows utilise the nutrients and effect bioremediation. If there is a heavy rain event excess water will be captured and reapplied when weather conditions are more conducive. Donegal County Council, Republic of Ireland is developing an integration of willow bioremediation on the top of an older landfill site (very effective during the summer growing season) along with constructed wetland (particularly effective during the winter months), however this scheme is only at its initial stages. More information can be found at the ANSWER website:

(<http://www.afbini.gov.uk/index/research/hp-work-area-environment-land/answer/answer-events.htm>).

CONCLUSIONS

SRC willow bioremediation is a cost effective, sustainable and practical method for the management of effluents originating from small rural Waste Water Treatment Works serving less than 500 People Equivalents. There is virtually no risk to ground water quality and by diverting the effluent away

from rivers and streams there is an opportunity to significantly improve environmental water quality. The additional value of the biomass produced from irrigation schemes could make a major contribution to the local economy. Furthermore the displacement of oil-generated energy would be highly beneficial in reducing the carbon impacts of burning fossil fuels. There is also the potential for willows to be used in the management of landfill leachate, although at present this will have to be investigated within the foot-print of the landfill site.

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COORDINATES OF MECHANICAL PARK AT DOLJ COUNTY LEVEL

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Abstract

Dolj County is an administrative territorial unit representative for the South-West, at least in terms of agricultural production, given its potential (agricultural land and arable land - 585,363 and 488, 715 ha). In this context, it is interesting to realize an overview of what it means agricultural equipment of Dolj with major mechanical components of the park (tractors, tractor plows, seeders and combine aerial) over the period 2011-2013. Unfortunately the work could not also capture the qualitative aspects of the mechanical park side, given that many of the machines are outdated. In this situation there is a need to modernize the mechanical park, operation down menus difficult to de-capitalization conditions of the greater part of farmers. Attracting European funds constitutes a viable alternative for only a part of manufacturers, unfortunately, those with favorable financial conditions. This paper seeks to anchor Dolj County, in terms of endowment with mechanical, in regional and national context.

Keywords: combine, field load per machine, plow, seeder, tractor

INTRODUCTION

The substantiation of the economic optimization solutions obtained in agriculture must take account of objective existing situations, paying a special attention to the technological structure.

Technological structure of agriculture is expressed by farmers' access to the intensification factors referring to: the means of mechanization (tractors, machinery, equipment, facilities and equipment for mechanization of various work processes), biological means also chemical means.

The means of mechanization have a direct and indirect labor productivity growth through working on the optimal time and quality (compared with simple manual means) and represent a production factor of economic growth.

Quantifying the endowment level of a territory or an enterprise is achieved by analyzing the following indicators:

a. structure of the tractors and agricultural machinery. Direct factors influencing the level and structure of the tractors and agricultural machines are: crop structure and the area occupied by each crop; each crop technology (optimal period of works, the

possible mechanization of agricultural operations etc.); production and distance to be transported; types of existing manufacturing equipment; mechanization cost per hectare with different types of aggregates.

b. degree of equipping with agriculture machinery needed for the works at the right time has the following values: tractors 58%; combine harvesting crops 94%, plows 49%, seeders 80%.

This poor endowment determines the failure of operations at the optimum level and consequently reducing agricultural production with values ranging from 15% and 80% depending on the work and culture.

c. the useful agricultural area per tractor. From this point of view the Romanian agriculture comes on the last position in the hierarchy of the European countries. [3]

For the farms, mechanically fixed capital has the highest share of total fixed capital, having a decisive role in the economic transfer of technologies in crop production and animal husbandry.

The general indicators, influencing factors and economic efficiency of the Tractors Park and agricultural machinery, are: total production value units for a conventional tractor and physically; average annual yield

per the tractor, plowing hectares, normal hours of actual use.

The factors affecting the economic efficiency of mechanization are: construction and operating skills for tractors, agricultural machinery, facilities and parts; framing the optimal operating limits for the mechanical means; professionalism of exploitation; price of mechanical means - tractors, agricultural machinery, installations; the price of fuel, lubricants and spare parts.

The efficiency of the tractors and agricultural machinery depends on the following factors: provision of effective technical means; rational use of technical means. [1]

Tractors and machinery for agriculture are elements of fixed capital used in seasonal agricultural production, which leads to a higher aspect for the investments recovery period and accelerating obsolescence of these fixed capital items compared to the situation recorded in other sectors.

Physical wear of tractors and agricultural machinery is determined by their use in production, their contact with the chemical and atmospheric factors, this phenomenon being accentuated in some situations, and deviations that may occur to the sequence of periodic repairs included in the technical books. Technical obsolescence occurs as a

result of the development of technical progress, as highlighted by the appearance of tractors and agricultural machinery with high throughput with lower specific consumption but with superior functional and technical characteristics. [2]

MATERIALS AND METHODS

The work was based online documentation, using information provided by Department of Statistics, Dolj County. The collected data were processed using the comparison method (in time and space) and dynamical range of the analyzed indicators: number of tractors, plows, seeders, combines, charge per equipment.

RESULTS AND DISCUSSIONS

Table 1 shows the details of Dolj County Mechanical Park, indicating the share at regional level.

The tractor Park ranged from 7,409 pieces in 2009 and 2011 to 7,491 pieces in 2010, the average in the analyzed period was 7,436 pieces as shown in Fig. 1. At regional level, the county share was 31.36% in 2011, 32.14% in 2010, 32.77% in 2009 and 32.08% for average period.

Table 1. Dolj County, Mechanical Park - regional positioning

Nr.	Specification	2009		2010		2011		Average	
		Buc.*	% from regional level**	Buc.*	% from regional level**	Buc.*	% from regional level**	Buc.**	% from regional level**
1	Physical Tractors	7,409	32.77	7,491	32.14	7,409	31.36	7,436	32.08
2	Plows	6,288	33.55	6,247	32.75	6,288	31.38	6,274	32.53
3	Mechanical seeders	4,332	38.58	4,305	37.76	4,332	37.22	4,323	37.84
4	Combine harvesters	1,777	40.65	1,770	40.86	1,777	39.97	1,775	40.50

*http://www.dolj.insse.ro/cmsdolj/rw/pages/j51_ParcTract.ro.do

** own calculations

The number of plows varied between 6,247 in 2010 and 6,288 pieces in 2009 and 2011, and the average for the whole period was 6,274 pieces (Fig.1). At the regional level, the Dolj County had variable weights (from 31.38% in 2011 to 33.55% in 2009), while for average period share was 32.53%.

The total number of mechanical seeders ranged between 4,305 pieces in 2010 to 4,332 pieces in the years 2009 and 2011, the average for the whole period being 4,323 pieces (Fig. 1).

The county has contributed to the regional park of mechanical seeders with weights

varying between 37.22 % and 38.58% respectively in the years 2011 and 2009, the average weight being 37.84%.

When referring to the combine park, it was found a regional average of 1,775 pieces, the annual average values ranging between 1,770 in the year 2010 and 1,777 in 2009 and 2011 (Fig. 1). Based on the levels of this indicator, the Dolj County registered at regional level the following weights 39.97 %, 40.50 %, 40.65 % and, respectively, 40.86% for the average period 2009 and 2010.

The evolution of the components of the mechanical park belonging to Dolj County in the period 2009-2011 is presented in Table 1. Also, this table reflects the regional positioning of the Dolj County in terms of the share of its mechanical component.

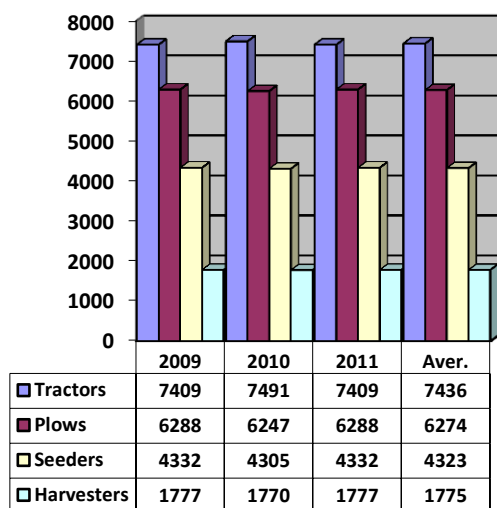


Fig.1. Dolj County - Mechanical Park means - pcs.

Aspects concerning the dynamic components of Mechanical Park are presented in Table 2.

The Park of tractors is characterized by a fluctuating dynamics, regarding all the types of components - subunitary values (98.9% in 2011 compared to 2010), equi-unitary for 2009 and 2011 (indices with fixed base) above for 2010 (+ 1.1% compared to the first term of the series dynamic) as shown in Fig. 2.

The dynamics of the total number of plows is one uneven reporting bases being exceeded only by mobile base indicators for 2011 (+ 0.7% compared with the previous term of dynamic series), equi-unitary values is specific for the same year, besides the first term of the dynamical series, otherwise there

are subunit levels indices (99.3% in 2010 and 99.8% respectively for the period average) as shown in Fig.2.

Regarding the way of evolution for the total number of mechanical seeders, we find lowering pointer with 0.6% in 2010 compared to 2009, then in 2011 the values are the same as in 2009 and higher than in 2010 (100.0 and 100.6% respectively for the indices with fixed and mobile bases). The dynamics of the indices is dominated by supra-unitary values for components, except for those with mobile base for the period average, 98.7%. The average of the period is characterized by subunit indices, decreasing by 0.2% compared to bases, as mentioned in Fig. 2.

The combine harvesters are characterized by a sinuous evolution, in terms of numbers.

The indicator decreased by 0.4% in 2010 compared to the first term of the dynamical series, and in 2011 it was a recovery (+ 0.4% over the previous term of the dynamic series), and the average was 0.1% lower than the terms of reference (2009 and 2011), Fig. 2.

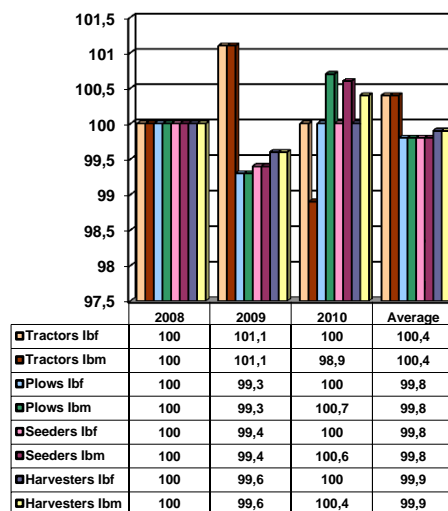


Fig.2. Dolj County Mechanical Park – dynamic indices

The load per machine (Table 3) has taken into account the components of county mechanical park and areas of arable farmland specific to Dolj County as follows: agricultural land: 585,469 ha, 585,451 ha and 585,169 ha in 2009, 2010 and 2011; arable land: 488,820 ha, 488,805 ha and 488,520 ha respectively in the years 2009, 2010 and 2011.

The load per tractor, in terms of agricultural land, ranged from 78.2 ha in 2010 to 79.0 ha in case of the years 2009 and 2011.

Table 2. Dolj County, mechanical park - dynamical indices with fixed and variable base * -

Nr.	Specification	2009		2010		2011		Average	
		I _{bf}	I _{bm}	I _{bf}	I _{bm}	I _{bf}	I _{bm}	I _{bf}	I _{bm}
1	Physical Tractors	100	100	101.1	101.1	100.0	98.9	100.4	100.4
2	Plows	100	100	99.3	99.3	100.0	100.7	99.8	99.8
3	Mechanical seeders	100	100	99.4	99.4	100.0	100.6	99.8	99.8
4	Combine harvesters	100	100	99.6	99.6	100.0	100.4	99.9	99.9

* own calculations

Table 3. Dolj County, the charge per mechanical mean *

Nr.	Specification	2009		2010		2011		Average	
		Buc.	Ha./ Pcs. **	Buc.	Ha./ Pcs. **	Buc.	Ha./ Pcs. **	Buc.	Ha./ Pcs. **
1	Physical Tractors	7,409	79.0/ 66.0	7,491	78.2/ 65.3	7,409	79.0/ 65.9	7,436	78.7/ 65.7
2	Plows	6,288	93.1	6,247	93.7	6,288	93.1	6,274	93.3
3	Mechanical seeders	4,332	135.1	4,305	136.0	4,332	135.1	4,323	135.4
4	Combine harvesters	1,777	275.1	1,770	276.2	1,777	274.9	1,775	275.3

* own calculations

** The first value shows the load of farmland, the second value shows the load of arable land per tractor

Under these conditions, the average indicator was 78.7 ha/ machine (Fig. 3).

In terms of agricultural area per the tractor, there is an average of 65.7 ha, a situation which is based on sequential levels of 65.3, 65.9 and 66.0 ha for the years 2010, 2011 and 2009 (Fig . 3).

The load per plow ranged between 93.1 ha in 2009 and 2011 to 93.7 ha - 2010.

Under these circumstances, the average indicator was 93.3 ha / machine (Fig. 4).

The load per seed drill ranged from 135.1 ha for the years 2009 and 2011 to 136 ha in 2010. Under these circumstances, the average indicator was 135.4 ha / machine (Fig. 5).

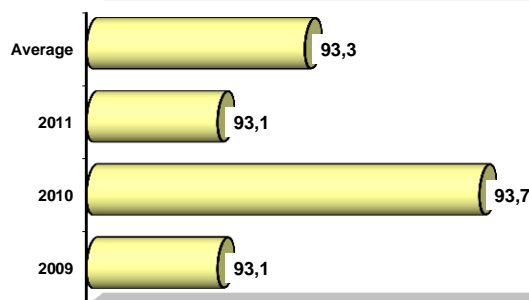


Fig.4. Dolj County, average load per plow (ha)

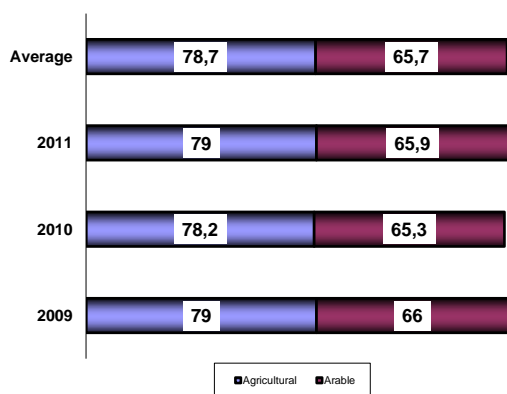


Fig.3. Dolj County, the average load per tractor (ha)

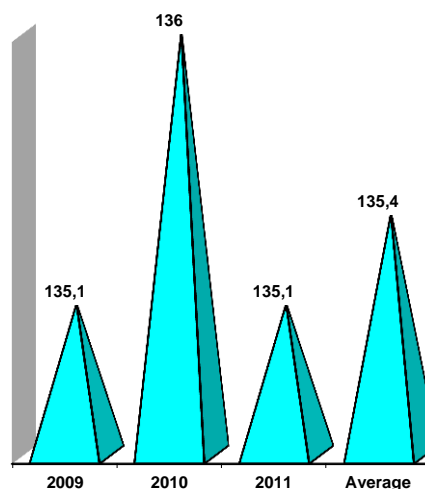


Fig.5. Dolj County, average load per seed drill (ha)

The load per combine harvester ranged from 274.9 to 276.2 ha in 2011 - 2010. Under these conditions (275.1 ha / machine in 2009), the average of the indicator was 275.3 ha / machine as shown in Fig. 6.

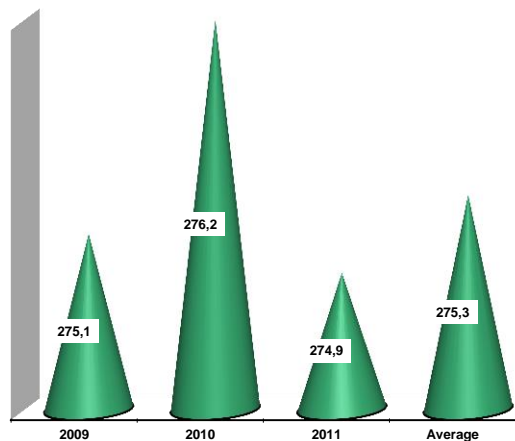


Fig.6. Dolj County, the average load per harvester combine (ha)

CONCLUSIONS

The research work based on the empirical data regarding the dynamics of the Mechanical Park of the Dolj County allowed to draw several conclusions

The mechanically park of the Dolj County represented in average - 32.08%, 32.53%, 37.84 %, and 40.50% of the total number of tractors, plows, seeders and combine existing at regional level, a benefic aspect for a representative county.

However, it is noteworthy the declining share of the county, at regional level, from a year to another (from 2009 to 2011), except the combines harvesting where in 2010 it was noticed an increased share of 0.21%. Successive annual declines were found as follows: 0.63 % and 0.78% for tractors, 0.80 and 1.37% for plows, 0.82 and 0.54% for the planters, 0.89% in 2011 for combines.

The dynamics of mechanical park is one uneven the year 2010 being characterized by decreases in machinery (except tractors - + 1.1%), while in 2011 it reached the same level as in 2009, no exception.

The farmland load per tractor reached 78.7 ha, by 1.1 ha more than at regional level (0.8 and 0.8 ha in 2010 and 2011).

The arable land per tractor was 65.7 ha, by 12.2 ha more than at the regional level (0.7 and 0.6 ha in 2010 and 2011).

The load of land per plow averaged 93.3 ha, being an identical figure with the one recorded at the regional level (0.6 and 0.6 ha for the years 2010 and 2011).

Regarding the land per seed drill, it was found an average of 135.4 ha, by 22.2 ha less compared with the regional figure (+0.9 and - 0.9 ha in 2010 and 2011).

For harvesters, the average load was 275.3 ha, which represented a decrease of 7.8 ha of the indicator compared to the regional level (+1.1 and -1.3 ha for 2011 compared to previous terms of dynamic series as well as for other cases).

From this perspective, it is worth to note the need to develop the mechanical park, especially regarding tractors, and eliminate, if possible, the obsolete machinery.

In this regard, it is worth to mention the efforts made by a number of manufacturers to access EU funds by various support measures in order to modernize the mechanical park.

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SOME ASPECTS OF MILK PRODUCTION IN ORODEL COMMUNE (2011-2013)

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Abstract

Orodel Commune, after the last administrative division in 1968, is composed of five villages: Bechet, Călugărei, Cornu, Tei and Orodel villages whose old names have been preserved over the time. Currently, Orodel commune covers an area of 83.72 km² having almost a hexagonal shape. It has the following "lands": North - Carpen Commune, South - Caraula Village, West - Verbiţa Commune and Pleniţa Commune and East - Vârtoş Commune and Vela Commune. Orodel Village is located in the high plain of Bălăciţa at the Southern limit of the Getic Plateau. In order to characterize milk production in the area, there were considered three species (cattle, sheep and goats) raised for milk production, total production and average yield per animal.

Key words: milk production, livestock, potential

INTRODUCTION

Orodel Commune, after the last administrative division in 1968, is composed of five small localities: Bechet, Călugărei, Cornu, Tei and Orodel villages whose old names have been preserved over the time, but they changed their affiliation and composition from an administrative census to another.

Currently, Orodel Commune covers an area of 83.72 km², with a nearly hexagonal shape. It has the following "lands": North - Carpen Commune, South - Caraula Village, West - Verbiţa Commune and Pleniţa Commune and East - Vârtoş Commune and Vela Commune. Orodel Village is located in the high plain of Bălăciţa at the Southern limit of the Getic Plateau. [1], [2].

Orodel village has a population of about 5,000 inhabitants. The basic occupation is agriculture (livestock and crop production).

The commune has four kindergartens (Orodel, Cornu, Călugărei, Tei) and four schools (Orodel and Cornu - schools with classes I - VIII respectively Călugărei and Tei - schools with classes I - IV).

In the village there are two medical offices served by family doctors and health workers with secondary education [3].

Concerning the climate, the village is situated in the temperate continental with Mediterranean influence area, with hot summers and cold winters. The winds characteristic in the area are Crivăţul, Austrul and Zephyr.

The communication paths are the roads, the village being crossed by DJ 561 D and a number of communal roads, some of them being modernized.

As mentioned, landforms are Belcigul Hill (14 m) and Glogovăţ Hill (12 m), Ulmuleţului, Cornului, Mare, Udubaşniţei, Vântului, Orodel, Scripeţoaia, Bivolitei valleys. Besides these relief units, there are areas or plain plateau in the Southern and Northern of the village (the Călugărei-Bechet, consisting of Padina Mica and Padina Mare).

The hydrographic network is represented by the Vâlcănuş creek and Balaurului Water, which join together and flow into the Baboia or Baboiaşul River. The village also has a hydrological planning of 11 hectares (about 150 million cubic meters of water).

For the period 2011-2013 one can observe a total area of 9,095 ha, of which 94.93% is agricultural land - 8634 ha and 5.07% is non-agricultural area - 461 ha.

MATERIALS AND METHODS

In order carry out this research work, it was needed a field documentation travelling in the territory to the Orodel Village Hall where the primary data where collected and then processed.

The data processing was based on the comparison method over time and the formation of structures related to certain indicators was also used. The data collected and analyzed covered the period 2011-2013, operating with average period.

RESULTS AND DISCUSSIONS

Table 1 shows the coordinates of milk production in the Orodel Commune, analyzing the herds in operation (Fig. 1), the total output which was obtained (Fig. 2) and the average production (Fig. 3) [8].

Milk production structure includes amounts provided by the following species of animals: cattle, sheep and goats.

For the production of cow's milk, the number of cattle used ranged from 216 heads in 2012 to 245 heads for 2013, while the average period reached 229 heads (Fig. 1).

The dynamics of the indicator highlighted uneven evolution of herds: -4.0% in 2012 compared to 2011, + 8.9 and 13.4% for 2013 to the terms of reference (2011 and 2012 respectively). Average ahead of 1.01 times the first term of dynamic series, but it was by 6.5 % lower compared to its previous term.

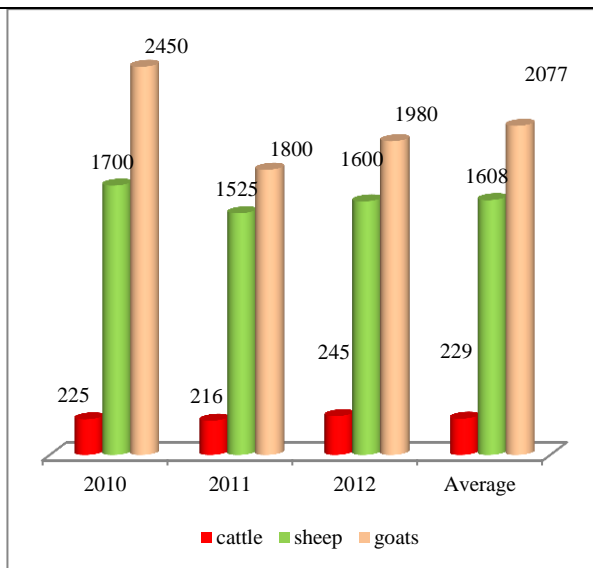


Fig. 1. The livestock (heads) used in total milk production (heads)

The sheep herds used for milk production ranged between 1,525 to 1,700 heads for the years 2012 and 2011 (Fig. 1). Under these circumstances, the average of the period was 1,608 heads (-5.4% compared to 2011 and + 0.5% compared to the specific situation of 2013-1,600 heads). An uneven trend was noticed, the annual declines of 10.3% in 2012 and increases for 2013 were of 4.9% compared to the previous year.

The stock of goats accounted for 2,077 heads with variation limits from 1,800 heads in 2012 to 2,450 heads in 2011 (Fig. 1). The indicator score registered both sub- and supra-unit value indices of components (73.5% in 2012, 80.8 and 110.0% in 2013, 84.8 and 104.9% for the period average).

Table 1. Milk production *

Nr.	Specification	Year									Average 2011-2013			
		2011			2012			2013			Livestock	Dynamic		
		Livestock	I _{bf}	I _{bm}	Livestock	I _{bf}	I _{bm}	Livestock	I _{bf}	I _{bm}		I _{bf}	I _{bm}	
1	Herds raised (heads)													
1.1.	- cattle	225	100	100	216	96.0	96.0	245	108.9	113.4	229	101.6	93.5	
1.2.	- sheep	1700	100	100	1,525	89.7	89.7	1,600	94.1	104.9	1,608	94.6	100.5	
1.3.	- goats	2450	100	100	1,800	73.5	73.5	1,980	80.8	110.0	2,077	84.8	104.9	
2	Total production (hl)													
2.1.	- Cow milk	6412,5	100	100	6,264	97.7	97.7	6,630	103.4	105.8	6,435.5	100.4	97.1	
2.2.	- Sheep milk	2125	100	100	1,753.75	82.5	82.5	1,920	90.4	109.5	1,932.92	91.0	100.7	
2.3.	- Goat milk	5292	100	100	4,104	77.6	77.6	4,873	92.1	118.7	4,756.3	89.9	97.6	
3.	Average yield (l / heads)													
3.1.	- Cow milk	2850	100	100	2,900	101.8	101.8	2,706	94.9	93.3	2,810	98.6	103.8	
3.2.	- Sheep milk	125	100	100	115	92.0	92.0	120	96.0	104.3	120	96.0	100.0	
3.3.	- Goat milk	216	100	100	228	105.6	105.6	246	113.9	107.9	229	106.0	93.1	

Orodel Town Hall, statistical reporting data

The total cow milk production ranged between 6,264 hl in 2011 and 6,630 hl in the year 2013, the average of the period being 6,435.5 hl (Fig. 2). The dynamics highlighted its fluctuation, the trend in 2012 is a decreasing one (-2.3% compared to the first term of the dynamical series) and one upward for 2013 (+3.4 and + 5.8% compared to the terms of reference). The average exceeded by 0.4% the first term of the dynamical series, but it was by 2.9% lower than the previous term (2013).

For sheep, it was recorded an average milk production of 1,932.92 hl (-9.0% compared to 2011, + 0.7% compared with the previous term of the dynamic series), which was based on the average levels sequential yearly from: 1,753.75 hl in 2012 (-17.5% compared with 2011), 1,920 hl in the year 2013 (-9.6% compared to the first term of the dynamical series and + 9.5% over the previous year of the dynamic series) 2,125 hl in 2011(Fig. 2).

The goats supplied between 4,104 and 5,292 hl milk (2012 and 2011), meaning an average of 4,756.3 hl (in terms of a level of 4,873 hl 2013) as shown in Fig. 2.

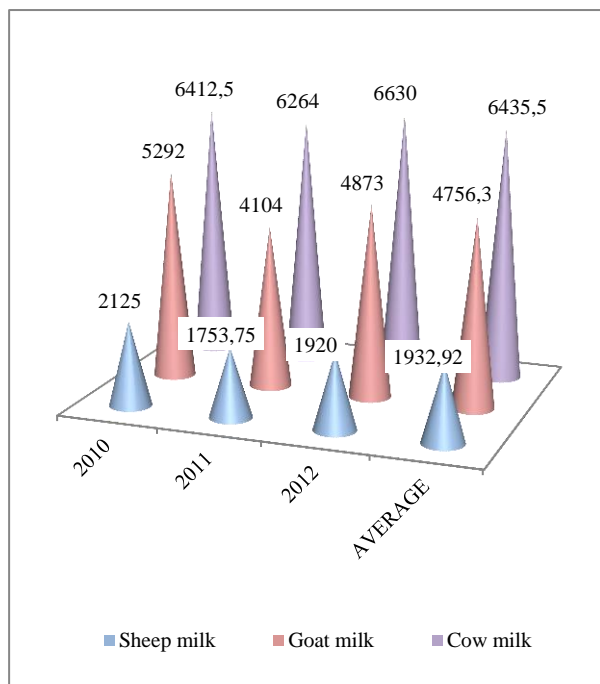


Fig. 2. Total milk production (hl)

The dynamics of the indicator highlighted the uneven development, decreased by 22.4% in 2012 compared to 2011, 7.9% compared to

the first term of the dynamical series in 2013, 10.1 %and 2.4% for the period average. The only value above the mobile base indices 118.7% appears in 2013.

Average production per cow was 2,810 l, with limits of variation from 2,706 to 2,900 l in the years 2013 and 2012 (Fig. 3).

The indicator has evolved unevenly, but at low limits (maximum exceeding benchmark was 3.8% for mobile based indices at period average, while the largest decrease was -6.7% in 2013 compared to the previous term of dynamical series).

In sheep, the average milk yield ranged from 115-125 l (2012 and 2011), the average period is 120 l (same level as in 2013) (Fig. 3).

The dynamics of indicator highlighted an uneven development, a decrease of 8.0% in 2012 (compared to 2011), followed by increases at the level of 2013 by 4.3% compared to the previous term of the dynamical series.

The goats are characterized by an average milk production of 229 l (period average) whose absolute variations were:- 13 l in 2011, -11 in 2012 and +17 l for year 2013 (Fig. 3). The indicator performed strictly ascending for the period under review (dynamics is dominated by above par levels of the components indices, except for those with mobile basis for period average, 93.1%).

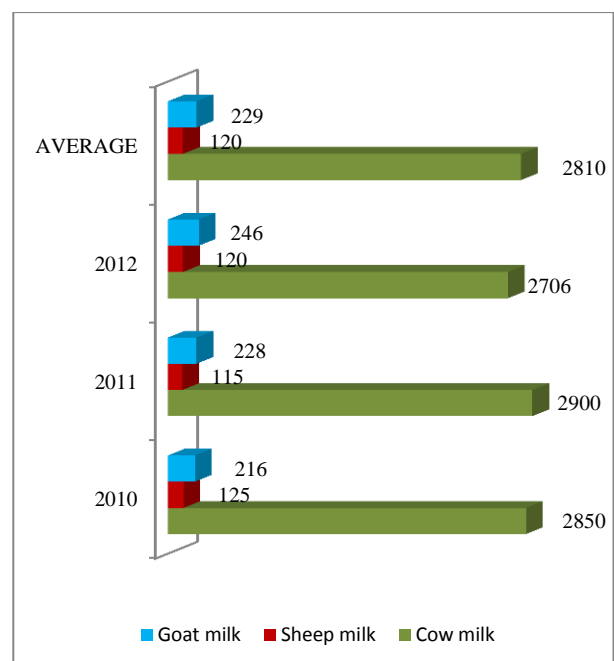


Fig. 3. Average milk production (liters / head)

CONCLUSIONS

Orodel Commune due to its surface accounting for 9,095 hectares, representing 1.23% of the total county (741,401 hectares) [4], could be considered a medium-sized locality for Dolj County, due to the existence of 114 administrative territorial units (municipalities, cities and municipalities) [5]. Regarding livestock, the locality registered variable weights compared to the county level as follows: 2.47% for goats (2,282 to 92,192 heads); 0.89% for sheep (1,890 compared to 211,418 head); 0.68% in cattle [6].

If we compare the total production related to the livestock sector, the situation of the county highlighted the following shares: 2.50% of the production of sheep and goat (6,689.22 to 267,000 hl); 1.16% of total milk production (13,124.72 to 1.131 million hl); 0.74% of the total milk production of cows (6,435.5 to 864,000 hl) [7].

The structure of the total production of milk (13,124.72 hl) was as follows (Fig. 4): 49.04% cow milk hl 6,435.5; 14.72% sheep milk 1,932.92 hl; 36.24% goat milk 4,756.3 hl.

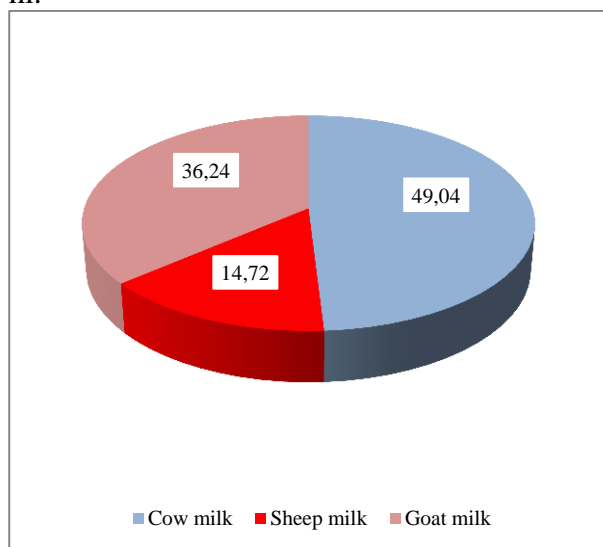


Fig. 4. The structure of milk production (%)

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OPPORTUNITIES FOR ORGANISING CLUSTERS IN THE BULGARIAN GRAPE-WINE SECTOR

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Abstract

Bulgaria's membership in the European Union defines the development of clusters as a key element of the National Strategy for increasing the competitiveness. The role of the clusters becomes especially important at this time because SME do not have the capacity to meet EU requirements and to survive without uniting themselves. Moreover the National Strategy for Vine-wine Sector in Bulgaria stipulates the transformation of the sector in a leading one and securing a decent place of Bulgarian wines on international market which may be succeed through cluster introduction in the sector. In the paper is presented an overview of the initiatives for cluster development in the Bulgarian grape-wine sector and are disclosed the structure and role of cluster participants.

Key words: clusters, wine sector

INTRODUCTION

Bulgaria's membership in the European Union defines the development of clusters as a key element of the National Strategy for increasing the competitiveness. One of the ways for sustainable development of the country and to improve the competitiveness of small and medium enterprises is the creation and maintenance of cluster formations. As their essential advantage is stressed that through their work is mobilized enormous economic potential, the managers from the public and private sector build more productive ways of cooperation which help to address the specific barriers to business and reach higher productivity, which affects the national economy. Their formation as networks of competing and cooperating companies and organizations creates conditions for realization of specialized and unique advantages of certain regional wines, which can be promoted through targeted priority support and assistance from the state. In practice, through the cluster is performed regional (geographic connected) concentration of similar or complementary interrelated companies with active channels for business relationships, communication and dialogue, which share a specialized infrastructure, labor

markets and services and are facing common opportunities for development and threats. Their creation is possible because of the existence of systematic links between companies and they are referred to primary or concomitant production, technology, natural resources, staff qualifications and distribution channels.

The issue of clusters is becoming more urgent by the fact that small companies lack the capacity to meet European requirements and can not survive if they do not unite. Cluster secures their markets and updates technology and machinery. Moreover, teamwork and partnership inevitably lead to increased product quality as negative assessments of a product affect the image of the entire cluster. Specificities of the wine sector also contribute to the implementation of the cluster approach. The full cycle in the supply chain of raw materials, production of grapes, wine, wine distribution and related travel and other related activities, includes a large number of business units of wine and other related sectors that add value at every stage, until a marketing of a high-value. The Bulgarian wine sector challenges remain on how to structure and organize in order to overcome the negative trends in production and trade in the sector. At the present stage of

development the Bulgarian wine sector is in dire need of investment to boost its competitive ability in international markets. Construction of wine clusters is a rational possibility for concentration, integration and increased investment in the sector. The essential advantages are reflected in the concentration of considerable economic resources of the private and public sectors, overcoming barriers to business, improving interconnections between suppliers and customers, increase competitiveness.

The vision for the development of the wine sector in our country (as defined in the National Strategy) [4] is transformed from one side in a leading sector of the national economy, on the other – in securing an authentic place of Bulgaria in international wine markets and mainly in the common European market.

The grounds for such future of the sector are associated with the traditions of the sector and its great potential to fit in a sector model delivering a product which meets the challenges of the 21st century. In practice this means the wine to meet the future requirements for environmental, healthy and safe product.

On the basis of strategic options for development of the sector, the cluster associated with grape-wine sector is envisaged to be built as a group of companies, suppliers of services, companies from related industries, tourism businesses and related institutions (government, business organizations, academia, financial institutions, etc.).

MATERIALS AND METHODS

Findings and conclusions in the paper are based on the results of university research project [2] and information from documents of National Statistical Institute. The overview of the current status of cluster implementation in the vine-wine sector in Bulgaria is made on the basis of information from the annual reports of National Vine-Wine Chamber[1], Regional Vine-Wine Chamber “Thrakia”, National Tourism Agency.

RESULTS AND DISCUSSIONS

The practice of building clusters in Bulgaria is still in early development. The arguments for the creation of clusters, including prioritization of regional economic policy, are associated with a number of their real and potential advantages. The creation of clusters in the national economy now is in the initial phase. The initiative belongs to business (private companies), and the state can assist them indirectly.

In the sector of Grape and Wine in recent years the emphasis is on building regional wine clusters based primarily on the development of local tourism in the involved areas. In 2006 Program PHARE, the Tourism Agency in cooperation with National Grape and Wine Chamber and other agencies launched a project to create a grape-wine cluster “The Bulgarian Roads of Wine” with 9 routes representing a functioning model for rural regions development through tourist activities related to agribusiness. Focus on wine tourism secures actively structuring of the organization and development of tourist resources within the related micro-regions, while strong administrative and marketing guidelines act as a driver for business in the wine sector. Offering packages for special range of tourists provide opportunities for economic growth of individual enterprises in the wine sector, local communities and wine regions as a whole.

In 2010 the Ministry of Economy, Energy and Tourism approved a package of documents for a procedure for the selection of projects under OP "Competitiveness of the Bulgarian Economy 2007-2013" under Priority Axis 2 "Increasing efficiency of enterprises and promoting supportive business environment" for the measure "Supporting the development of clusters in Bulgaria." [3]

Active actions of Plovdiv Regional Grape and Wine Chamber lead to the registration of three clusters - "The Road of Dionysus", "The Way of Orpheus" and "Ancient Thracian wine road" aimed at supporting economic and social development of the 31 municipalities of the South Central Region.

The first cluster - Road of Dionysus Cluster

strives to deliver a functioning model for rural and region development through tourism and touristic related business activities as a supportive element to the national objectives to create, "The Bulgarian Roads of Wine". Additional subprogram for the establishment of 1333 small wineries will support the creation of small wineries, hotels and restaurants, wellness and health spas, sports attractions and local festivals within the South-Central Region of Bulgaria. These organised touristic routes, together with the supportive subprogram "1333 Small Bulgarian Wineries" have been created to assist the economic and social development of both urban and rural areas in Bulgaria. Responding directly to local problems of unemployment, lack of sustainable business opportunities and to assist grape cultivators overcome the rising economic crisis related to the sale of wine grapes in the Bulgarian markets, The Road of Dionysus together with local governments, universities, local and foreign investors, governmental agencies and European Associations will actively promote these programs to introduce developed business models and will provide the project cycle management needed for all stages of cluster growth.

In regards to the Bulgarian Roads of Wine, the primary outputs provided by The Road of Dionysus Cluster are full project cycle management and empowering activities directed to the continual growth and expansion within all areas of activity. Initiating program outputs are as follows:

- Micro-region analysis for touristic resource development;
- Branding and marketing campaigns; individualised and global;
- Business empowerment through supportive subprograms and product promotions;
- Human resource development through training and education programs;
- Applied standards related to product quality, customer service, employee packaging and health and safety;
- Wine route unification through global administration.

The Route "Dionysus" cluster starts from the junction of highway "Trakia" (International

road E 80) in village Kalugerovo, passes through the area of Municipalities: Pazardzhik, Krichim, Perushtitsa, Rodopi, Kuklen, Asenovgrad, Kardzhali - Perperikon and Haskovski Mineralni Bani and again flows into the highway "Trakia". The length of the route is 220 km.

The objectives of the second cluster "Way of Orpheus" are related to:

- Creation of jobs and revival of the economy in the region;
- Development of food industry;
- Growing essential oil crops and production of essential oils, herbs, mushrooms, etc.;
- Hotel and SPA, tourism - eco, wine, religious, cultural and historical;
- Creating infrastructure and system of international tourist destination, which will be registered in the European Union and in the world tourist agencies,
- Increase of the overall welfare of the population;
- Disclosure and exhibition of cultural heritage, with which the region is richly endowed as well as using the potential of population engaged in studying the history of the area.

It includes municipalities Rodopi, Asenovgrad, Banite, Rudozem, Smolyan, Chepelare, Lucky and Kuklen. The route of the "Way of Orpheus" starts from Plovdiv passes through Kuklen municipality. Later passes Bachkovo villate towards the village Yugovo in municipality Lucky. There are three branches for summer and winter routes. There are 9 wineries on this territory.

Each of the municipalities has developed touristic routes. For example, routes for sports, rural, eco and cultural tourism in the municipality Banite include: thermal spa complex and specialized spa-complex Banite; area "Devil's Bridge" with hut; holiday house in Glogino; pond and dam in Davidkovo. Smolyan Municipality offers: hiking trails - hiking and cave tourism, Smolyan Lakes, village Shiroka Laka, villages Gela and Stoikite; rock climbing, mountain biking; cave "Uhlovitsa"; Observatory "Rozhen" and museums. Plovdiv Municipality is included in the visit: Old Town, the Ancient Stadium, the Ancient Theatre; Museums: Archaeological,

Ethnographic, Historical, Natural; churches: Orthodox, Catholic, Armenian, synagogues; different cultural events and more.

The third cluster "Ancient Thracian wine road" includes ten municipalities: Lesichevo, Panagyurishte, Strelcha, Hisar, Brezovo, Rakovsky, Karlovo, Kaloyanovo, Chirpan and Bratia Daskalovi. The route starts from the junction of highway "Trakia" / international road E80 to / with Kalugerovo passes through Panagyurishte, Strelcha village, Krasново village and Krasnovski mineralni bani, Starosel village, Panicheri village, the towns of Hissar and Bania/ Karlovo municipality/ goes to village Zelenikovo / Brezovo municipality/ and again flows into the highway "Trakia" before the Chirpan. The length of the route is 166 km.

The territory covered by the cluster is in the central part of Bulgaria. It includes nine wineries with a maximum capacity of 25 million bottles and potentially could be added 5 more (two in construction). In the area of the route there are seven settlements with well renowned spas, with built large tourist base - more than 50 hotels, spa sanatorium and rest homes, as well as natural and cultural heritage resources for further construction of not less than 15-20 new hotels.

The project aims are:

- Reconciliation and placing business fundamentals of exceptional cultural heritage with people livelihoods and creating new modern and interesting job opportunities;
- Creating of infrastructure and structure of tourist destinations, which will be registered in the European Union and in the world's travel agencies;
- Creation of jobs and revival of the economy in the region; Restructuring of agriculture and food industry;
- Development of Vine and Wine, fruit and canning industry;
- Growing essential oil crops and producing of rose and other essential oils, etc.;
- Hospitality industry development- year round holidays in places with mild climate, balneology and tourism;
- Increasing the welfare of the population.

In this cluster each municipality offers different possibilities of combining wine

tourism with other types of tourism. For example, the municipality of Hissar offers as options to visit: Starosel Thracian tomb; Panicheri -Krastevich - huts on the mountain; StaroZhelezare - spa tourism; Hissar – Krasново, Piasachnik dam; hunting and fishing tourism; routes for wine tourism: Hissar, Starosel.

Directly related and largely supporting the fulfillment of cluster formations in the area, is the project of the Regional Grape and Wine Chamber - "Establishment of small wineries." It aims to build wineries from owners of vineyards, a group of neighbors on the location of their vine plantations; from an association of owners of vineyards or by long-term tenants of properties with size between 20 and 100 acres. Are elaborated five different complex solutions for small wineries. The role of the regional viticulture and wine chamber is to support the selection of consulting company for training and project management in applying the Structural Funds. Successful implementation of the project depends on the development and participation of the Regional Grape and Wine Chamber in the activity of the "Center for regional partnership" in terms of recovery of 50% of the investments made under the Operational Program "Rural Development" - axis "Leader" and measures: "Help creation and development of non-agricultural business "," Preservation and enhancement of cultural and natural heritage of rural areas "," Encouragement of tourism activities "," Implementation of local development strategies "and others.

In early 2013, seven wine producers established a cluster "Danube wine" as a nonprofit organization. The cluster works in cooperation with similar Bulgarian and foreign organizations, local authorities and administration, representatives of the wine business and others. The objectives of the cluster are to achieve a sustainable and competitive market of wine from wineries in Northern Bulgaria, and to optimize connections and relationships between partners in the cluster through a single database.

Based on the above mentioned it can be concluded that the key players in the structure

of the 4 established clusters are four main types of participants: vineyards; producers of wine, travel agencies and traders. This creates a variety of economic relations and interests of the different stakeholders in the wine business. They are united on the basis of trade in raw materials (grapes) and the final product and its implementation (wine and products for wine). Wine growers can sell their wine directly to consumers of grapes, or use intermediaries - wine merchants, travel agencies. Most wine growers have developed vertical strategies related to the construction of own vineyards. The role of traders and tour agents does not end only to mediate between winegrowers and winemakers, but they can also order production of its own wines, improve marketing strategy for the realization of wine. These relationships should complement the value of the wine product.

Peripheral organizations located outside the central value chain in the sector are actors that interact with winegrowers and winemakers in the supply of resources, the supply of scientific knowledge and technology, logistics companies. Their interactions with key stakeholders define the boundaries of the cluster and contribute to the efficient functioning of the entire system. They carry out a wide range of activities in order to supply the viticulture sector from viticulture vines, fertilizers, pesticides, retaining structures, devices and other activities and supplies for wine such as equipment, materials, public relations and others. For the relations in the cluster is important the nearness to winegrowers and winemakers. Part of suppliers for the sector in the country are foreign companies and corporations (especially in the delivery of equipment and machinery, fertilizers and pesticides) that have relocated place throughout the system. The role of suppliers is not only in the provision of materials, as well as providing consultation and system knowledge

The participation of national organizations in the wine cluster is aimed at the realization of a rational policy for the sector. Ministry of Agriculture and Food (MAF) provides rules to stabilize production, contribute to the protection of public interest, secures control

and financial support. MAF implements the policy of the common organization of the market in the EU. The Executive Agency on Vine and Wine (EAVW) observes the realization of state policy in the sector and gives planting rights, uprooting and replanting. The National Grape and Wine Chamber protects the interests of the participating organizations in the sector, controls the origin, quality and authenticity of the products. The Chamber implements the decisions of the International Organization of Vine and Wine (OIV), aimed at the creation of standards and development of the international wine business. The participation of the national organizations have a stabilizing effect on the cluster, but the transformation of policy sector in recent years is a threat to weaker participants.

The supply of scientific and technological resources is carried out by the National Centre for Agrarian Sciences, the National Service for Agricultural Extension, private consulting organizations. Leading role in scientific information support for the wine sector has the Institute of Grape and Wine in the city of Pleven, the Complex Experimental Stations of Viticulture and Enology in Varna and Pomorie and others. They are able to develop technological and organizational solutions to improve the vineyards, wine quality, economics and management through seminars, networking events, providing publications. The training of specialists for work in the sector is concentrated in the Agricultural University of Plovdiv, in the secondary schools of agriculture, different research centers. Government has a major role in promoting technology transfer and provision of educational services for the sector. Important role for the introduction of the achievements and innovations in the sector have the annual exhibitions Vinaria and Vinexpo.

Specific place occupy the logistics organizations relevant to all participants in the cluster and performing the movements of material flows in the sector.

CONCLUSIONS

Based on the review of the implementation of clusters in the grape-wine sector can be drawn the following conclusions:

- Clusters are formed mainly by a desire to use their advantages in terms of reduced transaction costs and increased efficiency, the creation of specialized institutions, higher reputation and more. They are characterized by a diversity of elements and participants;
- The participants in them are bound by the chain of value creation;
- Restriction conditions to their development is the lack of leadership, the low level of cooperation and insufficient trust between companies;
- The clusters in the grape-wine sector benefit an organizational support from local authorities, which assist them to overcome bureaucratic difficulties;
- Among the initiators for their establishment are representatives of public authorities and non-governmental and professional branch organizations, which retain their partnership;
- Weakness are insufficient European funds that help to finance the initial phase of cluster creation. Financial resources for implementation of joint projects are limited, there is a lack of interest for joint actions.

Prerequisite for the development of the cluster is the intensity of relations between participants in the cluster and their ability to deal collectively with emerging threats and limitations of the environment. Significant effect of participation in cluster companies can be sought in the improvement of their financial condition as a result of sound economic relations in the sector, in the creation of mechanisms for coordination (cooperation) that improve the access to international financial institutions and programs.

This gives greater freedom to farmers and business entities to think innovatively, to adopt investment decisions and to realize more investments. All this underlines the need for development of cluster approach for integration, for achievement of a modern and competitive wine sector.

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CONTRIBUTIONS TO (COLEOPTERA: STAPHYLINIDAE) IN DUMBRAVA SIBIULUI FOREST, ROMANIA IN TERMS OF THE YEARS 2013-2014

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Abstract

This research study describes the results obtained during the years 2013-2014 by capturing in the soil traps, the epigenous arthropodofauna in the Dumbrava Sibiului Forest. In addition, the entomofauna structure was studied and ecological interpretations were achieved regarding aspects such as: abundance, dominance, phenology of the collected species collected making a their description from an ecological and ethological point of view. Also the Species were presented and biologically described at the capture data. The experience was run in the period 2013-2014 (April 2, 2013 and March 21, 2014) and some of the data were taken from a study conducted from 2011-2014 by author together with the IV year students IPMA Framed discipline to control pest populations. The material was weekly collected, determined, labelled and assembled forming a collection which includes species caught in the study area.

Key words: Dumbrava Sibiului Forest, entomofauna, Staphylinidae

INTRODUCTION

Staphylinidae is one of the largest groups of beetles, with over 20.000 known species characteristic of the sheath short, membranous wings refolded under sheath, as "model" seen to dermapteres [1,2]. The abdomen is found often kept folded back when walking, as a kind of threat. Often the elytra are even missing. Inability to fly is compensated, may in part caused by these insects adapt to fast walking, and he tied predatory life of most representatives of the group. Some species feed on corpses or are phytophagous. Over 300 species are myrmecophilous [3,5,6,7,8,9].

Staphylinus olens, Completely black and *St. caesareus* with elitele redheads are the large group, common in our country[14,15,16,17].

Manosella fungus beetle is best known, with only ¼ mm long. Live in Neotropical lands and feeds on fungi[11,12].

This paper is a contribution to the study of fauna and ecological Staphylinidae Dumbrava Sibiului Forest (Photo 1.). The research we conducted in years 2013-2014. Collection sites were chosen based on

vegetation. In Dumbrava Sibiului Forest on 21 March 2014 and 13 April 2013 were installed experiences that have aimed to collect specific epigenous forest insect populations. To capture entomofauna installed a set of 12 traps on the circumference of a circle with a radius of 12.5 m which have defined an area of 981.25 m² inside the forest [4,10]. The traps used in the installation experience was made of PET bottles in two sizes. A 2 liter glass vessel where it is placed the protective 1.5 l represents the receptacle (Photo 2.). Below are the GPS coordinates for each trap in hand.



Photo 1. Aspects of the forest, the location of soil traps (Original photo)

Each trap was composed of a protective container in the bottom of which were practiced a few holes to avoid water stagnation derived from precipitation, then she introduced a receptacle with a capacity in which to put water and detergent (for lowering blood, shallow water). The two vessels forming trap were placed in a hole dug in the ground, then set the ground as well to avoid circumventing the fauna epigenous small areas, installing on each vessel mouth protector funnel made of foil PVC, dark.



Photo 2. Mounting experience (Original photo)

Trap 1	Trap 7
Coordinates: Latitude 43 °	Coordinates: Latitude 45 °
73'480"	73'67"
Longitude 24	Longitude 24 °
° 104'10"	103'90"
• Trap 2	• Trap 8
Coordinates: Latitude 45 °	Coordinates: Latitude 45 °
737'79"	737'67"
Longitude 24	Longitude 24 °
° 737'414"	103'96"
• Trap 3	• Trap 9
Coordinates: Latitude 45 °	Coordinates: Latitude 45 °
737'78"	737'71"
Longitude 24	Longitude 24 °
° 104'15"	103'96"
• Trap 4	• Trap 10
Coordinates: Latitude 45 °	Coordinates: Latitude 45 °
737'71"	737'71"
Longitude 24	Longitude 24 °
° 104'13"	104'01"
• Trap 5	• Trap 11
Coordinates: Latitude 45 °	Coordinates: Latitude 45 °
737'68"	737'75"
Longitude 24	Longitude 24
° 104'111"	° 103'94"
• Trap 6	• Trap 12
Coordinates: Latitude 45 °	Coordinates: Latitude 45 °
737'70"	737'75"
Longitude 24	Longitude 24
° 104'09"	° 103'95"

MATERIALS AND METHODS

The raising the captured material was made periodically picking out of each trap catches in cloth bags, with appropriate label. Were targeted geographically and numbered from 1-12 clockwise, from trap located at N.

The collected material was already dead introduced in glass containers in rubbing alcohol, measurements being performed at the end of the study period. Pitfalls worked from early March to late October 2013 and in 2014 all of March to November. Collection whole diameter is 12 cm, with an area of 226.08 cm² catching possible, thus occupying 29.37% of the circumference of the circle catching possibilities. The circumscribed area was 981.25 m². To achieve interpretations it was made a number of statistical calculations. This is just the beginning of the research that we want to perform in this biotope for a period of at least three years.

RESULTS AND DISCUSSIONS

The insect species which have been collected and their systematic classification are presented below.

Staphylinus erythropterus L.

5 ex., 17.05.2014, 7; 11 ex., 24.06.2013 Lc = 14 mm. (Photo 3.). Biology: edges of forests, areas covered by vegetation; Food regime: zoofage, especially entomophage.



Photo 3. *Staphylinus erythropterus* L.

(<http://www.insektenbox.de>)

Staphylinus olenus Mull.

7 ex., 4, 7, 21, 29. 05. 2014, 13 ex. 13,18,22,29.05.2013, C5, Lc = 19 mm. (Photo

4.). Biology: forest, field crops, in association with *S. caesareus*. Food regime: entomophage.



Photo 4. *Staphylinus olenus* Mull.
(<http://www.de.wikipedia.org>)

***Staphylinus caesareus* Cederh.**

6 ex., 1, 6, 11, 17.05.2014, 7, 15 ex., 1, 6, 14, 22, 19, 06.2013, Lc = 18 to 19 mm. (Photo 5). Biology: almost all biotopes in which optimal conditions present in field crops, food regime: in general zoofage, but with predilection entomophage.



Photo 5. *Staphylinus caesareus* Cederh.
(<http://www.zin.ru>)

Staphylinus sp.

7 ex., 22.04.2014, 8 ex., 1, 6, 13, 21, 29, 06.28.2013, C4; Lc = 17-19 mm. (Photo 6). Biology: larvae, like all staphylides of galleries in the soil where they hunt prey. Food regime: most species are zoofage.



Photo 6. *Staphylinus sp.* (<http://www.insektenwelt.ch>)

Velleius dilatatus

13 ex., 3, 7, 18, 22, 30.04.2014, C5; 4.06., C2, 05.07.2013, C4, Lc = 15 mm, (Photo 7).

Biology: Forest, with a preferred moisture, tree, food regime: mixofage.



Photo 7. *Velleius dilatatus* (<http://www.insect.at>)

Velleius sp.

5 ex., 13, 22.04.2014, 9 ex., 2, 6, 14, 18, 29.06.2013, C4, C7; Lc=11-12,5 mm.(Photo 8).



Photo 8. *Velleius sp.* (<http://www.insect.at>)

Philonthus sp.

10 ex., 3, 7, 18, 22, 30.04.2014, C7; 11 ex., 2, 7, 14, 21, 29.05.2013, C4; Lc = 13 mm; (Photo 9). Biology: forests, tree. Rt: entomophaga.



Photo 9. *Philonthus sp.* (<http://www.aramel.free.fr>)

After capturing insects, the material was punctured, labeled, determined by determinatoarelor specialized in the laboratory of Plant Protection. Conservation of material was made boxes insectary. To determine the species of insects collected and taking pictures with their morphology, along research using IPM Scope camera (Photo 10).



Photo 10. IPM Scope camera

CONCLUSIONS

This research work aimed to analyze insect population from the Oak Forest Grove Sibiu. It is located in the Sibiu Depression at the contact with the Cindrel Mountains and the sediment basin itself and now it occupies the piedmont plain and hills, located in the South-West part of Sibiu.

It has an area of 978 ha divided into four forest bodies.

Frequently used in the environmental research, abundance corresponds to the number of individuals per unit area. This is actually the numerical abundance.

In this research it was used the relative abundance (in terms of proportions or probabilities of participation of each species in the studied population [3,11].

Of the taxa to reveal the presence of 14 species of Carabidae in this research work, the species representing Staphylinidae 7 species, 122 copies, of the genera *Staphylinus* (80%) and *Philonthus* (20%) were studied (Photo 11.).



Photo 11. Entomological Collection captured material (Original photo)

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FAMILY PIERIDE (LEPIDOPTERA, PIERIDAE) AND EVOLUTION OVER TIME IN FOREST GROVE SIBIU (SIBIU, ROMANIA)

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Abstract

Transylvania, with its geographic location, flora and fauna is a well defined region, whereby, in addition to many common elements with neighboring areas, there are also some characteristic species, which so far continue to maintain the "endemic" status. The previous decades were very important for the development of Lepidopterological research in Sibiu and Transylvania, in the postwar years. The richness of insect fauna and especially the numerous species of Lepidoptera as of its existing knowledge of this group of insects stimulated the curiosity of many researchers since the middle of the 19th century.

Key words: Dumbrava Sibiului Forest, lepidoptera, Pieridae

INTRODUCTION

Dumbrava Sibiului Forest is located in Sibiu Depression at the with the Cindrel Mountains and sediment basin itself and now occupies the piedmont plain and hills, located in the South-West side of Sibiu (Fig. 1). It has an area of 978 ha divided into four bodies forest, two being the highest: Grove I (693 ha) and Grove II (261.5 ha); the other two are NATO troops (18.2 ha) and body Poplaca (5.3 ha). The forest stretches from the outskirts of Sibiu towards settlements Rasinari and Poplaca and is surrounded by pastures, meadows and arable land.

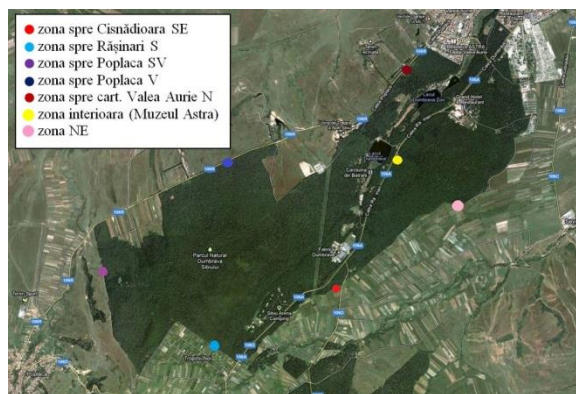


Fig.1. Location of the study area

Swallowtail butterflies are large, colorful butterflies in the family Papilionidae,

and include over 550 species [1]. Though the majority are tropical, members of the family inhabit every continent except Antarctica. The family includes the largest butterflies in the world, the birdwing butterflies of the genus *Ornithoptera* [6].

Swallowtails have a number of distinctive features; for example, the Papilionid caterpillar bears a repugnatorial organ called the osmeterium on its prothorax. The osmeterium normally remains hidden, but when threatened, the larva turns it outward through a transverse dorsal groove [7] by inflating it with blood. The forked appearance of the swallowtails' hind wings, which can be seen when the butterfly is resting with its wings spread, gave rise to the common name *swallowtail*. As for its formal name, Linnaeus chose *Papilio* for the type genus, as *Papilio* is Latin for 'butterfly'. For the specific epithets of the genus, Linnaeus applied the names of Greek heroes to the swallowtails. The type species: *Papilio machaon* honoured *Machaon*, one of the sons of *Asclepius*, mentioned in the *Iliad* [8].

Egg. Dome-shaped, smooth or obscurely faceted, not as high as wide, somewhat leathery, opaque[1].

Larva. Stout, smooth or with a series of fleshy tubercles on the dorsum: sometimes

with a raised fleshy protuberance (the so-called hood or crest) on the fourth segment. The second segment has a transverse opening, out of which the larva protrudes at will and an erect, forked, glandular fleshy organ that emits a strong, penetrating, and somewhat pleasant odor.

Pupa. Variable in form but most often curved backwards. It is angulated, with the head truncate or rounded and the back of abdomen is smooth or tuberculate. It is attached by the tail, normally in a perpendicular position, and further secured by a silken girth round the middle. In *Parnassius*, the pupa is placed in a loose silken web between leaves.

Imago. Wings extraordinarily variable in shape. Hind wing very frequently has a tail, which may be slender, or broad and spatulate, but is always an extension of the termen at vein 4. In one genus, *Arandia*, the termen of the hind wing is prolonged into tails at the apices of veins 2 and 3 as well as at vein 4. Pore wing (except in the aberrant genera *Parnassius* and *Hypermnestra*) with all 12 veins present and in addition a short internal vein, vein 1 a, that invariably terminates on the dorsal margin[2,3].

MATERIALS AND METHODS

The materials used in this research have been: macro lepidoptero fauna, entomological net (net), jar with cork, bottle with dropper for ether or chloroform, tweezers with wide top, very good are the philatelic, entomological pins, boxes field, tension, insectarium boxes for collection, writing pads, label, pencil, magnifying glass pocket.

Collecting butterflies is generally a difficult operation, but also enjoyable for those who love this order of insects. The high speed with which they fly and the tenderness of their wings require more care and attention to Lepidoptera. The Macro Collection Forest Grove daytime Sibiu was performed using the entomological net. It was composed of: Frame circular wire diameter of 1.5-2 mm but with about 33 cm to 35-50 cm opening. Some Lepidopterae need a net opening of 20 cm with folding frame to wear constantly (Photo 1).



Photo 1. Collecting butterflies (photo. orig.)

RESULTS AND DISCUSSIONS

PAPILIONIDAE FAMILY (3446 RO, K. & R. 6939)

PAPILIONINAE SUBFAMILY

Genus *Papilio* Linnaeus, 1758 (3459 Ro, K. & R. 6959)

(sin. *Pterourus* Scopoli, 1777; *Aernauta* Berge, 1842)

Papilio machaon machaon Linnaeus, 1758 (3469 Ro, K. & R. 6960) [4,5]

Examined Material: 2 ex.; 17.V.1902 VW; 1♂17.V.1939 EW; 9.VII.1904 VW; 1♂25.VII.1939 EW; 1♀, 12.VII.2001, 1♂1.X.2007 CM; A: 65-75 mm;

Degree of hazard: EN

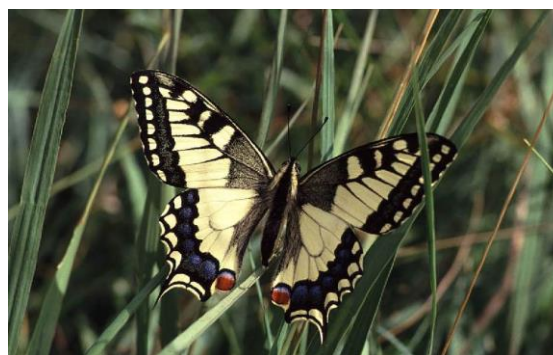


Photo 2. *Papilio machaon machaon* Linnaeus, 1758 ([http://www. biolib.cz.](http://www.biolib.cz.)).

Distribution: species well spread all over Europe and in Romania. In the Alps they were observed at over 2045 m altitude. There are many local species. In the Western China, Asia, they are present between 500 and 4,000 m altitude. Because of human intervention, it is now the preferred habitat of a species increasingly rare.

Biology: Ponta isolated eggs laid on leaves, caterpillars hatch after 6-7 days, leading daytime activity. Pupae stage is on a stand clutching a silk thread as a supporting belt. Larva: G1: VIII-IX; G2: VI. Larval development: caterpillars disturbed removes yellow substance odor repellent character. The chrysalis stage G1 takes 21 days in the 2nd G winters and III/IV hatch butterflies. Basically butterflies this species can be seen in III-IX. Green or brown chrysalis, winters. Flight Period: 1-3G/Ang1: III/IV-V/VI; G2: VII-VIII/IX, chrysalis overwinters.

Ecology: Biotope: lush fields, meadows, flower gardens and vegetable plants, grassy mountain slopes, can exceed 1,800 m or even 2,000 m; in the Tibet Plateau they are met up to 4,500 m altitude. Trophic base: *Daucus carota*, *Peucedanum palustre*, *P. oreoselinum*, *P. Cervara*, *sphondylium Heracleum*, *Angelica sp.*, *A. silvestris*, *Feniculum vulgar*, *Anthem graveolens*, *Carum carvi*, *Petroselinum hortense*, *Ferula sp.*, *F. communis*, *Foeniculum capillaceum F. officinale*, *Chaerophyllum temulum*, *Laserpitium gallicum*, *Libanotis montana*, *Lotus corniculatus*, *Melanocarpus crithmifolius*, *Pastinaca sativa*, *Meum sp.*, *Pimpinella Saxifraga*, *P. magna*, *Ranunculus acris*, *Seselj montanum*, *Ruta graveolens*, *Rosa sp.* and other plant species, especially *Apiaceae*.

Ethology: At hatching, the adult has wings folded as seemingly small but for about 20 minutes they unfold reaching normal size and shape, hardening only after half past one when you can fly; a period when the butterfly is very vulnerable. It prefers the nectar of *Echium sp.*, *Trifolium sp.* and *Lychnis sp.*, and also can be seen in the period IV-V on *Prunus spinosa*, *Lamium purpureum*, *Corydalis cava* and *Taraxacum officinale* and in VII-VIII *Canum Cirsium*, *Carduus acanthoides*, *Linaria sp.* and *Centaurea solstitialis*. The adults have a quick flight row and often hovered, being able to travel long distances. Mating occurs often among grasses [16].

Genus *Iphiclides* Hübner, 1819 (3457 Ro, K. & R. 6957)

Iphiclides podalirius podalirius Scopoli, 1763 (3458 Ro, K. & R. 6958) [4,5]

Examined Material: 1♀, 8.V.2001, 1♂, 1.V.2011 CM; 1♀ 27.V.1925 EW; 1♀ 9.VI.2011; 14.VII.1904 VW; 1♀, 22.VII.2011 CM; 3♂♂ 2,4,16.VIII.2011 CM; A: 63-75 mm;

Degree of hazard: VU



Photo 3. *Iphiclides podalirius podalirius*, Scopoli, 1763 (original photo).

Distribution: mainly in the Central and South America, it was observed up to 2,000 m altitude. It is present in the Alps and also in Romania from the plains to the mountains (The Retezat Mountains, 1506 m altitude). [3]

Biology: Type: the female lays larval development: larval stage lasts 1-2 months, and has 2G/year; in the high mountain areas it has only 1G/year chrysalis stage being about nine months. Summer G chrysalis is green hatching being occurred after a month from pupae stage. Ponta isolated host plant leaves. Larva: G1: VIII-IX; G2: VI-VII and VII-VIII. Autumn it is a brown chrysalis of her butterflies hatch next spring. Experimentally, from the same batch of chrysalises of the same age and the same conditions, some butterflies have hatched after 24 days and the other after 250 days (Wohlfahrt in Niculescu, 1961). Flight Period: 2G/year; G1:V-VI; G2:VII-VIII or V-VII only.

Ecology: Biotope: light rare woods, cuts in forests, meadows, fields, orchards with trees and bushes, which can reach 1,500 m altitude meadows. Spring flowers butterflies prefer *Vinca herbacea*, *Lamium purpureum Scabiosa columbaria* and summer ones, *Carduus acanthoides*, *Viola sp.*, *Prunus spinosa*, *Crataegus oxyacantha*, *Cirsium Canum*, *Knautia arvensis*, *Centaurea solstitialis*, *Medicago sativa*, *Sambucus ebulus* etc.

Trophic base: *Betula pendula*, *Prunus spinosa*, *P. padus*, *P. cerasus*, *P. avium*, *P. machaleb*, *P. persica*, *Sorbus aucuparia*, *S. domestica*, *Avelana Corylus*, *Crataegus sp.*, *C. oxyacantha*, *Amygdalus communis*, *Berberis vulgaris* and other trees and shrubs, especially trees.

Ethology: The adult is a good flier, often preferring the flight plan. After rain, clumps of adults may be seen in some wet places where liquid could be suckled. [9,10,11,12,13,14,15]

CONCLUSIONS

The major impact both quantitatively and qualitatively of the Macrolepidopterae population identified in the Forest Grove Sibiu is the result of human factor having often irreversible interventions which led to changes in the natural environment. Human action can witness the changes in topography, climate, vegetation, all of them being in close relation with the environment.

Human action on flora and fauna has two sides: one destructive of deforestation, conversion of grasslands into farmland and one unforeseen by replacing native fauna species living damaging some crops, or because of chemical control of these insect species.

Ecosystem transformation was about the beginning of traditional agriculture which aimed to increase the area of agricultural land that man has resorted to deforestation, conversion of fields, meadows and pastures in agricultural land, overgrazing and intensive modern agriculture then aim drainage of swamps and chemical processing of cultivated land. Other interventions are due to industrialization, urbanization, construction of roads and highways, tourism activities.

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ESTIMATING THE IMPACT ON THE LEASING OF HOUSEHOLDS OF FARMERS IN THE RURAL AREA

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Abstract

Leasing is the most common operation on the land market, at least in areas with a high quality agricultural land. The Romanian legislation in post-communist period leasing experienced a special regulation to introduce it in the new Civil Code, thus recognizing the importance it has in the socio-economic rent in Romania. From this perspective, the lease determining role in the Romanian society is a useful approach to determine regulatory requirements and how the current legislation covers the needs of society. Based on statistical data obtained from the National Institute of Statistics in conjunction with the data collected from the performance of contracts of lease rent in the areas where agricultural land is a very common operation (counties Calarasi, Ialomita, Giurgiu. An image was created on the living standard of the rural farming households and the conclusion drawn is that although the leasing company has only a strong economic role, down to the grassroots level in the households examined, the role of leasing also acquires social issues.

Key words: agricultural land, farming families, rural

INTRODUCTION

The Land reform started immediately after the Revolution of 1989 included most of the Romanian owners of farmland, so the agricultural area of Romania crumbled in a few years into millions of parcels, which on you could not practice agriculture to capitalize on the new agricultural oriented technologies. With the new owners of agricultural land, appeared the need for a land market covering not only buying or selling, but also operations such as leasing, to determine land consolidation in large farms, with important consequences in the modernization of agriculture and increased profitability. Leasing land soon became its first settlement in 1994, the main operation of an early land market, this being due to the fact that the new owners were able to exploit the land without alienating the property.

Twenty years after the first settlement of rent in the new socio-political conditions [2], rent, because it is very common, carries a particular importance in the Romanian society. Therefore, identifying the role that this part of the land market has in society, community or

household level is of interest for regulatory limits of rent in the future.

MATERIALS AND METHODS

To identify the role that rent fulfills in rural communities and in families or households majority of those who use this operation, data was collected from the National Statistics Institute, in Calarasi County Pension Agency for Payments and Intervention in Agriculture has been consulted and specific legislation and works including rural post revolutionary analysis.

In his purpose, the online Tempo database was consulted. The data collected in the year 2013 were analyzed by comparison, and the results were interpreted to highlight the differences between different related indicators of rural households whose manager is a farmer and other related indicators of households ran by other social and professional categories.

The indicators taken into consideration were those which can guide the establishment of living standard or comfort level, revenues and expenditures.

RESULTS AND DISCUSSIONS

According to INS data, the most numerous are those of retired households (41.5%) and employees (38.7%). In terms of occupancy, in 65.8% of urban households live persons employed, a significantly lower percentage compared to urban areas, where 70.8% of households live persons employed.

In 2013, according to the way they cover expenses, 62.7% of households whose head is a farmer cope with difficulty or with great difficulty, the no. 2 by households after whose head is unemployed.

From this perspective it is very clear that reported to routine household maintenance needs, farmers are the most disadvantaged category of active population. Even pensioners are able to cope in a higher percentage with maintenance costs (8.7% of families and pensioners cope easy to very easy compared to 7.7% of current expenditure of farming families).

In Romania in 2013 there were 808,000 households whose head is a farmer, of which 25.6% believe that they need a net monthly income of under 1,000 lei to meet current expenses, 45.4% believe that the necessary monthly net income should be between 1000 and 2000 lei to meet current expenses, 18.8% need a net monthly income between 2000 and 3000 lei and only 10.2% were current needs are of over 3,000 lei monthly.

Table 1. Households by level of net monthly income deemed necessary to cover current expenses, 2013

Occupational status of the family head	Incomes up to 500 lei/month %	Incomes between 501 and 1000 lei /month %	Incomes between 1001 and 2000 lei /month %	Incomes between 2001 and 3000 lei /month %	Incomes over 3000 lei/month %
Employee	1.8	4.8	21.1	33.5	38.8
Owner	-	-	9.8	27.0	61.2
Self-employed in non-agricultural activities	1.3	6.1	29.6	38.6	24.4
Unemployed	2.2	7.4	37.5	30.4	22.5
Farmer	6.4	19.2	45.4	18.8	10.2
Pensioner	3.8	13.4	40.4	25.5	16.9
Other status	5.1	13.2	34.0	24.0	23.7

Source: NIS, 2014

"Findings in terms of household cash needs clearly demonstrate the great differences

between the living conditions of households in the two areas, urban and rural areas" [4], but also between families whose members have different employment status, the most disadvantaged category being the farmers.

Data analysis showed that families whose head was a farmer, 25.6% needed less than Lei 1,000 lei per month, compared to only 9.6% of families whose head is unemployed and 17.2% of pensioners families below Lei 1,000 lei monthly. The conclusion was that farmers are the people with the most modest demands of comfort, this leads to the idea that they are the lowest income category in Romania. In support of this conclusion is the idea that while farming households had the cheapest monthly needs, 62.7% of households whose head was a farmer cover current needs with difficulty or with great difficulty.

Only 4.5% of households whose head was a farmer had borrowings. This reflects the low level of development of this type of households and low prospects regarding their future development.

Table 2. Households with borrowings, occupational status of the household head in 2013

Occupational status of the family head	% households with borrowings
Employee	18.6
Owner	26.6
Self-employed in non-agricultural activities	9.9
Unemployed	9.7
Farmer	4.5
Pensioner	5.8
Other status	90

Source: NIS, 2014

About 65.6% of rural households have no bathroom/shower inside the home (for comparison only 8.5% of urban households do not have a bath or shower in the house. Also 68.6% of rural households do not have wc inside the house. From the data above we can observe that the level of comfort and quality of housing in rural households is much lower than in urban areas, the differences being significant.

In regards the provision of durable goods in households of farmers is as follows: 40.3% of households have no washing machine (the highest percentage, compared to 23.3% of households whose head is unemployed have washing machine); 20.7% have mobile phone,

73.9% have no computer. The statistical data shows that farming households have the most modest endowment, this being mainly due to the limited financial resources available to them.

Table 3. Households by endowment of some durables and occupational status of the household head in 2013

Occupational status of the family head	No washing machine (%)	No phone (%)	No TV (%)	No computer (%)	No car (%)
Employee	3.9	1.9	0.2	21.9	44.6
Owner	-	-	-	4.2	7.2
Self-employed in non-agricultural activities	10.8	8.6	1.0	38.1	48.2
Unemployed	23.3	11.9	-	59.5	82.3
Farmer	40.3	20.7	3.4	73.9	81.7
Pensioner	21.2	16.6	1.6	72.6	78.4

Source: NIS, 2014

22.2% of farmers say that they have a satisfactory health status or bad, being the second category, after pensioners, with poor health self-declared (for comparison, 9.5% of employees say they have a satisfactory health status or bad, 13.7% of unemployed, 10.9% of owners). 233 000 farmers could not consult a specialist in 2013, 79.2% of them because they could not afford this, and 3.4% due to excessive distance to be traveled and lack of transportation. 311,000 farmers although they needed it, they could not make in 2013 a dental checkup, 82.9% of them because they could not afford it.

In 2013, 44.4% of farming households could not perform on time some expenditure, especially electricity or other expenses of maintaining the house.

households of pensioners, 37.4% households of employees, 9.3% households of farmers, 3.9% and 4.7% unemployed workers households in non-agricultural activities on their own. Of the total households of pensioners 48.8% live in rural areas. With regard to rural households 48.1% are households of pensioners and only 19.9% are households of farmers. [5].

In 2013 "the largest cash income, average monthly per household, was achieved by the households of employees (3100 lei) and the lowest by the farming households (1114.4 lei)". The data presented by the National

Statistics Institute shows that subsistence economy is characteristic to the farm household. This is highlighted by the fact that from the total cash income of all households in 2013, only 3.9% of the money income was from agriculture, 2.8% from the sale of agricultural products, livestock and poultry and 1.1% of revenue provision of agricultural work.

Table 4. Available income (net) on categories of households, according to the occupational status of householder head, in 2013

Occupational status of householder head	Average monthly income per household (Lei)
Employee	2,548.7
Self-employed in non-agricultural activities	1,689.5
Unemployed	1,403.2
Farmer	1,130.2
Pensioner	1,688.5

Source: NIS, 2014

The idea that the family farm can be a solution in rural areas, in addition to lack of means, the problem is that in our country, as "in all countries with market economies, the most sensitive sphere of activity a family farms has, is capitalizing production" [10]

Rent is considered to be not only a legal operation whereby the lessee conveys the lessor the right to use and exploit agricultural goods, for a period determined at a price [1] but also a way for families of owners of agricultural land to complete their annual income. This method of disposal of agricultural land use in Romania has experienced continuous growth, according to current studies, it is a clear tendency to increase the share of agricultural areas leased from 17% in 2007 to approx. 27% in 2010 [8] and about 32% in 2014.

"The consequence of leasing is primarily that of bringing agricultural land unproductive or low productive area in the productivity performance, mainly by creating optimal conditions for practicing agriculture on large surfaces. This produces large crops under conditions of high profitability. From this perspective, leasing plays a key economic role that can not be questioned" [3], especially in the context that „agriculture will continue to be one of the most important economic sectors in rural areas, further contributing

significantly to innovation and development of rural areas" [9].

The particularly low standard of living of the rural population, especially of farmers, is observed not only statistically but also in the literature that analyzes the rural areas in terms of the role it plays in agriculture: "The greatest part of lessors is the low-income people, with money or products obtained under contract on leased land, this being an important source of income, especially for the elderly who have pension of less than 200 euros, which is the most common category in Calarasi county rural area.

According to statistics, the average pension of state social insurance in Calarasi County is 160 euros and the average pension for farmers is 79 euros per month" [3].

Also, in the literature that examines the issue of the lease, it is noted that, in general, farms are characterized by advanced age of family members, the scarcity of inputs and isolation from the market, something which highlights the degree of underdevelopment of rural families of those who act as lessors [6]. "Lease, the price of the property leased, should satisfy the interests of both partners equally: lessors and lessees" [7]

CONCLUSIONS

If the economic role of the lease is certain, out of the question and proved by the high efficiency of agriculture practiced on large surfaces, the lease having an essential role in achieving large farms, the same can not be said with certainty that the lease has a social role. I say this because at the company level, the lease has not made significant changes at the social level. However, by ensuring additional income for the category of the most disadvantaged population, we can say that it has social influence on families rent owners of agricultural land, which due to the lack of ability to work the land, they submit the land to the lessee to use. This is very important because it can guide future policy in this field by supporting and promoting other operations that may have a pronounced social role in the community as a whole, and the entire Romanian society. This is deemed necessary

because there is a need for developed agriculture in rural coupling just by land owners, who mostly stayed to live in the countryside.

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MODELING OF THE NITRIFICATION PROCESS IN A SOIL IN CĂLĂRAȘI COUNTY

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Abstract

Quantifying the best possible the nitrification of nitrogen in the soil remains an important issue for the sustainable agriculture and for the environmental protection. The aim of the study was to evaluate in the laboratory the influence of some factors: temperature, humidity and amount of manure incorporated in the process of nitrification in a soil mainly in Călărași county, on a cambic chernozem. The results of the laboratory analyses were statistically processed by the analysis of variation. In the experimental model, the nitrogen dose increase, given to the soil, had no effect on the nitrification capacity. However, the humidity of 100 % nitrification was stimulated even in the case of the sample test, which has not received the ammonium nitrate. Such an observation could be the basis of the observation that in the irrigated fields, the processes of mineralization of organic substance are always high, especially at high doses of mineral fertilizer. It was noticed that the nitrification process was subject to a seasonal dynamics. The nitrification is more intense in autumn, when the conditions are optimal for this process. As a conclusion, the fertilization system has a great influence on the nitrogen nitrification in the soil.

Key words: ammonium nitrate, cambic chernozem, humidity, nitrification, temperature

INTRODUCTION

The crop is the main factor depleting soil mineral nitrogen solution [4].

The fertilization with organic and mineral fertilizers are an important way of increasing the content and quality of soil organic substance [11].

The mineral fertilizers rose over time problems, especially on the processes of mineralization (ammonification) and nitrification of nitrogen in the soil. The nitrogenous fertilizers were used in larger and larger amounts in order to increase the production, but they led over time to the increase of the amount of nitrate in the soil, agricultural products and hence water. [6].

Since the soil organic substance can provide the plant with the mineralization processes large amounts of nitrogen, it increasingly requires further research on finding ways to optimize the nitrogen regime in order to ensure a greater efficiency of the mineral fertilization [5].

The transformation in the soil of nitrogen fertilizers, the nitrogen passes from one chemical form to another can result in

assimilable mineral nitrogen losses and changes in soil reaction, likely to reduce the effectiveness of these fertilizers [10].

The conversion of nitrogen compounds in the soil is made by means of soil population [9].

The nitrates are the only natural source of nitrogen available for relatively neutral p_H soils in Călărași. In optimal conditions for the flora nitrification, the ammonia nitrogen in mineral and organic fertilizers introduced in the soil is rapidly converted to nitrate.

For the pollution control and prevention with mineral nitrogenous substances, directives were adopted both at European and national level, which aim to oriented to a sustainable agriculture and a national code of best agricultural practices for all Romanian farmers [2].

MATERIALS AND METHODS

This research aimed to assess the dynamics nitrification that occurs in a cambic chernozem with increasing doses of mineral nitrogen. I chose this type of soil, because in Călărași county, the chernozem occupies 80 % of the

agricultural area.

The soil studied was a cambic chernozem with good fertility: 2.6-2.9 % in irrigated soil 2.9-3.1 % in non-irrigated soil; 0.11 to 0.12 % total nitrogen. The soil reaction is characterized by a neutral p_H (6.3 to 7), with small differences in the profile. The buffering capacity of the soil is good. The soil nitrification potential is high, being favored by agrophytotechnical works performed in optimal period, by altering the termo-hidric regime of the soil.

In order to estimate the nitrification process, Waksman incubation method was used of soil incubation in the laboratory under controlled temperature and humidity, eliminating the possibility of loss by leaching of nitrates. Soil samples, collected from the 0-20 cm layer, the three repetitions of the field, were mixed in a mixed sample of the experimental variant and incubated for 21 days in the laboratory [8]. The soil samples were studied in model according to the following scheme [7]:

A. Temperature of incubation, with the following graduations: a_1 , 5⁰C (early spring); a_2 , 20⁰C (in spring), a_3 , 30⁰C (in summer).

B. Capacity of filed for water - C.F.W. (humidity %), with the graduations: b_1 – 40%, b_2 – 80%, b_3 – 100%.

C. Dosis of nitrogenous fertilizer (ammonium nitrate NH_4NO_3 , N active substance) with the graduations: N_0 , N_{60} , N_{120} , N_{160} , N_{240} , respectively c_1 - c_5 .

The determination of the nitrate content was made by colorimetric method. The nitrate extraction was done with a solution of K_2SO_4 . Nitrate dosing was phenol-disulphuric acid, by which nitrates are bound to nitro-acid phenol-disulphuric, coloured in yellow in alkaline medium. The colour intensity obtained depended on the concentration of nitrates. The maximum extinction was at 410 nm.

The results obtained following the analyses were processed statistically by the analysis of variation.

RESULTS AND DISCUSSIONS

The determinate nitrate amounts are found in tables 1, 2 and 3.

The letters before the numbers separate in alphabetical order the significant decrease of

the values in the column, based on the limit difference (L.D.), and those placed after the numbers separate in alphabetical order the significant decrease of the values in the line based on limit difference (L.D.).

Table 1. Influence of incubation temperature of the soil samples depending on humidity (40% C.F.W. – factor B) and chemical fertilizers with nitrogen on the nitrification potential

C/A N	5 ⁰ C a_1	20 ⁰ C a_2	30 ⁰ C a_3	X_c
0 c_1	c -1.23 c	b 1.06 b	c 1.69 a	c 0.51
60 c_2	c -1.28 c	a 1.52 b	b 2.78 a	a 1.01
120 c_3	b -0.98 c	b 1.11 b	a 3.18 a	a 1.10
160 c_4	d -1.6 c	c 0.71 b	a 3.31 a	b 0.81
240 c_5	a -0.67 b	a 1.67 a	c 1.77 a	b 0.92
X_a	-1.15 c	1.21 b	2.55 a	0.87 c average B

L.D. A 0.1% = 0,18 L.D. CxA 0.1% = 0,20

L.D. B 0.1% = 0,13 L.D. AxC 0.1% = 0,20

L.D. C 0.1% = 0,11 X_a = average A; X_c = average C

At 40% capacity of field for water (table 1), it was found out: the unique influence of factor A determined the increase of nitrate amounts found in the soil sample in the experimental model, while increasing the temperature of incubation (-1.15 c to 5⁰C; 1.21 b to 20⁰C; 2.55 a to 30⁰C). Value -1.15mg $NO_3/$ 100g soil means that at 5⁰C a nitrate consume was made, under a low nitrification process.

Table 2. Influence of incubation temperature of the soil samples depending on humidity (80% C.F.W. – factor B) and chemical fertilizers with nitrogen on the nitrification potential

C/A N	5 ⁰ C a_1	20 ⁰ C a_2	30 ⁰ C a_3	X_c
0 c_1	c -1.34 c	e 1.09 b	d 1.69 a	e 0.48
60 c_2	b -1.12 c	d 2.23 b	c 3.10 a	d 1.40
120 c_3	a -0.52 c	c 2.65 b	b 4.28 a	c 2.14
160 c_4	c -1.42 c	a 5.56 a	a 5.07 b	a 3.07
240 c_5	a -0.49 c	b 3.79 b	a 4.97 a	b 2.76
X_a	-0,98 c	3.06 b	3.82 a	1.97 b average B

L.D. A 0.1% = 0,18 L.D. CxA 0.1% = 0,20

L.D. B 0.1% = 0,13 L.D. AxC 0.1% = 0,20

L.D. C 0.1% = 0,11 X_a = average A; X_c = average C

As regards the separate influence of the factor C (nitrogen fertilizer dose), there were no significant changes in the concentration of nitrates in the soil sample after the incubation. The positive influence of the temperature of incubation on the nitrification process was observed in all nitrogen doses administered.

The ammonium nitrate administered in the soil subject to incubation did not cause significant changes in the nitrification process.

At 80% capacity of field for water (table 2), the following were found out:

The simple influence of factor A determined, as in the case of 40% in the capacity of field for water, an increase of the nitrate amounts made in the process of nitrification such as: - 0,98 c to 5°C, 3,06 b to 20°C, 3,82 a to 30°C. The separate influence of factor C (nitrogen fertilizer dose) did not determine significant changes of the intensity of the nitrification process.

The increase of the temperature of incubation proves to be favourable to the nitrification process, regardless the increase of nitrogen fertilizer dose administered to the model.

The influence of increasing the nitrogen dose, regardless the temperature of incubation, of nitrification, was insignificant.

At 100% capacity of field for water (table 3), it was found out that the influence of factors A and C were insignificant. In this case, the influence of temperature on the dose of the fertilizer was also insignificant. The same can be said for the influence of fertilizer amounts to each of the three temperatures of incubation.

In particular, we see that at 100% capacity of field for water, the nitrification process did not vary in intensity depending on the two influence factors. It is possible that the discriminate factor is only insufficient oxygen, knowing that nitrifying bacteria have the role to oxidize the ammonia and that in the conditions of its deficiency, the nitrification process is limited.

As the nitrogen dose decreases, from N₂₄₀ to N₀, the potential for nitrification increased.

This is the proof of the depressive effect of the mineral fertilization with ammonium nitrate on the nitrification process.

Table 3. Influence of incubation temperature of the soil samples depending on humidity (100% C.F.W.– factor B) and chemical fertilizers with nitrogen on the nitrification potential

C/A N	5°C a ₁	20°C a ₂	30°C a ₃	X _c
0 c ₁	c 2.67 b	d 4.17 a	e 1.59 c	c 2.81
60 c ₂	d 2.57 b	c 4.67 a	d 2.54 b	b 3.26
120 c ₃	a 4.19 b	a 5.47 a	b 3.59 c	a 4.42
160 c ₄	c 2.84 b	e 3.86 a	c 3.06 b	b 3.25
240 c ₅	b 3.41 b	b 4.96 a	a 5.06 a	a 4.48
X _a	3.14 b	4.63 a	3.17 b	3.64 a average B

L.D. A 0.1% = 0,18 L.D. CxA 0.1% = 0,20

L.D. B 0.1% = 0,13 L.D. AxC 0.1% = 0,20

L.D. C 0.1% = 0,11 X_a= average A; X_c= average C

Average factor B: 0,87 c (40% C.F.W.); 1,97 b (80% C.F.W.); 3,64 a (100% C.F.W.)

The increased nitrogen dose administered, decreased soil p_H (a soil acidification occurred due to the acidifying effect of this fertilizer). This acidification prevents the nitrification process.

CONCLUSIONS

As a general conclusion on the nitrification process depending on the moisture content of the soil - aerating soil samples during incubation, there is a clear increase from 40% to 100% C.F.W. (0.87 to 40 %; 1.97 to 80 % ; 3.64 to 100 %).

From the data obtained, we can see that the amount of nitrogen fertilizer influenced the nitrification potential. The amount of nitrate increased with the dose of nitrogen fertilizer. The correlation is particularly close to 100% of capacity of field for water. These findings confirm several previous data [3] and they provided the basis of the finding that the capacity of mineralization-nitrification is the most adequate index to assess the nitrogen need for the crops [1].

The nitrates resulting from the oxidation of the ammonia in the soil and of the one added as a mineral fertilizer represent on the one hand, elements of nutrition for other organisms, as well as waste of the nitrification process. In anaerobic conditions produced in

the version of reaching the ceiling of 100 % of field capacity for the soil water, the nitrates existing or produced in the soil can be a source of oxygen for the anaerobic respiration of the microflora, known as the reduction of nitrate and denitrification.

From the experimental data, we observe that at the humidity of 100%, the nitrification was stimulated even in the case of the witness sample, which did not receive the ammonium nitrate. Such an observation could be the basis of the finding that in irrigated fields, the processes of mineralization of the organic substance are always higher, especially at high doses of mineral fertilizer.

From our data we can see that the fertilization system has a great influence on the nitrogen nitrification of the soil.

As we found out, there were no anaerobic conditions or they lasted very little, because there is an increase of nitrate with increasing the capacity of field for water, which probably facilitated the development of various species of soil microflora and with it releasing into the environment easily assimilated organic substances.

As I remarked in my study, the nitrifying bacteria grow and nitrify best when the humidity is between 60-80% of field capacity. Depending on the local environment conditions, the nitrification processes are subject to seasonal dynamics. The vegetable residues which accumulate in the soil at the end of the growing season are only partially decomposed, due to the low temperature of the soil in this season. The disintegration processes are lower in the winter months. Only at the beginning of the growing season, an increase in nitrification may be expected. The process culminates in early summer, being interrupted only during the periods of drought. The soil works have a key influence on this dynamics. The nitrification is more intense in autumn (when favorable conditions of temperature and humidity are met).

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ANALYSIS OF WEALTH STATUS AND ITS DETERMINANTS AMONG CASSAVA PROCESSING HOUSEHOLDS IN IMO STATE, NIGERIA

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Abstract

The study analyzed the wealth status and its determinants among cassava processing households in Imo State, Nigeria. It specifically sought to classify the households into different wealth categories and estimate factors that influence the wealth status of the cassava processing households. In selecting the sample, multistage sampling technique was used in drawing 90 cassava processing households from the local government areas within the three agricultural zones. Relevant data and information were elicited from the selected households using well structured and pre-tested questionnaire. In analyzing the data, wealth index and multiple regression model were employed. The results showed that the households were classified into poor (65.56%); middle class (3.33%) and the rich (31.11%) while age, household size, monthly expenses and income were found to be major factors influencing wealth status. The study therefore recommended the introduction of income support policy to assist the smallholders to continue in the agricultural business since commercial agriculture which has the capacity to feed the economy has not taken root in the study area.

Key words: value addition, cassava processing, households, wealth

INTRODUCTION

Wealth has been defined by a lot of scholars but majority perceive it as an abundance of items of economic value or state of controlling or possessing such items. It is one of the most important variables in social science research since it plays a significant role in the planning and execution of development programmes [9, 13].

The specification of wealth as having the spirit of capitalism has been promoted in recent times because it is assumed to give status to the owners. However, not all wealth confers equal social status. Wealth can be classified into three principal categories: Personal property including homes or automobiles; monetary savings such as the accumulation of past income; capital wealth of income producing assets including real estate, stocks, bonds and business. All these

delineations make wealth an especially important part of social stratification [5,7].

Prior to the advent of oil production, the Nigeria economy was predicated on agriculture with multiplicity of smallholder resource poor farmers bearing the brunt of food production for the entire population. In addition, the sector employs about 70 – 80% of the country's labour forced while contributing about 40% to the gross domestic product (GDP) [14].

Among the numerous crops produced by the smallholder producers, cassava is the most cultivated because almost every household in Nigeria is engaged in it. Cassava ranks highly as a major staple food particularly for the low income earners and resource poor farmers in the developing economies of sub-Saharan Africa. This has raised the status of Nigeria as the leader in cassava production in the world [4].

In the face of this lofty productive capacity, the majority of small farmers experience difficulties in food production with heavy post-harvest losses due to weak connections to national and international markets and failure to add value [3]. This trend impacts negatively on profitability of the enterprise and the wealth of farmers. It has also stimulated interest in value addition which has increasingly drawn attention to the processing of cassava into other food forms such as fufu, garri, chips etc. However, the quantum of this contribution to wealth and factors influencing it will delineate the possibility of sustaining the practice among the processing households. Review of literature has revealed that a number of studies have been undertaken to assess the wealth status and its relations with adoption of innovations and technologies especially on-farm. Examples include [8, 10, 12] who found a significant positive relationship between the wealth index and adoption of agricultural innovations while [1] found a significant negative relationship between the two variables. However, [2, 11, 15] never found any significant relationship between them. A cursory look at the articles has shown that all of them were interested in technologies that related to production without considering post-harvest scenarios. In the light of the foregoing, the present study sought to analyze the wealth status and its determinants among cassava processing households in Imo State, Nigeria with the following objectives: (i) classify the households into different wealth categories; (ii) estimate factors that influence the wealth status of the cassava processing households.

MATERIALS AND METHODS

The study area was Imo State and it lies between latitude 4°45 and 7°15 North, and longitude 6°50 and 7°25 east of the Greenwich Meridian. The Cassava processing households (90) used for the study were selected by multistage sampling technique drawn from the local government areas across the three agricultural zones (30 households per zone). Well structured and pre-tested questionnaire administered on the selected households to

elicit data and information required for the study. Data were analyzed using wealth index and multiple regression model.

Following [6], wealth index is establishing by aggregating the major wealth indicators in the study area. The number of livestock and farm implement owned as well as the average amount of cultivated land are usually major wealth indicators in farming communities. The indicators are aggregated by calculating the wealth index (WID) as follows:

$$WID = \sum_{j=1}^n \frac{Y_i}{\bar{Y}_{ij}} \quad (1 = 1 \dots \dots 5; j = 1, 2 \dots \dots N) \dots (i)$$

Where Y_i = the average number of livestock units farm implements (hand hoes, axes, cutting equipment) and cultivated land for the past three years.

\bar{Y}_{ij} = the sample mean for each item; and

N = sample size

Multiple regression model for addressing factors influencing wealth status:

$$WID = (X_1, X_2, X_3, \dots X_8, e) \dots \dots \dots (ii)$$

Where:

WID = wealth index

X_1 = age (years)

X_2 = education (years)

X_3 = sex (male=1; female=0)

X_4 = household size (no)

X_5 = marital state (married 1; otherwise=0)

X_6 = consumption expenditure (naira)

X_7 = agricultural income

X_8 = access to credit (naira)

e = error term

RESULTS AND DISCUSSIONS

Categorization of households into Wealth Classes

In classifying the household into different wealth categories, the wealth index was computed and the results were presented in Table 1. The medium class is synonymous with the average wealth index while those households with wealth indices below the mean wealth index belong to the poor class. However, those with wealth indices that are above the mean belong to the rich class. By implication, 65.56% of household were

classified as poor; 3.33% were in the middle class while 31.11% fall in the rich households' category. This indicates that the value addition practice has not enhanced the wealth status of the processing household since majority is in living in poverty.

Table 1. Distribution of Households into wealth categories

Wealth categories	Frequency	Percentage
Poor class	59	65.56
Middle class	3	3.33
Rich class	28	31.11

Source: Field Survey, 2014

Determinants of Wealth Status

The result of the multiple regression analysis in Table 2 on estimation of factors influencing the wealth status revealed that out of the eight variables employed in the analysis, four variables which include age, household size, monthly expenses and income were statistically significant at various probability levels. Age was significant at 5% probability level with a positive coefficient (0.163), implying that wealth increases as age increases. Household size was significant at 1% probability level with a negative coefficient (-0.418), indicating that household size has an inverse relationship with wealth status. Invariably, the more the household size, the less their wealth. The coefficient of monthly expenses posted a significant, negative value (-5.989); with rising monthly expenses, wealth of the household diminishes while income which is sparingly significant, recorded a positive sign in line with a priori expectation.

Table 2. Factors influencing wealth status

Variable	Coefficient	Standard Error	t - value
Constant	-2.921*	1.466	-1.993
Age	0.163**	0.054	3.038
Education	-0.356	0.392	-0.931
Sex	0.400	0.445	0.899
H/hold size	-0.418***	0.115	-3.635
Marital Status	0.044	0.439	0.099
M/expenses	-5.989***	1.174	5.100
Income	3.061*	1.622	0.887
Access to credit	0.138	0.522	0.265
R ²	0.506		
F-Ratio	10.377***		

Source: Computed from Field Survey, 2014

The diagnostic statistics posted appreciably good values. Specifically, the coefficient of multiple determination (R²) is 0.506, implying a goodness –of- fit measure of about 50%. This indicates that the changes in the wealth status of the households were explained to the tune of 50.6% by the explanatory variables. The remaining 49.4% was attributable to error and omitted variables.

The F-ratio recorded 10.377 and significant at one percent probability level. By this value, it implies that the explanatory power of the model is high.

CONCLUSIONS

The analysis of wealth status of the Cassava processing households in Imo state has shown that majority lives in poverty.

By implication, the value addition practice seems not to have contributed meaningfully to their wealth ranking since poverty is wide spread.

Having realized that the coefficients of age, household size, monthly expenses and income were major factors influencing their wealth status, the need to employ policy options hinged on the factors has become rather imperative.

It is therefore necessary that family planning programmes should be intensified in farming communities to discourage the entrenched practice of having overbloated households among Africans.

More so, the introduction of income support policy will assist the smallholders to continue in the agricultural business since commercial agriculture which has the capacity to feed the economy has not taken root in the study area.

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INFLUENCE OF DRIP IRRIGATION AND OF FERTILIZATION, ON THE PRODUCTIVITY OF PLUM VARIETIES. CASE STUDY

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Abstract

*The large expanding and feedback from the consumers who enjoy common plum (*Prunus domestica*) is due to the rusticity of the trees, namely are the modest requirements for soil, climate, growing technology and the ability to easily adapt to the special ecological conditions compared with other varieties. The slight propagation by seed, grafting on the most common rootstock, the relatively early entry in bearing (3-4 years after planting), the high production and the long life of the trees, even under less favorable soil conditions, like heavy soils, podzols etc. The experiences during the years 2010-2012 aimed to experiment some technologies destined to maximize the productive potential of some plum varieties grown in the Moara Domneasca farm and widespread in the current range of varieties. Two productive varieties were used: Stanley and Anna Spath, grafted on rootstock Mirobolan. The fertilization comprised the administration of Megasol product which is a soluble fertilizer which is suitable to be used in the advanced irrigation systems, in particular the drip irrigation, at a dose of 2.5 kg/ha and 5.0 kg/ha. The irrigation consisted of the dripping administration of 2l/h and, respectively 4 l/h.*

Key words: fertilization, growing, increases, irrigation, production

INTRODUCTION

The plum growing enjoys a special attention in all the countries with climatic conditions which comply with the biological requirements of the known species and varieties. [5]

The large extend and feedback from the consumers who enjoy common plum species (*Prunus domestica*) is due to the following features: the rusticity of the trees, namely the modest requirements the plum tree has for soil, climate, growing technology and the ability to easily adapt to the special environment conditions compared to other species [10]; easy multiplying by seed, grafting, the most common rootstock and relatively early entry in bearing (3-4 years after planting); the high productions that we can ensure and the long life of the trees, even under less favorable soil conditions like heavy soils, podzols etc. [4]; the long period of fruit capitalization (about 90 days), because of the many different varieties with ripening periods, from very early (late June) until very late

(October) [3]; the food value of the plums results not only from the energy but also, and especially, from the diversity of the nutrients they contain. [7]

Grown for centuries in Romania, the plum tree was and remains one of the most popular and loved fruit species. The fact that it can be seen everywhere, from the hill to the plain, is another evidence that the plum tree is adapted relatively easily to a variety of climatic and soil conditions in our country[9]. For obtaining consistent and high production, it is necessary to ensure optimum conditions to pass the vegetation phases, both in terms of water and feed[1].

The administration of drip irrigation allows the application through the irrigation water of some easily soluble fertilizer products[8]. The plants reaction to irrigation is proven, currently getting the performance in terms of production is not possible without ensuring the necessary fluid[6]. The drip irrigation is one of the newest methods of irrigation, having mainly the advantage of administration of strict water in the root system and therefore

avoiding the degradation of the soil structure, the maintenance works are not disturbed and the soil can be maintained at a constant level of optimal humidity for every stage of the plant life [2].

MATERIALS AND METHODS

The content of the present paper is based on research, observations, experiments, extensive research of some aspects considered priority and processing of data comprising the whole range of aspects, from the irrigation and fertilization need. As a result, the entire paper is based almost exclusively on the results of own researches on the effect of irrigation and fertilization at plum tree in the conditions in Moara Domneasca Farm situated in South Muntenia, a few kilometers from Bucharest, the capital of Romania. The research work for the elaboration of this paper was carried out in the period 2010-2012.

The locality territory is included in the Romanian Plain relief, Vlăsiei Plain subdivision, in the transition area from steppe to forest area. The general relief is flat, with small bumps and numerous depressions called dales, of different shapes and sizes.

The groundwater is located at different depths, from 6 m to 10 m, depending on the relief.

The soil in Moara Domneascafarm belongs to a red brown type (preluvosoil) mollic subtype.

The experimental plot was located in Belciugatele Didactical And Experimental Station, Moara Domneasca School farm and consisted of the study of two plum tree varieties grafted on Mirobolan.

The plantation was established in 2004, respectively in November 2004, the planting distances being of 5 m/4 m.

In order to achieve the proposed objectives, the created experiences were three factor type with the following experimental factors:

Factor A: variety; a1 Stanley; a2 Anna Spath.

Factor B: irrigation norm: b1 not-irrigated; b2 2 l/h; b3 4l/h.

Factor C: dose of fertilizer: c1 unfertilized, c2 2.5 kg/ha and c3 5.0 kg/ ha.

The experience was placed according to the subdivided plots method with the systematic

factors A, B and C in three repetitions. The established moments for water administration were influenced by the plants need in certain phases of vegetation, namely: binding fruit, physiological fall, pits strengthening, intensive grow of sprouts and fruit, fruit bud differentiation. The needed rules of water were between 300 and 700 m³/ha.

The fertilization consisted in the use of Megasol product which is a soluble fertilizer specifically designed to be used in the advanced irrigation systems, in particular in drip ones, and for the foliar and basic fertilization.

RESULTS AND DISCUSSIONS

From Table 1 it can be seen that the two varieties, considering the average of production of the three years of experiments, had the same productive potential highlighted by the climatic conditions of the growing and by several factors such as irrigation and fertilization. Comparing the productions obtained, it was remarked that there are no statistically differences between the two varieties, the production differences being 0.16 t/ha, Stanley variety achieving 1.1 % production gain.

Table1. The influence of the variety (A) on the production of plums, average of 2010-2012

Variety	Production t/ha	%	Difference	Significance
Anna Spath	14.00	98.9	-0.16	-
Stanley	14.32	101.1	0.16	-
average	14.16	100.0	-	Mt

DI 5 % = 0.488 t/ha

DI 1 % = 1.128 t/ha DI 0.1 % = 3.588 t/ha

From the data resulting from Table 2, it was found out that the Anna Spath variety, under not irrigation conditions recorded a higher production than Stanley variety, from 12.38 t/ha to 11.44 t/ha. The watering determined significant production increases in case of the both varieties. Anna Spath variety recorded a gain 1.79 t/ha, at rules of 2 l/h and 3.07 t/ha, at rules of 4 l/h. Stanley variety, at 2 l/ha obtained a production increase of 3.35 t/ha and at 4 l/h, an increase of 5.28 t/ha. Stanley variety capitalized the irrigation water much

better than Anna Spath variety, as it can be seen by higher increases.

Analyzing table 3 one can see that under the growing conditions without the influence of

other factors, Anna Spath variety had a higher production potential compared to the one of the Stanley variety, 12.38 t/ha to 11.44 t/ha.

Table2. The influence of drip irrigation levels on productivity for the same variety of plums, average of 2010-2012 (BxA)

Variety	Anna Spath			Stanley		
	Irrigation rule	Prod. t/ha	Dif. t/ha	Significance	Prod. t/ha	Dif. t/ha
Not irrigated	12.38	-	Mt	11.44	-	Mt
2 l/h	14.17	1.79	***	14.79	3.35	***
4 l/h	15.45	3.07	***	16.72	5.28	***

Dl 5 % = 0.087 t/ha Dl 1 % = 0.127 t/ha Dl 0.1 % = 0.191 t/ha

Table3. The influence of variety on the production of plums for the same level of irrigation (AxB), average of 2010-2012

Irrigation rule	Not irrigated			2 l/h			4 l/h		
	Variety	Prod. t/ha	Dif. t/ha	Signific.	Prod. t/ha	Dif. t/ha	Signific.	Prod. t/ha	Dif. t/ha
Anna Spath	12.38	-	Mt	14.17	-	Mt	15.45	-	Mt
Stanley	11.44	-0.94	0	14.79	0.62	*	16.72	1.27	**

Dl 5 % = 0.490 t/ha Dl 1 % = 1.115 t/ha Dl 0.1 % = 3.503 t/ha

Table4. The influence of irrigation levels on the production of plums for the same level of fertilization (BxC), average of 2010-2012

Dose of fertilizer	Not fertilized			2,5 kg/ha Megasol			5,0 kg/ha Megasol		
	Irrigation rule	Prod. t/ha	Dif. t/ha	Signific.	Prod. t/ha	Dif. t/ha	Signific.	Prod. t/ha	Dif. t/ha
Not irrigated	10.81	-	Mt	12.00	-	Mt	12.93	-	Mt
2 l/h	12.72	1.91	***	14.48	2.48	***	16.24	3.31	***
4 l/h	14.06	3.25	***	15.88	3.88	***	18.32	5.39	***

Dl 5 % = 0.114 t/ha Dl 1 % = 0.157 t/ha Dl 0.1 % = 0.218 t/ha

Table5. The influence of the fertilization level(C) on the production of plums for the same variety (A) and the same level of irrigation (B) (CxAB), average of 2010-2012

Variety	Anna Spath						Stanley					
	Not irrigated		2 l/h		4 l/h		Not irrigated		2 l/h		4 l/h	
	Factor BxC	Prod. t/ha	Dif.	Prod. t/ha	Dif.	Prod. t/ha	Dif.	Prod. t/ha	Dif.	Prod. t/ha	Dif.	
Not fertilized	11.08	-	12.43	-	13.34	-	10.54	-	13.00	-	14.77	-
2.5 kg/ha	12.49	1.41***	14.32	1.89***	15.28	1.94***	11.50	0.96***	14.64	1.64***	16.47	1.70***
5.0 kg/ha	13.57	2.49***	15.75	3.32***	17.73	4.39***	12.28	1.74***	16.73	3.73***	18.91	4.14***

Dl 5 % = 0.165 t/ha Dl 1 % = 0.225 t/ha Dl 0.1 % = 0.301 t/ha

Table 6. The influence of irrigation level (B) on the production of plums for the same variety (A) and the same level of fertilization (C) (BxAC), average of 2010-2012

Variety	Anna Spath						Stanley					
	Not fertilized		2,5 kg/ha		5,0 kg /ha		Not fertilized		2,5 kg /ha		5,0 kg /ha	
	Factor CxB	Prod. t/ha	Dif.	Prod. t/ha	Dif.	Prod. t/ha	Dif.	Prod. t/ha	Dif.	Prod. t/ha	Dif.	
Not irrigated	11.08	-	12.49	-	13.57	-	10.54	-	11.50	-	12.28	-
2 l/h	12.43	1.35***	14.32	1.83***	15.75	2.18***	13.00	2.46***	14.64	3.14***	16.73	4.45***
4 l/h	13.34	2.26***	15.28	2.79***	17.73	4.16***	14.77	4.23***	16.47	4.97***	18.91	6.63***

Dl 5 % = 0.161 t/ha Dl 1 % = 0.222 t/ha Dl 0.1 % = 0.308 t/ha

The application of irrigation resulted in increased productions and stimulate the productive potential of Stanley variety, which performed an increase of 0.62 Harvest t/ha, provided statistically as significant increase. At rules of 4 l/h, the same variety recorded with a production increase of 1.27 t/ha, increase ranked as distinct significantly.

As it is remarked during the experiments, the irrigation level led to production increases higher than those obtained after fertilization (Table 4). At the not fertilized variants, the productions were between 10.81- 14.06 t/ha, with gains of 1.91 t/ha and 3.25 t/ha. The application of a dose of 2.5 kg/ha Megasol resulted in increases in production of 2.48 t/ha 3.88 t/ha. At the dose of 5 kg Megasol, increases were achieved of 3.31 t/ha and 5.39 t/ha. The highest production increase was obtained in the irrigation rules of 4 l/h. All increases were recorded statistically and were rated as very significant.

It is found out that Anna Spath variety achieved the highest production increases under the influence of fertilization, although the productions were lower than those of Stanley variety. This shows a better use of the fertilization effect, by this variety. The highest production increase was obtained in the variants fertilized with a dose of 5 kg/ha Megasol, 4.39 t/ha, corresponding to a production of 17.73 t/ha. At the same variant, Stanley variety records an increase of 4.14 t/ha, corresponding to a production of 18.91 t/ha. Regardless of the dose administered, the production increases were very significant for both studied varieties (Table 5).

Stanley variety recorded the highest production increases compared to those recorded by Anna Spath variety, which leads to the conclusion that this variety highly exploits the effect of irrigation (Table 6). Increasing the water rules applied resulted in increases in production for the two varieties, at all experimental variants, which are very significant. Anna Spath variety obtained the lowest production, 11.08 t/ha at not irrigated and fertilized variant and the highest, at irrigated variant with 4 l/h and fertilized with 5 kg/ha, 17.73 t/ha, the difference between these two values is 6.65 t/ha. Stanley variety

obtained the lowest production, 10.54 t/ha at not irrigated and fertilized variant, and the highest, at irrigated variant with 4 l/h and fertilized with 5 kg/ha, 18.91 t/h, the difference between these two values is 8.37 t/ha. The increase made by these varieties had statistical ensurance being very significant, at all analyzed variants.

CONCLUSIONS

The influence of variety on the production of plums, average of years 2010-2012

The two varieties, considering the average production of the three years of experimentation, have the same productive potential highlighted by the climatic conditions of the growing year and by several factors such as irrigation and fertilization.

The influence of the drip irrigation on productivity for the same variety of plums, average of years 2010-2012

Under not irrigation conditions, Anna Spath variety records higher production than Stanley variety. The application of irrigation water stimulates the production growth obtained by Stanley variety, which exceeds Anna Spath variety productions at both levels administered. The recorded increases were very significant in all cases. The highest productions were obtained at rules 4 l/h, 16.72 t/ha.

The influence of variety on the production of plums for the same level of irrigation, average of years 2010-2012

Anna Spath variety showed a higher production potential than Stanley variety, the difference between them is significant. Applying irrigation had positive effects on the production capacity of Stanley variety, its production increased while increasing the irrigation rules and exceeding Anna Spath variety productions with distinct significant increases of up to 1.27 t/ha.

The influence of irrigation on the production of plums for the same level of fertilization, average of years 2010-2012

The level of irrigation led to production increases higher than those obtained following the fertilization and rated as very significant for all levels applied. The highest productions

were obtained at rules 4 l/h, 18.32 t / ha with an increase of 5.39 t/ha.

The influence of irrigation on the production of plums for the same variety and fertilization level, average of years 2010-2012

Stanley variety recorded the highest production increases compared to those recorded by Anna Spath variety, which leads to the conclusion that this variety highly exploits the effect of irrigation. Increasing water rules applied resulted in increases in production for the two varieties, at all experimental variants, which are very significant.

The influence of variety on the production of plums for the same level of irrigation and fertilization, average of years 2010-2012

During the three years of experimentation, it was found out that Anna Spath variety achieved higher production than Stanley variety under not irrigation conditions, the differences are distinctly significant (1.29 t/ha). The application of irrigation increases the production of Stanley variety, the differences between varieties were reduced to insignificant, at rule of 2 l/h. The increase of rule at 4 l/h determines production increases of Stanley variety, the production difference between this variety and Anna Spath variety was distinctly significant (43 t/ha).

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CAPACITY OF MAINTAINING THE APPLES QUALITY, IN FRESH CONDITION-CASE STUDY

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Abstract

A balanced diet implies consuming fruit throughout the year, for which their preservation throughout the winter helps to ensure their consumption and increase the growing profitability by avoiding the market overloading during fruit harvest. In order to establish the ability to maintain the quality of fresh apples, 6 varieties of apples were analyzed Florina, Generos, Golden Delicious, Idared, Jonathan and Redix with large spreading in the current range in our country. The fruits were produced in the fruit tree farm of Belciugatele Didactical and Experimental Station and were tested in the laboratory in the cold store of the unit. The experimental and storage conditions were $t = 0...+4^{\circ}\text{C}$, UR = 90-95%. After 120 days of storage were made determinations regarding :the recorded quantity and quality of the losses of fruit during storage; the change of the fruit consistency (penetrometer determined); the soluble dry matter evolution during storage (refractometer determined); the organoleptic appreciation (appearance, firmness, taste) of the fruits after storage. The mass losses were increased in the variety Golden Delicious. The contents of dry soluble substance in apples increased during the maintenance in different proportion, depending on the variety.

Key words: apple, growing, losses, organoleptic, soluble dry substance

INTRODUCTION

The great nutritional value of the fruit, due to its contents of highly assimilable sugars (glucose and fructose), organic acids, minerals and micro-elements, justify its inclusion in the daily ration of people. [7]

A balanced diet implies consuming fruit throughout the year, for which their preservation throughout the winter helps to ensure their consumption and increases growing profitability by avoiding the market overloading during fruit harvest. [3]

Preserving fruits in such conditions must ensure that when they are used they meet the best organoleptic qualities.[9]

It is believed that the fruits are preserved better if they maintain health, turgid and organoleptic characteristics and weight loss during preservation is very low. [5]

Achieving these parameters is subject to "dowry" that fruit have when placing in the storage, so all the physical, biochemical and organoleptic characteristics defining the

quality.[1]

Fresh fruits are living organisms, in their tissues, complex metabolic processes take place after the harvest, under the action of its own enzymes.[10] The preservation technologies are designed to reduce the intensity of the metabolic processes, in particular the breath and perspiration, as well as the activity of pathogenic micro-organisms which generate decomposition processes. [8] Fresh fruit is one of the indispensable components of rational nutrition of men. The food value of the fruit eaten fresh, due to their chemical components easily accessible by the human body, plus a number of excitatory gustatory, olfactory and visual factors which make them to be enjoyed at any time of day or season. [4]

Due to the complex chemical composition of the fruit, and the important role they play in nutrition, the food need should include 10-15% fruit for the daily consumption, which can not be substituted by other food. From chemical point of view, the fruit contain water

and dry substance (organic substances and minerals). The contents of water of the fresh fruit varies depending on the species, as follows: 74 % plums, peaches 91.5 %, 93 % of strawberry [2]

Sugars form the main mass of dry fruit component (about 90%). The most widespread are monosaccharides (glucose, fructose), disaccharides (sucrose) and polysaccharides (cellulose, starch and pectin). The sugars in fruits, especially simple ones are easily assimilated by the human body, entering directly into the bloodstream. [6]

MATERIALS AND METHODS

In order to establish the ability to maintain the quality of fresh apples, 6 varieties of apple were taken into consideration Florina, Generos, Golden Delicious, Idared, Jonathan and Redix with large spreading of the current variety in our country. The fruits were produced in the fruit tree farm of Belciugatele Teaching Station and were tested in the laboratory in cold store of the unit. The experimentation and storage conditions were $t = 0 \dots + 4 \text{ }^\circ\text{C}$, UR = 90-95 %.

After 120 days of storage determinations were used related to:

- the level of quantitative and qualitative losses recorded by fruit;
- modification of fruit consistency (determined penetrometer);
- evolution of soluble solid substance content (determined refractive);
- organoleptic assessment (appearance, firmness, taste) of the fruits after storage .

The experiments were organized in 6 comparative variants with 3 repetitions per variant, the fruit is placed in plastic boxes for fruits and vegetables, in a single layer for preservation (table 1)

Table 1. Experimental variants of the storage experiences

Variant	Apple Variety
1	Florina
2	Generos
3	Golden Delicious
4	Idared
5	Jonathan
6	Redix

During the storage, the daily control was performed of thermo-hydric factors in the cold room in order to ensure the compliance with the conditions of maintaining optimum quality (temperature $0 \dots 4 \text{ }^\circ\text{C}$ and relative humidity 90..95 %). It was also assessed the ability to maintain the fruit quality by findings on occurring aspect changes related to the dehydration, the emergence and development of various diseases of deposit. After removing the apples from the storage space, determinations were made on the quantitative and qualitative level of losses recorded by the fruit, the modification of the fruit consistency, (determined penetrometer), the evolution of soluble solid substance content (determined refractive) and organoleptic assessment (appearance, firmness, flavor), of the fruit after the storage.

The determination of loss of mass and the product spoilage during the storage was done by weighing the samples of resulted fruit or impaired fruit (ill) during the storage, compared to the initial amount deposited and the results are expressed in percentages.

The fruit firmness was performed with manual penetrometer type Effe -gi with large piston with the diameter of 11 mm, to a number of 25 fruits per variant, each fruit being penetrated in 4 points in the equatorial area, after the removal of skin in the penetration areas.

The determination of soluble solid substance was performed by refractometry method, using mass ABBE refractometer, expressing the results in percentages.

For the organoleptic assessment, tastings were conducted using the tasting sheets comprising a total of 3 assessment criteria (appearance, texture, taste). The assessment was made using 100 points scale. Each of the three assessment criteria have different weight in the general scoring, depending on their importance. This "aspect" is 15%, "texture" is 35% and "taste" is 50%. Depending on the achieved score, 5 quality classes differentiate, according to table 2. The organoleptic testing of the fruit was conducted in the laboratory inside the cold storage.

Table 2. Classification of fruit after scoring

Quality classes	Points
very good	80-100
good	60-79
Acceptable	40-59
Mediocre	20-39
not adequate	0-19

RESULTS AND DISCUSSIONS

The results regarding the level of quantitative and qualitative losses recorded by fruit during the storage to the analyzed variants are shown in table 3.

From the data presented it results that the total apple losses during storage were between 2,1 - 6.4% (depending on variety), with an average of 4.21%. The weight loss varied between 2.1 - 6.4%, with an average of 3.48% and the blackening between 0-2%, with an average 0.73%.

The lowest total losses were recorded in var. 4-Idared (2.1%), followed by var.1 - Florina, These variants showed low losses and record impairment due to the disease. The highest total losses were recorded in var.3- Golden Delicious (6.4%).

The mass loss during storage varied between 2.1-6.4% depending on variety, with an average of 3.48 %. The lowest losses were determined in fruit var.4-Idared (2.1%) and var.2-Generos (2.9 %) and highest in var.3 - Golden Delicious (6.4%).

The impairment losses experienced were low in general, averaging 0.73%. Thus, at a total of 3 varieties, losses were not recorded by impairment during the storage, and the other 3 variants, they were very small, of 1.0-2.0% depending on the variety.

Conclusions: The loss of mass varied between 2.1-6.4%, with an average of 3.48% and the blackening between 0-2%, with an average 0.73%. The lowest total losses were recorded in var.4-Idared (2.1%), the weight loss during storage varies between 2.1-6.4% depending on variety, with an average of 3.48%. The lowest losses were determined in fruit in var.4 - Idared (2.1%) and var.2 Generos (2.9%) and the highest in var.3 - Golden Delicious (6.4%). Impairment losses experienced in general were low, on an average 0.73%

The results regarding the modification of the fruit consistency (determined penetrometer) during the storage are shown in table 4.

When stored in cold places, the studied apple varieties presented a different level of pulp consistency, with variations between 3.92 kgf/cm² (var.6-Redix) and 5.11 kgf/cm² (var.2-Generos). The average value at the 6 variants was 4.62 kgf/cm². The varieties with the highest firmness were var.2-Generos (5.11 kgf/cm²) and var.1-Florina (5.01 kgf/cm²), and the lowest firmness recorded in var.6-Redix (3.92 kgf/cm²).

During the storage, the apples firmness decreased at most variants in different percentages, except for var.6-Redix, fruit firmness increased by 2.55%. The most drastical decrease of firmness recorded at var.3-Golden Delicious (31.26%), followed by var.2-Generos (26,02%).

Conclusions: Compared to the initial fruit firmness ranged from 3.92-5.11 kgf/cm² (depending on variety) after storing, the apples recorded firmness values of 3.63-4.39 kgf/cm² according to the variety.

The firmness of apples decreased at most variants during storage in cold places with values between 2.66-31.26%, while there are apples to which the value of this indicator increased by 2.55 % (var.6 - Redix).

Among some varieties, var.4-Idared and var.6-Redix were noted, with low variations of firmness during the storage. The last place was var.3-Golden Delicious, its firmness decreased by 31.26 % during storage.

The results on the evolution of soluble solid substance content during the storage refractive determined are shown in Table 5.

The initial content of soluble dry substance of apples which were experimented was between 10.80-13.2% depending on the variant, with an average of 12.00%.

During the storage all experimental variants showed increases in content between 1.89-6.48 % of soluble dry substance, with an average of 4.08%. The highest increases were determined to var.4 - Idared (6.48%) and lowest in var.1 - Florina (1.89%)

Table 3. Losses while preserving apples

Variant	Growing	Losses (%)			Observations	Place
		Total	Mass	Impairment		
1	Florina	3.5	3.5	-	15 % fruit with wrinkled aspect	2
2	Generos	4.3	2.9	1.4	very good aspect	4
3	Golden Delicious	6.4	6.4	-	81% fruit with accentuated wrinkle	6
4	Idared	2.1	2.1	-	very good aspect	1
5	Jonathan	5.0	3.0	2.0	20% fruit with wrinkled aspect	5
6	Redix	4.0	3.0	1.0	9% fruit with wrinkled aspect	3
	Average	4.21	3.48	0.73		

Table 4. Firmness of apples during storage and after storage

Variant	rowing	Firmness (kgf/cm ²)			
		Before storage	After storage	Differences (%)	
1	Florina	5.01	3.85	-23.15	
2	Generos	5.11	3.78	-26.02	
3	Golden Delicious	4.67	3.21	-31.26	
4	Idared	4.51	4.39	-2.66	
5	Jonathan	4.54	3.63	-20.04	
6	Redix	3.92	4.02	+2.55	
	Average	-	4.62	3.81	-

Table 5. Dry soluble substance evolution before and after storage

Variant	Cultivar	Soluble dry substance (%)		
		Before storage	After storage	Difference (%)
1	Florina	13.20	13.45	+1.89
2	Generos	10.45	11.00	+5.26
3	Golden Delicious	12.40	13.00	+4.83
4	Idared	10.80	11.50	+6.48
5	Jonathan	12.75	13.00	+1.96
6	Redix	12.50	13.00	+4.00
	Average	12.00	12.49	+4.08

Table 6. Organoleptic assessment of apples after storage

Variant	Growing	Organoleptic assessment-points				Score	Place
		Appearance	Firmness	Taste	Total		
1	Florina	13.80	30.20	40.00	84.00	Very good	5
2	Generos	14.40	32.20	44.00	90.60	Very good	1
3	Golden Delicious	9.00	19.60	36.00	64.60	Good	6
4	Idared	14.40	30.80	40.00	85.20	Very good	3
5	Jonathan	12.00	26.60	46.00	84.60	Very good	4
6	Redix	12.60	30.80	42.00	85.40	Very good	2

Conclusions: the soluble solid substance content of the apples increases during the storage in different proportions, depending on variety. The average growth is 4.08%, with variations ranging from 1.89-6.48. The results of the organoleptic test at apples (appearance, firmness, flavor) after storage are shown in Table 6.

In terms of appearance, it was found out that var.2-Generos, has obtained the highest score (14.40 points) of all experimental variants, equal to var.4- Idared. Var.3-Golden

Delicious obtained the lowest score on this indicator (9.00). At the end of storage period, the fruit firmness obtained a score between 19.60-32.20 points. Var.2- Generos variety was the most appreciated, achieving a score of 32.20, followed by variants var.4-Idared and var.6 - Redix variety, which obtained 30.80 points.

In terms of taste, the assessment score was between 36.0 and 46.0 points, depending on the variant. Among the varieties the highest score belonged to variant 5- variety Jonathan

(46.0 points) and the lowest variant 3 Golden Delicious (36.0 points).

The total score (firmness+skin+taste) was between 64.60 and 90.60 points, depending on the variant. In the first place with a score of 90.60 points and the qualification «very good», was ranked var.2-Generos, followed by var.6 - Redix with 85.40 points and 85.20 points var.4-Idared with and the same score. The last place was var.3-Golden Delicious, which recorded a score of only 64.60 points and the qualification «good ».

Conclusions: Of the 6 apple varieties that were studied, 5 varieties (Generos, Redix, Idared, Jonathan and Florina) were rated «very good», and Golden Delicious «good», being in the last place.

CONCLUSIONS

The presented conclusions refer to the results obtained from the experiments carried out on fruit in 2013 harvest, in the specific technical and climatic conditions.

The total losses in apples during the storage are between 2.1-33.9% (depending on variety), with an average of 4.21%. The weight loss varies between 2.1-6.4%, with an average of 3.48% and the blackening between 0-2%, with an average 0.73%. The lowest losses were determined in fruit var.4-Idared (2.1%) and var.2 Generos (2.9 %) and the highest in var.3 - Golden Delicious (6.4%).

The impairment losses experienced in general were low, averaging 0.73%

Compared to the initial fruit firmness of 3.92-5.11 kgf/cm² (depending on variety), after storing, the apples recorded firmness values of 3.63- 4.39 kgf/cm² depending on variety.

The firmness of apples decreased at most variants during the storage in a cold place with values between 2.66-31.26%, while there are apples which this indicator increased by 2.55% (var.6 - Redix).

Among some varieties, var.4-Idared and var.6-Redix were noted with low variations of firmness during the storage. The last place was var.3-Golden Delicious, its firmness decreased by 31.26 % during the storage.

The soluble solid substance content in apples increases during the storage in different

proportions, depending on the variety. The average growth is 4.08%, with variations ranging from 1.89-6.48%.

Of the 6 apple varieties which were studied, 5 varieties (Generos, Redix, Idared, Jonathan and Florina) were rated «very good», and Golden Delicious «good», being in the last place.

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PRODUCTION OF RAPESEED IN THE UNITED KINGDOM, IN THE ZONAL AND EUROPEAN CONTEXT (2010-2012)

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Abstract

Rapeseed is currently one of the world's most important oil species. Rapeseed oil contains varying proportions of saturated and unsaturated fatty acids: Oleic - 20%, linoleic 15%, linolenic - 9% -15% erucic, casenoic - 8%, palmitic - 4%, 1% stearic acid. Erucic acid from rapeseed oil used in diet has negative effects on the human body because it retards the growth of young organism causing diseases of the circulatory system and the adrenal glands, liver and thyroid gland. By reducing the erucic acid content has increased proportion of oleic acid, from 14-20% to more than 64%, and the percentage of linoleic acid from 13-15% to more than 24%, which increased the food quality of rapeseed oil which can replace in this respect the sunflower oil. It should be noted also that, rapeseed oil low in erucic acid content, has unique effects on serum total cholesterol, serum fatty acids and the level of anti-oxidants, compared to diets high in saturated fat or oil mono- or poly-unsaturated from sunflower. The work was born following the presentation of producer's performance placed in another area of culture, rather than national, through different environmental conditions and production (production structure, way of organizing the activity, degree of capitalization of the producers etc.).

Keywords: rapeseed acreage, average production, total production

INTRODUCTION

Oilseed rape is currently one of the world's most important oil species, cultivating seed is rich in oil 42-48% used in feed people, the preparation of margarine and industry.

Rapeseed oil has iodine index 94-112 and can be used in the textile, leather, plastics, varnishes, paints, inks, detergents, printing industry, lighting or as a lubricant, oil paintings, candles, to manufacture anti-dusting agent, as an adjunct to pesticides, hydraulic fluids.

The oilcake and grist remaining after oil extraction is a valuable fodder for animals, if taken in moderation. It contains 35-40% protein, 32-37% carbohydrate and 8-10% of mineral salts, thus having high biological value. From 100 kg rapeseed afford 30 - 35 kg oil and 50 - 55 kg of grist.

Oilseed rape can be cultivated also for feed purposes, using as green fodder, very late autumn, when it is sown in late summer or early spring when sown in autumn.

Oilseed rape is a very good melliferous plant,

from a hectare of rape yielding 50 kg of high-quality honey, energizing, anti-anemic also digestive.

In organic farming, the infusion of rape (leaves also roots) is used to apricot and plum fighting monilia by splashing in blooming.

Autumn rape also offers a number of agro-phyto advantages for growers: sown and harvested outside busy periods; reacts favorably to fertilization; allow full use of the same type of machine as grain; matures early (June-July), free of weeds also leaves the soil with good fertility, being a very good run for winter cereals or succeeding crops; by the speed of growth and rich vegetation mass, rapeseed largely suppress weeds and soil remains in a good state from physico-chemical and biological; biological circuit remains in soil a large amount of biomass; having small seed dries quickly and reaches 10-12% moisture in the field, reducing the need for artificial drying; is an excellent anti-erosion plant; covers the ground in winter, limiting the risk of nitrate leachate; has a large multiplication coefficient (500 - 1000),

compared with wheat (40-50) or peas. [3]

In the culture of oilseed rape, the need of obtaining superior parameters of profitability and economic efficiency can be achieved by increasing yield per hectare, proper management of production costs and optimize marketing.

a. The increase in yield per hectare. It is directly related to the following factors: soil suitability in terms of compliance with the conditions required by this plant; use of varieties with high oil content; integrated control of weeds, pests and diseases; full mechanization of work, etc.

b. Managing production costs. Improving this aspect is based on: determination, knowledge also operation cost structure throughout the economic cycle; scheduled correlation yields per hectare costs; makers flexibility in light of changing production conditions during the growing season.

c. Optimizing marketing production. Production quality is directly related to harvesting technology in two phases or directly to combine.

For both alternatives should be considered the optimal time for starting the harvesting operation.

Preparing production for sale involves bringing indices - hectoliter mass, foreign bodies and moisture to known standards. When negotiating the sale price should be considered also oil content of the seeds. In general, farms must have accurate information on market-especially rapeseed formation and evolution of supply and demand. [2]

MATERIAL AND METHOD

Based on the data used as a source document, the British succeeded in framing under

Table 1. UK - Rapeseed, surface cultivated (thousand ha)

Nr.	Year	Europe	U.E.	North Europe	Great Britain			
					Effective	% beside Europe**	% beside U. E.**	% beside Northern Europe**
1	2010*	8,944,6	7,087,4	1,549,9	642	7.18	9.06	41.42
2	2011*	8,810,1	6,756,5	1,524,1	705	8.00	10.43	46.26
3	2012*	8,240,1	6,206,6	1,538,1	756	9.17	12.18	49.15
4	Average**	8,664,9	6,683,5	1,537,4	701	8.09	10.49	45.60

* <http://faostat.fao.org/site/567/DesktopDefault.aspx?PageID=567#ancor>

** own calculation;

economic and geographical report (according to FAO), making reference to Europe, the European Union (interstate body to which the UK is a party), and in Northern Europe (geographical region used by FAO). In the first body includes countries such as UK, France, Germany, Belgium, Holland, Ireland, Italy, Denmark, Finland, Sweden, Spain, Portugal, Greece, Cyprus, Luxembourg, Malta, Poland, Slovenia, Slovakia, Czech Republic, Austria, Lithuania, Latvia, Estonia, Hungary, Romania, Bulgaria. Northern Europe region consists (according to FAO statistics), a series of countries such as Denmark, Finland, Sweden, Ireland, Norway, Lithuania, Latvia, Estonia.

The method of analysis used for the study is the comparison in time and space, and were used as indicators of cultivated area (thousand ha), total production (thousand tons) also average production per unit productive kg / (ha).

Adequate indicators based on building a dynamic (composed of levels of indicators for the years 2010, 2011 and 2012, to which was added period average), using fixed and mobile based indices (which allowed adequate analysis indicators).

RESULTS AND DISCUSSIONS

Cultivated area. The European continent is characterized by an area planted with rapeseed between 8,240,100 ha in 2012, and 8,944,600 ha in 2010, while the average period reached 8.6649 million ha (Table 1.).

ha in 2010 to 756,000 ha in the year 2012, while the average period reached 701,000 ha (705,000 ha in 2011).

These levels relate to specific situations of the European continent, but also for the European Union (7,087.4, 6,756.5, 6,206.6 and 6,683,3 ha in 2010, 2011, 2012 and period average) respectively Northern Europe (1,549.9, 1,524.1, 1,538.1 and 1,537.4 ha in the years 2010, 2011, 2012 and for the period average) as presented in Fig. 1.

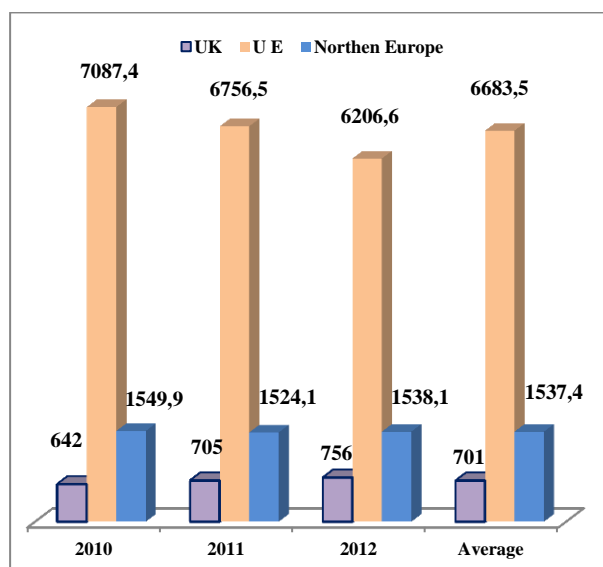


Fig. 1. UK. Rapeseed cultivated surface (thousand ha)

Table 2. Great Britain - Rapeseed, total production (thousand tons)

Nr.	Year	Europe	U.E.	Northern Europe	Great Britain			
					Effective	% beside Europe**	% beside U. E.**	% beside Northern Europe **
1	2010*	23,236.3	20,576.7	4,079.1	2,230	9.60	10.84	54.67
2	2011*	22,307.0	19,249.3	4,560.2	2,758	12.36	14.33	60.48
3	2012*	22,355.1	19,247.0	4,592.3	2,557	11.44	13.29	55.68
4	Average**	22,632.7	19,691.0	4,410.5	2,515	11.11	12.77	57.02

* <http://faostat.fao.org/site/567/DesktopDefault.aspx?PageID=567#ancor>

** own calculation

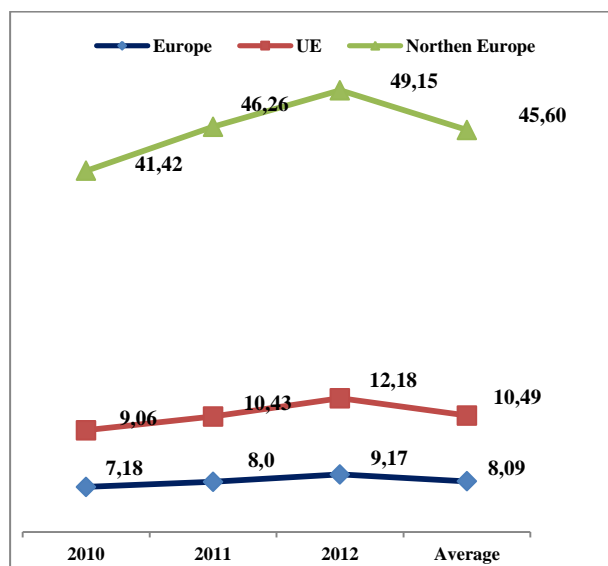


Fig. 2. UK. Rapeseed acreage, European and regional percentage (%)

in the European and regional context (2010-2012)

Referring to the cultivated area in the UK, one can observe the variation thereof, from 642,000

It is worth to note that Great Britain has held varying weights to the three levels of reporting.

a. compared with the continental situation: from 7.18 to 9.17% (2010 and 2012), with a share of 8.09% of the average period (Fig. 2);

b. compared to the specific situation of the European Union: 9.06% in 2010, 10.43% in 2011, 12.18% in 2012, 10.49% compared with the average of the period (Fig. 2);

c. reported to Northern Europe: 45.60% average share, 41.42% in 2010, 46.26% in 2011, 49.15% in the year 2012 (Fig. 2).

Total production. Regarding the total European production of rapeseed (Table 2), it can be seen that this was an average of 22,632.7 thousand tons, annual sequential levels of 22,307.0 thousand tons in 2011, 22,355.1 thousand tons 2012 and 23,236.3 thousand tons for 2010.

If we analyze specific data of total British production, variation on indicator is found to 2.23 million t in 2010 to 2.758 million t in 2011.

The average of the period 2.515 million t (while the indicator reached 2.557 million t for 2012) as shown in Fig.3. The total production will be reported to the state of things specific to Europe, the European Union (20,576.7, 19,249.3, 19,247.0 and 19,691.0 thousand tons in 2010, 2011, 2012 and for the period average) and Northern Europe (4,079.1, 4,560.2, 4,592.3 and 4,410 thousand tones t in the years 2010.2011, 2012 and for the period average) as presented in Fig. 3.

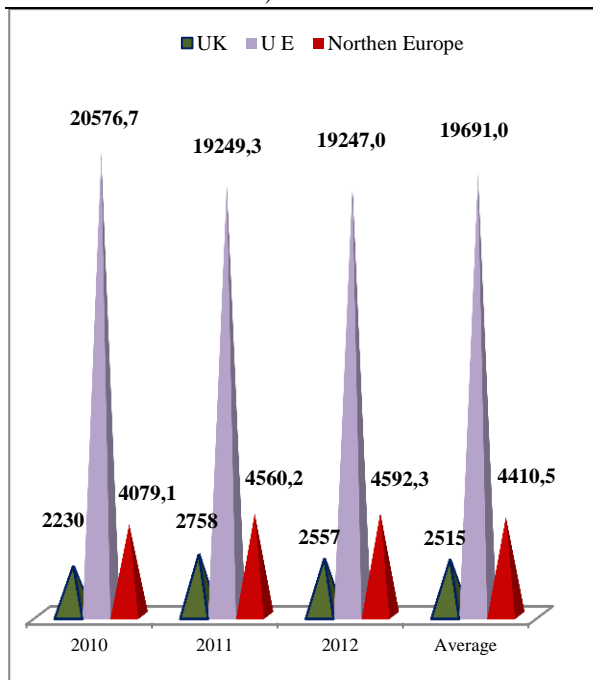


Fig. 3. UK. Rapeseed Total production (thousand tons) in the European and regional context

Realizing a comparison in space, we can see that Great Britain has held varying weights beside the terms of comparison, as follows:

- a. 9.60, 12.36, 11.44 and 11.11% beside the continental situation for 2010, 2011, 2012 and period average (Fig. 4);
- b. 10.84, 14.33, 13.29 and 12.77% compared to the situation characteristic of the European Union for the years 2010, 2011, 2012 and for the period average (Fig. 4);

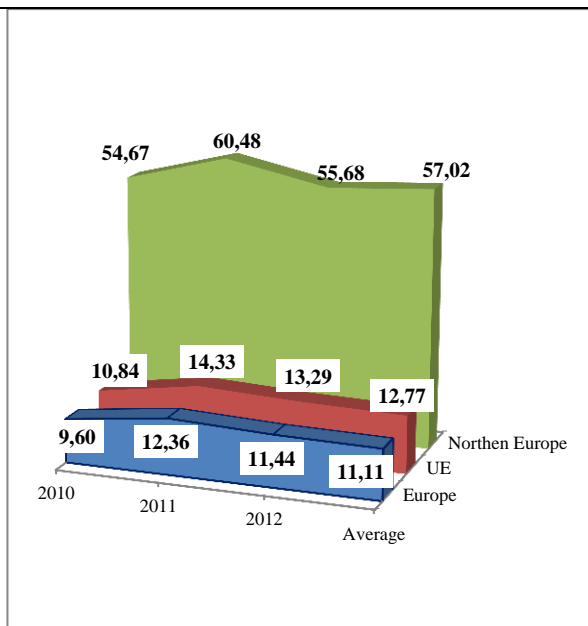


Fig. 4. UK. Rapeseed - Total, European and regional percentage%

c. 54.67, 60.48, 55.68 and 57.02% for the years 2010, 2011, 2012 and for the period average compared to Northern Europe (Fig. 4).

European **average yield** (Table 3) was one that consistently exceeded the level of 2,500 kg / ha (average of the period reached 2,612 kg) as follows: 2,532 kg / ha in 2011, 2,598 kg / ha for 2010 and 2,713 kg respectively / ha for 2012.

Table 3. Great Britain, Rapeseed average production (kg / ha)

Nr.	Year	Europe	U.E.	Northern Europe	Great Britain			
					Effective	% beside Europe**	% beside U. E.**	% beside Northern Europe**
1	2010*	2,598	2,903	2,632	3,474	133.72	119.67	131.99
2	2011*	2,532	2,849	2,992	3,912	154.50	137.31	130.75
3	2012*	2,713	3,101	2,986	3,382	124.66	109.06	113.26
4	Average**	2,612	2,946	2,869	3,588	137.36	121.79	123.89

* <http://faostat.fao.org/site/567/DesktopDefault.aspx?PageID=567#ancor>

** own calculation

In terms of average production per productive unit (ha), UK averaged 3,588 kg, 3,382 kg variation limits in 2012 and 3,912 kg in 2011 (3,474 kg in the case of 2010) as shown in Fig. 5.

The indicator levels evolved into a continental and regional context, quite variable (2,903, 2,849, 3,101 and 2,946 kg for the European Union in 2,632, 2,992, 2,986 and 2,869 kg for Northern Europe in the years 2010, 2011,

2012 and for average of the period, as shown in Fig. 5).

Compared to the continental and regional Great Britain is positioned, in terms of average production, as follows:

- a. It exceeds by 24.66%, 33.72%, 37.36% and 54.50% the continental level in 2012, 2010 for the average of the period and the year 2011(Fig. 6);

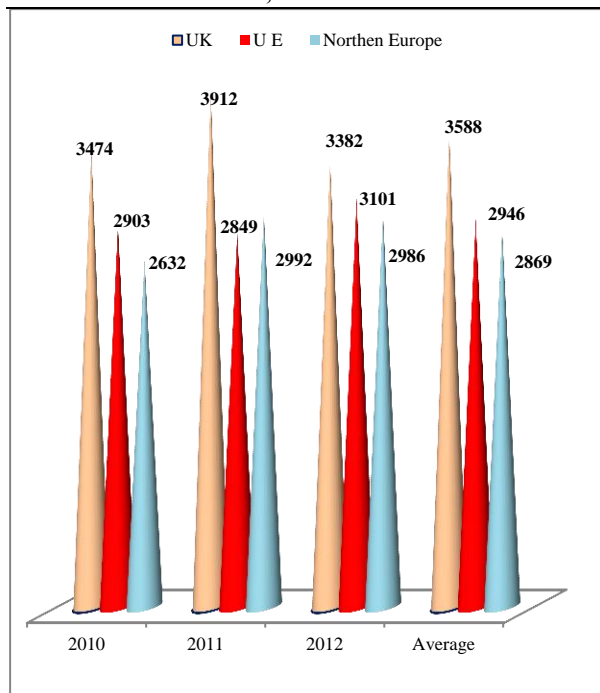


Fig. 5. UK. Rapeseed Average yield (kg / ha) in the European and regional context

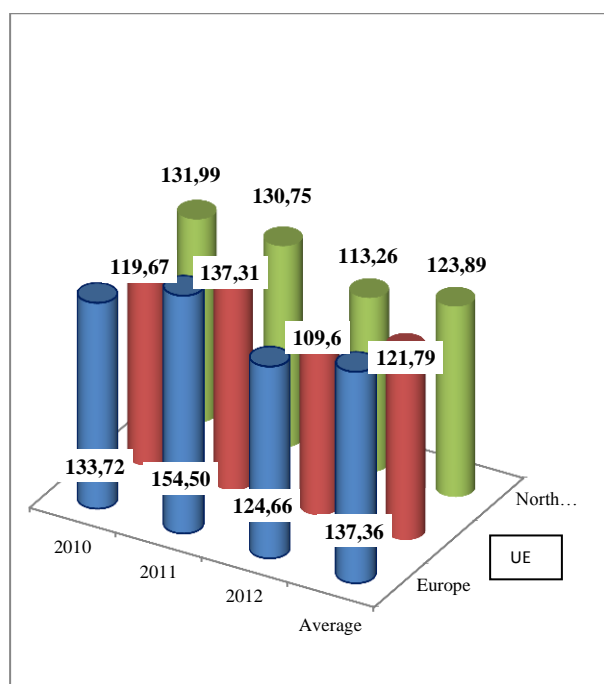


Fig. 6. UK. Rapeseed average production, percentage at European and regional level (%)

- b. It outruns of 1.09, 1.19, 1.21 and 1.37 times the situation in the European Union for the years 2012, 2010, and that the average of the period 2011 (Fig. 6);
- c. Its production is higher by 13.26%, 23.89%, 30.75% and 31.99% than the specific

level for Northern Europe in 2012, for the period average and year 2011 and 2010 (Fig.6).

CONCLUSIONS

- This study led to the following conclusions:
- a. in terms of cultivated area, Great Britain represents a major player in Europe, beside the European Union and Northern Europe at the level average weights of 8.09%, 10.49% and 45.60% (noting the annual weights evolved ascending in all three reporting cases);
 - b. It is noticeable the upward trend of the surface (from 642 to 756,000 ha - 2010 and 2012), a situation favorable compared to the European Community and north Europe, areas for which the indicator has been descending or more fluctuating (North Europe);
 - c. The British total rapeseed production evolved uneven similar appearance to the European one positive compared to Community downward trend and negative compared with the situation in the North of Europe (characterized by increasing the index from 2010 to 2012);
 - d. The UK has achieved, in average, 11.11% of the total European production (3.02% exceeds the percentage recorded for the area), 12.77% of Community production (+ 2.28% compared to the share at the level of surface), 57.02% of the Europe the northern (+ 11.42% compared with the percentage of the area), which noted special attention given to this crop;
 - e. The uneven development of production has entailed also variable annual weights compared with the terms of reference;
 - f. The average production has recorded an uneven trend during the period under review, increases in 2011 (438 kg compared to 2010), followed by decreases in the case of 2012 (- 530 kg compared with the previous term of dynamic series - 2011) . The appearance is unfavorable compared to the situation specific of the European continent (continuous growth), but similar to that for the European Union and the Northern Europe. This instability is mainly the result of the influence of climatic conditions;

g. It is noteworthy that Great Britain surpasses clearly all the terms for comparison - Europe, European Union, Northern Europe - demotions average of 1.37, 1.21 and the 1.23 times. Exceedances of European situation evolved upward, while towards the European Union and the Northern Europe, overruns were fluctuating.

It can be concluded that the UK is a major player in the European market of rapeseed, at least through the primary potential which it develops. Following are considered beneficial experiences of producers in this area, at least technically and technologically.

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ECONOMIC AND FINANCIAL ASPECTS OF THE ACTIVITY OF THE SC TREPMA LLC, ȘOPÂRLIȚA, OLT COUNTY (2011-2013)

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Abstract

The unit was established in 2003, with the object of activity "Support activities to agriculture and post-harvest activities" - CAEN code 0161 from 02.08.2006. The company has the legal form of a limited liability company and operates in accordance with Romanian legislation. In addition to the main business - support activities for crop production, the company may carry on business as a secondary objective: the cultivation of cereals, legumes and oilseeds producing plant; Growing of vegetables and melons, roots and tubers, tobacco cultivation; cultivation of plants for the preparation of beverages; dairy cattle; pig breeding, poultry farming; Raising of other animals; post-harvest activities; preparing seed; activities (mixed farming of crops combined with farming of animals); Silviculture and other forestry; forestry and forestry; Freshwater aquaculture; processing and preserving of meat; processing and preserving of poultry meat; processing and preserving of potatoes; Manufacture of fruit and vegetables; mill products; manufacture of dairy products and cheeses, bread making, making cakes and fresh pastry; manufacture of other food products. Duration of the company's is one unlimited, and the subscribed capital was Lei 300 (wholly owned only by the shareholder), increase or reduction of capital, and its transmission can be achieved in concrete terms stipulated in the articles of incorporation.

Key words: assets, capital, customers, equipment, landscape, providers

INTRODUCTION

Șopârlița Village is located in Olt County, at the confluence of the creek Olteț and river Olt at a distance of about 25 km from Slatina. Founded in 1476, the village is documented later in 1642, during the reign of Matei Basarab, whose treasurer built, in a place called "Zapodie" Oltețului terrace, a church around which it is supposed to have been fireplace old village. In November 2004 Common Șopârlița was re-established that during the communist regime was a village affiliate to commune Pârșoveni. Places neighboring the vilagge: to North-East Brâncoveni, Pârșoveni locality to West, Osica de Sus village to South-East and Dobrun village to South. [1]

Common Șopârlița is a plain village, a medium sized type, together with houses grouped closely next to each other, consisting of two "hearths": the hearth of the hill, which stretches along the county road DJ 644, on a length of 2 km and 400 meters terrace and the hearth of the Olteț River valley slope terrace

which stretches the plain continuing to the county meadow. [2]

The whole village is deployed in length from East to West. On the hill, in the village there are the local authorities and institutions: the City Hall, police, schools, cultural centers, local dispensary, care and support, and the railway station Șopârlița in the East, the entrance to the village. The most important development in recent years deployed in the village was the regaining of the common status, which attracted the establishment of vital institutions to the functioning of the administrative apparatus, such as the mayor, the city council, Chamber of Agriculture, police etc.

The unit was established in 2003, with the object of activity "To support activities in agriculture and post-harvest activities" - CAEN code 0161 from 02.08.2006.

The company has the legal form of a limited liability company and operates in accordance with the Romanian legislation. The farm is owned by the sole shareholder, Mariana Trepaduș who is also the administrator, and

the problems belonging to financial and accounting aspects are solved by an accountant.

The current headquarters of the company are in the Șopârlița Commune, the Olt County, and it could establish subsidiaries as mentioned by law in force. The farm is located on the former CAP Șopârlița.

The main buildings are: the store for storing grains, corn cobs bed store, manure platform, sheds for piglets growing, stables for dairy cows and cattle fattening.

In addition to the main business: "to support activities for crop production", the company may carry on business as a secondary objective: the cultivation of cereals, vegetables and oilseeds, processing plant, growing of vegetables and melons, roots and tubers, tobacco cultivation; cultivation of plants for the preparation of beverages; dairy farming; pig fattening, poultry farming; raising of other animals; post-harvest activities; preparing seed; activities (mixed farming of crops combined with animal farming); forestry; freshwater aquaculture; meat processing and preservation; potatoes processing and preservation; fruit and vegetables processing; mill products; manufacturing dairy products and cheese, bread making, making cakes and fresh pastry; manufacturing other food products.

The duration of the company is unlimited, and the subscribed capital was Lei 300 lei (wholly owned by the sole shareholder), increase or reduction of capital, and its transmission could be achieved, in concrete terms, as stipulated in the articles of the legislation in force.

The Constitutive Act contains provisions regarding the rights and obligations of the members, their powers, organization and holding of the general meeting, issues of appointments and tasks, issues regarding the dissolution, liquidation, merger and division of the society, the staff of the company, the balance sheet and profit and loss calculation and allocation of profits, litigation and final provisions.

The culture Plan shows that the company has marched on conventional crops such as: wheat, sunflower, corn, triticale, nu also

fodder plants, barley and oats on small areas.

MATERIALS AND METHODS

In order to achieve the documentation required by the research work, it was needed to consult the company accounting documents [3].

After data collection, it was compulsory to select them by homogeneous categories: income, expenses, and profit. Forming an overview about those financial indicators, it was calculated the average for the years 2011, 2012 and 2013, also included in the analysis.

RESULTS AND DISCUSSIONS

Indicators of income. Table 1 shows the indicators of income for the years 2011, 2012 and 2013.

The first indicator is the sold production income. This indicator varied from Lei 330,684 in 2011 to Lei 547,406 in the year 2013, while the average period reached Lei 428,297.

It may be noted that the income value has grown by 23.0% in 2012 (Lei 406,801) compared to 2011, followed by further increases (larger) by 34.6% in 2013 compared to the previous term of the dynamic series, while the average period was diminished by 21.8% compared to the situation of 2013.

The revenue from sale of goods occurred only in 2012 - Lei 9,408, which led to Lei 3,136, the average of the indicator.

The revenues coming from grants have averaged Lei 127,970 (+ 19.0% compared to 2013), which was based on the sequential average values: Lei 107,549 in 2013 (-12.8% in dynamics), Lei 123,363 in 2012 (-19.4% compared to the previous term of the dynamic series and Lei 152,998 for 2011. Based on these values, it was noticed the downward trend of this indicator during the analyzed period.

Following the issues mentioned on the sold production, proceeded from the sale of goods and income subsidies, the net turnover was also determined.

Table 1. Indicators of income (Lei)

No.	Specification	2011	2012		2013		Average	
		Ef.	Ef.	2012 /2011**** (%)	Ef.	2013 /2012**** (%)	Ef. ****	Average /2013**** (%)
1.	Sold Production*	330,684	406,801	123.0	547,406	134.6	428,297	78.2
2	Revenue from sale of goods*	-	9,408	-	-	-	3,136	-
3	Income from grants*	152,998	123,363	80.6	107,549	87.2	127,970	119.0
4	Net turnover*(1+2+3)	483,682	539,572	111.6	654,955	121.4	559,403	85.4
5	Income cost of production in progress*	+23,767	+244,318	10.3 times	-142,764	-	41,773.67	-
5.1.	Sold C***	23,767	244,318	10.3 times	-	-	89,361.67	-
5.2.	Sold D**	-	-	-	142,764	-	47,588	33.3
6	Other income*	-	-	-	-	-	-	-
I	Operating income*(4+5+6)	507,449	783,890	154.5	512,191	65.3	601,176.67	117.4
7	Interest income*	-	2	-	-	-	0.66	-
8	Other financial income*	-	-	-	-	-	-	-
II	Financial income*(7+8)	-	2	-	-	-	0.66	-
III	Extraordinary income*	-	-	-	-	-	-	-
IV	Total revenue*(I+II+III)	507449	783892	154.5	512191	65.3	601177.33	117.4

* Data extracted from Profit and loss Account, (2011 – 2013)

** Assigned revenue in balance D, are deducted from net turnover;

*** Assigned revenue in balance C is added to net turnover;

**** Own calculations;

Its value varied between Lei 483,682 in 2011 and Lei 654,955 lei in 2013, and the average period recording Lei 559,403 lei. The dynamics of this indicator was similar to the one recorded by sold production. Thus, it was observed an increase by 11.6% in 2012 (Lei 539,572) compared to the first term of the dynamic series, a 1.21 times growth in 2013, and a decrease in average by 14.6% compared to the situation in 2013.

The revenue from cost of production in progress ranged from Lei 23,767 in 2011 to Lei 244,318 for 2012 (10.3 times more compared to the previous year), both included in the balance C, the average period was Lei 41,773.67 and since 2013, Lei 142,764 was placed on the balance D. The farm did not record other revenues related to the operating activities and therefore the operating income reached: Lei 507,449 in 2011, Lei 783,890 in 2012, a growth rate of 154.5% in dynamics; Lei 512,191 for the year 2013 meaning 65.3%, Lei 601,176.67 for the average period (+ 17.4%).

The unit recorded interest income only in the year 2012, Lei 2. This led to an period average of Lei 0.66.

The unit did not achieve any other income, therefore the financial income is equal to the income coming from interest.

It should be noted that the firm did not register any kind of extraordinary income during the

analyzed period.

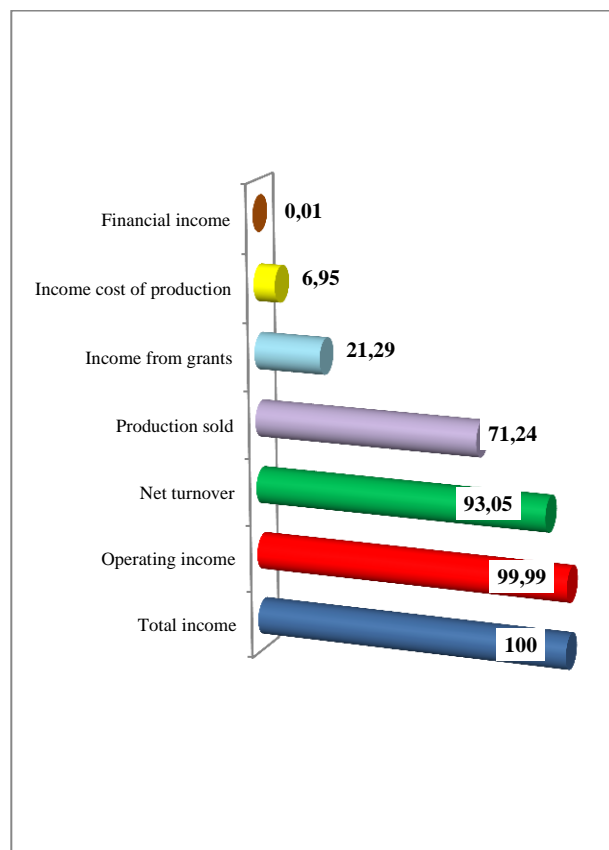


Fig.1. The ratio of total income and its main components (%)

Based on the three categories of revenues (operating, financial and extraordinary), it was calculated the total income of the farm (very

similar to those in operation), whose value was: Lei 507,449 lei for 2011, Lei 783,892 in the year 2012, that is by 54.5% higher in dynamics; Lei 512,191 for 2013 (decreasing by 34.7% compared to the reporting basis); Lei 601,177.33 for the period average (+ 17.4% compared to 2013).

Indicators of expenditures. Table 2 shows the indicators of expenditures for the period under review. Referring to the operating expenses, financial expenses, extraordinary expenses and total expenditures, one can see that the unit performed only operating costs (without financial and extraordinary ones), therefore the total expenditures were strictly influenced only by their value.

Expenses with raw materials and consumables ranged from Lei 301,786 in 2013 to Lei 642,581 in the year 2012, while the average of the period was Lei 433,936.33. The dynamics highlighted an uneven trend of indicator, increases in 2012 (+ 79.8% compared to the year 2011 of Lei 357,442), followed by declines in 2013 (-53.1% compared to the previous term of the dynamic

series) and then it was occurred an increase for the average of the period (+ 43.8%).

Other material expenses occurred during the years 2011, 2012 and 2013 accounted for Lei 1,400, and only Lei 6 and Lei 8, resulting an average of Lei 472.33 for the period under review.

Under these circumstances, the dynamics contains subunit values for 2012 (0.43%) and supra-unitary in 2013 and for period average, exceeding 1.83 and, respectively, 42.9 times in terms of comparison.

As a result, the total expenses related to materials and goods ranged from Lei 301,797 in 2013 to Lei 642,587 for the year 2012 and at the level of 2011 they reached Lei 358,842 (Fig. 3).

Under these circumstances, the average of the period was Lei 434,408.67, which represented in dynamic an overrun with 43.9% of the reporting base. In dynamics, the indicator was uneven, it increased by 79.1% in 2012, followed by a decrease of 53.1% in 2013, compared to the previous term of the dynamic series.

Table 2.Indicatori of expenditures (Lei)

No.	Specification	2011	2012		2013		Average	
		Ef.	Ef.	2012 /2011** (%)	Ef.	2013 /2012** (%)	Ef. **	Average /2013** (%)
1	Raw materials and consumables *	357,442	642,581	179.8	301,786	46.9	433,936.33	143.8
2	Other material expenses *	1,400	6	0.43	11	183.3	472.33	42.9 times
3	Expenditure on goods *	-	-	-	-	-	-	-
4	Trade discounts received *	-	-	-	-	-	-	-
5	Total expenses related to materials and goods * (1+2+3-4)	358,842	642,587	179.1	301,797	46.9	434,408.67	143.9
6	Salaries *	7,185	28,007	3.90 times	32,210	115.0	22,467.33	69.8
7	Expenditure related to insurance *	2,008	7,777	3.87 times	8,948	115.1	6,244.33	69.8
8	Personnel expenses * (6+7)	9,193	35,784	3.89 times	41,158	115.0	28,711.67	69.8
9	Adjustments for property *	16,200	10,709	66.1	10,709	100.0	12,539.33	117.1
10	Expenditure on external services *	26028	86142	3,31 times	123068	142,9	78412,67	63,7
11	Other taxes, duties and assimilated payments *	10,965	27	0.25	25	92.6	3,672.33	146.9 times
12	Other expenses *	37	2,839	76.72 times	14	0.5	963.33	68.81 times
13	Other operating expenses (external services, other taxes - taxes - payments, damages, donationm transferred assets)*(10+11+12)	37,030	89,008	2.40 times	123,107	138.3	83,048.33	67.5
I	Total operational expenses *(4+8+9+13)	421,265	778,088	184.7	476,771	61.3	558,708	117.2
II	Financial expenses * (11+12)	-	-	-	-	-	-	-
III	Extraordinary expenses *	-	-	-	-	-	-	-
IV	Total expenditure *(I+II+III)	421,265	778,088	184.7	476,771	61.3	558,708	117.2

* Data extracted from Profit and loss Account, (2011 – 2013)

** Own calculations

Wages have increased from Lei 7,185 in 2011 by 3.90% in 2012 (Lei 28,007) and by 15.0% in 2013 (Lei 32,210).

The average of the period reached Lei 22,467.33, representing only 69.8% of the comparison period.

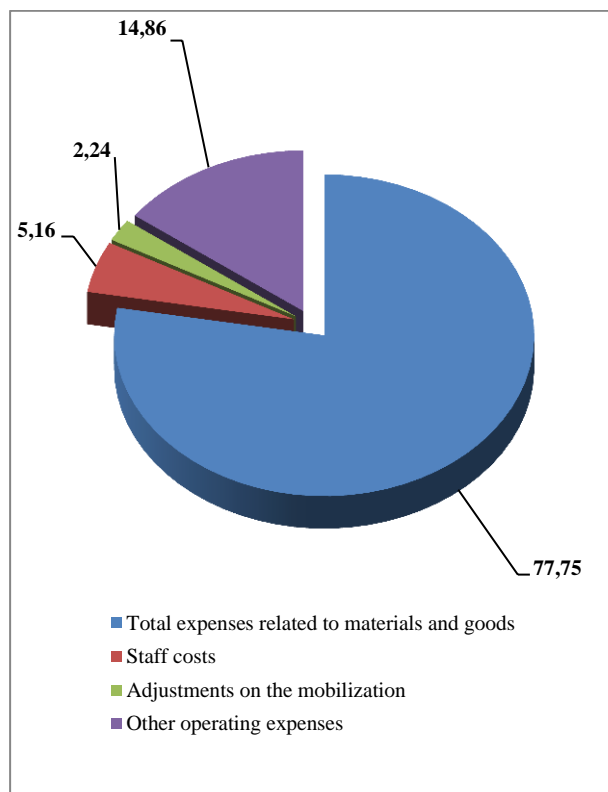


Fig.2. Structure of total expenditure (%)

Security costs have averaged Lei 6244.33 (-30.2% over the reporting basis) with the limit values Lei 2,008 in 2011 and Lei 8,948 in 2013, while at the level of 2012, the indicator reached Lei 7,777. Its dynamics was similar to that recorded for wages.

Based on wages and insurance charges, there determined the personnel expenses. This indicator increased during the analyzed period from Lei 9,193 in 2011 to Lei 41,158 in the year 2013. Therefore, it was noticed an increasing trend of the indicator in reference period, as follows: 3.89 times for 2012 (Lei 35,784), 15.0% for 2013 (average - Lei 28,711.67, by 30.2 % lower compared to the reference base).

Another item of expenditure appears as the adjustments for property, but the indicator development was uneven. The year 2011 was characterized by a value of Lei 16,200 adjustments, then by a fall to Lei 10,709 for

2012 and 2013.

Under these conditions, the average of the period reached Lei 12,539.33 (117.1% over the reporting basis). The dynamics contained indices above unit for the period average, equi-unitary in 2012 and subunit (66.1%) in the year 2012.

Expenditure on external services were Lei 26,028 in 2011 and increased 3.31 times in 2012 (Lei 86,142), increased by 42.9% in 2013 (Lei 123,068), while the average of the period (Lei 78,412.67) was by 36.3% lower over the reporting period.

Regarding other tax expenditures, duties and assimilated payments, it can be seen that they ranged from Lei 25 in 2013 to Lei 10,965 in 2011, while the average of the period was Lei 3,672.33.

In the dynamics, one can see the values for 2012 and 2013 (0.25 % and 92.6% respectively) and the average supra-unitary values for the period (146.9 times higher than the comparison base-2013).

For other expenses, the company recorded an average of Lei 963.33 (exceeding 68.81 times the reference period), the value being based on the annual sequential levels: Lei 14 in 2013 (0.5% in dynamics), Lei 37 lei 2011 and Lei 2,839 lei in the year 2012 (76.72 times higher compared with the previous term of dynamic series).

Following the values quoted for the last three indicators, there were determined other operating expenses, which registered: Lei 37,030 in 2011, Lei 89,008 in 2012 (2.40 times more than the base), Lei 123,107 for 2013 (+38.3% in dynamics).

Based on these values, it was determined the average period which accounted for Lei 83,048.33, representing a decrease in dynamic by 32.5% over the term of comparison.

The total operating expenses were based on the total material costs, personnel costs, adjustments on assets and other operating expenses. Based on indicator values, previously named, the sequential levels were: Lei 421,265 in 2011, Lei 778,088 in 2012 (+84.7% in dynamics), Lei 476,771 in the year 2013 (by -38.7% lower compared to the benchmark), Lei 558,708 for the period average (+17.2% in dynamics).

As the company did not record any financial or extraordinary expenses, there was a similarity between total operating expenses and total expenditures.

Profitability indicators. Table 3 shows the profitability indicators for the period under review.

Table 3. Profitability indicators

No.	Specification	U.M.	2011	2012		2013		Average	
			Ef.	Ef.	2012 /2011** (%)	Ef.	2013 /2012** (%)	Ef. **	Average /2013** (%)
1	The operating profit *	lei	86,184	5,802	6.73	35,420	6.10 times	42,468.67	119.9
2	Financial income *	lei	-	2	-	-	-	0.66	-
3	Current profit * (1+2)	lei	86,184	5,804	6.73	35,420	6.10 times	42,469.33	119.9
4	Extraordinary income *	lei	-	-	-	-	-	-	-
5	Gross profit * (3+4)	lei	86,184	5,804	6.73	35,420	6.10 times	42,469.33	119.9
6	Income tax *	lei	13,789	929	6.74	5,667	6.10 times	6,795	119.9
7	Other taxes or levies *	lei	-	-	-	-	-	-	-
8	Net profit * (5-6-7)	lei	72,395	4,875	6.74	29,753	6.10 times	35,674.33	119.9
9	Operating profit rate **	%	20.46	0.74	3.66	7.43	10.0 times	7.60	102.3
10	Current profit rate **	%	20.46	0.74	3.66	7.43	10.0 times	7.60	102.3
11	Extraordinary profit rate **	%	-	-	-	-	-	-	-
12	The gross profit rate **	%	20.46	0.74	3.66	7.43	10.0 times	7.60	102.3
13	Net profit ratio **	%	17.19	0.63	3.66	6.24	9.90 times	6.38	102.2

* Data extracted from Profit and loss Account, (2011 – 2013)

** Own calculations

Operating profit was characterized by an average of Lei 42,468.67, resulting a value of Lei 86,184 for sequential annual levels in 2011, and Lei 5,802 for year 2013. These values Lei 35,420 highlighted a fluctuating trend indicator, demotions of terms of reference in 2013 and the period average (6.10 and 1.19 times respectively), decreases in 2012 (-93.27%).

Financial profit was Lei 2i in 2012 which led to an average period of Lei 0.66.

Current profit appears as the sum of operating profit and financial profit. The absolute values were Lei 86,184 in 2011, Lei 5,804 in 2012, Lei 35,420 in 2013 and Lei 42,469.33 for the average of the period.

The dynamics was characterized by a supra-unitary value of the component indices for the year 2013 and the period average (6.10 and 1.19 times exceeded the bases of comparison) and subunit levels in 2012 (6.73%).

Gross profit was equal to the current profit, as the company did not register extraordinary profit or loss.

The company paid income tax but it did not pay "other taxes". Thus, the income tax values were: Lei 13,789 in 2011, Lei 929 for the year 2012 (-93.26% in dynamics), Lei 5,667 in 2013 (frontloading of 6.10 times of

comparator). Under these circumstances, the average of the period was Lei 6,795, which exceeded 1.19 times the reporting base.

Net profit was in average Lei 35,674.33, while the extreme values of the indicator occurred in 2012, accounted for Lei 4,875 and Lei 72,395 in 2011.

The dynamics reflected an uneven level being 1.19 times and 6.10 times the average of the period in 2013 (compared with the specific value of 2012), while in 2012 there was a decrease of 93.26 % compared to the term of reference.

Operating profit rate was 20.46% in 2011, 3.66% for 2012, 7.43% in 2013 and 7.60% for the period average.

The evolution over time of the indicator had the form of an uneven trend, decreasing compared to the 2012 reference period (-96.34%), followed by increases in the case of 2013 (10.0 times) and exceeded by 2-3% - the basis of comparison in 2013 for the period average.

It can be seen that the current profit rate was substantially equal to the previous indicator, differences appearing only in 2012, when the rate reached 0.75%.

The gross profit rate was equal to the current

rate of profit as the company did not register extraordinary profit or loss.

The last profitability indicator refers to the net profit rate. It can be seen that this ratio averaged 6.38% (1.02 times higher the base of comparison) with extreme values of 0.63% for 2012 and 17.19% in 2011.

The consequence of this situation is an uneven dynamics, finding a negative difference of 96.34% (compared to term of reference) in the year 2012, and is ahead by 10.0 times in 2013 from the reporting base of 2012.

CONCLUSIONS

The analysis allowed to draw the conclusions presented below.

In the total income structure prevailing the operating revenues by 99.99%, financial income is only 0.01% of the total. The components are included in operating revenues ratios: 93.05% turnover, 71.24% sold production, income subsidies 21.29%, 6.95% revenues of production costs.

The total expenditure structure prevailing in material costs and related to goods - 77.75%, followed by other operating expenses - 14.86%, personal expenses - 5.16% and adjustments on assets - 2.24%.

The farm recorded an operating and, respectively, financial profit of Lei 42,468.67 respectively, Lei 0.66 lei, forming the current profit - Lei 42,469.33.

Because the farm did not register extraordinary profit or loss, it was noticed a similarity between the current and gross profit, the latter decreasing by taxes paid (Lei 6,795), so resulting a net profit of Lei 35,674.33.

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THE EFFECT OF ADDED WHOLE OAT FLOUR ON SOME DOUGH RHEOLOGICAL PARAMETERS

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Abstract

This paper examined the effect of the addition of whole oat flour on dough farinographical parameters. In this regard, the successive amounts of 10 to 50% of whole oat flour were added to wheat flour type 550. For each experimental variants were performed farinographical analyzes. According to our results, the optimal proportion of whole oat flour that can be added to wheat flour, without adversely affecting technological parameters of dough, was 20%. At this amount, dough parameters: Development time (DT), Stability (ST) and Farinograph Quality Number registered the best values.

Keywords: dough rheology, farinograph,, wheat flour, whole oat flour

INTRODUCTION

Diversifying sources of dietary fibers, which can become inputs for the manufacture of bread, meets consumer interest in the development of functional foods. This is due to the fact that in comparison with products derived from wheat or rye, oat products are characterized by a unique nutritional profile, able to bring significant benefits to our diet. Oat is characterized by a high content of lipids, 2-3 times more than other cereals (Butt et al., 2008; Angioloni and Collar, 2012) [1,2] and a high protein content that can be a great exogenous source of amino acids (Hahn et al., 1990, Butt et al., 2008; Gambusia et al., 2011) [2, 3, 4]. Compared to other cereals, oat contains a smaller amount of carbohydrates, being more abundant in dietary fibers (mainly glucans and pentosans). Also, oat can be a good source of vitamins, especially vitamin E and pantothenic acid. Having a high content of β -glucans, products made from oat have a positive effect on prevention of coronary heart disease. This is due to the ability to reduce serum cholesterol levels and postprandial serum glucose (Klopfenstein, 1988) [11]. Also, fibers from oat can bring important

benefits to the health of the digestive tract, due to the contribution of the increase of faecal mass.

In addition to β -glucans benefits, products derived from oat have a significant content of phenolic compounds and other antioxidants, as shown by some published works (Madhujith & Shahidi 2007; Inglett et al. 2011; or Inglett & Chen 2012) [6, 10, 18]. The effects of the addition of oat are not limited only to nutritional benefits of these kind of products.

The literature describes a whole range of other applications of the addition of oat in bakery products: reduction of fat amount and implicitly of calories (Lee et. al 2004), control of rheology and texture (Rosell et al, 2001), modification of starch gelatinisation and retrogradation (Rojas et al., 1999; Lee et al., 2005), reducing the rate of bread aging (Salehifaret al., 2006) and improving the tolerance to freezing / thawing of the bakery products (Lee et al., 2002) [12, 14, 16, 19, 20, 21].

The main problem with the use of products derived from oat, especially bakery products, refers to the degree of consumer acceptance to this addition.

In our country, the most important purchase criterion of bakery products is the volume of bread. Numerous studies have shown that the use of products derived from oat, in bread composition, have caused a drastic decrease of its volume (Litwinek et. Al., 2013) [17]. A first explanation for the occurrence of this effect is based on the fact that products derived from oat do not contain gluten. Thus, the addition of oat flour in bakery products contribute significantly to the reduction of dough gluten content, as compared to a dough made entirely of wheat flour. Therefore, worsen the rheological properties of the dough and the gas retaining capacity is reduced. This effect is accentuated with the use of products derived from oat, rich in fibers, because the gluten films are mechanical damaged. Finally, another explanation is related to the distribution of water in the dough. Water retention in fibers may cause incomplete hydration of gluten proteins and formation of short gluten networks, with altered elastic properties. This paper aims to assess the effect of the addition of whole oat flour on rheological parameters of dough by using the farinographical method.

MATERIALS AND METHODS

To achieve the researches we used two types of flour:

1. wheat flour type 550, from SC Farinsan SA (harvest 2014), having the following quality characteristics: Moisture % = 14.3; Protein content % = 13.0; Wet gluten content % = 30.2; Gluten Index = 82; Content of minerals% = 0.55; Hydration capacity = 57.8; Dough development time (min) = 2.0; dough Stability time (minutes) = 5.9; Degree of softening (UF) = 54; alveographical mechanical work (W) = 302×10^{-4} J; alveographical report Resistance/Extensibility (p/l) = 1.02;
2. whole oat standardized flour, purchased from SC Cope SA Piatra Neamt, having the following characteristics: max. Moisture % = 10; max. Ash content % = 1,2; Protein content% = 10.0; Fiber content % = 4.0; Content of carbohydrates % = 66.0, Lipid

content % = 8.0; Granularity, characterized by a particle size mean of less than 500 μ , for 97% of particles, the remaining 3% having sizes between 500 and 1,000 μ .

In order to evaluate the impact over farinographical parameters, were added successive quantities, increasingly higher, of whole oat flour to wheat flour, according to the experimental design presented in table 1.

Table 1. The amounts of whole oat flour added to wheat flour

No.	Wheat flour type 550 (%)	Whole oat flour (%)
1	100	0
2	90	10
3	80	20
4	70	30
5	60	40
6	50	50

To determine the farinographical parameters of the 6 samples of flours, established under the scheme in table 1, it was used a Brabender Farinograph E device.

Analyses were performed in accordance with ISO 5530-1 standard.

The determined parameters were: Water absorption (WA,%); Development time (DT, min); Stability (ST, min), Degree of softening at 10 minutes after start (DS₁₀, FU) and Farinograph® quality number (FQN).

RESULTS AND DISCUSSIONS

In table 2 are shown the farinographical tests results concerning mixtures of wheat flour and oat flour.

As seen from table 2, farinographical parameters of flour control (0% added whole oat flour) described a bakery flour with optimal characteristics.

Addition of whole oat flour determined significant changes in all parameters. In figure 1 we presented the corresponding farinograms of control flour and of the mixtures of control flour and oat flour, overlapped.

Mixed flours Hydration capacity changed significantly compared to flour control, being the higher, as the amount of added oat flour increased.

Table 2. Farinographical parameters for mixtures of wheat and oat flours

Oat flour (%)	WA(%)	DT	ST	DS ₁₀	FQN
0	57.8	2	5.9	44	42
10	58.3	1.9	8.7	35	96
20	58.7	7	9.7	19	112
30	61.1	6.3	6.9	43	89
40	64.3	6.4	4.8	38	94
50	66.6	10.7	5.6	6	132

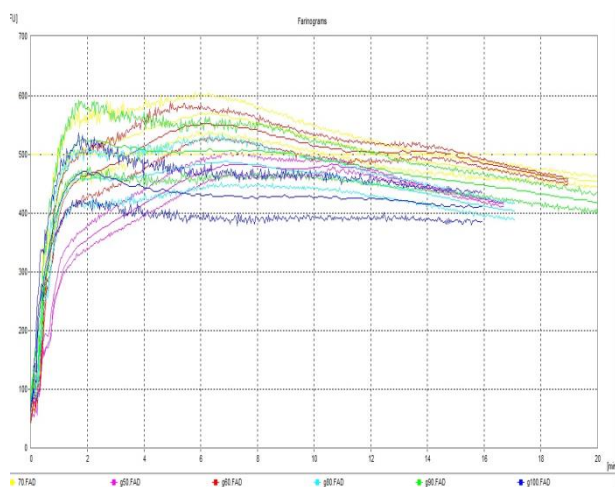


Fig.1. Control flour and mixtures of wheat and oat flours farinograms

Each fraction of 10% whole oat flour determined the increase of Hydration capacity by about 1.8% compared to control (figure 2). Increase of wheat flour Hydration capacity is explained by the additional intake of fibers, which whole oat flour brought in the dough. Oat flour used had a content of about 4% fibers, compared to wheat flour which had a fibers content of about 2%.

Increase of the Hydration capacity of the flours can be a major economic advantage, as causes higher yield in bread.

Addition of whole oat flour caused significant changes of the following parameters: Dough development time (DT) and Stability (ST).

Dough development time, associated with the time required for the homogenization of all ingredients and their integration into a stable structure in terms of viscosity, did not vary linearly with increase of oat flour addition.

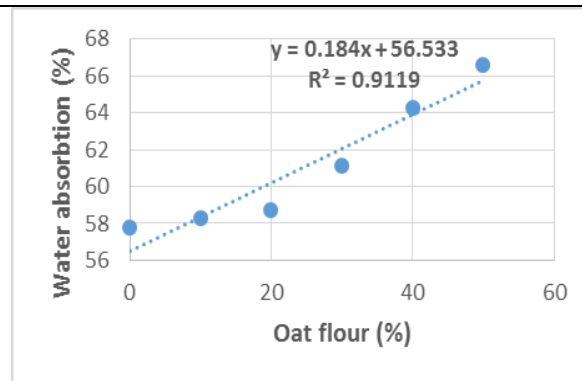


Fig.2. Hydration capacity (water absorption) of dough for various percentages of whole oat flour

Thus, in the case of the addition of 10% oat flour, there were no significant changes in Dough development time. In contrast, larger additions of whole oat flour, significantly changed the Dough development time, which reached values of up to 5 times higher, compared with control flours.

Also, the increase of Dough development time was correlated, up to 20% added whole oat flour, with the increase of dough Stability. Thus, the dough Stability was maximum at 20% added of whole oat flour, then tended to decrease. By the additions of more than 30% whole oat flour, doughs Stability was under the control flour (4.8 minutes with 40% oat flour and 5.6 minutes with 50% oat flour, versus 5.9 minutes).

This is explained by the limited capacity of the gluten network, formed in dough, to immobilize fibers. Basically, at some point, additional fibers cause mechanical damages of glutenic films with significant effects in lowering dough Stability.

Since Stability is generally correlated with dough tolerance to kneading, fermentation and even with the volume of finished products, the evolution of this parameter can be used to determine the optimal amount of oat flour, which can be added in manufacturing recipes (figure 3).

Similar observations can be made in terms of the evolution of Dough softening degree parameter. It characterizes the state of dough colloidal systems, at certain times of kneading, considering the loss of viscosity of the entire system.

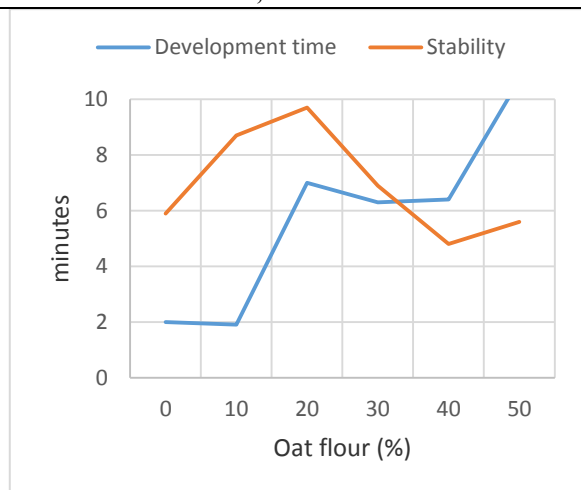


Fig.3. Dough Development time (DT) and Stability (ST) with different additions of whole oat flour

Thus, a higher value of Dough softening degree indicates a degraded dough, where the majority links, which stabilize the dough, are broken and the water is released from the system. From figure 4 it is observed that the addition of oat flour decreased the degree of Dough softening, but the decrease rate was not constant. Maximum decreased were recorded in the case of 50% added whole oat flour (6 FU), respectively in the case of 20% added oat flour (UF 19). Theoretically, additional intake of fibers in oat flour made a better water link in dough, with a corresponding effect on the degree of softening.

Farinograph Quality Number parameter increased significantly with the addition of oat flour. The most significant increases were observed in samples to which was added 50% and 20% oat flour.

Farinograph quality number describes the length, along the time axis, between the point of the addition of water to flour and the point where the height of the centre of the farinographical curve has decreased by 30 FU, compared to the height of the centre of the farinographical curve in the point where the dough development is finished. Theoretically, this is a synthetical indicator that provides informations about the quality of dough, comprising elements regarding dough Development time, Stability and Degree of softening. The higher its value is, the technological performances of flour are supposed to be better.

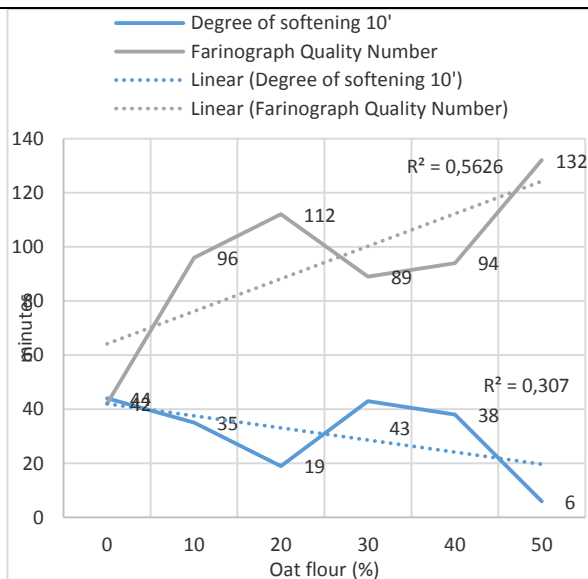


Fig.4. The degree of Dough softening at 10 minutes (DS10) and Farinograph Quality Number (FQN) of dough, with different additions of whole oat flour

The optimal amount of whole oat flour that can be added to wheat flour, without adversely affecting technological parameters of dough was, according to our results, 20%.

For 20% added oat flour, the parameters: Development time (DT), Stability (ST) and Farinograph Quality Number of dough, had the best values compared to the control flour.

CONCLUSIONS

Flours Hydration capacity changed significantly compared to flour control, being the higher, the amount of added oat flour increased. Each fraction of 10% oat flour, increased Hydration capacity by about 1.8%, compared to control sample.

Addition of whole oat flour caused significant changes of: Dough development time (DT) and Stability (ST) parameters. Dough Development time increased in all experimental variants, compared to control flour.

The dough Stability, by the addition of whole oat flour, was higher compared to the control flour, until 20% added oat flour, then decreased for 30% and 40% added oat flour.

The addition of oat flour decreased the degree of Dough softening, but the rate of decrease was not constant. Maximum decreases were recorded in the case of 50% added oat flour (6 FU), respectively in the case of 20% added

oat flour (19 FU).

The optimal amount of oat flour that can be added to wheat flour, without adversely affecting technological parameters of dough was 20%, according to our results. At this value, the parameters Dough development (DT), Stability (ST) and Farinograph Quality Number were the best, compared to control flour.

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MINERAL WATER FROM SUPERMARKET VS. TAP WATER. SOME CONSIDERATIONS RELATED TO INNOCUITY

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Abstract

15 Romanian brands of mineral water were purchased from hypermarket. For each of the 15 mineral waters were determined the content of nitrates, nitrites and pH. The data obtained were compared with the content of nitrates, nitrites and pH of the tap water collected in 15 locations in Bucharest, according to data released by the Apa Nova operator. The results showed that the mean of tap water pH in Bucharest, although slightly higher than the tested mineral waters pH, did not differ significantly from the mean of mineral waters pH, being situated in the alkaline domain. The mean content of nitrates in tap water in Bucharest, did not differ significantly from that of the tested mineral waters ($t = 0.811$). Nitrates content of tap water in Bucharest was significantly distinct less, as the pH was higher ($r = 0.68^{**}$). Basically, the change in pH by one unit, lowers the amount of nitrate by 46%. Bucharest tap water nitrites content was significantly lower than that of tested mineral waters (0.005 mg/l to 0.0124; $t = 2.674^*$). Basically, Bucharest tap water contained up to 2.5 times less nitrites than the nitrites mean of tested mineral waters.

Key words: nitrates, nitrites, pH, mineral water, tap water

INTRODUCTION

Water is the main constituent of living matter and a substance essential for life [5]. In nature water is found never pure, being enriched with minerals taken from the soil layers through which it passes [2]. Consequently, this makes that there are no two identical types of water. Mineral water can be defined as a water from various natural or drilled sources, with special hygienic characteristics and positive effects on health [1]. Drinking water can be defined as a clear, odorless, colorless and tasteless liquid, harmless, free of pathogenic microorganisms or substances harmful to human [2].

The purpose of this paper is to analyze the quality of mineral waters sold on the Romanian market, compared to supplied tap water. There is a general trend in the behavior of Romanian consumers to avoid tap water, considered not sufficiently safe, from the toxicological point of view. This is due to the impression that investments in improving urban utility network of Bucharest, were not correlated with the rate of urban utility

network degradation [6].

MATERIALS AND METHODS

A total of 15 samples of mineral waters provided by 15 Romanian brands, were purchased in the first week of March 2014 from Titan Auchan shopping center (Bucharest). The main identification elements of analyzed Romanian brands are shown in Table 1.

For each of the 15 tested mineral waters were determined the content of nitrates, nitrites and pH.

The concentration of nitrates was determined using the acid fenoldisulfonic reaction method. This involves the formation of a yellow nitrofenolsulfonic derivative, whose intensity determined photometrically at 480 nm, is proportional to the nitrates content in the sample [7].

Nitrites content was determined by Saltzman method. The method is based on the property of nitrite ions to form, through a chemical reaction, a colored azo complex that can be photometric evaluated. In an acid medium,

nitrite ions react with sulfanilic acid to form a diazonium salt. The diazonium salt is coupled with N-naphthyl ethylenediamine, at pH = 2-2.5, to form a violet azo compound, whose absorbance is measured at a wavelength of 520 nm [7].

Table 1. Mineral water brand names and main key identifiers

No. sample	Commercial name	Source	Producer
P1	Bucovina uncarbonated	C7 SECU, Dorna Candrenilor, Suceava	Rio Bucovina SRL
P2	Bilbor	Q1, Bilbor, Harghita county (height rate 1114, Călimani mountains)	Bilbor Mineral Water SRL
P3	Zizin	F2, F4, Zizin, Braşov county	Apemin Zizin S.A.
P4	Dorna - Izvorul alb	White spring, Dealul Floreni - Dorna Candrenilor village, Suceava county	Coca Cola HBC SRL
P5	Apa Craiului	Spring water no. 5, Gâlgoaie, Dâmbovicioara, Argeş county	Cheresta Dîmbovicioara SRL
P6	Aqua Carpatica	Băjenaru spring, Păltiniş, Suceava county	Carphatian Springs S.A.
P7	Keia uncarbonated	Zăganului spring, Ciucaş, Prahova county	Nicolțana S.A.
P8	Perenna Premier uncarbonated	Călina, Caraş Severin county	Apollini Company SRL
P9	Cheile Bicazului	Bicazul Ardelean (drilling FH1), Neamţ county	Natural Aqua Group SRL
P10	Borsec uncarbonated	Făget Borsec, Harghita county	Romaqua Group S.A.
P11	Herculane uncarbonated	Domogled, Băile Herculane, Caraş Severin county	Carpatina S.A.
P12	Carpatina light mineral	Toşorog, Neamţ county	Carpatina S.A.
P13	Perla Covasnei	F1, Târgu Secuiesc, Covasna county	Covasna pearl S.A.
P14	Hera	Hera, Budureasa, Bihor county	European Drinks
P15	Tuşnad Spring fairy	Tuşnad, Harghita county	Apemin Tuşnad S.A.

To determine pH, we used a digital pH-meter. There are changes in pH value, on the variation of the potential difference between a glass electrode and a reference electrode, placed in the water sample to be analyzed.

In order to assess the safety of tested mineral waters in relation to tap water, supplied by the

Apa Nova Bucharest operator, we used a set of data from the operator website. Thus, we recorded the content of nitrates, nitrites and pH of the water supplied by Apa Nova, in 15 locations across the entire area of the town, in 05.05.2014 - 07.05.2014 period [4].

The obtained data are presented in Table 2.

Table 2. The content of nitrites, nitrates and pH of the water, supplied in 15 locations by Apa Nova Bucharest, between 05.05.2014 - 05.07.2014 [4]

No. sample	Area sampling	pH	NO ₂ ⁻ mg/l	NO ₃ ⁻ mg/l
1	Mihai Bravu Highway no. 290	7.55	0.005	4.57
2	Vitan Square	7.59	0.005	4.48
3	Aerogării Avenue	7.42	0.005	4.47
4	Norilor Square	7.27	0.005	6.75
5	Progresul Square	7.38	0.005	6.78
6	Amzei Square	7.47	0.005	4.62
7	Matache Square	7.49	0.005	4.52
8	Gemini Square	7.47	0.005	4.30
9	Chitila Highway	7.46	0.005	4.51
10	Domenii Square	7.46	0.005	4.51
11	Mitropolit Varlaam Street	7.47	0.005	4.61
12	Reşiţa Square	7.42	0.005	6.76
13	Fundeni Highway	7.37	0.005	4.51
14	Ialomiţei Valley	7.39	0.005	6.52
15	Olteniţei Highway	7.37	0.005	6.7

RESULTS AND DISCUSSIONS

Tap water in Bucharest was characterized according to the values in Table 2. We could notice a mean value of pH = 7.42 ± 0.08, an invariably nitrites content of 0.005 mg/l, respectively a nitrates content of 5.25 ± 1.07 mg/l.

As shown in Figure 1, the mean of tap water pH in Bucharest, although slightly higher than the mean of the tested mineral waters pH, did not differ significantly from this, being located in alkaline domain (t = - 0.954).

As is normal, since the tested tap water in Bucharest comes from a single source, pH variability is much lower than that of tested mineral waters (± 1.07% versus 5.73%).

Regarding nitrates content, the situation is the same. The content of nitrates mean in tap water in Bucharest (5.25 mg/l) was lower than the nitrates content mean of mineral waters (5.89 mg/l).

The difference between the two specimens was not statistically significant (t = 0.811).

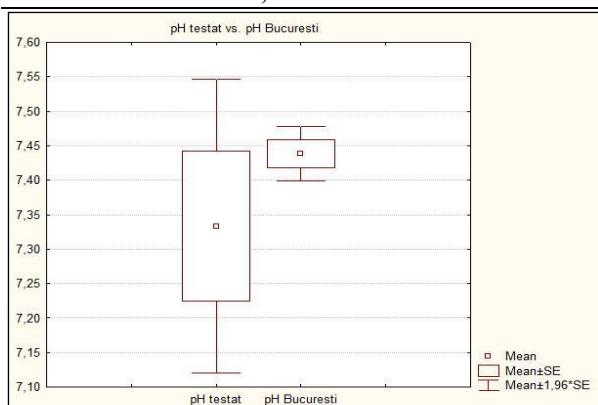


Fig. 1. Mineral waters pH vs tap water pH in Bucharest

We also noted that the nitrates variability mean in tap water samples in Bucharest, was much lower than that of mineral waters (Fig. 2).

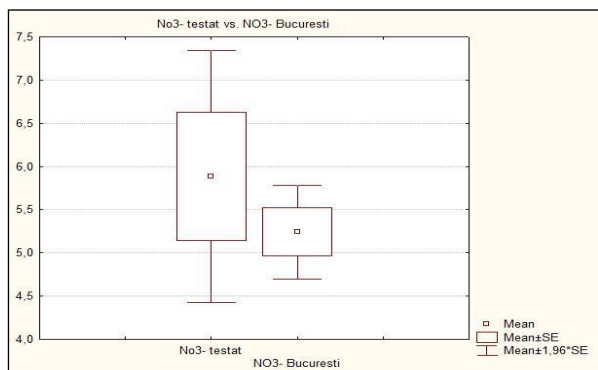


Fig. 2. Mineral waters NO₃⁻ content vs. tap water NO₃⁻ content

Nitrates content of tap water in Bucharest was significantly distinct less, as the pH was higher ($r = 0.68^{**}$).

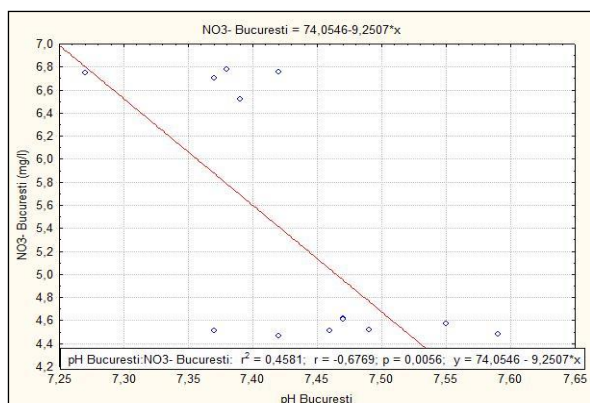


Fig. 3. Regression NO₃⁻ - pH for tap water in Bucharest

Basically, the change in pH by one unit lowers the amount of nitrate by almost 46% (determination coefficient $r^2 = 0.458$) (Fig.3).

Tap water in Bucharest presented a significantly lower content of nitrite than tested mineral waters (0.005 mg/l to 0.0124; $t = 2.674^*$). Basically, tap water in Bucharest had a content of nitrites up to 2.5 times lower than the nitrites mean of tested mineral waters (Fig.4).

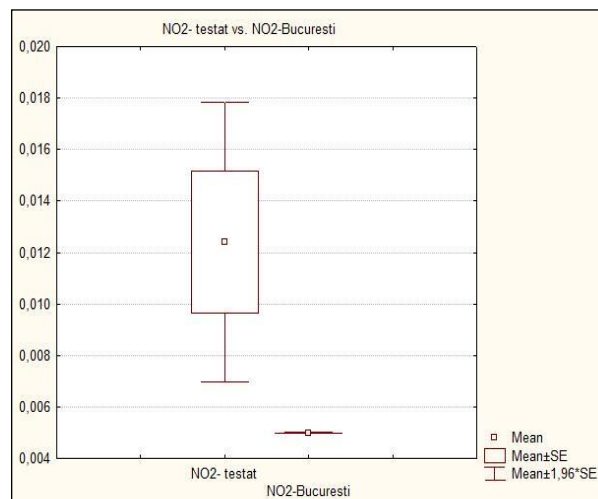


Fig. 4. Mineral waters NO₂⁻ content vs. tap water NO₂⁻ content

Accordingly, we believe that tap water in Bucharest is safer in terms of harmlessness, than tested mineral waters. This does not mean that exploitation of mineral waters is a simple commercially exercise for robbing consumers. Mineral waters constitute important sources of minerals necessary for human body, their therapeutic effects being validated on a historical scale.

CONCLUSIONS

The mean of tap water pH in Bucharest did not differ significantly from the mean of tested mineral waters pH, both being situated in the alkaline domain. The mean of nitrates content in tap water in Bucharest (5.25 mg/l) was lower than the mean of nitrates content of mineral waters (5.89 mg/l). The difference between the two specimens was not statistically significant ($t = 0.811$). Nitrates content of tap water in Bucharest was significantly distinct less, as the pH was higher ($r = 0.68^{**}$). Basically, the change in pH by one unit, lowers the amount of nitrates by 46%. Tap water in Bucharest has a

significantly lower content of nitrites than tested mineral waters (0.005 mg/l to 0.0124; $t = 2.674^*$). In fact, tap water in Bucharest contains up to 2.5 times less nitrites than the nitrites mean of studied mineral waters. In conclusion, drinking tap water is not a health hazard.

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RESEARCH ON THE EVOLUTION OF THE TOP ROMANIAN TRADEMARKS IN THE DOMESTIC MARKET

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Abstract

The paper analyzed the position of the Romanian trademarks using the data provided by Unlock Market Research Company in 2010 and 2014. The statistical parameters: average, variance, standard deviation and variation coefficient, and the Point Method and Comparison Method were used to process the collected data. In 2014, among the top 50 brands in Romania's market, the top 10 positions were occupied by the following trademarks: Borsec, Dero, Gerovital, Dorna, Arctic, Dacia, Elmiplant, Aqua Carpatica, Farmec and Petrom. Food industry came on the 1st position with 17 brands and on the 3rd position after telephony and finance and banking, based on the average positions of its trademarks. By field of activity, based on the average position, the 1st three positions were occupied by Machinery construction and Chemical and extractive industry, Alcoholic beverages, and Wood working industry. On the last position was situated Telephony. As a final conclusion, consumers behavior reflected an intensive orientation to the Romanian brands belonging to food industry, care and health sector and also of the appliances for household reflecting a new behavior to assure a higher living standards.

Key words: actual situation, hierarchy, market, Romania, trademarks, trends

INTRODUCTION

Branding is extremely important for a producer or trade, but also for consumer, because it allows to identify a specific company and its products and it may not be used by another firm without permission.[8]

In the vision of US Patent and Trademark Office, "A **trademark** is a word, phrase, symbol, and/or design that identifies and distinguishes the source of the goods of one party from those of others. A **service mark** is a word, phrase, symbol, and/or design that identifies and distinguishes the source of a service rather than goods. The term "trademark" is often used to refer to both trademarks and service marks".[9, 10]

The American Marketing Association considers that "The brand is a name, term, design, symbol, or any other feature that identifies one seller's good or service as distinct from those of other sellers. The legal term for brand is trademark. A brand may identify one item, a family of items, or all items of that seller. If used for the firm as a whole, the preferred term is trade name.[1,

11]

In 2000, Kotler defined a brand as "the name, associated with one or more items in the product line, that is used to identify the source of character of the item(s)" and also considered it as "a major issue in product strategy".[2]

Many market research studies approached the analysis of various trademarks position in the market.

The MEMRB Research and Monitoring Company analyzed the position of the Romanian Brands in 29 categories of various products existing in the market, based on their market share and noticed that the Romanian trademarks from the field of food industry are on the top positions.

It was concluded that the Romanian companies, operating in a very competitive market, were disadvantaged compared to the foreign firms, because they were not financially supported. Also, consumer behavior had a negative impact on the brands' position in the 1990's when Romania opened its frontiers and the consumers thought that the imported products are better than the

Romanian ones. At present, the consumers are looking for Romanian brands which have the highest quality, taste and flavor.

In 2014, on the occasion of the 5th Conference on "BrandRo", the Unlock Market Research Company presented its results regarding the "Top 100 most powerful Romanian brands" as a continued research work of the study made in 2010 upon the "Top 50 most powerful Romanian brands". The study was based on the investment of trust and affectivity from the consumers' side without taking into consideration the financial indicators. A sample of 1,000 individuals between 15-55 years old both from the urban and rural areas, were online interviewed on a questionnaire survey, the results being processed using Max Diff (Maximum Differentiation Scaling) Method.

It was concluded that on the top positions came the following brands: Borsec, Dero, Gerovital, Dorna, Arctic, Dacia, Elmiplant, Aqua Carpatica, Farmec and Petrom and the main trend in the last years was that the powerful trademarks which dominate the market to keep their position from a year to another.

The water brands, sweets' brands, care products brands and also brands from the field of services (Petrom, Banks, Medlife) and also on-line retailing (eMag, Dedeman, Mobexpert) had a high position in the hierarchy reflecting a recover of consumer's behavior, a new orientation to healthy food, health care and household good to improve the living standard.[6]

In this context, this study aimed to analyze the position of the Romanian brands in 2014 compared to the positions determined in 2010, based on the data provided by Unlock Market Research Company, in order to identify the main trends recorded in the period 2010-2014.

MATERIALS AND METHODS

The data were represented by the results found by Unlock Market Research Company in 2010 and 2014, on the results obtained by Popa Ciprian in 2013. [4, 5, 6]

The following aspects were studied: (a)the position of the Top 50 Romanian Brands in

the domestic market in 2010 and 2014, and emphasizing the differences recorded in the period 2010-2014, (b)the calculation of average position and variability of the top 50 Romanian brands in various economic fields of activity in 2014, and established (c)the differences concerning their average position and their new hierarchy using the point methods.

The following methods were used to carry out this study: usual statistical parameters: average, variance, standard deviation, variation coefficient, Point Rating Method, and Comparison Method.

The main formulas used in this research work were the following ones:

(a)Average of the variable, \bar{X} , where $X_1, 2, \dots, n$ are the terms of the data series.

$$\bar{X} = \frac{X_1 + X_2 + \dots + X_n}{n} \quad (1)$$

(b)Variance of variable, S^2

$$S^2 = \frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n-1} \quad (2)$$

(c)Standard Deviation

$$S = \sqrt{\frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n-1}} \quad (3)$$

(d)Variation Coefficient, $V_{\%}$

$$V_{\%} = \frac{S}{\bar{X}} \times 100 \quad (4)$$

RESULTS AND DISCUSSIONS

Comparison between the top Romanian trademarks based on their position. The Romanian trademarks are of a large variety and occupied different positions in the market. During the last 5 years, Borsec proved that it is the most powerful brands, being very much appreciated by customers.

The top 10 positions were occupied in the descending order by the following trademarks: Borsec, Dero, Gerovital, Dorna, Arctic, Dacia, Elmiplant, Aqua Carpatica, Farmec and Petrom. However, among these 10 brands, only two, Borsec and Dorna preserved their position, the 1st one in case of

Borsec and the 4th one in case of Farmec. Other 7 brands went up from lower positions in 2010 to much higher positions in 2012. It is about Dero, Gerovital, Arctic, Elmiplant,

Petrom and Farmec. Dacia brand went down from the 2nd position in 2010 to the 6th position in 2014. (Table 1) [7]

Table 1. Top 50 Romanian Brands in the domestic market in 2010 and 2014

Brand	Position			Brand	Position		
	2014*	2010**	Difference 2014-2010		2014*	2010**	Difference 2014-2010
Borsec	1	1	0	La Dorna	26	21	+5
Dero	2	34	-32	Altex	27	0	+27
Gerovital	3	33	-30	Dedeman	28	0	+28
Dorna	4	4	0	Medlife	29	0	+29
Arctic	5	26	-21	Kandia	30	41	-11
Dacia	6	2	+4	BCR	31	10	+11
Elmiplant	7	50	-43	Fan Courier	32	0	+32
Aqua Carpatica	8	0	+8	Clujana	33	0	+33
Farmec	9	27	-16	Covalact	34	44	-10
Petrom	10	40	-30	Catena	35	0	+35
Jolidon	11	0	+11	Plafar	36	0	+36
Poiana	12	5	+7	Romtelecom	37	20	+17
Fares	13	0	+13	Margaritar	39	0	+38
Rom	14	22	-8	Sensiblu	39	0	+39
eMag	15	0	+15	Eugenia	40	0	+40
Bucovina	16	0	+16	Zuzu	41	37	+4
Mobexpert	17	45	-28	Cris Tim	42	18	+24
Doina	18	0	+18	Nufarul	43	0	+43
Joe	19	0	+19	Izvorul Minunilor	44	0	+44
Triumf	20	0	+20	Primola	45	47	-2
Perla Harghitei	21	43	-22	CEC	46	39	+7
Heidi	22	0	+22	Bitdefender	47	0	+47
Banca Transilvania	23	17	+6	Caroli	48	0	+48
BRD	24	14	+10	Biborteni	49	35	+14
Napolact	25	19	+6	Pegas	50	0	+50

Source:[5,6] Own calculations.

Also, important positions are occupied by Fares, Rom, eMag, Bucovina, Mobexpert, Doina, Joe and Triumf, which came on the following positions between 11 and 20.

Some brands registered a lower position in 2014 compared to 2010. Among them, there were: Poiana (from the 5th position to the 12th position), Banca Transilvania (from the 17th position to the 23rd position), BRD (from the 14th position to the 24th position), Napolact (from the 19th position to the 25th position), La Dorna (from the 21st position to the 26th position), BCR (from the 10th position to the 31 position), Romtelecom (from the 20th position to the 37th position), Cris Tim (from the 18th position to the 42nd

position), Biborteni (from the 35th position to the 49th position). This reflect the lack of attraction of the banks for clients because of the high interest rate and bank commissions. Romtelecom lost a part of its customers due to the invasion of smartphones commercialized by Mobile Telephony. A new orientation of the buyers to healthier food, mainly dairy products, vegetables and fruit determined reduction of consumption of meat preparations, where products are in general expensive and the purchased amount is limited by the low family income.

The average position occupied by the top 50 Romanian brands by economic field. Machinery construction and Chemical and

extractive industry are the economic branches situated in the top, recording a similar average position of 6. But, while Dacia is the only brand the most appreciated by consumers in the field of machinery construction, chemical and extractive industry had a large variability among brands.

Table 2. Average position and variability of the top 50 Romanian brands in various economic fields of activity in 2010

Economic branch	Number of brands	$\bar{X} \pm S_x$	V (%)
Alcoholic beverages	8	16.50 ± 10.56	64.05
Soft drinks	7	22.29 ± 18.27	81.98
Mass Media	8	24.00 ± 12.30	51.27
Food industry	13	30.15 ± 14.71	48.77
Finance - Banks	4	20.00 ± 12.99	64.93
Care products	3	36.67 ± 11.93	32.54
Chemical and extractive industry	3	40.00 ± 6.00	15.00
Construction machinery	1	2.00 ± 0	0
Manufacturing household appliances	1	26.00 ± 0	0
Woodworking Industry	1	45.00 ± 0	0
Telephony	1	20.00 ± 0	0

Source: Popa C.N. et al.,(2013)[8]

On the 3rd position is placed the field of alcoholic beverages with an average position of 14, and no variability because it is about only one brand.

In the field of wood working industry, represented by two brands, it was registered an average position of 17.50 and a low variation coefficient.

A specific feature of almost all the trademarks by field of activity was the high variability reflecting that a part of the brands occupy high positions while other brands were placed on lower positions. On the last position with the highest average position of 37 came Telephony having as representative Romtelecom brand. (Table 2 and 3)

Table 3. Average position and variability of the top 50 Romanian brands in various economic fields of activity in 2014

Economic branch	Number of brands	$\bar{X} \pm S_x$	V (%)
Alcoholic beverages	1	14.00 ± 0	0
Soft drinks	6	23.16 ± 19.38	83.67
Mass Media	1	32.00 ± 0	0
Food industry	17	29.58 ± 14.05	47.49
Finance - Banks	4	31.00 ± 10.61	34.22
Care products	12	24.41 ± 13.85	56.73
Chemical and extractive industry	2	6.00 ± 5.65	94.16
Construction machinery	1	6.00 ± 0	0
Manufacturing household appliances	4	23.50 ± 0	0
Woodworking Industry	2	17.50 ± 0.70	4.00
Telephony	1	37.00 ± 0	0

Source: Own calculations

Comparison regarding the number of brands by field of activity in 2014 compared to 2010.

During the period 2010-2014, some changes were noticed concerning the number of trademarks positioned in the top 50.

Food industry counted 17 brands situated in the top 50 Romanian trademarks in 2014, compared to 13 brands in the year 2010.

Also, care products recorded 12 brands in 2014 compared to only 3 brands in 2010. The manufacturing household appliances reached 4 brands in the top of the year 2014 compared to only one brand in the year 2010.

The alcoholic beverages lost 7 brands, the soft drinks lost one brand, mass media lost 7 brands, and chemical and extractive industry lost one brand.

Therefore, consumers proved to be more interested of the Romanian brands belonging to food industry, care and health sector and also of the appliances for household reflecting a new behavior to assure a higher living standards. (Table 4).

Table 4. Difference concerning the number of top Romanian brands and their average position between 2010 and 2014

Economic branch	2014		2010		Difference 2014-2010	
	Number of brands	Average position	Number of brands	Average position	Number of brands	Average position
Alcoholic beverages	1	14.00	8	16.50	-7	-2.50
Soft drinks	6	23.16	7	22.29	-1	+0.87
Mass Media	1	32.00	8	24.00	-7	+8.00
Food industry	17	29.58	13	30.15	+4	-0.57
Finance - Banks	4	31	4	20.00	0	+11.00
Care products	12	24.41	3	36.67	+9	-12.26
Chemical and extractive industry	2	6.00	3	40.00	-1	-34.00
Construction machinery	1	6.00	1	2.00	0	+4.00
Manufacturing household appliances	4	23.50	1	26.00	+3	-2.50
Woodworking Industry	2	17.50	1	45.00	+1	-28.00
Telephony	1	37.00	1	20.00	0	+17.00

Source: Own calculations

CONCLUSIONS

The Romanian brands occupy the top positions in the market being preferred by the population. Food industry occupies the 1st position with 17 brands and on the 3rd position after telephony and finance and banking, based on the average positions of its trademarks (29.58).

Care products trademarks counted 12 brands in 2014 by 9 brands less (-75%) compared to 2010. The manufacturing household appliances reached 4 brands in the top of the year 2014, by 300 % more compared to one brand in the year 2010.

The trademarks which recorded a decline of position in the domestic market are: the alcoholic beverages which lost 7 brands, the soft drinks which lost one brand, mass media which lost 7 brands, and chemical and extractive industry which lost one brand.

As a final conclusion, consumers' preference for a brand or another based on the diversity of the offer and product price has determined a change in the position occupied by various Romanian brands. Consumers looked to be more interested of the Romanian brands belonging to food industry, care and health sector and also of the appliances for household reflecting a new behavior to assure a higher living standards.

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RESEARCH ON THE TOP ROMANIAN TRADEMARKS IN THE MILK AND DAIRY PRODUCTS' MARKET

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Abstract

The paper analyzed the position of the top Romanian trademarks in milk and dairy products market. Using the Ministry of Finance Database regarding the turnover of all the 472 dairies, in the period 2011-2013, it was established the hierarchy of the brands based on the Average Turnover, Point Ranking Method and Market Share. Of the 472 trademarks in the milk and dairy products market, a number 255 brands (54%) are concentrated in 10 counties: Constanta, Suceava, Bistrita Nasaud, Maramures, Botosani, Tulcea, Braila, Bucharest and Sibiu. The turnover achieved by all the 472 brands of dairy products accounted for Euro million 882.6 in 2013. A number of 175 brands (37%), belonging to 10 counties (Cluj, Bucharest, Mures, Alba, Covasna, Suceava, Timis, Bistrita Nasaud, Arges, Botosani) contributed by 83.89% to the turnover of milk processing industry. The average turnover/brand was Euro million 1.87. The top 10 brands based on the number of points for the turnover carried out in the period 2011-2013 were the following ones: Danone, Friesland, Albalact, Napolact, Fabrica de lapte, Hochland, La Dorna, Simultan, Industrializarea laptelui Mures and Covalact. Based on the market share in 2013, the top 10 brands in dairy products market were Danone (12.11 %), Albalact (10.65 %), Friesland (9.09 %), Fabrica de lapte (6.07%), Napolact (5.61 %), Hochland (5.43 %), La Dorna lactate (4.42 %), Simultan (4.04 %), Covalact (3.31 %) and Industrializarea laptelui Mures (3.22 %), all together totalizing 63.90 % market share. The abolition of milk quota in April 2015, the increased stocks of dairy products and the lower purchasing price of milk and dairy products in other EU countries are the main factors which could affect the position of the Romanian brands, when the market will be invaded by cheaper foreign products, taking into account the low purchasing power of the consumer. Only the top powerful Romanian brands with a good endowment, production capacity and diversity, financial resources, a good management will be able to resist to the market pressures.

Key words: domestic market, milk and dairy products, Romania, top brands, trends

INTRODUCTION

A trademark is identified with the goods or services which offer functional benefits and value added that clients appreciate the most in their decision to buy a product/service (Bradley, 1995) .[2]

The brands functions for the consumer have been presented by various authors along the time, but a comprehensive critical overview on branding emphasizing the definition, functions, characteristics, branding models was made by Guzman (2005). [6]

In Romania, the brand as "capable of being represented graphically, serving to distinguish the goods or services of a natural or legal person from those of others. May be trademarks or signs such as words, including personal names, designs, letters, numerals,

figurative elements, three-dimensional shapes and, particularly, the shape of the product and its packaging, colour combinations, and any combination of these signs ".[8]

The firm trademarks could have subcategories or related brands called "trademarks families" with deep effects on the market value and market share of a company.[1]

Many companied enlarge the trademark protection of various characteristics of the product such as color, odors, sounds and shapes.[3]

The orientation of the consumer behavior especially to the food products, care products and household appliances for improving health and living standard was an incentive to set up this research. Starting from the fact that milk and dairy products are among the current food purchased almost every day by

consumers, the research work was focused on the Romanian trademarks operating in this field of activity.

Table 1. The Trademark Functions for the Consumer

TRADEMARK FUNCTION	CONSUMER BENEFIT
IDENTIFICATION	TO BE CLEARLY SEEN, TO MAKE SENSE OF THE OFFER, TO QUICKLY IDENTIFY THE SOUGHT-AFTER PRODUCTS.
PRACTICALITY	TO ALLOW SAVINGS OF TIME AND ENERGY THROUGH IDENTICAL REPURCHASING AND LOYALTY.
GUARANTEE	TO BE SURE OF FINDING THE SAME QUALITY NO MATTER WHERE OR WHEN YOU BUY THE PRODUCT OR SERVICE.
OPTIMIZATION	TO BE SURE OF BUYING THE BEST PRODUCT IN ITS CATEGORY, THE BEST PERFORMER FOR A PARTICULAR PURPOSE.
CHARACTERIZATION	TO HAVE CONFIRMATION OF YOUR SELF-IMAGE OR THE IMAGE THAT YOU PRESENT TO OTHERS.
CONTINUITY	SATISFACTION BROUGHT ABOUT THROUGH FAMILIARITY AND INTIMACY WITH THE BRAND THAT YOU HAVE BEEN CONSUMING FOR YEARS.
HEDONISTIC	SATISFACTION LINKED TO THE ATTRACTIVENESS OF THE BRAND, TO ITS LOGO, TO ITS COMMUNICATION.
ETHICAL	SATISFACTION LINKED TO THE RESPONSIBLE BEHAVIOR OF THE BRAND IN ITS RELATIONSHIP TOWARDS SOCIETY.

Source: Guzman Francisco (2005)[6]

In this context, the goal of the study was to analyze the position of the top Romanian brands in the field of dairy products market using empirical data regarding the turnover of the 472 companies and its distribution in the territory, the market share and brand ranking. The main trends and problems in Romania's dairy products market have been also identified.

MATERIALS AND METHODS

The empirical data were collected from the Ministry of Finance, regarding the turnover of the 472 dairies operating in food industry and in the market in the period 2011-2013.[12]

The following aspects were approached: (a) the number of the Romanian brands in milk processing industry and their distribution by county in 2013, (b) the calculation of the turnover of the Romanian brands in milk processing industry and its distribution by county in 2013 and also (c) the market share of the counties in the market, (d) the top 30 Romanian Brands in Milk Processing Industry based on their turnover in the period 2011-2013 and using the Point Method, (e) calculation of the market share for the top 20 Romanian brands in milk processing industry based on their turnover in 2013.

The following methods were used to carry out this study: statistical average, Point Ranking

Method, Comparison Method, Market Share method.

The main formulas used in this research work were the following ones:

(a) Average of the variable, \bar{X} , where $X_{1, 2, \dots, n}$ are the terms of the data series.

$$\bar{X} = \frac{X_1 + X_2 + \dots + X_n}{n}$$

(b) Market share, $M_s (\%) = (T_i / \sum T_i) * 100$, where T_i = the turnover of the company i and $\sum T_i$ = the total turnover of all the companies operating in the field of milk processing industry in Romania.

(c) Point Ranking Method, which allowed to classify the dairies from the highest to the lowest, based on the turnover. For each level, $1, 2, \dots, n$, of the turnover, there were allotted points in a scale where: 1 means the top position and the higher figures means the lower positions. The Point Ranking method was applied for each year from the reference period: 2011-2013, and finally the positions obtained were cumulated for each dairy. Finally, it was established the hierarchy of the Romanian brands in milk and dairy products' market for the whole analyzed period, 2001-2013.

RESULTS AND DISCUSSIONS

The number of the Romanian brands operating in the milk processing industry. In

the year 2013, there were 472 trademarks representing milk and dairy products. Their distribution in the territory reflected that on the top positions with the highest number of brands there were the following counties: Constanta County with 65 trademarks (13.77% of the whole number of brands), Suceava County with 43 brands (9.11%), Bistrita Nasaud County with 25 brands (5.29%), Maramures County with 24 brands (5.08%), Botosani County with 22 brands (4.66%), Tulcea County also with 22 brands (4.66%), Braila County with 20 brands

(4.23%), Bucharest with 19 brands (4.02%), and Sibiu County with 15 brands (3.17%).

All these 10 counties concentrated a number of 255 brands, representing 54 % of all the number of dairy products' trademarks.

The lowest number of brands was recorded by Dambovita County 1 brand (0.21 %), Mehedinti County 1 brand (0.21 %), Dolj County 2 brands (0.42%), Giurgiu County 2 brands (0.42%), Gorj County 3 brands (0.63%), Hunedoara County 3 brands (0.63%) and Vaslui County also 3 brands (0.63%).(Table 2)

Table 2. The number of the Romanian brands in milk processing industry and their distribution by county in 2013

COUNTY	NUMBER OF BRANDS	SHARE(%)	COUNTY	NUMBER OF BRANDS	SHARE(%)
ALBA	8	1.69	IALOMITA	4	0.84
ARAD	6	1.27	IASI	4	0.84
ARGES	8	1.69	ILFOV	4	0.84
BACAU	8	1.69	MARAMURES	24	5.08
BIHOR	8	1.69	MEHEDINTI	1	0.21
BISTRITA NASAUD	25	5.30	MURES	14	2.97
BOTOSANI	22	4.66	NEAMT	10	2.12
BRAILA	20	4.23	OLT	5	1.05
BRASOV	13	2.75	PRAHOVA	9	1.90
BUZAU	6	1.27	SALAJ	6	1.27
CALARASI	6	1.27	SATUMARE	6	1.27
CARAS SEVERIN	7	1.48	SIBIU	15	3.17
CLUJ	14	2.97	SUCEAVA	43	9.11
CONSTANTA	65	13.77	TELEORMAN	9	1.90
COVASNA	13	2.75	TIMIS	9	1.90
DAMBOVITA	2	0.42	TULCEA	22	4.66
DOLJ	2	0.42	VALCEA	4	0.84
GALATI	5	1.05	VASLUI	3	0.63
GIURGIU	2	0.42	VRANCEA	4	0.84
GORJ	3	0.63	BUCHAREST	19	3.97
HARGHITA	12	2.54	TOTAL	472	100.00
HUNEDOARA	3	0.63			

Source: Ministry of Finance Database, 2014. [12] Own calculations.

According to the MEMRB survey on the power of the Romanian brands in the retail market, the following positions were occupied in the milk and dairy products market in 2008: [13]

-In the milk market, the top Romanian brands are: La Dorna (1st position), Zuzu-Albalact (the 3rd position), Fulga-Albalact (the 5th position), Brenac-Brailact (the 7th position),

Primulact (the 9th position).

-In the yoghurt market, Napolact is on the 10th position.

-In the process cheese market, the top Romanian brands are: Gordon (the 2nd position), La Dorna (the 6th position), Paulact (the 7th position), Therezia (the 8th position), and Tihuta-Carmolact (the 10th position).

-In the sana and kefir market, the top

Romanian brands are: Napolact (1st position), Big Panda-Almera International (the 2nd position), Primulact (the 4th position), Natura -SCIL Dambovita (the 10th position).

-In the butter milk market, the top Romanian brands are: Napolact (1st position), Big Panda-Almera International (the 4th position), Monor-Carmolact (the 5th position), Zuzu -Alabalact (the 6th position), Paco International (the 7th position), Bucovina (the 8th position), Simultan (the 9th position), Natura -SCIL Dambovita (the 10th position).

-In the butter market, the top Romanian brands are: Albalact (the 1st position), Covalact (the 3rd position), Napolact (the 4th position), La Dorna (the 7th position), Tramar-Risk com (the 8th position), Bucovina (the 9th position), Paco International (10th position). [10]

La Dorna is the leader in the UHT milk, ecological milk, with a large variety of products with high value added: milk, cheese, cottage cheese, cheese cream and pearls, process cheese. It is on the 3rd position for process cheese and butter. [7, 9]

Albalact is a leader in butter production, and Covalact comes on the 3rd position. Zuzu has the top position in milk, sana and kefir. Napolact is a leader in sana, kefir, butter milk, butter and yoghourts. Big Panda is a leader in sana, kefir and butter milk. Gordon is a competitor for Hochland for process cheese. The most powerful competitor for UHT milk for La Dorna and Friesland. Primulact este in top in cea mai mare categorie de lactate. [10]

The distribution of the turnover achieved in 2013 in the territory by milk processing industry. the total turnover registered by milk processing industry in 2013 accounted for Lei 3,972,098,229, that is Euro 882,688,495 at an average exchange rate 1 Euro= Lei 4.50.

The contribution of the brands of dairy products from various counties to the turnover at the industry level was different from a county to another as follows: Cluj County 15.35 %, Bucharest 13.77%, Mures County 11.45%, Alba County 11.32%, Covasna County 9.80%, Suceava County 9.43%, Timis County 4.43%, Bistrita Nasaud County 2.91%, Arges County 2.84% and Botosani

County 2.59%. All these 10 counties achieved 83.89 % of the turnover in milk processing industry.

The lowest sales were recorded by Bacau County, despite that there were operating 8 dairies in this county. (Table 3)

The average turnover in milk processing industry recorded at national level accounted for Lei 8,415,462.34 in the year 2013. This indicator changed the position in the hierarchy of the counties as follows: on the top position came Alba County with an average turnover of Lei 56,222,695.5, on the 2nd position came Cluj County with an average turnover Lei 43,555,024.64, on the 3rd position came Mures County with Lei 35,510,150.57 average sales, Covasna County came on the 4th position with Lei 29,959,866.76 sales, on the 5th position came Bucharest with Lei 28,790,610.47 sales, on the 6th position came Dambovita County with Lei 21,915,492, on the 7th position was placed Timis County with Lei 19,575,632.11 sales, on the 8th position was situated Arges County with Lei 14,117,168.50 sales, on the 9th position was Harghita County with Lei 12,679,430.25 sales and finally, on the 10th position was situated Galati County with Lei 12,351,129 sales.

Two aspects can be noticed:

-counties which were not situated on the top 10 positions regarding the number of brands, such as Dambovita, Harghita and Galati are in the top 10 for average turnover;

-counties like Suceava, Bistrita Nasaud were in the top 10 for the number of brands, but they are not in the top 10 for the turnover.

The lowest average turnover was achieved by Ilfov County, Lei 359,250.75.

A number of 12 counties registered an average turnover over Lei 8,415,463.3, the average sales in milk processing industry.

Besides the counties: Alba, Cluj, Mures, Covasna, Bucharest, Dambovita, Timis, Arges, Harghita, Galati, there are still other two, more exactly Suceava and Vaslui. (Table 3)

The positions of the Romanian brands representing milk processing industry, based on the turnover achieved in the period 2011-2013.

Using the Point Method in each year of the

analyzed period and totalizing the number of points, a new ranking of the Romanian brands was established as shown in the last column of Table 4.

In the top 10 position were situated the following brands, in the decreasing order: Danone, Friesland, Albalact, Napolact, Fabrica de lapte, Hochland, La Dorna,

Simultan, Industrializarea laptelui Mures and Covalact.

In the following group situated on the positions 11-20, there were placed Dorna, Carmolact, Almera International, Gordon, Lactate Harghita, Raraul, Nordex Food, Indlacto Mures, Lacto-Solomonescu and Five Continents Group.

Table 3. The turnover of the Romanian brands in milk processing industry and its distribution by county in 2013

COUNTRY	TURNOVER OF THE BRANDS FROM MILK PROCESSING INDUSTRY (LEI)	AVERAGE TURNOVER (LEI/BRAND)	MARKET SHARE OF THE BRANDS BY COUNTY (%)	COUNTRY	TURNOVER OF THE BRANDS FROM MILK PROCESSING INDUSTRY (LEI)	AVERAGE TURNOVER (LEI/BRAND)	MARKET SHARE OF THE BRANDS BY COUNTY (%)
ALBA	449,781,564	56,222,695.50	11.32	IALOMITA	2,275,822	568,955.50	0.05
ARAD	18,083,495	3,013,915.83	0.45	IASI	8,057,954	2,014,488.50	0.20
ARGES	112,937,348	14,117,168.50	2.84	ILFOV	1,437,003	359,250.75	0.03
BACAU	705,375	88,171.87	0.01	MARAMURES	29,270,736	1,219,614.00	8.28
BIHOR	8,616,831	1,077,103.87	0.21	MEHEDINTI	3,107,637	3,107,637.00	0.07
BISTRITA NASAUD	115,960,292	4,638,411.68	2.91	MURES	455,142,108	35,510,150.57	11.45
BOTOSANI	102,950,059	4,679,548.13	2.59	NEAMT	12,097,853	1,209,785.30	0.30
BRAILA	8,897,560	444,878.00	0.22	OLT	2,771,650	554,330	0.06
BRASOV	47,879,876	3,683,067.38	1.20	PRAHOVA	31,047,998	3,449,777.55	0.78
BUZAU	20,177,662	3,362,943.66	0.50	SALAJ	2,305,015	384,169.16	0.05
CALARASI	5,590,834	931,805.66	0.14	SATUMARE	10,613,509	1,768,918.16	0.24
CARAS SEVERIN	4,740,621	677,231.57	0.11	SIBIU	14,489,200	965,946.66	0.36
CLUJ	609,770,345	43,555,024.64	15.35	SUCEAVA	374,593,941	8,771,487.00	9.43
CONSTANTA	72,517,927	1,115,660.41	1.82	TELEORMAN	24,980,759	2,775,639.88	0.62
COVASNA	389,478,268	29,959,866.76	9.80	TIMIS	176,180,689	19,575,632.11	4.43
DAMBOVITA	21,915,492	21,915,492	5.58	TULCEA	11,626,835	528,492.50	0.29
DOLJ	1,337,236	668,618.00	0.03	VALCEA	2,485,634	621,408.50	0.06
GALATI	61,755,645	12,315,129.00	1.55	VASLUI	25,732,769	8,755,589.66	0.64
GIURGIU	11,852,760	5,926,380.00	0.29	VRANCEA	9,637,318	2,409,329.50	0.24
GORJ	4,738,126	1,579,375.33	0.12	BUCHAREST	547,021,599	28,790,610.47	13.77
HARGHITA	152,153,163	12,679,430.25	3.83	TOTAL	3,972,098,229	8,415,462.34	100.00
HUNEDOARA	5,381,721	1,793,907.00	0.13				

Source: Ministry of Finance Database, 2014. [12] Own calculations.

Lactag SA Arges is the only company which went up in the hierarchy in 2013, being placed on the 12th position due its turnover, but because of the 28th position recorded in 2011 and the 26th position in 2012, it was evaluated for the 21st position based on its turnover achieved for the period 2011-2013.

In the last group of the Romanian brands, situated on the positions 21-20, there were: Lactag Arges, Lactate Natura, Ilvas Vaslui, Ecolact Prod, Five Continents Trading, Therezia Prodcom, Prodlacta Brasov, Lacto Baron Constanta, Sanlacta Mures and Paulact Harghita. (Table 4)

The market share for the top 20 Romanian

trademarks in milk processing industry. On the top position it is Danone with 12.11 % market share, followed by Albalact with 10.65 % and Friesland with 9.09 %. They are followed by Fabrica de lapte with 6.07% market share, Napolact 5.61 %, Hochland 5.43 %, La Dorna lactate 4.42 %, Simultan 4.04 %, Covalact 3.31 % and Industrializarea laptelui Mures 3.22 %. All these top 10 trademarks totalized 63.90 % market share.

In the following positions 11-20, there were situated companies whose market share was lower than 2 %. All these 10 brands together had 12.93 % market share.

All the top 20 trademarks of the milk processing

industry registered 76.83 % market share in 2013, reflecting that they are the most powerful Romanian brands in this field.(Table 5)

Table 4.Top 30 Romanian Brands in Milk Processing Industry based on their turnover in the period 2011-2013

	BRANDNAME	2011		2012		2013		SUM OF POSITIONS	FINAL RANKING FOR 2011-2013
		TURNOVER LEI	POS.	TURNOVER LEI	POS.	TURNOVER LEI	POS.		
1	SC DANONEPDDA SRL BUCHAREST	502998666	1	506400194	1	481066088	1	3	1
2	ALBALACTSA OIEIDEA, ALBA	338250661	3	343844878	3	423185187	2	8	3
3	SCHRIESLAND CIMPINARONANIA SA, CLUJ-NAPOCA	382720738	2	407116089	2	361368289	3	7	2
4	FABRICA DE LAPTE BRASOV SA, BARAOLT, COVASNA	97112904	10	169381143	5	239131953	4	19	5
5	SC NAPOLACT SA, CLUJ-NAPOCA	222374112	4	224502870	4	222864517	5	13	4
6	HOCHLAND, SIGHISOARA, MURES	197954114	5	197444322	6	216040409	6	17	6
7	LA DORNA LACTATE SA, DORNA CANDRENILOR, SUCEAVA	185200945	6	182010865	7	175770125	7	20	7
8	SIMULTAN SRL, FAGET, TIMIS	127754068	7	96471864	10	160655455	8	25	8
9	SC COVALACT SA, SFANTUL GHEORGHE, COVASNA	90434113	11	118526463	9	131853427	9	29	10
10	INDUSTRIALIZAREA LAPTELUI MURES SA, TGMURES	124344812	8	135054888	8	128096688	10	26	9
11	DORNASA, VATRADORNEI, SUCEAVA	104414981	9	92652187	11	78556940	11	31	11
12	LACTAG SA, COSTIESTI, ARGES	15705984	28	19587002	26	60947171	12	66	21
13	LACTATE HARGHITA SA, MIERCUREA CIUC, HARGHITA	42015624	15	34777394	19	56677254	13	47	15
14	SC CARMOLACT PROD SRL MONOR, BISTRITANASAUD	47831233	12	55339217	12	56076562	14	36	12
15	SC ALMERA INTERNATIONAL SRL, GALATI	44494711	13	52876400	13	51739904	15	41	13
16	GORDON PROD SRL, BISERICANI, HARGHITA	42664986	14	45929516	14	51641863	16	44	14
17	RARAU SA, CIMPULUNG MOLDOVENESC, SUCEAVA	34541901	17	37329084	16	46638888	17	50	16
18	NORDEX FOOD ROMANIA SRL, CIMPULUNG, ARGES	30218285	19	39929994	15	38987306	18	52	17
19	INDLACTOMURES SRL, TGMURES	35248619	16	35297079	18	38817673	19	53	18
20	FIVE CONTINENTS GROUP SRL, RACHITII, BOTOSANI	24216168	23	26641878	20	35324661	20	63	20
21	SC LACTO SOLOMONESCU SRL COSTIN, BOTOSANI	29231999	20	35318191	17	31866439	21	58	19
22	LACTOBARON SRL, HIRSOVA, CONSTANTIA	11141706	30	18494228	28	31328207	22	80	27
23	PRODLACTASA BRASOV	18190357	27	9175548	30	25621264	23	80	27
24	FIVE CONTINENTS TRADING COMPANY, BUCURESTI	18772371	25	19863765	25	25621264	24	74	25
25	THEREZIA PROD COM SRL, PANET, MURES	18094626	26	21454524	24	24293376	25	75	26
26	PAULACT SA, SINPAUL, HARGHITA	11202205	29	13263175	29	23225797	26	84	29
27	ECOLACT PROD SRL, PAULESTI, PRAHOVA	27641964	22	21018071	23	23103777	27	72	24
28	SC ILVASSA, VASLUI	2708363	21	24008539	21	22862894	28	70	23
29	LACTATE NATURA SA, TIRGOVISTE, DAMBOVITA	32545143	18	23799000	22	21915492	29	69	22
30	SANLACTE SA, SINTANA DE MURES, MURES	19322344	24	19502085	27	19654848	30	81	28

Source: Ministry of Finance Database, 2014. [12] Own calculations.

The major problems of the dairy products Romanian brands are the following ones:

- The higher market pressure by foreign trademarks which are prepared to invade the Romanian market after the embargo imposed by Russia, which increased their stocks of dairy products and then, after the abolition of the milk quota starting from April 1st, 2015;
- The increased competition in the domestic market between the dairies brands and supermarkets brands; the supermarkets used

and will continue to import dairy products at a lower price from abroad, mainly from Austria, Germany, Hungary, Poland, Slovakia; also they will continue to import cheap raw milk and sell their own products on the shelves at lower prices, which do not include the shelf tax;

- The high shelf tax practiced by supermarkets which does not allow many producers to exhibit their products in this kind of shops;

Table 5. The market share of the top 20 Romanian brands in milk processing industry based on their turnover in 2013

CRT. NO.	BRAND NAME	MARKET SHARE(%)	CRT. NO.	BRAND NAME	MARKET SHARE (%)
1	SCDANONEPDDPA.SRL	12.11	11	DORNASA,VATRADORNEL,SUCEAVA	1.97
2	ALBALACT.SAOIEIDEA,ALBA	10.65	12	LACTAGSA,COSTESTI,ARGES	1.53
3	SC FRIESLAND CIMPINA RONANIA SA,CLUJ-NAPOCA	9.09	13	LACTATE HARGHITA SA,MIERCUREA CIUC,HARGHITA	1.42
4	FABRICA DE LAPTE BRASOV SA, BARAOLT,COVASNA	6.02	14	SC CARMOLACT PROD SRL MONOR, BISTRITANASAUD	1.41
5	SCNAPOLACTSA,CLUJ-NAPOCA	5.61	15	SC ALMERA INTERNATIONAL SRL, GALATI	1.30
6	HOCHLAND,SIGHISOARA,MURES	5.43	16	GORDON PROD SRL, BISERICANI, HARGHITA	1.30
7	LA DORNA LACTATE SA, DORNA CANDRENILOR,SUCEAVA	4.42	17	RARAUL SA, CIMPULUNG MOLDOVENESC,SUCEAVA	1.17
8	SIMULTAN.SRL,FAGET,TIMIS	4.04	18	NORDEX FOOD ROMANIA SRL, CIMPULUNG,ARGES	0.98
9	SC COVALACT SA, SFANTUL GHEORGHE,COVASNA	3.31	19	INDLACTOMURESSRL,TGMURES	0.97
10	INDUSTRIALIZAREA LAPTELUI MURESSA,TGMURES	3.22	20	FIVECONTINENTSGROUPSRL,RACHITI, BOTOSANI	0.88
	TOTALTOP10	63.90		TOTALTOP20	76.83

Source: Own calculations.

-The invasion of foreign dairy products coming from other EU countries where their price is lower because of the cheaper raw milk, lower production costs and increased stocks of dairy products; [4]

-The embargo imposed by Russia has negatively influenced the demand/offer ratio of dairy products in the EU, creating a growth of the stocks and a reduction of the selling price;

-The high production cost in dairy farming and milk processing industry will determine an increase of dairy products price;

-The limited purchasing power of the Romanian consumers will encourage the increase of the demand for imported milk and dairy products which are cheaper, coming from the countries where agriculture is strongly subsidized;

-The low financial support given by the Romanian Authorities to dairy farmers who are in danger to lose their business and to look for other deals;

-The high stocks of dairy products at the dairies will determine milk processors to keep the farm gate price at a lower price, deeply affecting dairy farmers' income and profitability; [10]

-Some of the dairies will be obliged to close, so, their brands will disappear because they could not resist to the market pressure. In 2014, over dairies representing one third of

the production capacity disappeared for this reason.[11]

-However, the most powerful Romanian brands will be able to survive, even though they will be obliged to retrain their production capacity. [5]

-Also, it is expected as the foreign investors to continue to penetrate in milk processing industry.

CONCLUSIONS

In 2013, in the milk and dairy products market, there were 472 trademarks, of which 255 brands (54%) were concentrated in 10 counties (Constanta, Suceava, Bistrita Nasaud, Maramures, Botosani, Tulcea, Braila, Bucharest and Sibiu.

In the same year, the turnover achieved by all the 472 brands of dairy products accounted for Euro 882,688,495, of which 83.89% was achieved by 175 brands (37%), belonging to 10 counties (Cluj, Bucharest, Mures, Alba, Covasna, Suceava, Timis, Bistrita Nasaud, Arges, Botosani).

The average turnover/brand was Euro Lei 1,870,102.74 in the dairy products sector.

Taking into account the number of points received for the turnover carried out in the period 2011-2013, a number of 10 brands Danone, Friesland, Albalact, Napolact, Fabrica de lapte, Hochland, La Dorna,

Simultan, Industrializarea laptelui Mures and Covalact were situated in the top 10 positions. Based on the market share in 2013, the top 10 trademarks in dairy products market were the following ones: Danone (12.11 %), Albalact (10.65 %), Friesland (9.09 %), Fabrica de lapte (6.07%), Napolact (5.61 %), Hochland (5.43 %), La Dorna lactate (4.42 %), Simultan (4.04 %), Covalact (3.31 %) and Industrializarea laptelui Mures (3.22 %), all together totalizing 63.90 % market share.

The main restraining factors which is expected to affect the position of the Romanian brands in the future are: the abolition of milk quota starting from April 1st, 2015, the increased stocks of dairy products and the lower purchasing price of milk and dairy products in other EU countries, the invasion of raw milk and dairy products from Germany, Austria, Poland, Hungary, the low purchasing power of the consumer.

Only the top powerful Romanian brands with a good endowment, production capacity and diversity of products, financial resources, and a good management will be able to resist to the market pressures.

Taking into consideration the market pressures on milk and dairy products sector, the Romanian Government should take some measures in order to diminish the negative effects.

Among the these important measures that we propose there are:

-the allotment of a financial support on the whole milk chain in order recover dairy farming and milk processing sectors;

-the identification of new markets where the Romanian products to be commercialized;

-the VAT reduction to encourage the decrease of the price and a recover of the consumption of dairy products;

-the labeling of the dairy products for an easier identification of the product origin according to the principles of traceability and in order to avoid the falsification of the products;

-the innovation focused on product in order to offer a large variety of products, encourage consumption and sales; [14]

-a more intensive marketing promotion by specific measures like advertising by mass

media, web sites, detailed information in the shops and at the shelf level, a better visibility of the products, promotions, tastings etc;

-an increased role for promoting the Romanian brands is e-commerce which allows producers and retailers to keep a close contact with their trade partners, suppliers and clients; it is an efficient tool for market studies destined to identify consumers' needs and demand, and also for brands promotion in the market.[15]

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RESEARCH ON THE TRENDS IN MILKING LIVESTOCK AND MILK PRODUCTION IN ROMANIA

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Abstract

The goal of the paper was to analyze the main trends in the milking livestock and milk production in Romania during the period 2007-2012 and to establish the forecast for the 2013-2015 horizon, based on the empirical data provided by the National Institute of Statistics and Eurostat. The methods used in this study were: the fixed basis index, average change method, and comparison method. While the number of dairy cows declined by 30 %, accounting for 1,265 thou heads in 2012, the number of female sheep and goats increased by 45 % reaching 8,726 thou heads. The farm size is very small, 1-2 cows/farm for 59 % holdings, 3-9 cows/farm for 38 % holdings and over 10 cows for only 3 % farms and the extensive technology is the most practiced one. Milk production declined by 20 %, accounting for 44,172 thou hl in 2012, of which 86 % is produced by cows. Milk production value contributes by 32 % to agricultural production value. Cow milk yield is small, only 3,417 kg/cow in 2012 and in decline. Only about 22 % of milk is delivered to dairies and the remaining is consumed on farm and directly sold in the market because of the low milk farm gate price and milk quality. The producer's price is the lowest in the EU, accounting for Euro 29.84/100 milk kg. As a conclusion, to rehabilitate the sector of milk producing, the farmers' associative forms are required to join the capital and financial resources, to apply for EU funding to modernize the farms, to produce a higher production and assure a high profitability and competitiveness.

Key words: milking livestock, milk production, Romania, trends

INTRODUCTION

Romania has a long tradition in producing milk, due to its geographical position, with a large variety of relief, important surface of agricultural land, and also pastures and meadows for raising cattle, sheep and goats.

The entry into the EU was a real challenge for the milking livestock, spread in million of small farms of subsistence, lacked of modern technologies and financial resources, with low milk performance in more than 90 % animal holdings.

Just a few farms were able to keep pace with the EU requirements regarding milk production and quality which resulted in a low percentage of direct milk delivery to milk processors.

Romania was a modest milk producer during the last 25 years because of its huge number of small holdings, the decreasing number of milking farm animals mainly cows, the low number of dairy cows per farm, extensive technologies, low technical endowments,

difficulties in assuring a corresponding feeding, high production cost, low producer's price, problems with milk quality, which pushed the dairy farming at the limit of the profitability producing dissatisfaction to the most of the Romanian farmers. [13]

Milk production is in a continuous decline, because of the decreasing number of dairy cattle, milk yield is still small about 3,400 kg/cow/year, milk delivery is affected by farm gate price and milk quality, so that the demand/offer is unbalanced and consumption is lower than in other EU countries. So, the imports of milk and dairy products were required to cover the population and industry needs.

However, some specialized farms recorded better performances supplying milk processors, despite that about 78 % of milk production is consumed on farm or directly in the market.

The areas with the highest contribution to Romania's milk production are the Central region and North East region, fresh dairy

products are mainly carried out in the Central and South Muntenia and Bucharest and Ilfov County and cheese production is especially achieved in the North-West, Central and North Eastern Romania. [8]

In this context, the paper aimed to analyze the evolution of the milking livestock, farm structures, milk yield, milk production, farm gate milk price, producers problems in order to identify the main trends arising after the accession into the EU in the period 2007-2012, and set up the forecast for the period 2013-2015.

MATERIALS AND METHODS

In order to carry out this analysis, the empirical data were collected from various official sources such as: National Institute of Statistics Data Base, National Institute of Statistics. EuroStat data base, journals, official communications. The period of reference was 2007-2012.

The main indicators taken into consideration to analyze the milk and dairy products market were the following ones: number of holdings producing milk, number of dairy cows, buffaloes, female sheep and goats, farm size, animal density/ha, milk production, milk production per inhabitant, milk yield, milk quality, and farm gate milk price.

The data were processed according to the fixed basis index method and comparison method and the results have been tabled and interpreted.

Also, the average change method was used to set up the forecast for the period 2013-2015, involving the adjustment of the chronological series, based on the formula: $Y_{t_i} = y_{t_0} - n \bar{\Delta}$, Y_{t_i} = the adjusted value of the variable in the year i , y_{t_0} = the real value of the variable in the year zero, $n = 1, 2, 3, \dots, i$, $\bar{\Delta}$, was calculated with the formula $\bar{\Delta} = (\sum \Delta) / (n-1)$, where $\Delta =$ annual change, $y_1 - y_0$; $y_2 - y_1$; $y_n - y_{n-1}$, where $i = 1, 2, \dots, n$ years of the chronological series. [7]

RESULTS AND DISCUSSIONS

Agricultural holdings raising cattle, sheep

and goats. In 2010, there were 728,020 agricultural holdings dealing with cattle farming, by 31.82 % less than in 2007.

Taking into account that in the same year in the EU, there were 2.6 million holdings with cattle, this means that the share of the Romanian agricultural holdings was 28 %.

The descending trend in Romania followed, in general, the EU decreasing tendency regarding the number of cattle holdings, the highest decline being noticed in the Czech Republic (-45 %), Slovakia (-45 %), Slovenia (-43 %) and Estonia (-42 %) between 2007 and 2010. [10]

Taking into account the surface of the holdings in Romania, their structure was the following one: 24.28 % farms had less than 1 ha, 59.29 % holdings had 1-5 ha, 11.88 % farms had 5-10 ha, 3.91 % had 10-50 ha, 0.31 % had 50-100 ha and 0.33 % had over 100 ha. The main trend regarding the agricultural holdings raising cattle is that the number of farms had a general decreasing trend, except the farms with over 50 cattle whose number is increasing, and a number of 608,512 farms (83.58%) had less than 5 ha. (Table 1)

Also, in 2010, Romania had 272,272 holdings with sheep and goats, by 30.25 % less than in 2007.

The holdings structure depending on their land was the following one: 25.83 % had 1-5 ha, 52.26 % had 1-5 ha, 14.02 % had 5-10 ha, 6.43 % had 10-50 ha, 0.78 % had 50-100 ha and 0.68 % had over 100 ha.

The main trends regarding the agricultural holdings raising sheep and goats were the following ones: the number of farms registered a continuous descending trend, except the smallest farms with less than 1 ha and the largest farms with over 50 ha whose number increased. (Table 1)

In the EU Dairy farms Report, 2013, based on FADN Data 2011, concerning the milk specialized farms, it is specified that Romania had 2 ha fodder area (farm size), compared to 29 ha in the EU-27, 51 ha in the EU-15, 788 ha in Slovakia (the largest farm size), 252 ha in Czech Rep., 102 ha in Denmark, 101 ha in United Kingdom, 92 ha in Hungary, 13 ha in Poland and 8 ha in Bulgaria. [3]

Table 1. Agricultural holdings raising cattle, sheep and goats, 2007 and 2010 (number)

Farm surface Ha	Cattle holdings			Sheep and goats holdings		
	2007	2010	2010/2007 (%)	2007	2010	2010/2007 (%)
Total	1,067,726	728,020	68.18	390,562	272,275	69.75
0-1	198,480	176,823	89.08	66,385	70,342	105.96
1-5	658,454	431,689	65.56	221,572	142,305	64.22
5-10	158,804	86,528	54.48	71,398	38,192	53.49
10-50	48,122	28,511	59.24	28,171	17,509	62.15
50-100	2,030	2,382	117.33	1,620	2,126	131.23
Over 100	1,836	2,087	113.67	1,413	1,801	127.45

Source: NIS, 2013, Romania's Statistical Yearbook. [11]Own calculations.

Cattle, sheep and goats stock. In the period 2007-2012, in Romania, the number of cattle decreased by 28.74 % from 2,819 thou heads in 2007 to 2,009 thou heads in 2012. Also, the number of dairy cows, buffalo and heifers declined by about 30 %. The share of dairy cows, buffalo and heifers in the cattle number

registered a slight growth from 61.44 % in 2007 to 62.96 % in 2012.

The number of cattle stock and dairy cows is different distributed in the territory of Romania.

Table 2. Cattle, sheep and goats stock, 2007-2012 (Thousand heads)

	2007	2008	2009	2010	2011	2012	2012/2007 (%)
Cattle, of which:	2,819	2,684	2,512	2,001	1,989	2,009	71.26
-Dairy cows, buffalo and heifers	1,732	1,639	1,569	1,299	1,266	1,265	70.03
Share(%)	61.44	61.06	62.46	64.91	63.65	62.96	-
Sheep, of which:	8,469	8,882	9,141	8,417	8,533	8,834	104.30
-Ewes and ewe lambs	7,207	7,597	7,818	7,338	7,441	7,695	106.77
Share (%)	85.09	85.53	85.52	87.18	87.20	87.10	-
Goats, of which:	865	898	917	1,241	1,236	1,266	146.35
-Female goats	713	741	755	1,032	1,012	1,031	144.60
Share(%)	82.42	82.51	82.33	83.15	81.87	81.43	-

Source: NIS, 2013, Romania's Statistical Yearbook. [11]Own calculations.

The region with the highest number of dairy cows is the North-East Romania with about 23 % in total cattle stock and about 22.6 % in total number of dairy cows. On the next positions are coming, in the decreasing order, the North West region, the South Region and the Western region. [1]

In 2011, the EU had over 86 million cattle, a smaller figure compared to the previous years. This means that in 2011, about 2.31 % of the EU cattle stock was in Romania. The decreasing trend regarding cattle number was noticed in some EU countries, the highest decline being noticed in Romania (-32 %) and Slovakia (-25 %) in the period 2007-2011. But, important growths were recorded in other EU countries such as: Greece (+12 %), Portugal (+8 %), Cyprus (+7 %) and the Netherlands (+2 %).[10]

The number of sheep increased by 4.30 % from 8,469 thou heads in 2007 to 8,834 thou heads in 2012. A similar ascending trend was registered by ewes and ewe lambs whose number increased by 6.77 %. The number of goats recorded the highest growth, + 46.35 %, from 865 thou heads in 2007 to 1,266 thou heads in 2012, of which female goats about 81.43 %.[12]

Therefore, while the number of dairy cows, buffalo and heifers is decreasing, the number of sheep and goats is increasing mainly due to the importance of goat milk for human consumption. [12]

Farm size. Taking into account the number of holdings with cattle, sheep and goats and the number of dairy cows, buffalo and heifers and also of ewes and ewe lambs and female goats, it is easy to notice that the holding size is very

small in term of average number of animals per farm.

The average farm size in dairy farming is 1-2 heads in about 59 % of holdings, 38 % have 3-9 heads and only about 3 % have more than 10 cows. Romania comes on the last position in the EU from this point of view, compared to the EU average farm size.

In the EU Dairy farms Report, 2013, based on FADN Data 2011, regarding milk specialized farms, it is mentioned that Romania had 4 LU (Livestock unit)/farm, compared to the EU-27 average farm size of 29 LU, EU-15 with 54 LU, or various EU countries such as: Slovakia

217 LU, Denmark 142 LU, Czech Rep 138 LU, United Kingdom 119 LU, Hungary 76 LU, Poland 16 LU, Austria 16 LU, Bulgaria 13 LU. [3, 5]

Animal density per surface unit. The number of animals per surface unit is very small in Romania: 14.8 cattle/ha in 2012 by 31 % less than in 2007, 9.3 dairy cows, buffalo and heifers/ha in 2012 compared to 13.2 heads/ha in 2007, that is by 29.55 % less. Therefore, the density of cattle has continuously decreased taking into account the descending trend of cattle stock.

Table 3. Cattle, sheep and goats per hectare (heads/ha)

	2007	2008	2009	2010	2011	2012	2012/2007 (%)
Cattle, of which:	21.4	20.4	19.1	14.6	14.7	14.8	69.15
-Dairy cows, buffalo and heifers	13.2	12.4	11.9	9.5	9.3	9.3	70.45
Sheep and goats, of which:	70.9	74.3	76.4	70.5	72.2	74.6	105.21
Ewes, ewe lambs and female goats	60.1	63.3	65.1	61.1	62.4	64.5	107.32

Source: NIS, 2013, Romania's Statistical Yearbook. [11]Own calculations.

But, concerning sheep and goat stock per ha, the density increased reaching 74.6 heads/ha in 2012, by +5.21 more than in 2007 and 64.5 ewes, ewe lambs and female goats in 2012, meaning +7.32 compared to 2007. Therefore, the increased livestock for these species had a positive impact on animal density.

However, Romania has the lowest animal density per surface unit compared to other EU countries.

Milk production recorded a descending trend from 54,991 thou hl in 2007 to 44,172 thou hl, that is minus 19.68 % in the analyzed period.

Table 4. The share of Milk production produced by dairy cows and buffaloes in total milk production, 2007-2012 (Thousand hl)

	2007	2008	2009	2010	2011	2012
Share of Milk production produced by dairy cows and buffaloes in total milk production (%)	88.77	99.54	88.66	85.92	86.64	85.73

Source: Own calculations based on NIS, 2013, Romania's Statistical Yearbook. [11]

This was a consequence of the decline of the milking livestock, mainly dairy cows, which have the largest contribution to milk production. The share of milk coming from dairy cows and buffalo to the whole milk production in the country declined from 88.77 % in 2007 to 85.73 % in 2012. (Table 4).

Milk production produced by dairy cows and buffalo accounted for 37,878 thou hl in 2012, by 23.43 % less than in 2007.

Taking into consideration the milk production achieved by Romania in the year 2011, and

the total amount of milk produced in the EU of 156 Million tons, one can notice that Romania's contribution to the EU milk production was about 4.23 %. In Romania about 86 % of milk is produced by cows, while in the EU cows contribution accounts for about 97.8 %.

In Romania, due to the livestock structure, tradition and geographical conditions, about 14 % milk is produced by sheep and goats. Based on milk coming from these species, Romania is situated on the 5 th position in the EU, after Greece, Spain, France and Italy. All

these 5 countries produces 92 % of the EU ewe milk. [10]

In 2011, Romania's milk production value accounted for Euro million 1,252.8, contributing by 7.32 % to the value of

agricultural production (Euro million 17,103.3) and 2.35 % of the EU milk production value (Euro million 53,215). In the EU, milk represented 14 % of the agricultural production value.

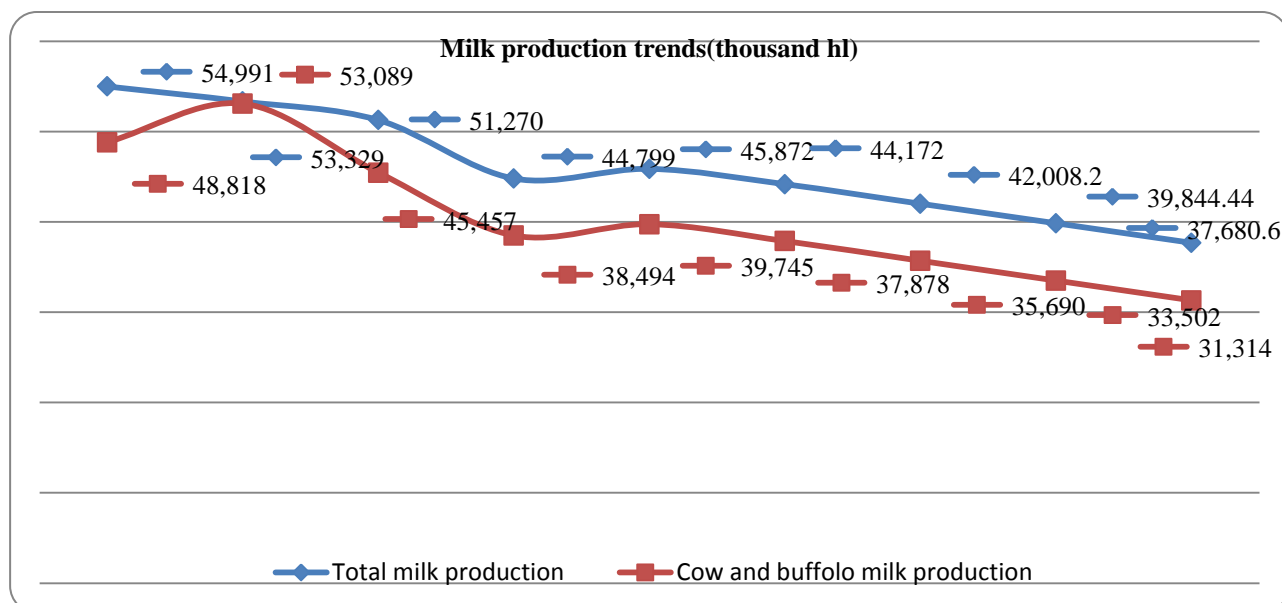


Fig.1.Evolution of the Total milk production and Cow and buffalo milk production during the period 2007-2012 and the forecast for the 2013-2015 horizon. Own design based on NIS, 2013, Romania's Statistical Yearbook. [11]

Regarding milk quota, the Romanian farmers have not been able to fulfill it in the period 2007-2012 and the EU decision to remove the dairy quota starting from the year 2015 will deeply affect the Romanian milk market which is expected to be invaded by many foreign dairy products coming from the EU countries which are exceeding their quota currently. [15]

Based on the evolution of milk production during the period 2007-2012, the forecast for the 2013-2015 horizon is illustrated in Fig.1. In the year 2015, it is expected as total milk production to account for 37,680.6 thousand hl, of which 31,314 thousand hl, that is 83.10 % to be supplied by dairy cows and buffaloes. (Fig.1.)

Milk production per farm. In 2011, a dairy farm produced 14 tons milk, compared to 203 tons in the EU-27, 396 tons in the EU-15, 1,242 tons in Slovakia (the highest production in the EU), 1,193 tons in Denmark, 942 tons in Czech Rep., 885 tons in United Kingdom, 654 tons in the Netherlands, 544 tons in Hungary, 86 tons in Poland and 40 tons in Bulgaria, as just a few examples. Therefore,

Romania had the lowest milk production per farm among the EU countries. [3]

Cow milk yield. As cows give the highest contribution to milk production, this article is mainly focused on cow milk. Cow Milk yield is in general small in Romania, taking into account the breeds' production and fodder production, the small sized farms where growing technologies are more extensive than intensive. In 2012, Romania registered 3,417 kg milk/cow by 4.13 % less than in 2007 (3,564 kg/cow). (Fig.2.)

In 2011, Romania produced 3,524 kg/cow, twice less than the EU-15 average accounting for 7,337 kg/cow or compared to 6,905 kg/cow produced in the EU-27. In other European countries the average milk production is much higher: 8,711 kg/cow in Finland, 8,546 kg/cow in Sweden, 8,421 kg in Denmark, 8,019 kg in the Netherlands, 6,814 kg in Czech Rep., 7,199 kg in Hungary, 5,732 kg in Slovakia, 5,319 kg in Poland, 3,140 kg in Bulgaria. [3] Therefore, in the EU, there are countries with the highest performance in terms of milk yield like Finland, Denmark, Sweden, Spain, and also countries in the

opposite side, with the lowest yield: Romania, Greece and Bulgaria. [5]

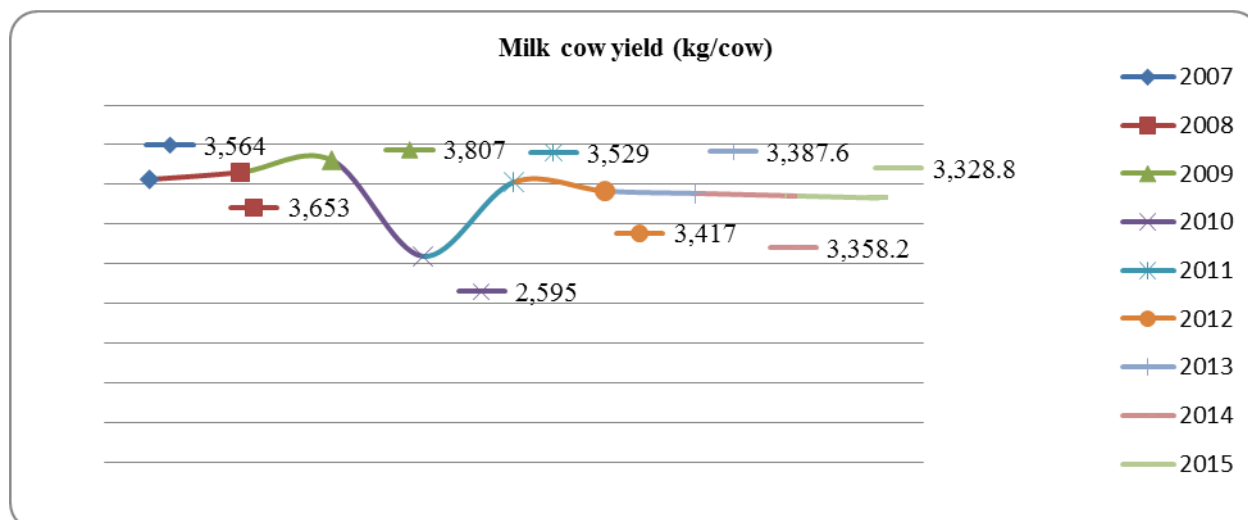


Fig.2. Evolution of cow milk yield in the period 2007-2012 and the forecast for the 2013-2015 horizon in Romania. Own design based on MARD Report 2014, [8]

Milk production per inhabitant. Taking into consideration the evolution of Romania's milk production and population, the milk production per inhabitant in the period 2007-

2012 declined from 292.3 kg/capita in 2007 to 240.5 kg/capita in 2012, that is by 17.73 % less.(Fig.3.)

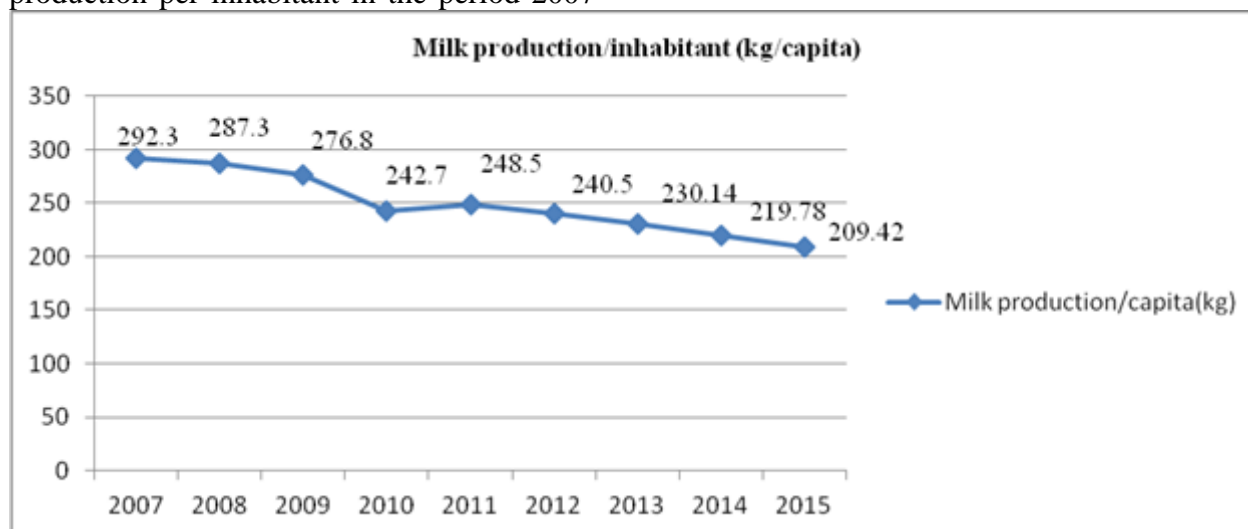


Fig.3. Evolution of milk production per inhabitant in the period 2007-2012 and the forecast for the 2013-2015 horizon. Own design based on NIS, 2013, Romania's Statistical Yearbook. [11]

Milk quality is very important for processing and for human consumption of healthy milk and dairy products. At delivery, milk quality is checked regarding its fat and protein percentage, acidity, density, and the number of total pathogenic germs and the number of somatic cells. The EU established specific standards regarding milk quality, which should be respected by all the member states according to the requirements of Commission

Directive 89/362/EEC (1) and Council Directive 92/46/EEC. [2,6,14]

In Romania, the amount of delivered milk from dairy farms is recalculated at the standard fat %, that is 3.5 %, from this calculus being advantaged the farmers whose dairy cows produce a milk with a fat % higher than 3.5 %, while the ones delivering a milk with less than 3.5 % fat are deeply disadvantaged. The thresholds for the number

of pathogenic germs is maximum 100,000 per ml milk and for the number of somatic cells is maximum 400,000/ml milked milk. These standards reflect the hygiene conditions where milk was produced and milked, the degree of disinfection of the milking machine and other milk equipments between two milkings and also how milk was treated. [16]

In Romania, there are still problems from this point of view, due to the fact that many of the small farmers are practicing manual milking, have no milk tanks to store milk at a corresponding temperature. However, milk quality is checked and only the corresponding milk is collected by dairies and milk collecting centers.

Starting from January 1st 2014, milk producers are not allowed to deliver milk which do not comply with the EU milk quality standards. [9]

Farm gate milk price. Producer's price, that is the one he receives at delivery based on standard milk amount, has slightly increased from Lei 0.75/kg in the year 2007 to Lei 1.11/kg in 2012, meaning + 48 % in case of cow milk and from Lei 1.20/kg in 2007 to Lei 1.87/kg in 2012, reflecting +55 % gain in case of sheep milk. In 2012, a kilogram of sheep milk was by 68.47 % higher than a kilogram of cow milk. (Fig.4.).

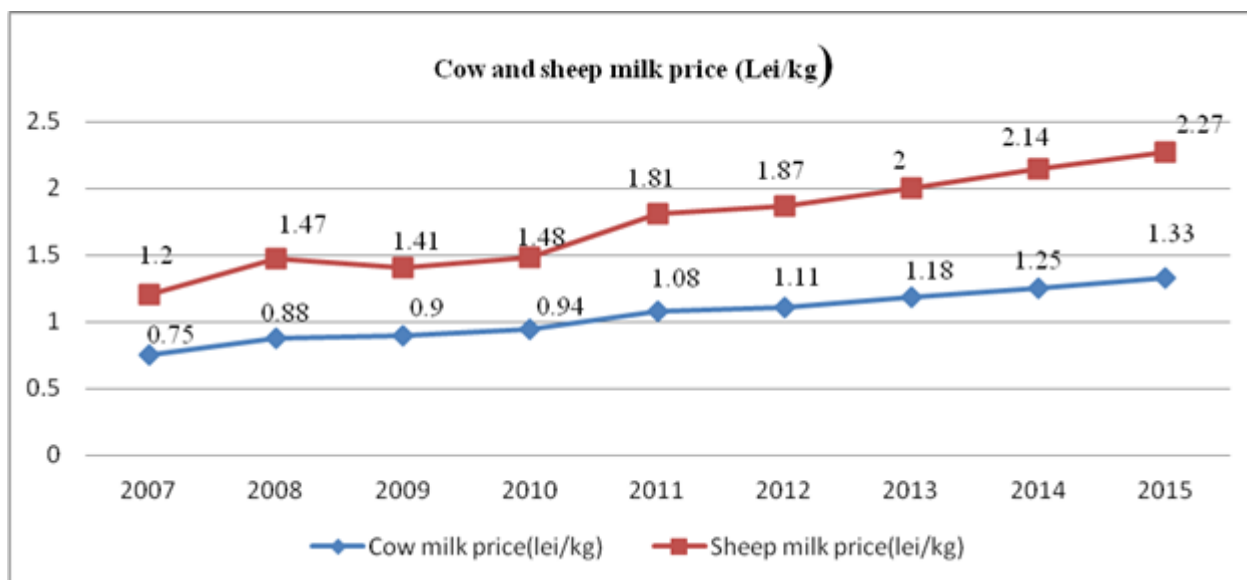


Fig.4.Evolution of cow and sheep milk price in the period 2007-2012 and the forecast for the 2013-2015 horizon. Own design based on NIS, 2013, Romania's Statistical Yearbook. [11]

Romania recorded in the year 2011 a milk price of Euro 323 per ton, lower than Euro 357 per ton in the EU-15 and Euro 349 per ton in the EU-27. In comparison with other European countries, farm gate milk price in Romania is the lowest one: Euro 460/ton in Italy (the highest milk price), Euro 411 in Finland, Euro 394 in the Netherlands, Euro 371 in Denmark, Euro 335 in Czech Rep., Euro 334/ton Slovakia. However, milk price in Romania was higher than in other EU countries such as: United Kingdom Euro 315 per ton, Bulgaria Euro 311, Hungary Euro 309, Poland Euro 286. [3]

In 2014, the average farm gate milk price in the EU-28 was Euro 34.32 per 100 kg.

Romania registered Euro 29.84 per 100 kg, by 7.62 % less than in 2011, reflecting a decreasing trend. A similar situation was noticed in other EU countries such as: Italy Euro 36.77/100 kg (-20 %), Denmark Euro 36 (- 2.97 %), the Netherlands Euro 34.50 (- 12.44 %), while in other countries the price increased like in Finland Euro 42.33 per 100 kg (+2.99 %), United Kingdom Euro 35.63 (+13.11 %), and Bulgaria Euro 32.58 (+4.75 %).[4]

The reduced milk price places Romania on the last position in the EU, the main causes being: the growth of farm input cost, mainly of feeding cost, the lack of cooperatives or other associative organization forms to assure farm

inputs at a lower cost and sell milk at a higher price, milk quality, which sometimes does not compile with the EU standards, and as a consequence, the low milk price offered by dairies to farmers, the demand/offer ratio in Romania, the restraints and embargo imposed by Russia, and the dynamics of milk production and marketed milk in Slovakia, Poland and Hungary. [5]

However, a few cooperatives have been already founded and their results proved a higher efficiency, but their impact on milk producing sector is not yet so significant.

For this reason, farmers are dissatisfied of the low milk price, which stagnated for several years and of the lost of their business and some of them have been oriented to beef cattle growing as meat production is a niche for the Romanian producers as long as the demand is higher than the offer currently. [15]

Milk delivery. A low number of farms delivered milk directly to milk processors, it is about 1,464 specialized farms accounting for only 1.30 % of the total number of dairy holdings. The marketed milk directly sold to the milk processing industry represented only 22 %, meaning that the remaining of 78 % was consumed by the family members, calves, and other animals.

Some milk processors had the idea to provide milk tanks and installed 1,613 milk collecting centers where farmers to bring their milk.

Despite this, many farmers could not deliver milk to the processing industry.

As a result, milk processors' need of raw milk is only partially covered by the domestic suppliers, a reason to make milk import to assure the processing capacity and profitability.

CONCLUSIONS

Romania is facing a continuous decline regarding milking animal stock, number of farms, milk yield, and milk production.

The small farm size, the low technical endowment, the lack of financial resources led to a low milk performance, a low productivity and competitiveness in this sector.

In addition, milk quality requirements imposed by the Romania's entry into the EU

have limited the number of farmers able to supply milk processing industry.

As a result, the amount of delivered milk was diminished with a negative impact on the raw milk offer and milk processors were obliged to import milk from various EU countries to cover the processing capacity.

This analysis pointed out that some measures are imposed to rehabilitate this sector of activity. First, farmers' associative forms could restore the milk producing sector to increase profitability and milk quality. Also, important investments are required to modernize or develop modern dairy farms which are the major suppliers of raw milk.

Unfortunately, after the quota abolition in 2015, it is expected as import of raw milk and dairy products to be encouraged, so that The Romanian milk producers to be more affected than they are at present.

Milk quality is a challenge to overpass the increasing competition in the milk and dairy products market.

However, sheep and mainly goat milk and products could be a niche for Romania's export in the future.

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RESEARCH ON THE TRENDS IN MILK PRODUCTION AND CONSUMPTION IN ROMANIA

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Abstract

The purpose of the paper was to analyze the main trends in the milk and dairy products market in Romania in the period 2007-2012 and to set up the forecast for the 2013-2015 horizon, based on the empirical data provided by the National Institute of Statistics and Eurostat and using the fixed basis index, average change method, and comparison method. Milk production for consumption reached 210 thou tons in 2012 registering a descending trend. Despite that milk production decreased in the period 2007-2012, the production diversification applied by dairies supported the growth of dairy products output as follows: by 13.54 % for milk, by 3.45 % for sour cream, and by 13 % for butter. The forecast for the year 2015 provides that the production of dairy products will account for: 223,936.6 tons milk for consumption, 48,709.4 tons sour cream, 166,674.2 tons acidulated milk, 9,937.6 tons butter and 66,584.4 tons cheese. The development of milk processing imposes the improvement of production technologies, products quality, efficiency and competitiveness. Due to the unbalanced demand/offer ratio, after the elimination of milk quota, the Romanian milk and dairy products market will be invaded by foreign products.

Key words: dairy products, market, milk, Romania, trends

INTRODUCTION

Milk is a strategic product in any country as it is a basic food for children and adults. The demand for milk and dairy products has continuously increased, but the offer is not sufficient to cover the needs of the world population.

Milk supply is in a continuous decline due to small number of specialized farms market oriented, the low production performance, and milk quality which does not compile with the EU requirements. So, the imports of milk and dairy products were required to cover the population and industry needs.

The areas with the highest contribution to Romania's milk production are the Central region and North East region, fresh dairy products are mainly carried out in the Central and South Muntenia and Bucharest and Ilfov County and cheese production is especially achieved in the North-West, Central and North Eastern Romania.

In this context, the paper aimed to analyze Romania's milk and dairy products market in order to identify the main trends in the period

2007-2012 and establish a forecast for the 2013-2015 horizon.

MATERIALS AND METHODS

The empirical data were collected from the National Institute of Statistics Data Base, EuroStat data base, journals, food industry communications.

The main indicators taken into consideration to analyze the milk and dairy products market were the following ones: milk processing, milk and dairy products production for consumption, milk consumption for industrial purposes, consumer price index for milk and dairy products. The period of reference was 2007-2012.

The main methods used to process the data have been: the fixed basis index method and the comparison method. and also the average change method used to set up the forecast for the period 2013-2015. In this purpose, the chronological series needed the adjustment, based on the average change index, according to the formula: $Y_{t_i} = y_{t_0} - n \bar{\Delta}$, Y_{t_i} = the adjusted value of the variable in the year i ,

y_{t0} = the real value of the variable in the year zero, $n = 1, 2, 3, \dots, i, \bar{\Delta}$, was calculated with the formula $\bar{\Delta} = (\sum \Delta) / (n-1)$, where $\Delta =$ annual change, $y_1 - y_0; y_2 - y_1; \dots, y_n - y_{n-1}$, where $i = 1, 2, \dots, n$ years of the chronological series. [6]

RESULTS AND DISCUSSIONS

Milk processing. About 22 % of marketed milk is directly delivered to milk processors, while about 78 % is consumed on farm (38% for family consumption and 8% for calves' feeding) and commercialized in the market by producers (32%). This aspect places Romania on the last position in the EU. In the EU over 91 % milk is delivered to milk processing industry, directly or by means of a milk collection centre. Romania and Bulgaria are on the last position from this point of view, because most of the produced milk is used on the farm. [7]

In 2012, a number of 1,464 specialized farms (1.30 %) was accepted to deliver milk directly to dairies. The amount of raw milk sold to milk processors declined in the period 2007-2012 by 21.5%, and in order to cover the dairies' need, the raw milk import increased by 35 %.

In the same year, the number of collecting centers totalized 1,613 and the number of dairies accounted for 512, by 38% less than in the year 2000, because they could not assure they milk input or had financial problems or did not meet to the EU requirements regarding quality management. [3]

The lack of raw milk in the market for milk processors is due to the orientation of small producers to direct selling in the market looking for a better price as the price offered by milk processors is small and sometimes do not cover production cost or assure just a very small profit. [5]

The top milk processors in Romania are SC Danone PDPA, Albalact SA, SC Friesland Campina Romania SA Cluj and SC Napolact SA Cluj-Napoca, clearly dominating the market of drinking milk products and having an excellent distribution.

At present, a number of only 168 dairies is approved by N.A.S.V.F.S. to produce and export milk and dairy products which comply with hygiene and sanitary standards. [8]

Production of dairy products. The most important dairy products there are milk for consumption, powdered milk, fresh sour cream, acidulated milk, butter, cheese, process cheese.

A large variety of dairy products are achieved with different hygiene requirements and challenges from UHT liquid milk, yoghurt, cheese, ice cream to desserts.

In 2011, the share of various dairy products in the production was the following one: 15.6 % milk, 25.6 % yoghurt, 39.5 % cheese and 19.3 % others. [12]

In 2012, milk production for consumption accounted for 208,109 tons, while the raw milk production collected by dairies was 870,286 tons. [2]

In the period 2002-2012, Romania produced: 393,036 tons milk for consumption, 282,628 tons sour cream, 793,307 tons acidulated milk, 55,692 tons butter, and 398,843 tons cheese.

The production of milk for consumption increased by 13.54 % from 184,055 tons in 2007 to 208,981 tons in 2012. The production of sour cream increased by 3.45 % from 46,159 tons in 2007 to 47,753 tons in 2012. The acidulated milk production increased by 17.66 % reaching 151,903 tons in 2012 compared to 129,951 tons in 2007.

The butter production increased by 13.09 % accounting for 9,292 tons in 2012 in comparison with 8,216 tons in 2007.

Cheese production declined by 0.68 % from 67,314 tons in 2007 to 66,858 tons in 2012. (Fig.1.)

In 2007, Romania's production of milk and dairy products totalized over Euro million 129. Production of milk and dairy products is higher than in other EU states. [11]

In 2015, it is expected as the production of dairy products to reach: 223,936.6 tons milk for consumption, 48,709.4 tons of sour cream, 166,674.2 tons acidulated milk, 9,937.6 tons butter and 66,584.4 tons cheese.(Fig.1.)

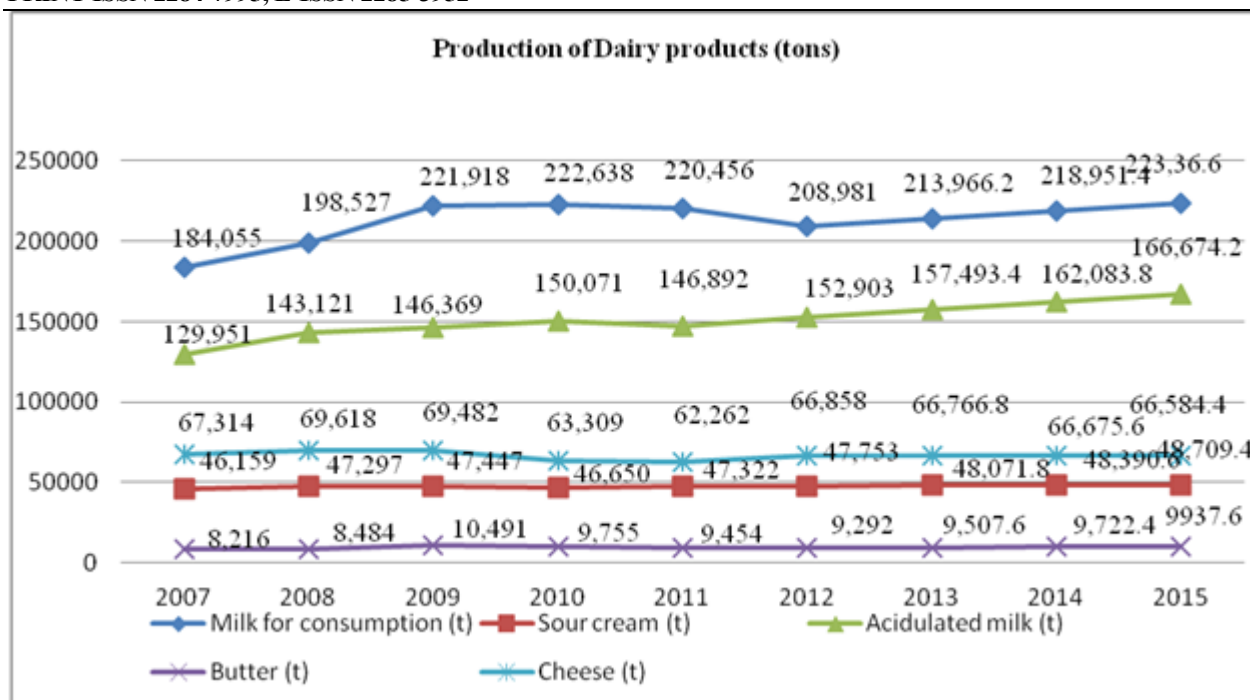


Fig.1. The evolution of the production of dairy products: milk for consumption, sour cream, acidulated milk, butter and cheese in the period 2007-2012 and the forecast for the 2013-2015 horizon. Own design based on NIS, 2008, 2010, 2012, Collected milk and dairy products. [4]

Milk consumption declined by 13.74 % from 67,563 thou hl in 2007 to 58,241 thou hl in 2012. Human milk consumption represented about 80 % of total milk consumption and

also registered a decrease by about 13.77 % from 54,445 thou hl in 2007 to 46,952 thou hl in 2012. (Table 1)

Table 1. Milk consumption, 2007-2012 (Thousand hl)

	2007	2008	2009	2010	2011	2012	2012/2007 (%)
Milk consumption, total, of which:	67,563	67,883	65,988	58,875	60,340	58,241	86.26
Human milk consumption	54,445	54,761	50,063	47,998	48,616	46,952	86.23
Share (%)	80.58	80.66	75.86	81.52	80.57	80.61	-

Source: NIS, 2013, Food Balance. [10] Own calculations.

The evolution of human milk consumption is illustrated in Fig.2. where also it could be seen the forecast for the period 2013-2015. So, in 2015, it is expected as human consumption of milk to account for 53,246.12 thousand hl.(Fig.2.)

Milk consumption per inhabitant decreased by 12.87 % from 260.4 liters/capita in 2007 to 226.9 liters/capita in 2012. (Fig.3.).

Liquid fresh milk consumption per inhabitant decreased by 11.51 % from 113 kg/capita 2007 to 100 liters/capita in 2011. (Table 2).

Liquid fresh milk consumption in Romania is higher than the EU-27 average (64 kg/capita), and also higher compared to other EU countries such as: Bulgaria (8 kg/capita),

Lithuania (31 kg), Luxembourg (35 kg), Greece (37 kg), Poland (42 kg), the Netherlands (49 kg), Hungary (51 kg), Germany (54 kg), Italy (57 kg), Czech Rep. (58 kg), but lower compared to milk consumption in Estonia (140 kg), Finland (126 kg), Ireland (128 kg), Latvia (83 kg). [1] Milk consumption of industrialized milk is very low in Romania, accounting for 12.6 kg/capita/year, representing 37.61 % of the average consumption in Europe (33.5 kg/capita/year) and 18.66 % of the milk consumption in the Western European countries (67.5 kg/capita/year). This quantity placed Romania on the last but one position in Europe. [3, 4]

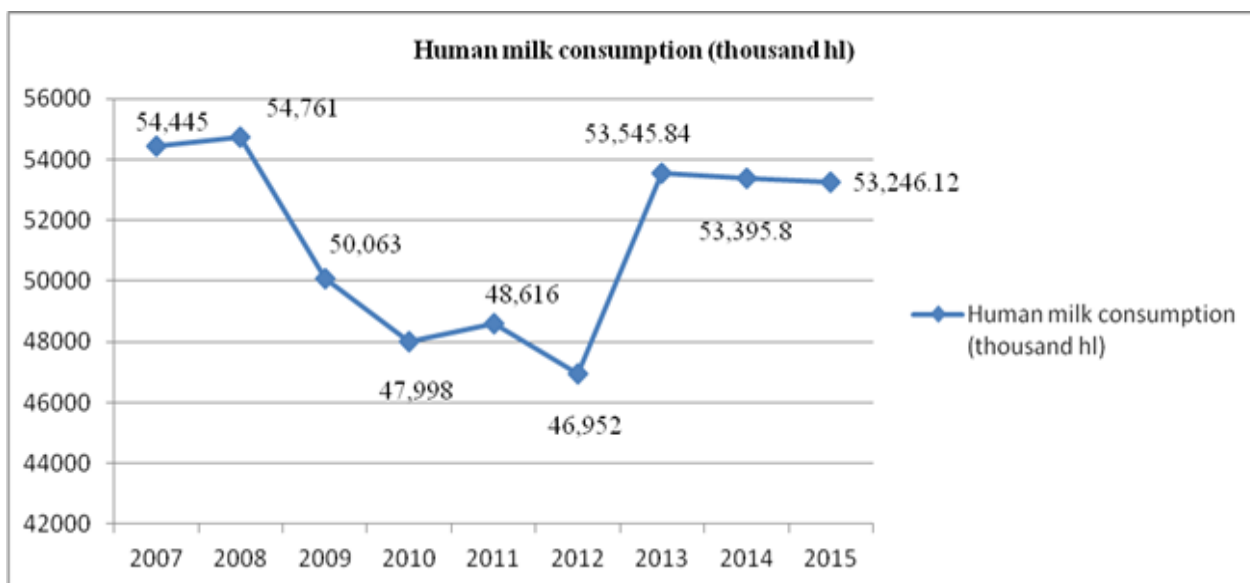


Fig.2.Evolution of human milk consumption in the period 2007-2012 and the forecast for the 2013-2015 horizon. Own design based on NIS, 2013, Food Balance. [10]

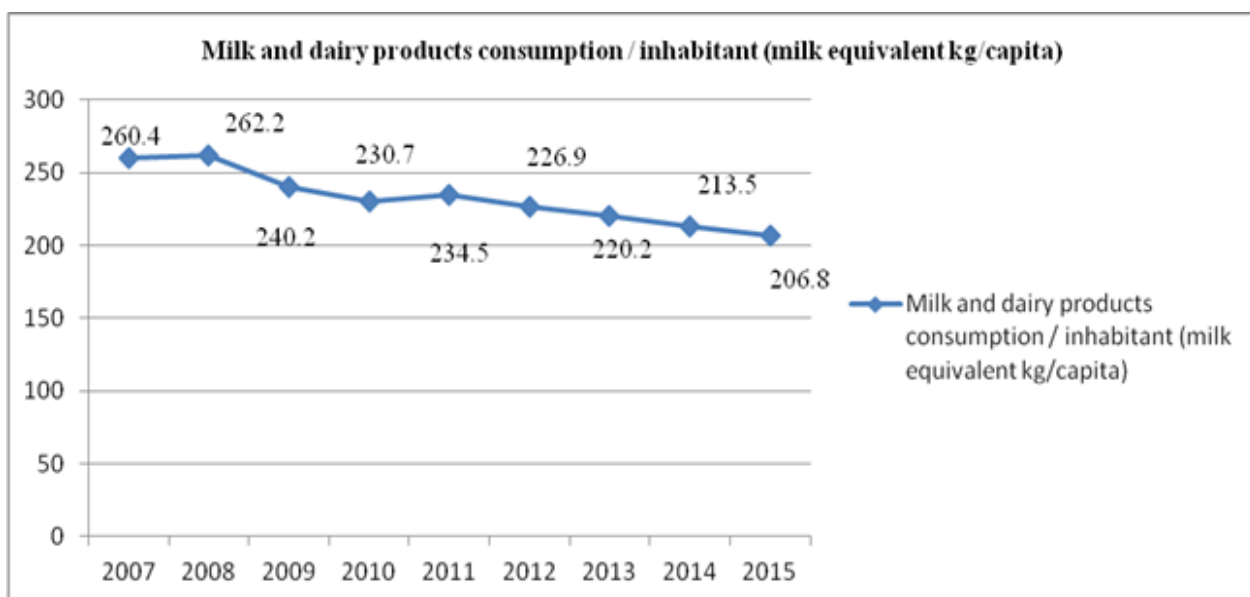


Fig.3.Evolution of milk and dairy products consumption per inhabitant (milk equivalent, kg/capita) in the period 2007-2012 and the forecast for the 2013-2015 horizon. Own design based on NIS, 2013, Food Balance. [10]

Table 2. Liquid fresh milk consumption per inhabitant (kg/capita)

	2007	2008	2009	2010	2011	2011/2007
Liquid fresh milk consumption per inhabitant	113	105	100	100	100	88.49

Source:AGRI-2012-c4-04 Analysis on future developments in the milk sector, EU Commission, Final Report, 2014[1]

Table 3. Milk consumption for industrial processing purposes, 2007-2012 (Thousand hl)

	2007	2008	2009	2010	2011	2012	2012/2007 (%)
Milk consumption, industrial purposes	1,561	1,385	1,750	1,774	1,984	1,883	120.62

Source: NIS, 2013, Food Balance. [10]Own calculations.

Milk consumption for industrial processing purposes increased by 20.62 % from 1,561 thou hl in 2007 to 1,883 thou hl in 2012. (Table 3)

Consumer price index for milk and dairy products. In Romania, in general, the price for milk and dairy products varied from a year to another, but the highest increase was recorded in 2008 (+11%) and the lowest one in 2010 (+1.49 %).

Milk price recorded lower growths compared to the price of the group of milk and dairy

products. The highest increase of milk price (+10.49 %) was registered in 2008 and the lowest growth (+1.32 %) in 2010.

Cow milk price recorded the highest growth (+18.99 %) in 2008 and the lowest one (-0.77 %) in 2010.

Therefore, the year 2008, at the beginning of the economic crisis, consumer price index registered the highest increase, while in 2010, the gains were more relaxed.(Table 4)

Table 4.Consumer price index for milk and dairy products (%)

Previous year=100

	2007	2008	2009	2010	2011	2012
Milk and dairy products	104.62	111.00	105.83	101.49	104.56	102.74
Milk total, of which:	104.38	110.49	103.95	101.32	104.05	102.23
Cow milk	107.75	118.99	108.79	100.77	106.62	103.10

Source: NIS, 2013, Romania's Statistical Yearbook. [10]

In 2007, the price of dairy products varied depending on product as follows: USD 1.5-3.5 per milk liter, USD 0.45-0.75 per 150 g yoghurts, USD 1.5-4.0 per kefir liter, USD 5.0-8.0 per sour cream liter, USD 10–20 per cheese kg, USD10-20 per butter kg. [11]

CONCLUSIONS

Milk supply is assured both from the domestic production but also from import in order to cover the processors capacity of processing.

The origin of the consumed fresh milk is either a farm or the shelves of supermarkets or small shops. The packaged milk is mainly bought and consumed in the cities.

The most popular dairy products among consumers are fresh/pasteurized milk and fresh dairy products (yoghurts).

Diversification of the production of dairy products is an alternative for extending the market and maintain the profitability of the dairies.

The invasion of dairy products expected to come after the abolition of milk quota starting from April 2015 will deeply affect both the Romanian farmers producing raw milk and also the milk processors which could not compete with the products coming from countries where milk and dairy products are produced at a lower cost.

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RESEARCH ON THE TRENDS IN ROMANIA'S MILK AND DAIRY PRODUCTS FOREIGN TRADE

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Abstract

The paper aimed to analyze the main trends in Romania's milk and dairy products foreign trade using a specific system of indicators destined to create a comprehensive image on the topic, based on the empirical data provided by the National Institute of Statistics and Eurostat for the period 2007-2012 and to set up the forecast for the 2013-2015 horizon, based on and using the fixed basis index, average change method, and comparison method. Milk and dairy products trade balance is a negative one, Romania being a net importing country. Despite this, both export value increased 2.9 times and the import value increased 1.3 times. The amount of milk exported by Romania will account for 1,673.8 thousand hl, and milk imported quantity for 6,119.8 thousand hl according to the forecast for the year 2015. In 2015, the forecast for Romania's milk export value is Euro thousand 96,258.75 and for milk import value Euro thousand 259,270.2. Romania's export value of dairy products accounted for Euro million 6.6, representing 0.06 % of the world exports, placing the country on the 56th position. Also, it comes on the 23rd position among the EU exporting countries with a very small contribution of 0.1 % to the EU export of dairy products. The main markets where the Romanian dairy products are sold are Italy, Belgium, Spain, United Kingdom and Greece. The import of dairy products is supplied by Hungary, Poland, Czech Rep, Italy, and Germany.

Key words: dairy products, milk, Romania, foreign trade, trends

INTRODUCTION

The world production and trade registered a higher and higher level during the last decades. In 2013, the world export accounted for USD Billion 48.3 for milk and cream and milk products (cheese and butter excluded), USD Billion 32.2 for cheese and USD Billion for butter, while the world import was USD Billion 47.1. for milk and cream and milk products (cheese and butter excluded), USD Billion 31.5 for cheese and USD Billion for butter [4]

Some important EU producing countries are among the top 10 exporting countries of milk and dairy products in the world, having the following market share in 2013: 35.9 % for milk and cream and milk products, cheese and butter excluded (Germany, France, Netherlands, Belgium, Poland), 64.4 % for cheese (Germany, Netherlands, France, Italy, Denmark, Belgium, Ireland, Poland) and 52.4 % for butter (Netherlands, Ireland, Germany, Belgium, France, Denmark, United

Kingdom). In the same year, the EU countries situated in the top 10 in the world had the following market share: 29.9 % for milk and cream and milk products, cheese and butter excluded (Netherlands, Italy, Germany, Belgium, France, United Kingdom, Spain), 47.4 % for cheese (Germany, Italy, United Kingdom, France, Belgium, Netherlands, Spain) and 45 % for butter (France, Belgium, Germany, United Kingdom, Netherlands, Italy). [4]

Romania was and still is a modest producer and exporter of milk and dairy products. Despite of the situation, Romania's trade with milk and dairy products registered a relatively growth during the last decade, but the country is a net importer having a deep negative balance.

In this context, the paper aimed to analyze Romania's milk and dairy products trade on the external market in order to identify the main trends in the period 2007-2012 and establish the forecast for the 2013-2015 horizon.

MATERIALS AND METHODS

In order to set up this study, the empirical data were collected from the National Institute of Statistics Tempo-Online, EuroStat data base, and UNCTAD WTO data base.

The main indicators taken into consideration were milk and dairy products trade and Romania's position as exporter at world level and in the EU. The period of reference was 2007-2012.

The data were processed using the fixed basis index method and comparison method, and also the average change index to elaborate the prospects of Romania's foreign trade with

milk and dairy products. The results have been tabled and interpreted.

RESULTS AND DISCUSSIONS

Milk trade. Romania's milk and dairy products trade has been continuously developing in the analyzed period. The amount of exported milk increased 3.44 times reaching 1,174 thou hl in 2012 compared to 341 thou hl in 2007, and the quantities of imported milk increased 1.88 times from 2,531 thou hl in 2007 to 4,774 thou hl in 2012 (Fig.1.)

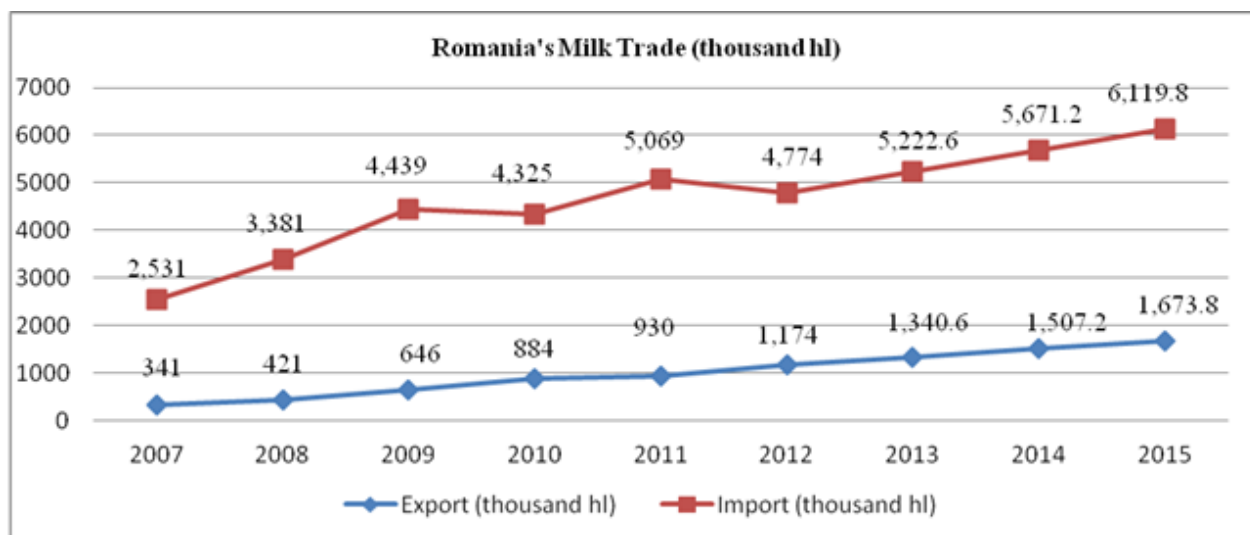


Fig.1. Evolution of Romania's milk export and import (Thousand hl) in the period 2007-2012 and the forecast for the 2013-2015 horizon. Own design based on the data provided by Beldescu Alina, Marascu Cristina, 2012, Milk and dairy products, Romanian Centre for Trade and Foreign Investments Promotion. [1]

In 2015, it is expected as milk export to account for 1,673.8 thousand hl, and milk import for 6,119.8 thousand hl as shown in Fig.1.

Considering Romania's external trade value, both the export and import value increased in the period 2008-2012. The export value was 2.92 times higher in 2012, accounting for Euro thousand 64,437 compared to Euro thousand 22,008 in the year 2008. The import value increased only 1.27 times from Euro thousand 175,195 in 2007 to Euro thousand 223,238 in 2012 (Fig.2.).

In 2015, it is expected as milk export value to reach Euro thousand 96,258.75 and milk

import value to account for Euro thousand 259,270.25.(Fig.2).

Taking into account that the import value was higher in comparison with export value, it is obvious that Romania was a net importing country of milk and dairy products. The explanation is found in the unbalanced demand/offer ratio, the lack of fresh milk for processing, the weak competition among dairy farmers, the surplus of milk and dairy products existing in other EU countries. [3]

The export value increased in case of all the groups of milk and dairy products, which is a positive aspect. The contribution of various groups of dairy products to Romania's export value was the following one in the year 2012: 42.97 % Cheese and green ewe cheese, 28.55

% Milk, milk sour cream, concentrated, with added sugar or sweeteners milk, 13.87 % Fermented milk products, 9.50 % Milk, milk sour cream, non-concentrated, without added

sugar or sweeteners milk, 2.85 % Whey and whey products and 2.26 % Butter and other fat milk products.

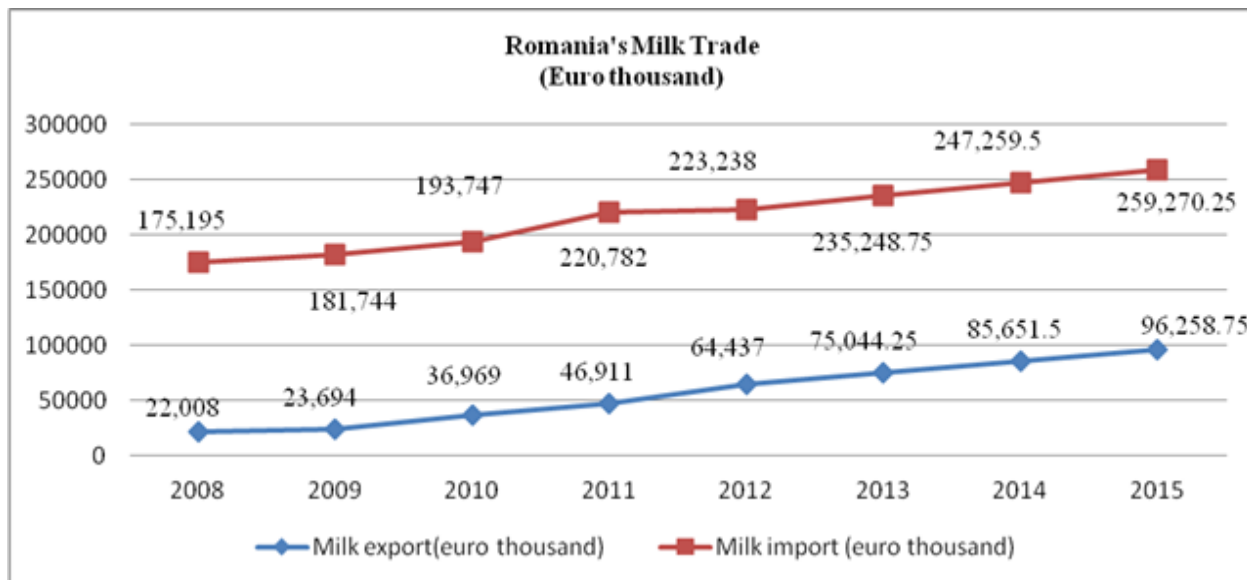


Fig.2.Evolution of Romania's Milk Export Value and Milk Import Value in the period 2007-2012 and the forecast for the 2013-2015 horizon. Own design based on the data provided by NIS, TEMPO online, 2014. [2]

The growth of export value, in the descending order, was the following one: Whey and whey products (55.78 times), Butter and other fat milk products (9.44 times), Milk, milk sour cream, concentrated, with added sugar or sweeteners milk (6.10

times), Cheese and green ewe cheese (5.43 times), Fermented milk products (3.92 times) and Milk, milk sour cream, concentrated, with added sugar or sweeteners milk (1.36 times) (Table 1).

Table 1. Romania's milk and dairy product export value by group of milk and dairy products, 2008- 2012 (Euro)

Dairy product	2008	2009	2010	2011	2012	2012/2008 %
Milk, milk sour cream, non-concentrated, without added sugar or sweeteners milk	1,004	1,390	1,703	3,957	6,126	610.15
Milk, milk sour cream, concentrated, with added sugar or sweeteners milk	13,443	12,219	16,542	22,148	18,399	136.86
Fermented milk products	2,281	2,412	2,784	4,591	8,942	392.02
Whey and whey products	33	147	609	1,175	1,841	5,578.78
Butter and other fat milk products	152	294	1,151	1,662	1,436	944.73
Cheese and green ewe cheese	5,095	7,232	14,180	13,378	27,693	543.53
Total export value	22,008	23,694	36,969	46,911	64,437	292.78

Source: NIS, TEMPO online, 2014. [2]Own calculations.

The import value increased in case of all the groups of milk and dairy products, which is a also positive aspect. The contribution of various groups of dairy products to Romania's import value was the following one in the year 2012: 45.97 % Cheese and green ewe cheese, 24.46 % Milk, milk sour cream, concentrated, with added sugar or sweeteners

milk, 9.87 % Milk, milk sour cream, non-concentrated, without added sugar or sweeteners milk, 9.58 % Fermented milk products, 6.40 % Butter and other fat milk products, and 3.68 % Whey and whey products.

The growth of import value, in the decreasing order, was the following one: Milk, milk sour

cream, concentrated, with added sugar or sweeteners milk (1.72 times), Fermented milk products (1.5 times), Milk, milk sour cream, concentrated, with added sugar or sweeteners milk (1.71 times), Cheese and green ewe

cheese (1.21 times), Whey and whey products (1.08 times), but Butter and other fat milk products registered a decrease by 26.74 % (Table 2).

Table 2. Romania's milk and dairy product import value group of milk and dairy products, 2008- 2012 (Euro Thousands)

Dairy product	2008	2009	2010	2011	2012	2012/2008 %
Milk, milk sour cream, non-concentrated, without added sugar or sweeteners milk	31,686	38,881	50,754	56,619	54,622	172.38
Milk, milk sour cream, concentrated, with added sugar or sweeteners milk	17,608	18,862	17,999	21,874	22,042	125.18
Fermented milk products	14,246	18,149	19,695	19,128	21,402	150.23
Whey and whey products	7,611	6,438	6,792	6,776	8,234	108.18
Butter and other fat milk products	19,528	22,108	17,157	16,307	14,307	73.26
Cheese and green ewe cheese	84,516	77,306	81,350	100,078	102,631	121.43
Total import value	175,195	181,744	193,747	220,782	223,238	127.42

Source: NIS, TEMPO online, 2014. [22]Own calculations.

The group of dairy products with a deepest negative impact on the trade balance are Cheese and green ewe cheese Milk, milk sour cream, concentrated, with added sugar or

sweeteners milk, all together with a share of 77.72 % in trade balance of dairy products. (Table 3).

Table 3. Romania's milk and dairy trade balance group of milk and dairy products, 2008-2012 (Euro Thousands)

Dairy product	2008	2009	2010	2011	2012	2012/2008 %
Milk, milk sour cream, non-concentrated, without added sugar or sweeteners milk	-30,682	-37,491	-49,051	-52,662	-48,496	158.06
Milk, milk sour cream, concentrated, with added sugar or sweeteners milk	+4,165	-6,643	-1,457	+274	-3,643	87.46
Fermented milk products	-11,965	-15,737	-16,911	-14,537	-12,460	104.13
Whey and whey products	-7,578	-6,291	-6,183	-5,601	-6,393	84.36
Butter and other fat milk products	-19,376	-21,814	-16,006	-15,145	-12,871	66.42
Cheese and green ewe cheese	-79,421	-70,074	-67,170	-86,700	-74,938	94.35

Source: Own calculations.

Table 4. Romania's position as exporting country of milk and dairy products in the world and in the EU

Dairy product	Romania in the world export		Romania in the EU Export	
	Position	Market share(%)	Position	Market share(%)
Milk and sour cream, nonconcentrates and nonsweeters	56	0.06	23	0.1
Milk and sour cream, concentrates and sweeters	40	0.02	16	0.04
Butter	48	0.03	24	0.05
Cheese	46	0.06	23	0.07

Source: Beldescu Alina, Marascu Cristina, 2012, Milk and dairy products, Romanian Centre for Trade and Foreign Investments Promotion. [1]

Romania is placed on the 56th position in the world as an exporting country of dairy products, its export value accounting for Euro million 6.6, representing 0.06 % of the world exports. Also, it comes on the 23rd position in

the EU with 0.1 % contribution to the EU exports.

The main countries were Romania exported dairy products were Italy, Belgium, Spain, United Kingdom and Greece and the main

suppliers of dairy products for Romania were: Hungary, Poland, Czech Rep, Italy, Germany. The main competitors of Romania for export were Bulgaria, Greece, Italy, Hungary, Czech Rep., Poland, United Kingdom, Spain, Belgium, Germany. [5]

CONCLUSIONS

Romania has a low position among the milk and dairy exporting countries in the world and in the EU. Despite this, its export and import of milk and dairy products registered a significant growth in the analyzed period, but Romania is still remaining a net importing country.

Romania's export value of dairy products accounted for Euro million 6.6, representing 0.06 % of the world exports, placing the country on the 56th position. Also, it comes on the 23rd position among the EU exporting countries with a very small contribution of 0.1 % to the EU export of dairy products.

The main markets where the Romanian dairy products are sold are Italy, Belgium, Spain, United Kingdom and Greece. The import of dairy products is supplied by Hungary, Poland, Czech Rep, Italy, and Germany.

Bulgaria, Greece, Italy, Hungary, Czech Rep., Poland, United Kingdom, Spain, Belgium, Germany are the main competitors of Romania for export.

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TARGETED CULTIVATION OF THE ENERGY PLANTS IN CONDITIONS OF THE SLOVAK REGIONS

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Abstract

The aim of this paper is to analyse the targeted cultivation possibilities of energy plants in Slovakia and to evaluate the appropriateness of targeted cultivation of energy plants Populus and energy grass Miscanthus. In Slovakia, is used the classification system of regions according territorial statistical units - NUTS (NUTS III - 8 regions). The highest potential for the cultivation of energy plants (soil quality group 5-9) is in Prešov (99.95%), Žilina (99.89%) and Košice (99.51) region. The research was conducted at the research locality of the energy plants in Koliňany (Nitra region). We studied four Italian varieties of gray poplar (Populus × canescens) (Monviso, Pegaso, AF-2 and Sirio) and two genotypes of energy grass Miscanthus (Miscantus × giganteus (Greef et Deuter, 1993) and Miscanthus sinensis (Tatai)). Production of Populus varieties after the first growing cycle (2009-2012), exceeding the value of the economic threshold was 67.42 t ha⁻¹ (AF-2) to 87.16 t ha⁻¹ (Monviso). Both genotypes of Miscanthus produce an economically interesting production of dry mass for the 4 year period (2010-2013) (Miscantus × giganteus (Greef et Deuter) 88.97 t ha⁻¹ and Miscanthus sinensis (Tatai) 77.80 t ha⁻¹). Cultivation of the energy plants permits to farm on unused land in the regions and produce biomass for energy use at the local level.

Key words: biomass, Miscanthus, energy plants, Populus, regions of Slovakia

INTRODUCTION

Slovak agriculture is undergoing alterations, reflected a certain consistency with the European model of land management. The non-productive functions of agriculture begins increasingly to apply by given the surplus land, where gradually started to grow plants and woody energy crops and expanding the use of biomass crops. This trend is in full compliance with the requirements of environmental protection. Interest in biomass of the energy crops gives basement for a new direction in agricultural production – phytoenergetics [13].

In recent years agriculture has important position not only in the production of raw materials for the food industry, but also as a producer of renewable energy. Targeted energy plantation brings a number of advantages. The most important advantage is the fact that it is an advantageous alternative to sedation of the production causing overproduction, energy crops can be grown on

contaminated soils and in areas with reduced possibility of application of agrochemicals, to strengthen its diversity of crops and economic profit usually remains in the place of production [3].

Energy plantation permits to farm on unused land resources, to produce the biomass for areas outside the EU frame and to produce the energy carrier's plant.

In Slovakia are specifications which in case of a decision on the cultivation of energy crops should be respected. Slovak Republic has limited arable and agricultural land with tending to descent. 23% of the area is in protected areas. Water and wind erosion threatens 990,000 hectares and compacted soil is 700,000 ha. The real prerequisites are for targeted cultivation of energy plants throughout the territory in Slovakia, with the exception of protected landscape areas and water bodies [13].

Targeted cultivation of biomass is the process of the energy crops plantations establishment that is prior for energy use. Targeted

cultivation can be regarded as the conventional method of growing with redirect of the energy flow to direct energy consumption. The total agricultural engineering and grower experience without the need for additional inputs in the form of investments in technology and last but not least, the new skills and knowledge is uses in this cultivation. Broadly speaking, we can say that it is a traditional agricultural production, in which the final product is predetermined for industrial use, particularly for energy purposes [10]. Targeted energy plantation is able to provide the expected volume, quality and delivery terms a particular energy source, depending on the need of the customer.

The identification of options for the area in terms of production potential is an important factor. Plantations of energy crops in regions of Slovakia can be located on agricultural land that is classified under code estimated pedologic-ecological unit (EPEU) in the fifth to the ninth qualitative groups or on the agricultural land contaminated by hazardous substances, or on the agricultural land falling under code of valuated soil-ecological units in the third or fourth group of quality, where the agricultural land is located in the floodplain areas or waterlogged or exposed to wind erosion [13].

The use of targeted energy crops based on the overall concept of ecosystem services, which are exploited ecosystems - agro-ecosystems that may affect the standard of living of the population of the region [2].

A major benefit of the energy plantations is maintenance and increase of employment in the regions. Establishment of plantations, their care, protection, collection and further processing and production transport can lead to long-term jobs. The advantage is that incomes and derived fuel are remaining by Slovak farmers and entrepreneurs, directly or indirectly linked throughout the logistics chain. Such a pattern can contribute to stop rural depopulation in some regions of Slovakia. Considerable is the fact that such a quality and professionally made crop of energy plants in the country is balanced and contributes to the sustainable stability [10].

The aim of this paper is to analyse the targeted cultivation possibilities of energy plants in Slovakia and evaluate the appropriateness of targeted cultivation of energy plants *Poplar* species and energy grass *Miscanthus* for example their cultivation in the Nitra region in south-western Slovakia.

MATERIALS AND METHODS

In the EU regions is used the classification system of regions according territorial statistical units known by the acronym NUTS (Nomenclature of French des Unites Territoriales Statistiques), prepared by Eurostat, which was created in order to subdivide the territory of the EU to territorial units lower hierarchical degree than are national level, and that the needs of the territorial scope of regional statistics since the early 70s of the 20th century.

Classification of Slovak's regions by NUTS III is as followed (Figure 1): Bratislava, Trnava, Trenčín, Nitra, Banská Bystrica, Žilina, Košice and Prešov region.

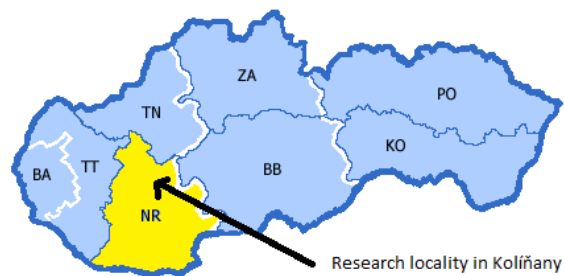


Fig. 1. Regions of the Slovak Republic by NUTS III
Legend: BA – Bratislava, NR – Nitra, TT – Trnava, TN – Trenčín, ZA – Žilina, BB – Banská Bystrica, KO – Košice, PO – Prešov region

The research was conducted at the research based of energy plants in Koliňany situated on the property of the University holding Slovak University of Agriculture. The research area is located in the Nitra region. Research habitat is located at an altitude of 180 m and the climate of the region is warm, very dry, lowland. The average annual temperature is 9.9 °C, average annual rainfall for the period 1951-2000 is 547.6 mm. The soil in the research station is moderate (aluminum), fluvisol to pH 7.26 with an average of 1.8% humus.

The article describes the production potential of the energy plants genus *Populus* and energy grass *Miscanthus*. Both observed energy plant species are in the conditions of Slovak regions featured by high biomass production, requiring low mineral nutrients, an efficient use of available resources, requiring low agronomic management and security of ecological and environmental.

The four varieties of gray poplar (*Populus × canescens*) from Italian breeding program (Monviso, Pegaso, AF-2 and Sirio) were included to the research, a detailed description of the studied varieties mentioned in the work [6].

In terms of field experiment were established crops of two genotypes of *Miscanthus*: *Miscanthus × giganteus* (Greef et Deuter, 1993) and *Miscanthus sinensis* (Tatai) [8,9]. *Miscanthus* is a multi-year perennial grass originating from the natural conditions of East Asia. These include plants with C₄ type of the carbon conversion which effectively using solar radiation and has a fast growth [5].

RESULTS AND DISCUSSIONS

The determination of appropriate localization of energy crops on farmland in regions of Slovakia is based on an analysis of the production potential estimated by pedologic-ecological unit (EPEU) and typological production category of agricultural land.

The most suitable environmental conditions are found in lowland and hilly uplands of Slovakia. Energy plants can grow well on significant and steep slopes, but there is more of conservation as a production character. Contaminated soil can also be a good choice for growing energy crops on the ground those areas should be excluded from crops that are used in the food chain and therefore should be used rather for growing food crops.

The all agricultural land under the jurisdiction to EPEU is classified into nine groups of soil quality according to Slovak Law No. 220/2004 [16]. The best quality belongs to the first group and at lowest quality the 9th group. For the cultivation of energy plants in Slovakia are the lands included in 5-9 of soil quality group.

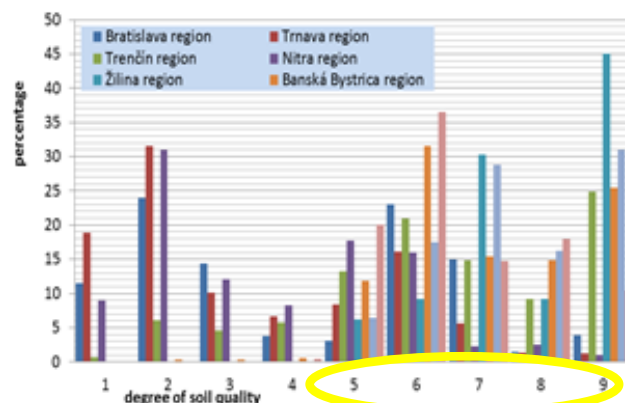


Fig. 2. Acreage of individual groups of soil quality (1-9) in the regions of Slovakia

Source: Own processing

As can be seen in Figure 2, the area of 5-9 soil quality is represented at the level of all the regions of the Slovak Republic. The highest potential in the cultivation of energy plants with respect to specific acreage of soils at the regional level is in Prešov (99.95%), Žilina (99.89%), Košice (99.51), Banská Bystrica, (98.94%) and Trenčín region (83.02%). The regions with the area of 5-9 soil quality below 50% of total agricultural land are Bratislava (46.35%), Nitra (39.56%) and Trnava (32.7%) region.

For fast-growing trees in the climatic conditions of Slovakia apply especially selected genotypes of poplar (*Populus* sp.) and willows (*Salix* sp.) [15].

Table 1. Harvesting of biomass varieties of *Populus* spp. at the end of the first growing cycle (2009-2012)

Varieties	Average weight of the fresh matter (kg plant ⁻¹)	Average yield of the dry matter (t ha ⁻¹ 4 yrs ⁻¹)
Monviso	21.16	87.16
Pegaso	18.83	76.90
Sirio	19.76	78.64
AF-2	15.83	67.42

Source: Own processing

The energy poplar crop was founded in the year 2009. The *Populus* plantations took place in two-line and used two methods of planting. In the first method of planting is 0.2 meters long cuttings of one-year old shoots in 25 mm diameter were planted into the soil, leaving a 30 mm length of the cuttings above the soil surface. In the second method, the off-cut is 0.2 m long planted the soil up to the surface of the soil. Distance between two-lines was 2.0

m, 1.0 m in double-row and distance of cuttings planted at least 0.75 m. These plantations provide 8,889 individuals.ha⁻¹.

The average yield of biomass by studied varieties of *Populus* spp. was at the end of the fourth growing year (2012) in the range of 15.83 kg of a variety AF-2 to 21.16 kg of a variety Monviso (table 1). Differences in plant yields were reflected by the crop of biomass of individual varieties in t ha⁻¹. The average yield of biomass at harvest moisture content ranged from 140.74 t ha⁻¹ in a variety AF-2 to 188.14 t ha⁻¹ in a variety Monviso. At 44.76 to 47.91% average dry mass yield of dry mass biomass by individual varieties was reached in the range of 67.42 t ha⁻¹ in a variety of AF-2 to 87.16 t ha⁻¹ in a variety Monviso .

The crop energy grass *Miscanthus* was founded in 2010. The transplant derived from micropropagation (in vitro) *Miscanthus sinensis* (Tatai) and rhizome *Miscanthus × giganteus* (Greef et Deuter) was used on the planting. The transplant were planted in the planting distance 1 x 1 m, which will provide 10,000 individuals.ha⁻¹.

Figure 2 shows increase of the annual production of dry mass of aboveground organs by studied genotypes in every year. Age of the plants affected the ability of income and allocation of materials into individual plant organs. A plant within the crop occupies a living space gradually. It provides a sufficient quantity of underground organs, roots and rhizomes. These underground organs also serve as storage organs, which will be used by the plant in the next year at the beginning of the vegetation period for the benefit of growth processes and the initial formation of organic matter aboveground organs.

[14] in eight poplar clones in the case of six-year crop present average yield of dry matter biomass ranged from 70 t ha⁻¹ to 127 t ha⁻¹. [12] for two years in poplar plantation provides dry matter yield of biomass ranged from 18.06 t ha⁻¹ to 35.40 t ha⁻¹.

Biomass production within targeted cultivation of energy crops exceeds the biomass production within conventional manner forestry. Harvest annual of poplar dry biomass depends on environmental conditions

and varieties and is given in the range of 4-11 t ha⁻¹ [1].

In the Orava region in Slovakia were obtained crop increases of the dry biomass in the range of 11.1 to 15.2 t ha⁻¹.year⁻¹ [4]. [7] reported values of the dry biomass on the research base in Koliňany of *Populus* varieties from 16.85 to 21.79 t ha⁻¹.year⁻¹. [11] provides an economic threshold for the cultivation of energy plants at the annual rate of increase from 10 to 12 t ha⁻¹.year⁻¹.

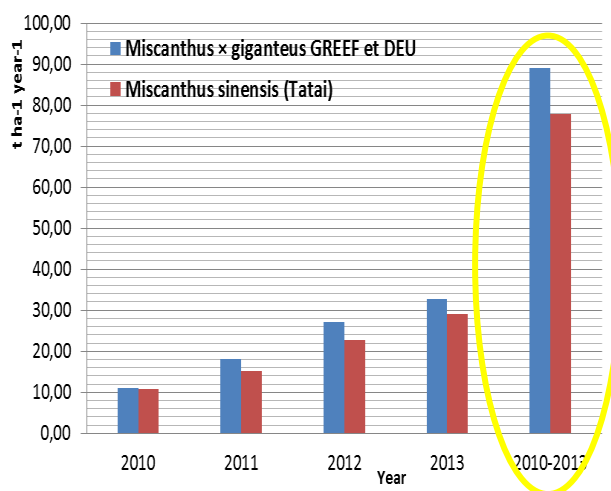


Fig. 3. The average yield of *Miscanthus* genotypes biomass in the research site in Koliňany, Nitra region of Slovakia, in the period 2010-2013

Source: Own processing

As shown in the Figure 3, both studied *Miscanthus* genotypes created in the first year a quantity of dry matter that can be considered as economically beneficial [11].

The dry mass production of growing crop increased in each subsequent vegetation period. When comparing the two *Miscanthus* genotypes based on the results it can be stated that in terms of the Nitra region (research locality Koliňany) both genotypes produce annually balanced production of dry mass, which is about the same, despite higher production of dry matter aboveground organs on file for genotype *Miscanthus × giganteus* (Greef et Deuter).

Based on the evaluation of the total formation of dry mass for the period since the establishment of the crop in 2010 until 2013 (4 vegetation period), it can be we stated that the genotype *Miscanthus × giganteus* created 88.97 t ha⁻¹ dry mass and genotype

Miscanthus sinensis (Tatai) created 77.80 t ha⁻¹ dry matter of aboveground organs (leaves and stems). In percentage terms, the production of dry matter of the aboveground organs *Miscanthus sinensis* (Tatai) compared to *Miscanthus × giganteus* decreased by 12.5%.

CONCLUSIONS

Targeted cultivation of energy plants in terms of Slovakia regions, for example Nitra region, appears to be suitable form for the country use to benefit the quality of life in the region and also provides an alternative to the basic functions of agriculture.

Energy poplar in Slovakia is adapted and it is capable in depending on the growing cycle to generate the amount of dry mass exceeding economic threshold. Production of four varieties of *Populus* studied at the end of the first four-year growing cycle represents values that far outweigh the economic threshold of production. The average yield of dry mass in the studied varieties achieved the range of 67.42 t ha⁻¹ (AF-2) to 87.16 t ha⁻¹ (Monviso). Studied genotypes of energy grass *Miscanthus* demonstrated ability to adapt to the environmental conditions and to create an economically interesting production of dry mass aboveground organs. Genotype *Miscanthus × giganteus* (Greef et Deuter) created for the period 2010-2013 88.97 t ha⁻¹ and genotype *Miscanthus sinensis* (Tatai) created 77.80 t ha⁻¹ dry mass aboveground organs. The production of *Miscanthus sinensis* (Tatai) decreased by 12.5% compared with *Miscanthus × giganteus* (Greef et Deuter). Cultivation of the energy plants permits to farm on unused land in the regions and produce biomass for energy use at the local level.

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RESEARCHES REGARDING MORPHOLOGIC FEATURES IN SOME GOAT POPULATIONS FROM THE SOUTH OF ROMANIA

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Abstract

The paper studied some morphologic features in four goat populations located in the Southern Romania., having as final aim the study of their genetic potential for different productions. There were analyzed males, females and young individuals in two breeds, Carpathian breed and Banat White, reared in different areas, with different rearing and environmental conditions. There were made body weight and body size measurements at different ages with the aid of the specific method. The recorded data were statistically processed. The results reveal the fact that the Banat White population is taller and longer than the Carpathian population, with a typical dolicomorph body shape, specific to the dairy populations, with a higher genetic potential straighten to the milk production.

Key words: goat populations body weight, body measurement

INTRODUCTION

Goats' rearing represents an important niche from the economic and ecologic point of view, especially within the small agricultural systems and generally in agriculture, due to the species adaptability, rusticity and the remarkable possibilities of using the cellulosic fodders and also the savoury milk products sorts. (Escareno and col. 2012; Taftă, 2008) [1, 5].

In Romania, goats rearing also represents an economic activity easy to be done by many inhabitants in the rural areas, but it has not be forgotten the fact that the price of the used forages and milk and milk products determine the future rearing activity. In addition, the price for milk and milk products is influenced by the market, and this one is affected by the high quality products demand of the final consumer.

So the local goat populations' identification and the characterization of their rearing technologies having as aim their genetic potential for different productions quantification represent a necessity in the actual social economic status in our country.

MATERIALS AND METHODS

The biologic material studied in the present paper was represented by the adult and youth goat livestock from four private farms in the south of Romania.

The research was made on 718 adult goats, as follows: 130 females and 4 bucks from Carpathian breed in Argeş county farm, 306 females and 9 bucks from Banat White in Ialomița county farm, 104 females and 3 bucks from Prahova county farm and 158 females and 4 bucks in Giurgiu county farm.

The body weight establishment in the adult stage was achieved by individual weighing of the animals in the morning, before feeding. The weighing was made with the aid of a weighing machine with fixed platform with a vertical grating adapted to animal heights, there were made two weightings in two consecutive days, by the same weighing procedure, the final weigh being considered the average of the two determinations.

The researches regarding the body weight in the adult stage were carried out on 25 females and all the bucks in the studied four farms and the ones for the body development only on the 25 females in each studied farm.

To establishing the body development range (body weight, body sizes and indices) there were carried out the specific measurements and there were weighed each individuals in the farms (kids weighing at birth, at weaning, 3 months, six months and also the adult animals).

The data obtained following all the researches were processed and statistic analyzed by usual statistic methods, being established the average values and the main variability parameters (average, standard deviation, variance, average error and the variability coefficient).

To establishing the statistic parameters the Statistic functions application included in Microsoft Excel 2007 package was used. Also, the Student T test was used to estimate the differences among the analyzed groups significance.

RESULTS AND DISCUSSIONS

In table 1 there are presented the results regarding the adult body weight in Carpathian breed populations. Thus, these data revealed the fact that average body weight in the three studied population was 38.76 ± 0.68 kg in females and 51.51 ± 1.38 kg in males.

The highest value of the body weight is the one in Giurgiu farm, both in females and males, being recorded a value over the average, the lowest one was recorded in animals from Prahova farm.

The animals in Arges are situated in the middle of the values, close to the average of the studied populations. (Chart 1).

From these results it may conclude that the body weight is influenced by the breeding range and the environmental conditions, the nutrition level especially, the goats in Arges and Giurgiu having a superior feeding level (the food ratios are calculated depending on weight, age category and physiologic status) because in these two farms the semi intensive rearing system is used.

The results regarding the body weight recorded in the adult stage are almost the same met in the special literature for this breed. Thus, in goat populations in Carpathian breed in Mizil, Hațeg and Zlatna areas, the

female body weight is situated between 38.5 ± 0.16 kg and 41.8 ± 0.82 kg (Taftă, 1996) [4].

Table1. Body weight in the Carpathian breeds goat populations

Specificatio n	Catego ry	n	$\bar{X} \pm s_x$	S	V%
Argeș Farm	Female	25	38.71 ± 1.20	6.01	15.52
	Males	4	51.08 ± 1.18	3.61	7.07
Giurgiu Farm	Female	25	40.73 ± 1.32	6.61	16.23
	Males	4	53.38 ± 2.78	5.55	10.40
Prahova Farm	Female	25	36.84 ± 0.85	4.27	11.60
	Males	3	49.60 ± 2.95	5.10	10.29
Average Carpathian breed	Female	75	38.76 ± 0.68	5.86	15.12
	Males	11	51.51 ± 1.38	4.58	8.88

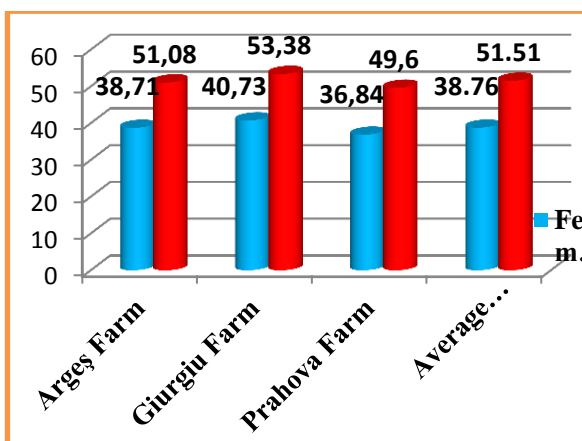


Chart 1. Body weights in the Carpathian breed goat populations

Other studies show that Carpathian breed goat height and weight are different depending the eco type, so the weight in females is between 31 and 44 kg, and male weight is between 38 and 55 kg (Vlad and col., 2003) [7]. Meanwhile, a recent study of ICDCOC Palas Constanța, carried out on many populations of Carpathian breed (Reghin, Constanța, Bilciurești), reveals the fact that the average body weight in adult females is situated between 34.85 kg and 38.22 kg, and males between 44.43 kg and 49.62 kg (Zamfir, 2014). [10]

Regarding the body weight of the animals in Banat White population, from the data in table 2, it may seen that the average was 45.08 ± 1.19 kg in females and 56.63 ± 1.92 kg in

males.

Following these results, it may notice that the body weights recorded in this study are close to the ones quoted in the special literature. Thus, Taftă (1996) [4], showed that the body weight in Banat White varies among very large limits, respectively 30-58 kg, with an average of 45 kg. Vlad and col. (2003) [7], showed that the body weight in this breed is situated between 32-47 kg in females and 40-58 kg in males.

Zamfir (2014), in a study on a goat population in this breed in Mures County found average

values of 43.75 kg in females and 58.67 kg in males. [10]

Table 2. Body weight in the Banat White breed goat population

Specification	Category	N	X±s _x	S	V%
Ialomița Farm	Females	25	45.08 ± 1.19	5.97	13.24
		9	56.63 ± 1.92	5.77	10.18
	Males				

Table 3. The significance of differences between breeds

Specification	Banat White average	Carpathian average	Difference	Calculated t value	Table t value	Significance
Female weight	45.08	38.76	6.32	4.60	t _[0.001; 98] = 3.39	***
Male weight	56.63	51.51	5.12	2.16	t _[0.05; 18] = 2.10	*

n.s. = non significant differences; * = significant differences; ** = distinct significant differences; *** = very significant differences

The Student T test was used to notice the differences between the weight average in Carpathian breed population and the weight average in Banat White population, the results being presented in table 3.

From table 3 data it may notice the fact that regarding the female weight, the difference between the average values is 6.32 kg, but after the test we can conclude that between the two population values there are very significant differences (P≤0.001).

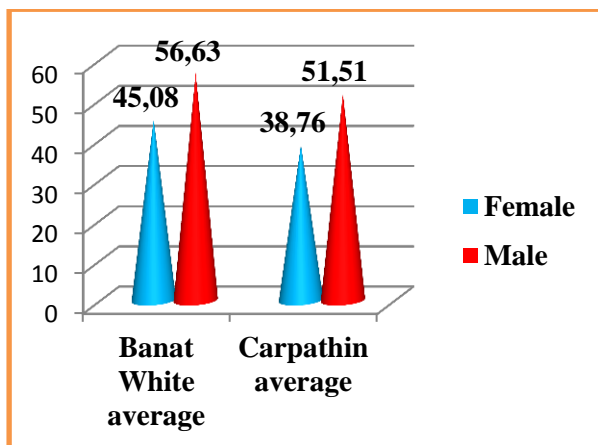


Chart.2. Body weight in Banat White and Carpathian breed goat populations

Regarding the males weight, the difference between average is 5.12 kg, but after the test there were recorded significant differences (P≤0.05).

This fact could be noticed in the comparative situation between the average body weights in the two populations, presented in chart 2.

Regarding the body development, in table 4 it may notice that in the Carpathian breed studied population, the height is situated between 60.84±0,77 cm and 63.68±0.82 cm, with an average of 61.93 cm, the value is almost 4% lower beside the data quoted in the special literature (table 4., table.6.) (Taftă, 1996). [4]

Regarding the comparative situation of the body sizes in the studied Carpathian goat populations, it may noticed that the height, the body length, the thorax width and perimeters recorded the highest values in Giurgiu Farm goats, and the lowest in Prahova Farm goats, the differences appeared due to the feeding and keeping conditions.

Table 4. The main body measurements in the Carpathian breed goat populations (cm)

No.	Specification	Argeş Farm		Giurgiu Farm		Prahova Ffarm	
		X±s _x	V%	X±s _x	V%	X±s _x	V%
1.	Height	61.28±0.64	5.25	63.68±0.82	6.44	60.84±0.77	6.35
2.	Body Length	66.00±0.96	7.28	67.32±0.86	6.40	64.96±0.99	7.63
3.	Thorax width	17.44±0.26	7.45	17.81±0.24	6.63	17.12±0.25	7.17
4.	Thorax perimeter	76.70±0.95	6.18	80.06±0.78	4.89	75.90±0.94	6.17
5.	Canon perimeter	7.86±0.17	10.98	8.19±0.16	9.71	7.62±0.16	10.29

In the studied White Banat population, the height recorded a value of 69.27±1.33 cm, being almost 12% higher than the average value of the Carpathian goat

breed (table 5, chart 3.) and only 0.1% higher than the data quoted in the special literature. (Taftă, 1996) [4].

Table 5. The main body measurements in the Banat White goat population (cm)

No.	Specification	Ialomița Farm	
		X±s _x	V%
1.	Height	69.27 ± 1.33	9.62
2.	Body length	76.08 ± 1.26	8.30
3.	Thorax width	17.80 ± 0.22	6.21
4.	Thorax perimeter	82.94 ± 0.73	4.41
5.	Canon perimeter	8.11 ± 0.19	11.60

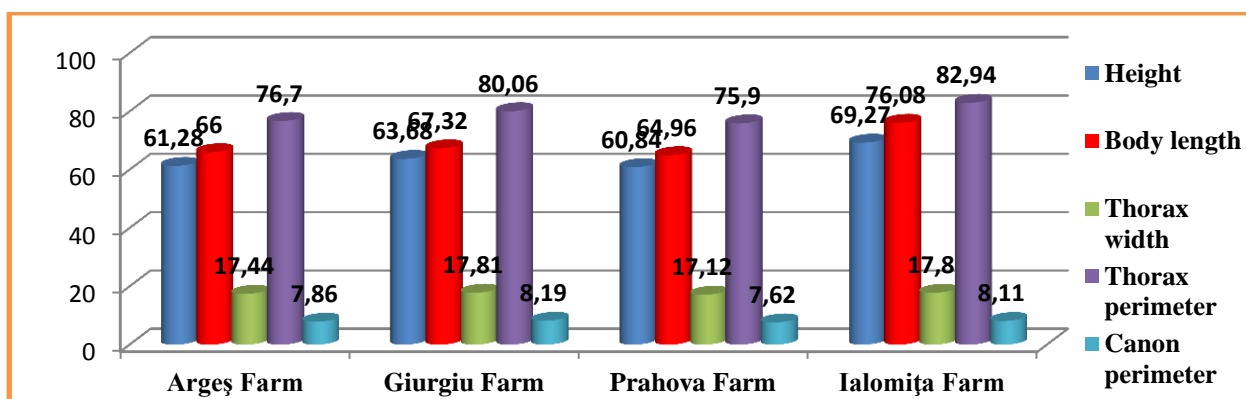


Chart.3. The main body measurements in the studied goat populations (cm)

Table 6. Comparative situation of body measurements in the studied populations (cm)

No.	Specification	Banat White average	% From height	Carpathian average	% From height
1.	Height	69.27	100.00	61.93	100.00
2.	Body length	76.08	109.83	66.09	106.72
3.	Thorax width	17.80	25.70	17.46	28.19
4.	Thorax perimeter	82.94	119.73	77.55	125.22
5.	Canon perimeter	8.11	11.71	7.89	12.74

Meanwhile, the obtained results confirm the fact that the length of the body is 66.09 cm in Carpathian goat populations, and the Banat White body length is almost 15% higher, respectively 76.08 ± 1.26 cm. The other body sizes (thorax length, thorax perimeter and canon perimeter) recorded higher values in the case of Banat White population beside the Carpathian populations. These data confirmed the fact that Banat White animals are taller and longer than the Carpathian ones, with a typical dolicomorph body shape, specific to the dairy populations, as reveal the special literature (Taftă, 1996, 2002, 2008; Vlad et al., 2003, Pascal, 2007, Pascal 2009; Zamfir, 2014, Zamfirescu 2009, Zaharia 2011a, Zaharia 2011b). [2,3, 4, 5, 6, 7, 8, 9, 10, 11]

CONCLUSIONS

The local goat populations' identification and the characterization represent a necessity in the actual social economic status in our country.

The average body weight in the three studied population was 38.76 ± 0.68 kg in females and 51.51 ± 1.38 kg in males. The highest value of the body weight is the one in Giurgiu farm, both in females and males, being recorded a value over the average, the lowest one was recorded in animals from Prahova farm. Regarding the body weight of the animals in Banat White population it may be seen that the average was 45.08 ± 1.19 kg in females and 56.63 ± 1.92 kg in males. So, the body weight is influenced by the breeding range and the environmental conditions, the nutrition level especially, the goats in Arges and Giurgiu having a superior feeding level.

Regarding the female weight, we can conclude that between the two populations the recorded values presented very significant differences ($P \leq 0.001$). Regarding the males weight, the difference between the average values recorded significant differences ($P \leq 0.05$).

The data regarding the body sizes in the four goat populations confirmed the fact that Banat White animals are taller and longer than the Carpathian ones, with a typical dolicomorph

body shape, specific to the dairy populations, as reveal the special literature, too.

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RESULTS REGARDING THE REPRODUCTION PERFORMANCES OF FOUR GOATS POPULATIONS IN THE SOUTHERN ROMANIA

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Abstract

The researches in the present paper were carried out upon four goat populations in the southern Romania, on 718 adult goats, in two breeds, reared in different production systems, with different mating season and activity. There were recorded primary data about the reproduction activity and there were calculated the reproduction indices, by the classic formulas in the special literature. The results were compared by breed and reproductive category, and there were calculated the main statistically parameters. The main conclusion reveals the fact that the reproduction activity in Carpathian breed farms is placed on an acceptable to good level; this breed could be continuously improved by a more careful monitoring of the factors affecting the reproduction function.

Key words: birth index, fertility and fecundity index, prolificacy

INTRODUCTION

There are two production systems of goats rearing in Romania, an intensive one, based on using some quality improved pastures and concentrated forages during the whole year, and a traditional extensive one, which uses only the natural pastures.

To developing the intensive system in goats rearing in our country, breeders should focus their attention to the used food quantification in the production potential for each flock and also to applying the up to date reproductive techniques.

Animal breeding including the local goat populations by applying a rigorous selection based upon special criteria and using some crossing with special breeds may represent certain ways of significant improving of the productive potential of the local goat populations.

MATERIALS AND METHODS

The studied biologic material in the present paper consisted in adult and youth goat

livestock in four private farms in the Southern Romania. The researches regarding the reproduction were carried out on 718 adult goats, as following: 130 females and 4 bucks, Carpathian breed in Arges farm, 306 females and 9 bucks, Banat White breed in Ialomita farm, 104 females and 3 bucks in Prahova farm and 158 females and 4 bucks in Giurgiu farm, the last two livestock being Carpathian breed.

Table1. Structure of adult goats livestock on farms

Specification	Females	Males	Total
Argeş Farm	130	4	134
Giurgiu Farm	158	4	162
Ialomița Farm	306	9	315
Prahova Farm	104	3	107
Total	698	20	718

The assessment of the reproduction activity in the studied goat populations was carried out with the aid of the reproduction indices, calculated by the classic formulas in the special literature. There were calculated the main reproduction indices: fertility index,

prolificacy index and birth index. To analyze the parameters necessary to calculate the reproduction indices, there were studied the reproduction data registers from all the studied farms. It may mention that all the reproductive works in the studied farms were assisted by qualified staff and all the animals had adequate conditions for feeding and keeping.

In Ialomița farm, the mating season starts between August 15 – September 1 and the beginning of November. The female youth is 18 months old and they have 30-40 kg body weight. In the farm the natural conducted mating is practiced, for one male there are 34 females with 5-7 mating/male/day. The calving period is February 15 - April 30, and the suckling period is 60-75 days. After the weaning period, the reproductive youth is fed with balanced food portions.

In Argeș farm, the mating period starts in September, There is applied the free natural mating on the pastures. The sex ratio is 1male: 32 females. The calving is during February. The suckling period is 60 days. The female youth are mated at 18 months. Before this, they are kept separately, being adequate fed and cared.

În Argeș farm, the mating period lasts during September and October, and the calving is in February and March. There is applied the free natural mating. The sex ratio is 1 male: 35 females. The suckling period is 60 days. For their first days, the kid goats stay together with their mothers, but after a week they are separated by a wooden fence which permit only their passing and there are fed 3 times a day during the first month and 2 times a day during the second month. After 3 weeks they were administered good quality hay. After weaning, the female youth is raised separately from the adult animals. Their age for reproduction is 18 months; the males are used almost 3 years, starting from 15-20 months.

In Giurgiu Farm the conducted natural mating is used. The sex ratio is 1 male: 40 females, the kids' origin is known. Reproductive female youth is 9-10 months. The mating period is between August and October. The kids are weaned depending on their gender, the males are weaned at 60 days old, and

females at three months. After weaning, the females retained for reproduction benefits of a special care about feeding and keeping being able for reproduction in the first year of life.

RESULTS AND DISCUSSIONS

Following the study of the reproduction reports in Ialomița farm it reveals that from 306 goats in the reproductive yield, the number of mated goats was 303 heads and the number of mother goats was 282 heads. It was also recorded a number of 11 aborted goats. Regarding the obtained products, the total number of the kids was 474 heads, from which 463 were born alive, 7 were non viable and dead 4 heads. The number of aborted kids was 13, so only two of the 11 aborted goats had twins (table 2).

Table 2. The number of goats and their products, on breeding categories, in Banat White breed

Specification	Heads
Reproductive females	306
Inseminated females	303
Females with abortions	11
Females with kids	282
Kids	474
Kids calved alive	463
Number of viable kids	7
Dead kids	4
Aborted kids	13

After analyzing the number of goats per each reproduction category and their products, there were calculated the main reproduction indices and present them in table 3 and chart 1.

From table 3 data it may notice that the fecundity index was 93,07%, being almost the same in the special literature for this breed. For example, Zamfirescu (2009), following the research upon a population of Banat White found the value 93,3% for the fecundity index. [8]

The value of the fertility index was slightly lower, 92.16%, due to the fact that 3 goats could not be mounted in the mating season due to their health status. The value of the prolificacy index was 168.08%, being a good value for this breed comparatively the value of the prolificacy index in the special literature.

Table 3. Reproduction indices in Banat white goats (%)

Specification	Value (%)
Fecundity index	93.07
Fertility index	92.16
Prolificacy index	168.08
Birth index	154.90

Zamfirescu (2009), found the value 166,70% for the prolificacy index in a population of Banat White in Mureş County[8]. Meanwhile, the value in this research is 32% lower than the other reported by other authors, as 200% (Taftă, 2004) [4].

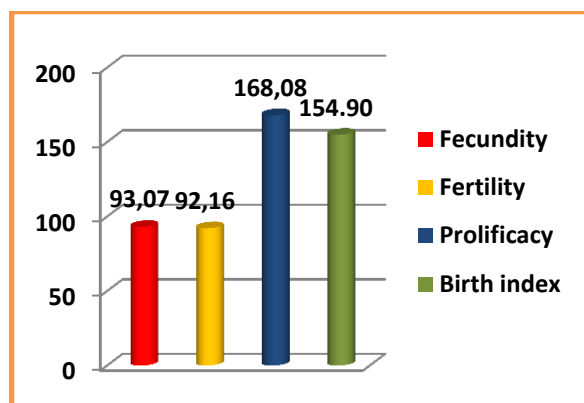


Chart 1. Reproduction indices values in Banat White breed population (%)

The birth index was 154,90%, a good enough value for the goats in Banat White breed and superior for the goats in Carpathian breed. As a conclusion, analyzing the reproduction indices, the reproduction activity in Ialomița farm is placed at a better place, which could be improved by a good management of the

factors which determined the reproduction function maximization.

In the farms where the Carpathian breed is reared, the mating season is different, in September in Argeş County Farm, in September and October in Prahova County Farm and August-October in Giurgiu County Farm. Also, the practised mating system is different. In Argeş and Prahova County Farms there is a free natural mating and in Giurgiu County farm is a guided natural mating system. The sex ratio is also different 1 male/32 females, in Argeş County farm, 1 male/35 females in Prahova County Farm and 1 male/39.5 females in Giurgiu County farm.

Analyzing the breeding records in the three studied farms where the Carpathian breed is reared, it can conclude that the number of the reproductive female goats is 392 heads, the mated goat number is 390 heads, the calved goats number was 370 heads, and the aborted goat number was 10 heads (table 4).

Regarding the obtained products, it was noticed that the total number of kids was 523 from which 516 live kids, 3 non viable kids and 4 dead kids. The number of aborted kids was 12, so only 2 goats recorded twins (table 4).

After analyzing the number of goats per each reproduction category and their products, there were calculated the main reproduction indices and present them in table 5 and chart 2.

Table 4. The number of goats and their products, on breeding categories, in the Carpathian breed

Specification	Heads			
	Argeş Farm	Giurgiu Farm	Prahova Farm	Total Carpathian
Reproductive females	130	158	104	392
Inseminated females	130	156	104	390
Females with abortions	3	6	1	10
Females with kids	124	145	101	370
Kids	182	198	143	523
Kids calved alive	180	193	143	516
Number of viable kids	0	3	0	3
Dead kids	2	2	0	4
Aborted kids	4	7	1	12

From table 5 data, one may notice that the fecundity index was 95.15% as average in the

3 farms, being 2 % higher than the value recorded in Banat White.

The highest value of the fecundity index was recorded in Prahova farm (97.12%), followed by Giurgiu farm (92.95%). The higher values

recorded in Prahova and Argeş farms could be explained due to the mating system.

Table 5. Reproduction indices in Carpathian goat populations (%)

Specification	Value (%)			
	Argeş Farm	Giurgiu Farm	Prahova Farm	Total Carpathian
Fecundity index	95.38	92.95	97.12	95.15
Fertility index	95.38	91.77	97.12	94.76
Prolificacy index	146.77	136.55	141.58	141.63
Birth index	140.00	125.32	137.50	134.27

There are also similar researches on the national level where the fecundity index value was between 93.81% and 96.36% (Pascal 2009; Taftă, 2004) [3,4]. Also, there are researches where the average value for Carpathian breed in the north-eastern region of the country is 97.4%, with a higher variability (88.1-99.1%) (Zaharia, 2011a). [6]

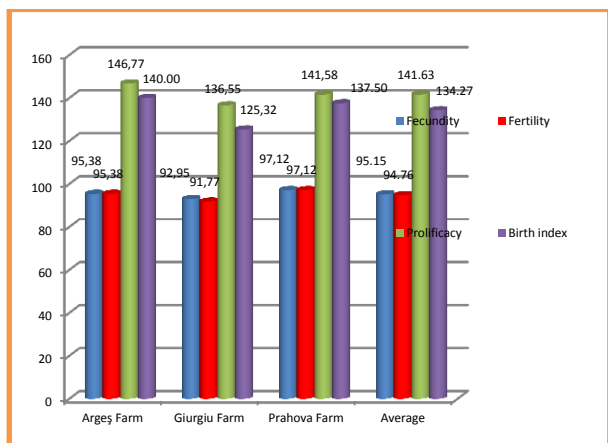


Chart 2. Reproduction indices values in Carpathian breed populations (%)

The average value of the fertility index is 94.76%, being the highest in Prahova farm (97.2%), intermediary in Argeş farm (95.38%) and lower in Giurgiu farm (91.77%). It could noticed that there was recorded the same values in Prahova and Argeş farms, due to the used free mating system.

The average value of the prolificacy index for Carpathian breed in this research is 141.63% being closed to the characteristic values for this breed (135-160%), as it is recorded in the special literature (Călin, 2004; Pascal 2007, Taftă, 2008) [1, 2, 5]. The prolificacy index is higher in Argeş farm (146.77%), intermediary

in Prahova farm (141.58%) and the lowest in Giurgiu farm (136.55%).

There were also on the national level research paper where the recorded values for this breed are lower or higher. For example, Zaharia (2011b), in a research on a Carpathian livestock in north-eastern region found an average value of 129.6%, with variability between 121.2 and 136.3%[6]. Zamfirescu (2009), following the researches on Carpathian breed in Constanța, Mureş and Dâmbovița County found values framed between 120 and 148.68%. [8]

The birth index has an average of 134.27%, which represents a good enough value for Carpathian breed, being higher in Argeş County Farm (140%) and lower in Giurgiu County Farm (125.32%). So, analyzing the reproduction indices, the reproduction activity in Carpathian breed farms is placed on an acceptable to good level, this breed could be continuously improved by a more careful monitoring of the factors affecting the reproduction function.

CONCLUSIONS

Analyzing the reproduction indices, the reproduction activity in Carpathian breed farms is placed on an acceptable to good level; this breed could be continuously improved by a more careful monitoring of the factors affecting the reproduction function. The fecundity index was 95.15% and the birth index has an average of 134.27%, in the 3 farms where the Carpathian breed is reared. The average value of the fertility index was 94.76%, being the highest in Prahova farm (97.12%) and the average value of the

prolificacy index was 141.63%.

In Banat White breed, the value of the fertility index was 92.16%, the value of the prolificacy index was 168.08%. The birth index was 154.90%, a good enough value for the goats in Banat White breed and superior for the goats in Carpathian breed.

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“SEABUCKTHORNOLOGY” A POSSIBLE NEW INTERDISCIPLINARY SCIENCE

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Abstract

The purpose of the paper was to present a critical overview on the main opinions and research results on "seabuckthornology" as a new interdisciplinary science, as mentioned on various international conferences and other events hold in different countries where the author took part and expressed his opinions as expert in the field. The current opinion of many experts is that the sea buckthorn is the result of a long hard work in the field of research, practice, landscape architecture, production, soil science, animal and human health. It is an important plant of the 3rd millennium. The only problem many experts are facing is the fact that it is very difficult to put in order all multidisciplinary information from Botany, Geology, Marketing, Medicine, Biochemistry, Agronomy, Management etc. The solution is the elaboration of a statute of the interdisciplinary new science "seabuckthornology" and the creation of a multilingual data base, which should be updated permanently as at any moment a manufacturer having sea buckthorn oil production to find many offers from the entire world, obtaining all parameters and prices in few minutes, the address, fax, e-mail, phone number etc. In the actual world crises, a scientifically aboard of seabuckthorn may be a solution to health and environmental problems.

Key words: Romanian contribution, cure, land improvements, scientific and commercial information, remedy, seabuckthornology, terminology, viticulture

INTRODUCTION

Humanity is in the third millennium of its Christian time measured existence. Romania is a country which benefited of excellent natural conditions. Now it is in a profound crisis, the solution being a radical change of actual approach in all domains of activity and in conditions of a modern reappraise of scientifically work of past generations. Under these conditions, it is necessary to reconsider the importance of some species from spontaneous flora which could become important resources for the economy and environmental protection. In the entire world, the situation is also critical, at Rio de Janeiro and Paris there were global reunions against environmental changes and the desertification. At Florence, Italy, it was adopted The European Convention of the Landscape. The objectives are: the protection of landscape, the management and arrangement and the organization of the European co-operation in this domain. In Romania, a new legislation provides rules and measures to protect various areas like „Dunes with

Hippophae rhamnoides L.”

Sea buckthorn could become a solution for the arrangement of landscape in regions which are now the subject of desertification, salinity a.s.o. The production of fruits is a resource of food and medical industry development. All the aspects of sea buckthorn utilization in the actual conditions in Romania were presented in 2006, in the Ph.D. Thesis on “Studies about the importance of sea buckthorn (Hippophae rhamnoides L.) in the environmental protection and human health economy” [19] Under the actual climate conditions, this plant is able to fix the lands which are deeply degraded (it has many suckers), to assimilate Nitrogen directly by roots (it has an ameliorative effect to the soil). The fruit contains a lot of vitamins, (the C vitamin content being twice higher than in hip roses), carotene, citric acid etc. The oil contains E vitamin which is revitalizing the human organism, besides P, B1, B2, A, K, F vitamins (F vitamin defends cells against cancer and irradiation). There are also 15 microelements such as: Fe, Mn, B, Al, K, F, Ti etc. From fruits, it is possible to obtain food products:

juice, vine, jam (with cherry, apples and plums), butter etc. All these products are very rich in vitamins. In pharmaceuticals and cosmetics, it could be used for treating the burned and irradiated tissues. In animal feeding, sea buckthorn could improve the hair of dogs, cats, and horses, egg quality, immunity etc. The *Hippophae rhamnoides* L. is a decorative plant, being used in landscape architecture in combination with other plants grace to its green-white colour contrasting with the orange of flowers and fruits.

In this context, the paper aimed to synthetically present an analysis of the importance of *The Hippophae rhamnoides* L. in many fields of activity and emphasize the reasons why it is need to develop a new multidisciplinary science named "*seabuckthornology*".

MATERIALS AND METHODS

This paper is based on a large documentation on the biological features and economical uses of the plant grace to the updated information provided by many research works of high importance presented to various international scientific events where the author took part. His opinions are also put into evidence and are based on his experience in the field which allow him a critical approach of the main aspects taken into consideration.

RESULTS AND DISCUSSIONS

Global climate situation

According to the US National Academy of Sciences, "Climate Intervention 2009" [22], the Earth's surface temperature has risen by about 1 degree Fahrenheit in the past century, with accelerated warming during the past two decades. There is new and stronger evidence that most of the warming over the last 50 years is due to human activities. Human activities have altered the chemical composition of the atmosphere through the build up of greenhouse gases—primarily carbon dioxide, methane, and nitrous oxide. The heat-trapping property of these gases is undisputed although uncertainties exist about how earth's climate responds to them.



Photo 1. Tulcea City, Aegyssus, an ancient Roman Fortress, the door of the Danube Delta, affected by floods (Original photo, Proorocu V.G., 2005)

Energy from the sun drives the earth's weather and climate, and heats the earth's surface; in turn, the earth radiates energy back into space. Atmospheric greenhouse gases (water steamers, carbon dioxide, and other gases) trap some of the outgoing energy, retaining heat somewhat like the glass panels of a greenhouse.

Since the beginning of the industrial revolution, the atmospheric concentrations of carbon dioxide have increased by about 30%, methane concentrations have become more than doubled, and nitrous oxide concentrations have risen by about 15%. These increases have enhanced the heat-trapping capability of the earth's atmosphere. Sulfate aerosol, a common air pollutant, is cooling the atmosphere by reflecting light back into space; however, sulfates are short-lived in the atmosphere and vary regionally.

Why are greenhouse gas concentrations increasing? Scientists believe that the combustion of fossil fuels and other human activities are the primary reason for the increased concentration of carbon dioxide. Plant respiration and the decomposition of organic matter release more than 10 times the CO₂ released by human activities. But these releases have generally been in balance during the centuries leading up to the industrial revolution with carbon dioxide absorbed by terrestrial vegetation and the oceans.

Soil degradation

According to the French school of Soil Science, soil retrogression and degradation

are two regressive evolution processes associated with the loss of equilibrium of a stable soil. Retrogression is primarily due to erosion and corresponds to a phenomenon where succession reverts back to pioneer conditions (such as bare ground). Degradation is an evolution, different of natural evolution, related to the locale climate and vegetation. It is due to the replacement of the primitive vegetation (known as climax) by secondary vegetation. This replacement modifies the humus composition and amount, and impacts the formation of the soil. It is directly related to human activity. The soil represents the surface layer of the earth's crust.

At the beginning of a soil formation, only the bare rock outcrops. It is gradually colonized by pioneer species (lichens and mosses), then herbaceous vegetation, shrubs and finally forest. In parallel a first humus-bearing horizon is formed (the A horizon), followed by some mineral horizons (B horizons). Each successive stage is characterized by a certain association of soil/vegetation and environment, which defines an ecosystem.

After a certain time of parallel evolution between the ground and the vegetation, a state of steady balance is reached; this stage of development is called climax by some ecologists and "natural potential" by others. Succession is the evolution towards climax. Regardless of its name, the equilibrium stage of primary succession is the highest natural form of development that the environmental factors are capable of producing.

The cycles of evolution of soils have very variable durations, between a thousand-year-old for soils of quick evolution (A horizon only) to more than a million of years for soils of slow development. There are two types of ecological factors influencing the evolution of a soil (alteration and humification). These two factors are extremely significant to explain the evolution of soils of short development.

When the state of balance, characterized by the ecosystem climax is reached, it tends to be maintained stable in the course of time. The vegetation installed on the ground provides the humus and ensures the ascending circulation of the matters. It protects the ground from erosion by playing the role of

barrier (for example, protection from water and wind). Plants can also reduce erosion by binding the particles of the ground to their roots.

A disturbance of climax will cause retrogression, but, if given the opportunity, nature will make every effort to restore the damage via secondary succession. Secondary succession is much faster than primary because the soil is already formed, although deteriorated and needing restoration as well.

However, when a significant destruction of the vegetation takes place (of natural origin such as an avalanche or human origin), the disturbance undergone by the ecosystem is too important. In this latter case, erosion is responsible for the destruction of the upper horizons of the ground, and is at the origin of a phenomenon of reversion to pioneer conditions. The phenomenon is called retrogression and can be partial or total (in this case, nothing remains beside bare rock). For example, the clearing of an inclined ground, subjected to violent rains, can lead to the complete destruction of the soil. Man can deeply modify the evolution of the soils by direct and brutal action, such as clearing, abusive cuts, forest pasture, litters raking. Erosion is the main factor for soil degradation and is due to several mechanisms: water erosion, wind erosion, chemical degradation and physical degradation.

Agriculture increases the risk of erosion through its disturbance of vegetation by way of: overgrazing of animals, planting of a monoculture row cropping, tilling or plowing, crop removal, land-use conversion

Recent increases in the human population have placed a great strain on the world's soil systems. More than 5.5 billion people are now using about 10 % of the land area of the Earth to raise crops and livestock. Many soils suffer from various types of degradation that can ultimately reduce their ability to produce food resources. Slight degradation refers to land where yield potential has been reduced by 10%, moderate degradation refers to a yield decrease from 10-50 %. Severely degraded soils have lost more than 50% of their potential. Most severely degraded soils are located in developing countries such as Asia

and Africa.

The increase in the turbidity of water and the contribution of nitrogen and of phosphorus can result in eutrophication. Soils particles in surface waters are also accompanied by agricultural inputs and by some pollutants of industrial, urban and road origin (such as heavy metals). The ecological impact of agricultural inputs (such as weed killer) is known but difficult to evaluate because of the multiplicity of the products and their broad spectrum of action.

Soil degradation may involve the disappearance of the climax vegetation, the decrease in animal habitat, thus leading to a biodiversity loss and animal extinction. Problems of soil erosion can be fought, and certain practices can lead to soil enhancement and rebuilding. Even though simple, methods for reducing erosion are often not chosen because these practices outweigh the short-term benefits. Rebuilding is especially possible through the improvement of soil structure, addition of organic matter and limitation of runoff. However, these techniques will never totally succeed to restore a soil (and the fauna and flora associated to it) that took more than 1000 years to build up.

Sea buckthorn importance under the conditions of human health degradation

The new civilization means stress, untidy life, eye disabilities, artificial feeding, synthetically drugs, foods, drinks and vitamins.

Sea buckthorn is called by the Romanian peasants in Buzau County “berries of the Holy Virgin”. Romanian people used from hundreds of years the fruits for the treatment of anemia, diarrhea, rheumatism and rash. From fruits, they obtained food products: juice, vine, jam (with cherry, apples and plums), butter etc., they used it also as a textile colorant. In the Romanian “Medicinal and Aromatic Plants from A to Z” Guide Book, the two appreciate specialists Ovidiu Bojor and Mircea Alexan recommended sea buckthorn as a vitamin complex (C, B1, B2, PP) carotenes, folic acid, oil, izoramnethol, fitosterol. For this reason, Fructus Hippophae is deeply recommended in avitaminosis in

combination with Fructus Cynosbati (hip rose), Folium Urticae (stinging nettle), gooseberry, Folium Menthae (mint), Folium Rubi idaei (raspberry) and Folium Primulae (cowslip), as infusion, cooling drinks, syrups, gout as reach in vitamins and diuretic, pneumonia in combination with colt’s foot, linden tree, hyssop, cowslip, savory, elder tree, rickets Fructus Cynosbati (hip rose), Fructus Hippophae, Folium Primulae (cowslip), Folium Melissaе (balm mint), adjuvant in pulmonary tuberculosis in winter and spring for vitamins with Fructus Cynosbati (hip rose), Folium Urticae (stinging nettle), Folium Primulae (cowslip), uremia in combination with diabetes Folium Betulae (birch tree), Folium Myrtilli (bilberry) and Herba galegae (goat’s rue), xerophthalmia in combination with Fructus Cynosbati (hip rose), Folium Urticae (stinging nettle), Flores Tagetes (marigold) and Fructus Myrtilli (bilberry).

Sea buckthorn presentation

Sea buckthorn is an Euro-Asiatic species, classified in 1753 in “Speciae Plantarum” by Karl von Linné at the position 1023. The great botanist seems to be its godfather.

Hippophae rhamnoides has two significances. Now, because it has a positive significance, accepted in the etymology from Greek words: horse and shine. The Romanian specialists demonstrated the influence of sea buckthorn on animal health improving the skin aspect.

The second significance comes also from Greek: horse and poison, being reflected in the Western Europe tradition.

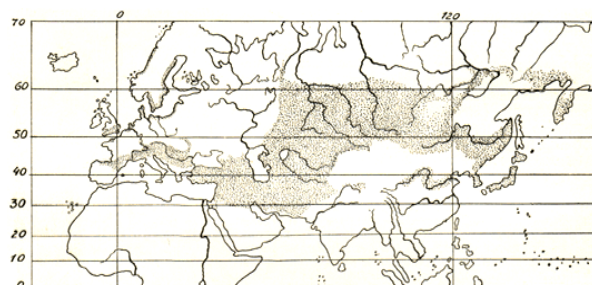


Fig. 216. Hippophae rhamnoides L. Verbreitungskarte unter Zugrundelage der Darstellung von Servetatz.

Fig. 1. Sea buckthorn area from Illustrierte Flora von Mittel - Europa (Gustav Hegi Munchen J.F. Lehmanns Verlag, 1926)

The Romanian specialists’ conception at the beginning of the XX century was the same: it

may be caudated by the plant's negative effect. Other opinions are related to the effect on the elimination of intestinal worms. The Romanian word "catina" seems to come from the Latin "catena", the image from the Roman invaders was a chain around rivers, the colour of leaves suggested them the silver. Its natural area was one of the largest in the world, from the Atlantic Ocean to the Pacific.

In Romania, the modern scientific statute of agriculture was founded in the inter-war period when, in 1938-1943, Constantin Filipescu coordinated a large staff and published "The Great Agricultural Romanian Encyclopedia".[2]"Any country with pretensions of civilization must have in the cultural treasure agricultural encyclopedia and dictionaries needed by anyone who is concerned by this millenary activity", said the author in the introduction. In the first volume of this work, sea buckthorn was largely described at page 710: "cătina albă" bot. *Hippophae rhamnoides* L. Fr. Saule epineux, germ. Sanddorn, engl. Sea buckthorn (sea, buck, thorn) a bush usually of 2-5 m which could become a little tree of 5-6 m. from slippery grounds of river's gravels. One year stems has silver scaly brush and ferruginous rust coloured down, early they get thorns, old stems has a great number of short stems transformed in thorns. The ovoid buds are covered by a small number of golden yellow scales with silver brush. Leafs are linear lancelet or narrow oblongs 4-5 (6) cm. long and 5-6 (10) mm. breadth, short petiolated, petiole of 1-3 mm., entered edge; superior face at first has silver scales, at maturity dark green, glabrous and only the long of principal nervure with down, inferior face is silver with scaly silver thread to golden yellow which at friction are taken on the fingers. Dioeciously flowers are little, less apparent, greenish, situated on annual stems on which it appear simultaneous with leafs by 2-3 at the base of inferior leafs which are hiding integrally. Male flowers sessile with yellow-green perigonium on intern face have silver scaly thread in tubular form, evidently separate at the extremity in two lobes on square disk. Female flowers in raceme specula form, with a perigonium evidently separate at the

extremity in two lobes, covered in exterior with scaly thread; unilocular pistil, one only ovule. It blossoms from April to May. Fruit is an achene covered in exterior with an indurion, seems that in the inferior part persists the perigonium which became fleshy. Fruit is ovoid like a pea bean brown-orange to golden yellow, the fleshy part has acidulous taste, contains a poisonous principia, which don't hinder birds to devour them after the snow fall. The pip, achene with solid brown shining cover, usually has one seed. The trunk may be strongly developed 4-6m. and at soil level it may be 10-15 cm. in diameter with many ramifications has lateral direction, sinuously, covered at the beginning with brown smooth bark, in time it has a rhizome dark brown scaly profoundly cracked. The hardwood yellow-brown, became by drying weighty, solid, may be polished, don't resist in air, the ashes are rich in potassium. The striking root is profound, because the pivoted part penetrates depth the soil and superficial by lateral roots parallels with the surface, from lateral roots in sands there are starting many suckers. In roots there are tuberosities in which leaves in symbiosis an Actinomycete capable to assimilate atmospherically nitrogen.

It is spread on marine dunes, alluvial sands along rivers and around lakes on stony versants and crumbling bank, coasts and cliffs, detritus degraded pasture lands, etc. Its principal area is the Central Asia from the Caucasian territory to North of Persia and the Ural, to the East of Asia.

In Europe, it is found along of the Scandinavian coasts, in the Baltic Countries to the North Sea, South of England to the South of Europe vegetating on a narrow band on the Mediterranean seashore in interior on valleys in the mountains or hills in North of Spain, South of France, North and Center of Italy, Yugoslavia, Down Austria, Hungary, South of Romania and Bulgaria.

In Romania, *Hippophae* is found in the hilly territories, in the Southern and Eastern Carpathians valleys of versants from Moldavia and in Muntenia it spreads along the valleys to plains and to the Danube. An insular center of sea buckthorn is in the

Danube Delta and at the Black Sea shore in the place called Cardon at North of Sulina (5 km.).

The optimum area is the Sub-Carpathian zone in the Ialomita River valley, Laculete, the Prahova valley and its affluents the Campina, Comarnic, Telega, Slanic, Teleajan valley, Homoraciu, the Buzau valley, Cislau, Nehoiasi, Ramnicu Sarat valley, valleys from Vrancea County etc. and it continues in all the basins to Bucovina.

In forestry, it is useful to fix the dunes or moving grounds supporting more salts in soil Na Cl, it may be the national essence for the restoration of Vrancea County and other regions Carpathian deforested regions wher the installation of new forests on salted soils is difficult. Its ample ramification and numerous thorns make it valorous for hedges. As a bush, it is considered a very ornamental plant, also with its silver leafs and its numerous orange fruits which last on branches after the snow fall.

It may be multiplied by seeds, slips, marcotage and suckers.

The first encyclopedia was set up during the first war as its authors declared.

The Romanian specialists have along experience in using *Hippophae rhamnoides* in soil improvement. In 2005, during the spring season, Romania was facing with floods at a large scale.

The economic phenomenon from the end of 19th century when forests were destroyed and sailed for the construction of railways in the Central Europe was the same in the legislative vide after 1990 and the situation in Romania is dramatic because the huge destruction. The mistake in the tackle of sea buckthorn is the attempt to define all varieties as one kind of assortment. It has a great variability and adaptability. The Romanian researchers had demonstrate that the species has the capacity to accumulate in its tissue a great level from some radioactive elements, characteristically for the soil and subsoil in its habitat zone. In soil and subsoil there are slowly transformations of radioactive elements, with variable times of halve which give to the crust a certain natural radioactivity. Alfa radioactivity results from the transformation

of radium in radon, the beta radioactivity is given in special by the isotopic form of potassium being in soil near K40 ions. Romanian measurements of fruits in regions which are known with the particularity of radioactivity, established that there were 34-37 less alfa global concentration compared to the maximum admitted limit in edible water and 2-3 times more beta radiations. This illustrated the capacity of fruits to indicate the presence of natural radioactivity in soil. The beta radiation from absorbed radioactive elements on soil particles were stored or dissolved in the soil solution.

There are other species like *Solanum nigrum*, Romanian "zarna", *Veratrum album* "stregoaie" which have toxic components influenced by the soil composition.

These explain many contradictions about the benefice or lethal effect of fruit utilization.

The authors of the Romanian Encyclopedia considered it like not recommended in feeding, their occidental formation and sources are explaining this opinion. The conclusion is that the variability of this species is the reason of many contradictions about the components concentration and its large utilization. [2]

The International Sea buckthorn Association should be the promoter of a scientific map-drawing of varieties at the global level, as a first step for research in the various domains of utilization.

The regional people's millenary experience under the conditions of maintaining the environmental parameters should be an important point of view in the research activity.

Hippophae rhamnoides L. has an opportunity to become the solution of the modern environment and feed global crises only under a global conception in research, production integration, processing, economic management and marketing.

The Viticulture Science - A study case

Viticulture (from the Latin word for vine) refers to the cultivation of grapes, often for use in the production of wine. When the grapes are used for winemaking, it is also known as viniculture.

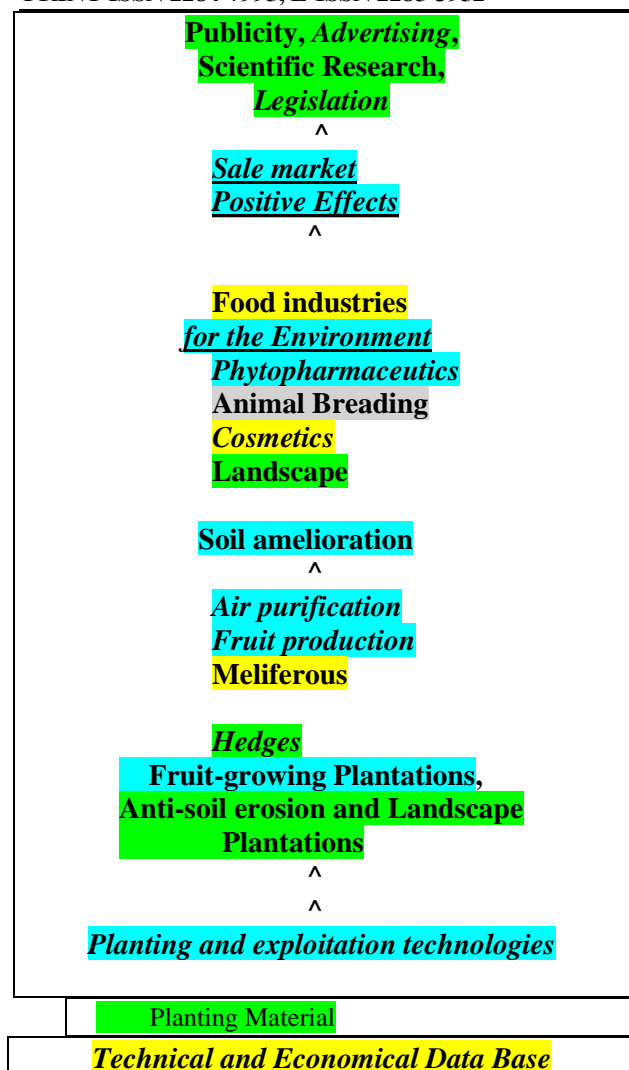


Fig. 2. The main aspects which should be taken into account for the scientifically implementation of sea buckthorn utilisation [16]

It is one branch of the science of horticulture. Viticulture is the science, production and study of grapes which deals with the series of events that occur in the vineyard. Grapes are grown for fresh fruit, dried fruit or for the grape juice, which can be used (amongst others) to produce wine. The viticulturalist's duties include: monitoring and controlling pests and diseases, fertilizing, irrigating, canopy management, monitoring fruit development and characteristics, deciding when to harvest and vine pruning during the winter months. Viticulturalists are often intimately involved with winemakers, because vineyard management and the resulting grape characteristics, provide the basis from which winemaking can begin. Viticulture is an example of scientifically approach of a

millenary human occupation with social, economical, habitual and ethnical aspects.

Vitis vinifera is a plant which changed the destiny of billion of people in their millenary existence. Viticulture is the basically occupation in Romania Cotnari, Husi, Panciu in Moldavia, Dragasani, Dealu Mare, in Muntenia, Niculitel and Murfatlar in Dobrogea, Pecica, Tarnave in Transylvania, France, Champagne, Portugal Porto also. It develops activities in aval: viticulture machines and implements, grape refrigeration, vinification industry equipment. Philoxera is an example of the importance of research activity in the maintenance of a millenary occupation. In France in 1863 cultures were destroyed. In Romania for example there were grafting centers at Tintea (Prahova County), Strehaia (Mehedinti County), Ceda (Arad County), Petresti (Vrancea County), in this mode appears a mosaic of varieties Cabernet Sauvignon, Muscat Ottonel, Riesling, Traminer, Sauvignon, Chasselas, Afuz Ali, Muscat de Hamburg a. s. o.

In the post-philoxeral period, in 1937, it was founded The Agricultural Research Institute where professor I.C. Teodorescu led the Horticulture Department. He was the promoter for the introduction of scientific and technical progress in the Romanian viticultural production. Political and social effects were in the period of prohibition, the illicit commerce won all public order measures.

Sea buckthornology - A need of modern times

In Romania, Popescu M. et al., in 1982, wrote "Pomicultura generală și specială" published by Didactical and Pedagogical Press House [24]. This was the first textbook of Tree culture which contained a chapter dedicated to the sea buckthorn technology, written by Profesor Victor Cireasa from Iasi Agricultural Institute who was the promoter of the culture and study of sea buckthorn in Romania.

Lupe Z. Ioan, Grigorescu Emanoil, Brad Ion, Cireasa Victor, Manea Stefan are some of Romanian specialists in forestry, horticulture, medicine, bio-chemistry with many studies and applications of sea buckthorn.

In Proceeding of the 1st Congress of International Sea buckthorn Association there are essays elaborated by specialists from Bolivia, Canada, China, Estonia, Finland, Germany, India, Italy, Latvia, Romania, Russia and Ukraine. At the 2nd Congress, other important research results were presented by experts from Azerbaijan, Bolivia, Canada, Korea, Finland, Germany, India, Italy, Japan, Latvia, Mongolia, Nepal, Nigeria, Pakistan, Russia, Sweden, Turkey, Ukraine, U.S.A. and from Romania too.

The main idea that everybody accepted was: the sea buckthorn is a plant which means hundreds of years of landscape architecture, research, experience, secrets, production, soil health, animal and human health, in a self-destructive human society of the 3rd millennium.

What displeased at those Conferences? The impossibility to put in order all the important and multidisciplinary information.

All the experts, no matter their field of activity: Botany, Geology, Marketing, Medicine, Biochemistry, Agronomy, Management etc. were deeply interested to get updated information. The conclusion was that the solution is to set up a statute of an interdisciplinary new science focused on "sea buckthorn" and the most important, a multilingual data base alphabetically ordered accessible for anyone interested is also needed.

As all the three congresses underlined, Seabuckthornology will be the science of the study of the biology of sea buckthorn and the rational and economical way of the culture of this plant for the soil recovery and human and animal medicine and feeding.

There are important domains where the sea buckthorn should be artificially introduced, to recuperate the negative role of modern technologies, modern conceptions and interests.

Food industry

Sea buckthorn is used in the composition of juice, tonic vine, jam (with cherry, apples and plums), butter etc. All products are very rich in vitamins. There are recommended for people with disabilities and sickness, mothers who are suckling children. In some countries,

sea buckthorn is used as a preserver and sauce for fish cooks.

As a meliferous species, it is interesting to evaluate the importance of picking from sea buckthorn flowers on honey composition.

For example, the Romanian experience could be reconsidered and in the research programs in this case we may obtain natural sorts of vines, vinegar, jams, marmalades, potato mash, juice and sweetness. Sea buckthorn is also a natural preserver. [3, 12]

Phytopharmaceutics

In Romania, the active principia from the sea buckthorn fruit oil are extracted by means of an original procedure resulting a natural food concentrate. The lipo-soluble components of the sea buckthorn oil represent a multi-vitamin complex with a regenerating action for the cellular metabolism. The active substances contained are, in principal: β -carotenes, D, E, F, K vitamins, therefore all the lipo-soluble vitamins, also o series of poliphenolic products with a strong anti-infectious impact. Also, it contains lecithin easy to be assimilated (calcium and magnesium salts), unsaturated fatty acids like β -linolic acid, a precursor of a lot of organic enzymes. It is has a tonic, antianemic, vitaminic and imuno-modulating effect, a synergic action with interferon. It also contributes to the synthesis of protein raw-material for interferon; it is also a coronary and anti-aterosclerosis protector; slowing down the process of ageing by consumption of undesirable free radicals; detoxifying the liver and assuring the trofic function for the hepatic cell; anticancer effect by the great content in β -carotene; externally used, it has a healing and dermo-regenerator, anti-inflammatory and nutritive effect as well; excellent protector against solar radiations or de other nature.

Prophylactic: It could slow down the process of ageing and also could fight against cancer, it is a general tonic in stress situations, and an imuno-modulator as well.

Adjuvant: internal treatment of some dermatological affections (psoriasis, skin diseases), ORL diseases with component atrophic and inflammatory, cardio-vascular diseases being a good coronary protector and

also for the digestive system. It is active in chronic hepatitis, uro-genital affections, neurological psychical affections, anti-anemia, excellent role in slowing down of some ocular affections (hemeralopy, presbytism, myopia, astigmatism, hipermetropy, glaucoma, cataracts) being rich in β - carotenes.

Extern use: local treatment of eczema, thermal and chemical burns, chilblains, alergic-dermias, psoriasis, lent recovery wound.

It is the only natural product recognised for the activity of protection against solar radiations or other nature.

Cosmetically use: antirid and nutritive creams, gels and lotions of protection and maintenance for all kinds of skin.

Plantavorel Piatra Neamt continued the traditions of The Vorel' pharmacists who in the 1880's initiated the so called "Green Pharmacy", and in 1942 produced 120 products. In 1983, Plantavorel Laboratory initiated a new research and production in the utilisation of the Romanian "Green Gold". Now, there are sea buckthorn homologated products like:(a) "Cevisol", a natural dietetic and food supplement extract of fruits. It is a general tonic for children, convalescents, and for the ones facing with an intellectual and physical effort;(b) "Vorisol pellets" is a natural dietetic and food supplement extracted from fruits of *Hippophae rhamnoides* and *Rosa* species. The pellets could be also used for tea, 2 spoons for 100 ml. water.(c)The "Hebe radix" cream including extracts from sea buckthorn, marigold and blackwort, used as volatile oil of mint, excipients, conservants. It is recommended in the treatment of the solar and thermo burns, contact dermatitis, etc. The Research programs recommended plants from "the Curvature Carpathians" as optimal areas for producing pharmaceutical products.

[1, 4, 6]

Animal husbandry

The effect of an antierosional, forest, tree culture or hedge culture is the utilization of fruits by animals and birds in their feeding. Also, the animals and birds are important in its natural extension. In the Danube Delta, the diversity of sea buckthorn is motivated by the

ways of birds migration. In 1989, in Romania it was elaborated "Polivitarom" from sea buckthorn fruits powder or granules. It has a good effect in the growth of chicken, hens, rabbits and pigs. For fur animals, the powder or oil of sea buckthorn introduced in feeding, make them to shine, this being one of the meanings of plants name. [8, 9]



Photo 2. Fruits of sea buckthorn are bird's favorite food, the seeds being dispersed at long distances (Original Photo, Proorocu V.G., 2005)

Cosmetics

Sea buckthorn is important in the composition of cosmetics. Sea Buckthorn oil has multiple benefits in the area of restorative and anti-aging skin care. Natural antioxidants and essential fatty acids help reverse damaging effects of sun radiation and minimize long term effects of sun exposure, like wrinkles, dryness, dark spots reduce skin inflammation, promote natural skin restorative processes. The oil is well tolerated by any type of skin and provides long term anti-inflammatory, restorative and revitalizing action. [7]

Landscape architecture



Photo 3. In Romania sea buckthorn was printed on stamps appreciating the importance of specie in modern pharmacology

Sea buckthorn is present in all manuals of landscape architecture. The yellow orange colour of flowers and fruits make a nice contrast with the silver colour of leaf.

It is present all the year and assures a self protection and protect areas with its spines. In the interior arrangements, colours and persistence assure the presence in many floral or plant arrangements. [13]

Forestry

Romania has many natural resources in all the domains of agriculture like hundreds of years in forestry, but we are isolated, due to many causes, mainly to the weak management. This makes sea buckthorn to be a solution for soil rehabilitation, and also a resource for the development of production of derivatives. In the Danube Delta, a research program running on 1,450 ha. and other surfaces demonstrated the capacity of the plant to be utilized in soil erosion protection. The actual situation needs thousand of environmental plantations, possibilities of rehabilitation are certified.

Landscape architecture

Sea buckthorn is present in all manuals of landscape architecture.

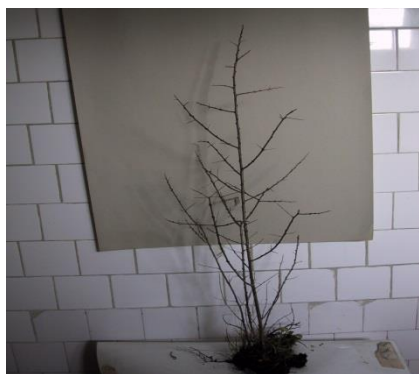


Photo 4. Plants of sea buckthorn cover in short time the zone of habitat (Original Photo, Proorocu A., 2003)

The yellow orange colour of flowers and fruits make a nice contrast with the silver colour of leaf. [10,11]

Land reclamation

Sea buckthorn is a very appreciated plant because it lasts just a short period of time and could take part with other species on denivelated lands, sloped river banks, sea shores, coasts and cliffs. It is in symbiotically relation with *Frankia* sp. The effect in humus formation and vegetal cover is very rapid. It is

a pioneer species. After the improvement of soil fertility, it migrates to unfertile zones, being replaced by other pretentious species. In the consolidation works against erosion or in the denivelated zones, it is recommended to be used together with some other species.

An example of powerful collaboration between many nations is the case of the Danube Commission. The Danube River is vital for Germany, Austria, and Hungary in relation with the entire world, trade, military transports and communications. [5]

The Turkish had the power at the door of the Danube and modern nations obtained the control after the Convention from Paris in 1856. The Danube Commission, at present a political organization for the jurisdiction of the old river, was first organized with the participation of representatives from England, France, Italy and also from Russia, Turkey, Germany, Austria, Croatia, Serbia, Bulgaria, Romania, and other countries officials.



Photo 5. Nodules on roots of sea buckthorn demonstrate the symbiosis relation with *Frankia* sp. (Original photo, Proorocu Angel 2003)

One of the positive result of this Commission's activity was the shorten of Sulina Branch from 83.8 km to 62,6 km. in 1868-1902. In the actual times. Sulina is the only navigable branch of the three Danube Delta Branches. Sulina had a hydrological arrangement with sea buckthorn plants circularly planted surrounding the city. Many experiments in 20th century were achieved by the Romanian researchers with *Hippophae rhamnoides* alone or in combination with other plants, which could belong to that period of time.

The biodiversity of sea buckthorn in the Danube Delta was amplified by the share of billion of birds which hundreds of years travelled above the territory in their annual migration. [20]

Terminological aspects

Terminology is very important to be clear in this new domain of research.

Cristian Galinski and Gerhard Budin (1993) from Infoterm, University of Viena, Austria, mentioned: “Whenever and wherever specialized information and knowledge are created, communicated, recorded, processed, stored, transformed or re-used, terminology is involved in one way or another.

Subject-field communication has become a specific type of discourse with specialized texts differentiating into a whole array of text types. When we define terminology as a structured set of concepts and their designations in a particular subject field, it can be considered the infrastructure of specialized knowledge.



Photo 6. On roots of sea buckthorn appears many suckers (Original Photo, Proorocu A., 2003)

Technical writing and technical documentation are thus impossible without properly using terminological resources. Since the production of technical texts increasingly involves several languages, high-quality multilingual terminologies have become scarce and much desired commodities on the burgeoning markets of language and knowledge industries.

The development of terminologies, as a crucial part of special purpose languages, reflects scientific, technical and economic progress in the subject fields concerned. Due to different speeds in this dynamic co-

evolution of knowledge in the individual domains, specialized discourse continues to differentiate into more and more sectorized special languages and terminologies. But these communication tools become increasingly ambiguous, due to the sheer number of concepts to be designated and the limited linguistic resources of every natural language: terms are taken over from one domain (or language) into another, usually with varying meanings in the (productive) form of metaphors or analogies; new homonyms, polysemes and synonyms arise, motivating or even forcing subject specialists to standardize their terminology and harmonize them on the multilingual level in order to reduce and manage the constantly rising communicative complexity that faces their discourse communities.

Terminology management is primarily concerned with manipulating terminological resources for specific purposes, e.g., establishing repertoires of terminological resources for publishing dictionaries, maintaining terminology databases, or ad hoc problem solving in finding multilingual equivalences in translation work or creating new terms in technical writing.

For such purposes special computer programs have been developed (terminology database management programs), either commercially available on the international terminology market or developed as prototypes in academic research projects.” [21]

CONCLUSIONS

Seabuckthornology may be the science of the study of the biology of sea buckthorn and the rational and economical way of the culture of this plant for the soil recovery and human and animal medicine and feeding.

The new science will be studied in special schools of agriculture, manuals and technologies will be improved.

Also it is needed to establish the terminology and scientifically branches which are involved in the new science theory like: Biology, Botany, Agrotehnics, Food industry, a.s.o.

The computer and internet era could be helpful to store and disseminate information

collected in thousand years at global level about this plant.

The experience accumulated by Chinese, Tibetan, Russian, German, Romanian people etc. will be easily collected in a unitary textbook on Seabuckthornology presenting: origin, scope of culture, technology, environmental plantation, fruits plantations, landscape architecture, and forestry a.s.o.

Also, specific Seabuckthornology textbooks could be elaborated for every country and region, characterizing the local experience, traditions, technologies, a.s.o.

The experience and models created across the time in viticulture could be successfully used in the field of Seabuckthornology.

Besides the economical interests, the sea buckthorn role of panacea for the soil, the air and human and animal beings in actual conditions on the Earth should not be ignored.

The most important aspect is the permanent actualization of data base, in a moment so that any manager to be able to find many offers from the entire world, obtaining all parameters and prices in few minutes, the address, fax, e-mail, phone number etc. [17]

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THE CONTRIBUTION OF AGRICULTURAL SECTOR TO GDP IN THE REPUBLIC OF MOLDOVA

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Abstract

Currently, we are witnessing to a steady decline of contribution of agriculture in the Republic of Moldova to the formation of macroeconomic indicators. However, agriculture remains an important sector for the national economy in the Republic of Moldova. About 24.3% of the working population is employed in agricultural sector, and the share of agriculture in gross domestic product in 2013 was of 12.3%. The approached subject in this scientific work is current and emphasizes the problems which farmers are facing in economic, social and uncertain conditions.

Key words: agricultural sector, GDP, economical growth, productivity

INTRODUCTION

Based on the decisive role that agricultural sectors play in economic and social aspect for any state, addressing problems that prevent its development presents an interest of maximum importance and topical.

The regulations of agricultural sector by the state governments aim to achieve 4 main objectives [4]:

- to protect farmers from uncertainties related to price developments;
- to ensure with their own food (food security through self-sufficiency);
- to maintain the viability of farms and small farms;
- to achieve certain objectives of spatial planning, such as maintaining a specific regional scale.

These objectives are in accordance with the objectives of Common Agricultural Policy (CAP):

- increasing the agricultural productivity by promoting technical progress and by optimal using of production factors;
- ensuring a fair standard of living for the population employed in agricultural sector by increasing the individual earnings of farmers;
- stabilizing markets;
- ensuring availability of supplies;
- ensuring certain reasonable prices for

consumers [6].

The State shall ensure the sustainable development mechanism of agricultural entities through promoted policies. Besides contribution to the employment of population, also agriculture plays a major role in economic growth through important relationships between production and consumption, ensuring non agricultural sector (industry and trade) with raw materials for production and commodities. Also, the agriculture is a consumer of energy, mineral and chemical products, etc.

The above mentioned require the necessity to promote protectionist policies from governments side.

MATERIALS AND METHODS

Informational support of the research is represented by empirical studies of different researchers on agricultural growth and its impact on poverty reduction [5], the World Bank's study conducted by Anne Krueger, Maurice Schiff and Valdes Alberto on the attitude to agriculture [1].

As analytical support for this study served the data of the National Bureau of Statistics of the Republic of Moldova, National Strategy for Agricultural and Rural Development for the years 2014 - 2020 and other relevant data

processed by the author.

RESULTS AND DISCUSSIONS

The agriculture of XXI century is highlighted from other sectors of the economy through size and potential impact on various macroeconomic issues, including on economic growth. Its multifunctional character confirms that agriculture is not just about food production. In addition, the XXI century has generated new challenges, such as price volatility, increasing climate changes, rural poverty to which agriculture must face. Also, agriculture provides jobs and incomes to the majority of the rural population.

The labor force as a factor of economic growth occurs through increasing the level of work done at the macroeconomic level and also through increasing its quality, which is expressed synthetic through labor productivity indicator. Although, the Republic of Moldova is among the first countries of Europe with the largest areas of agricultural land per capita, also continue to lead among the poorest countries of Europe with the lowest standard of living and economic development. The Republic of Moldova ranks on the last places regarding the usage of labor in rural areas, compared with EU countries. This is reflected by differential between rural share of the total population and share of agriculture in employment in some EU countries.

Productivity in the agricultural sector is very low both compared to productivity obtained in this sector in countries with developed agriculture as well as to productivity to other sectors, such as industrial and service sector [3].

Chart 1 shows an increased trend of labor productivity in agriculture simultaneously with reducing the number of employees working in this sector.

The decrease of employment of labor in agriculture in relation with the increased production of the sector has led to increased productivity in the Republic of Moldova's agriculture during 2000 - 2009. In the last 4 years of the analyzed period has been a steady trend of the labor productivity.

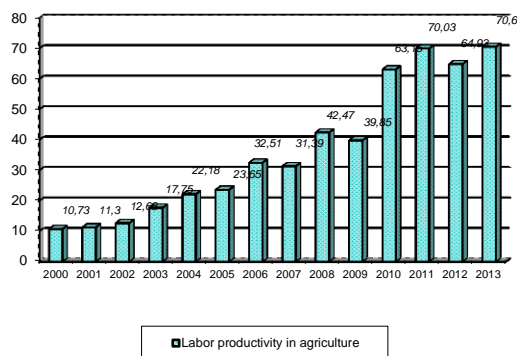


Fig.1. The evolution of labor productivity in agriculture during 2000-2013, thousand MDL.

Source: authors' calculations and processing based on data of the National Bureau of Statistics of the Republic of Moldova

Despite this, agriculture remains the sector with the lowest level of labor remuneration, with the largest number of day laborers. Working conditions and low level of labor remuneration lead to the abandonment of this sector, labor people migrating to other sectors or abroad looking for better paid jobs.

According to author, targeted theoretical models suggest conflicting views regarding the role of agriculture in developed countries, because they have on their base, assumptions resulting from different economic models, namely and the role of agriculture in each model is specific to it.

A low productivity may be determined by several factors. The main factors could be lack of appropriate technologies and lack of adoption (adoption). While the first requires for a better targeting of research in developing countries' economies and their conditions, the second requires a reduction of barriers to implementation technology. Of course, the problem of low productivity can also be a combination for both inadequate technologies as for barriers implementation and restricted access to resources of financial market.

Although new and available technologies are more productive, farmers are deprived of information on their existence and knowledge necessary for their use. Extension services represent educational tools that are designed to teach and to provide information enabling farmers to use and manage effectively new technologies. Also shall be considered global climate changes.

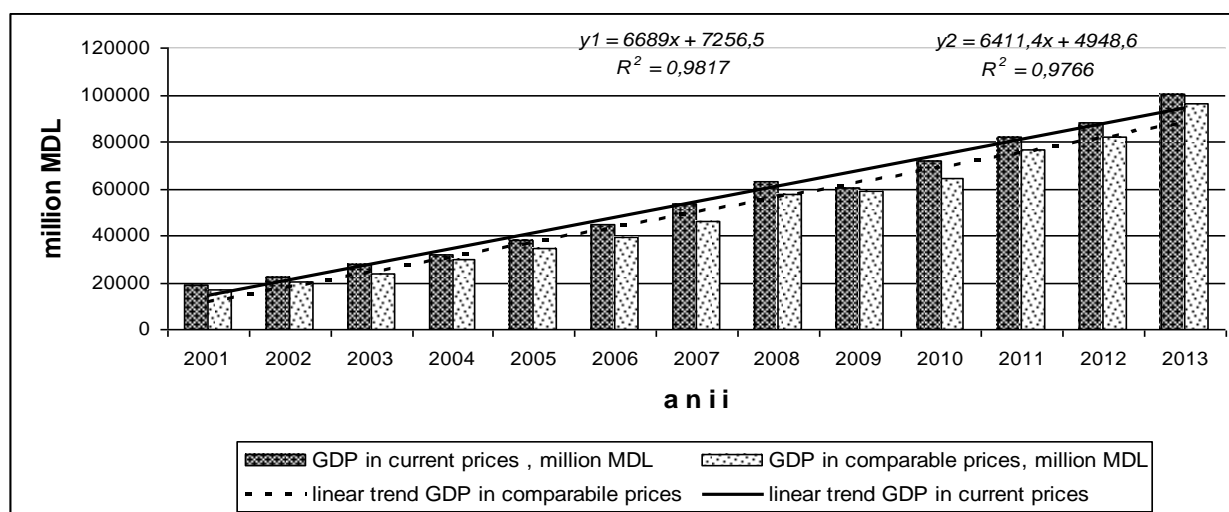


Fig.2. Trend of GDP evolutions (in current prices and in comparable prices) in the Republic of Moldova
 Source: authors' calculations and processing based on data of the National Bureau of Statistics of the Republic of Moldova

New crop varieties resistant to drought and increased investment in irrigation are required. These adaptation efforts shall be part of general strategies for agricultural development.

Agricultural sector in the Republic of Moldova is characterized as one of subsistence agriculture, uncompetitive compared to agriculture of other European countries [5]. Some theorists believe that the importance of the agricultural sector decreases with economic development. From this point of view, the role of agriculture in economic development is to provide cheap food and work places [2].

The Republic of Moldova's macroeconomic environment is similar to that of Eastern European countries, but different from the new member states of the European Union. If we represent the share of gross added value of agriculture in the region's GDP, it becomes obvious that agriculture plays a vital role in the economies of Eastern Europe. On the other hand, the role of agriculture in GDP has decreased in all Eastern European countries in the last decade.

The GDP's evolution in Lei million in the Republic of Moldova in the last 14 years shows an upward trend with a relatively constant linear evolution. Linear regression models of the GDP's evolution indicates a high degree of certainty, the R^2 values being

about 98 p.p. Simultaneously, there has been a decrease in the contribution of agricultural sector to GDP.

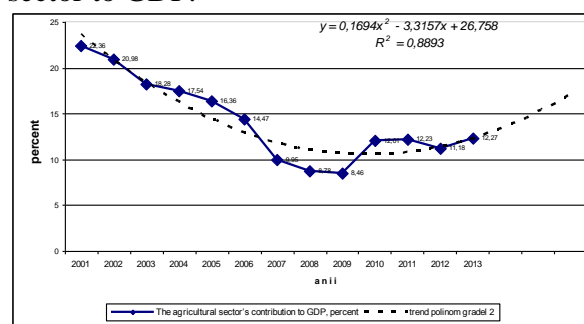


Fig.3. Trend of evolution of the agricultural sector's contribution to GDP, percent, during 2001-2013.
 Source: authors' calculations and processing based on data of the National Bureau of Statistics of the Republic of Moldova

Starting with 2000 in the Republic of Moldova has been a trend of evolutions of second degree parabola to agricultural contribution to GDP, indicating the decrease of this indicator with regular insignificant increase.

At the same time, as describing in Chart 4, although agriculture through its global production contributes to economic growth measured by GDP, this contribution is one simple negligible, taking into account the number of population employed in the sector concerned.

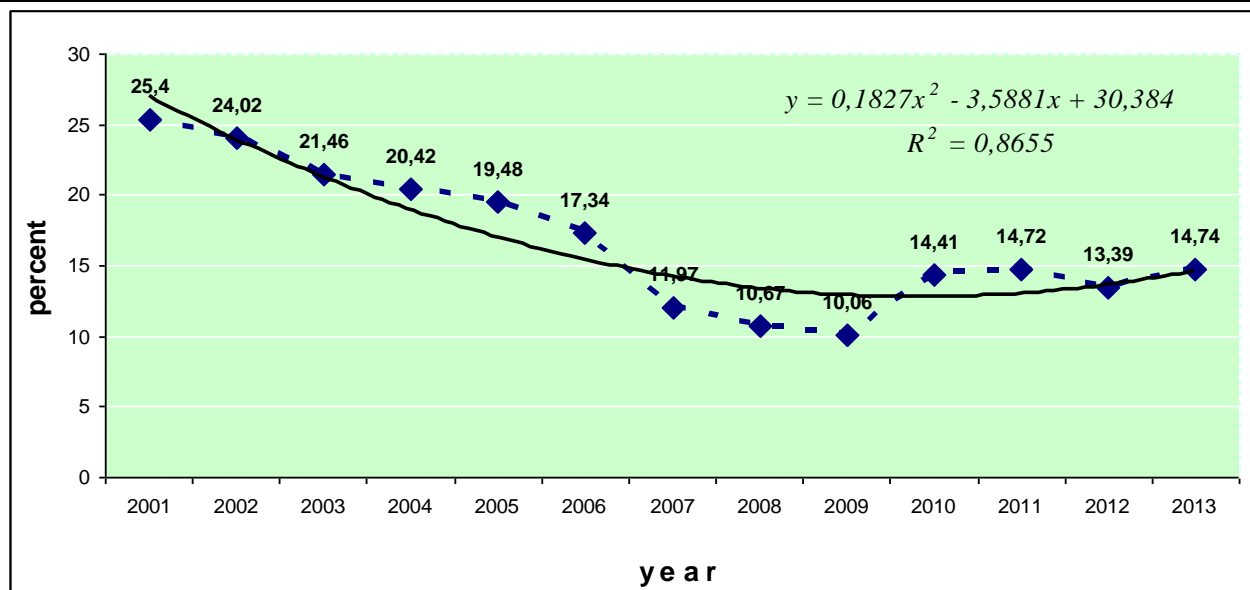


Fig. 4. The contribution of agriculture to gross added value in the Republic of Moldova. Evolution and trend, 2001-2013

Source: authors' calculations and processing based on data of the National Bureau of Statistics of the Republic of Moldova

The contribution of agriculture to gross added value has a trend of evolution similar to that of contribution to GDP. Thus, if in 2001 the contribution of agriculture to gross added value exceeded 25%, currently we are witnessing to a contribution of approximate 14.7%.

CONCLUSIONS

Agriculture remains an important sector in the economy of the Republic of Moldova, but one in decline for now. Thus, if in 2013 the contribution of agriculture to GDP was 12.3%, compared with those 23% recorded in 2001. This decrease was determined by upward development of the services sector, currently contributing with about 2/3 to GDP. The registered trend has a trajectory described by development models of other developed countries, where services sector plays a more important role in the economy, and agricultural sector being in a downward trend. Thus, the attention to agricultural sector from the government side both at EU level as at national level is important. Besides grant funds, the European Union allocates substantial funds in promoting innovation in agricultural sector, which contributes to

increases the efficiency and welfare of the population employed in this sector.

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REDUCING NITRATE LEACHING FROM SODDY-PODZOLIC SANDY LOAM SOIL WHEN APPLYING POULTRY MANURE IN COMBINATION WITH BARLEY STRAW

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Abstract

The results of the experimental research which established a decrease of nitrate nitrogen leaching from loamy sandy soddy-podzolic soil during application high doses of poultry manure (N200 and N400) in combination with barley straw are presented in this paper. The positive results are the basis for further research in the field and production experience to assess the impact of straw to reduce nitrogen losses when using high doses of poultry manure.

Key words: reducing nitrate leaching, poultry manure, straw

INTRODUCTION

Nowadays, in the large poultry farms of Russia annually accumulates about 20 million tons of poultry manure [9]. These organic wastes are potential and actual pollutants of the natural environment. In the ground waters at the sites of storage of poultry manure, where accumulated precipitation, the content of nitrate and ammonium nitrogen, mobile forms of phosphorus and potassium are often several times higher than the admissible limit values. Soil erosion, runoff organic waste leads to severe pollution of rivers and lakes.

Does not comply with environmental standards storage and use of manure not only causes significant harm to the environment, leading poultry farms adjacent to the territory in poor ecological condition, but is accompanied by a loss of a huge number of biophilic elements and organic matter.

Soil as an effective self-cleaning system, capable of providing microbiological and enzymatic transformation of biogenic waste, so one of the most reasonable methods for their disposal, from both an environmental and agronomic point of view, is the use as fertilizer.

It is known that the number of fertilizer

elements in poultry manure surpasses to other types of organic fertilizers and their availability - not inferior to mineral fertilizers. One of the main problems arising from the use of high doses of poultry manure as a fertilizer, is the increase the content of mobile phosphates and nitrates in the soil, often an order or more greater than background rates. High doses of poultry manure be able to influence phytotoxic effects, reducing crop yields. Against the background of possible deterioration of quality of plant products: the excessive accumulation of potassium and nitrates above acceptable norms.

For poultry manure is characterized by a fairly narrow ratio of carbon and nitrogen, so that the organic matter quickly mineralized soil microflora. The main part of the nitrogen in poultry manure is presented uric acid, which is converted to urea, then - in ammonium carbonate. As a result of the subsequent stages of transformation of nitrogen nitrification, denitrification is a significant part of the nitrogen may be lost as a result of emission of ammonia and oxides of nitrogen, migration of nitrates beyond the root layer.

The problem of preventing the loss of nitrogen, including due to leaching, has become global in the middle of the 90s, both

in production and in environmental aspects [2]. Recent research found that the leaching of nitrate from soils, which previously played a minor role in nitrogen decline, is much more important, while the emission of the gaseous products of denitrification compose only a few kg N ha^{-1} [5].

Migration of nitrogen in the soil profile occurs in the form of nitrates, nitrites, water-soluble ammonium and organic compounds. Numerous studies have established that in the rinse water dominated by 80-90 % nitrogen nitrate.

In the opinion of Kudeyarov V.N. [3], the regulation of nitrogen-carbon balance in the soil is possible with the help of methods aimed at reducing excessive amounts of mineral nitrogen by restocking available for microorganisms of carbon. Such a method is the application to the soil organic carbon in the form of straw and other materials of vegetable origin. As it is known that for fixing mineral soil nitrogen and fertilizer, it is necessary to appropriate amount of accessible for microorganisms of organic carbon. If the soil accumulation of mineral nitrogen, it indicates a deficiency of organic carbon in an available form.

After applying the soil available nitrogen from organic or mineral fertilizers occurs the activation of microbiological activity, mineral nitrogen fixed in the germ plasma, increasing the active phase of organic nitrogen. Fertilizer nitrogen within a certain time is passed on from generation to generation strenuously multiplying microflora and for a time as though is conserved in the bodies of microorganisms [12].

The temporary immobilization in the microbial biomass is protected by mineral nitrogen losses. Applying to easily mineralized plant matter and intensive development process of its transformation compensate for loss of soil nitrogen due to the formation of nitrous part of the molecule formed humic acids soil in the process of humification of plant residues [7].

Immobilization of mineral nitrogen by soil microorganisms is intensified when entering into soil organic matter with a wide aspect ratio C: N, for example, cereal straw.

Based on the analysis and generalization of these results we can draw a very important conclusion: applying straw into the soil helps to reduce unnecessary loss of mineral nitrogen fertilizers, transfer it into plasma microorganisms, later in humic substances, thereby contributing to the preservation and prolonged action.

It should be noted that the majority of studies on the use of poultry manure as organic fertilizer, were carried out in 80-90s of the last century. In recent years, the number of publications devoted to this problem, has declined slightly. The analysis of the state of knowledge of issues related to agro-ecological assessment of the effectiveness of the using of poultry litter in pure form and in combination with straw under crops specialized in grain crop rotations, showed a slight degree of study and reflection in the scientific literature. Nitrogen decline of fertilizer from the soil can be controlled by agricultural measures whose purpose is temporary fixation and transfer mobile nitrogen in the form of, inability to volatilization or leaching. One of these techniques may be the applying of litter in combination with plant biomass, characterized by a high ratio of C: N, for example it can be cereal straw. Adding straw, intensifying biological immobilization of mineral nitrogen produced in the process of transformation of nitrogen uric acid, promotes to its fixation in the biomass microorganisms, thereby reducing migration of nitrogen decline and groundwater contamination and increase in stocks of soil organic nitrogen.

To develop effective environmentally friendly ways of using poultry manure as a fertilizer and techniques to reduce nitrogen losses in Research Institute of Organic Fertilizers and Peat in field and laboratory experiments conducted research work to study the effect of poultry manure in conjunction with straw on nitrogen status and reproduction of fertility of soddy-podzolic sandy loam soil, yield and quality of grain crops in crop rotation.

In the present article discusses the results of a laboratory model experiment in which studied the effect of a combination of straw with bird droppings and mineral nitrogen fertilizers on nitrate nitrogen leaching from arable layer of

soddy-podzolic sandy loam soil.

MATERIALS AND METHODS

In vessels with a perforated bottom placed 650 g of soddy-podzolic sandy loam soil in an air-dry condition (with an experienced field), moistened to 60% of the field moisture capacity, fresh poultry manure was added in two doses of 200 and 400 kg of nitrogen per 1 ha of barley straw containing 41% organic carbon and 0.6% nitrogen (C: N = 68), shredded to a size of 0.5 - 1 cm, at a dose of 5 t ha⁻¹, the rate of ammonium nitrate N 200. Scheme of the experiment: 1. Soil (without fertilizer); 2. Bird droppings (BD) (N200); 3. BD (N200) + straw 5 t ha⁻¹; 4. BD (N400); 5. BD (N400) + straw 5 t ha⁻¹; 6. Straw 5 t ha⁻¹; 7. ammonium nitrate (N200); 8. ammonium nitrate (N200) + straw 5 t ha⁻¹.

The soil in the vessels was composting at room temperature and the optimum moisture content within 49 days. Periodically was adjusted soil moisture in the vessels to values exceeding the total moisture capacity and moisture-holding capacity of the soil, creating conditions for the washing of the water regime and the downward migration of nitrate down the profile. The washings were collected in special containers, taking into account their volume, and determined the content of nitrate nitrogen. Was calculated number of losses of nitrogen from the soil in each period of definitions and in total and for the whole period of composting.

RESULTS AND DISCUSSIONS

As a result of the research showed that adding straw when applying poultry litter and ammonium nitrate significantly reduced the leaching of soil nitrogen in nitrate form.

So, poultry manure applying at a dose of N200 adding straw at a dose of 5 t ha⁻¹ was accompanied by a decrease in leaching of nitrate nitrogen in the whole observation period from 21.4 to 13.2 mg / vessel, or 38% (in terms of - from 99 to 61 kg ha⁻¹); when using the poultry manure at a dose of N400 - from 28 to 16.9 mg or 66 % (from 129 to 78 kg ha⁻¹); in the variant with ammonium

saltpeter in a dose of N200 from 22.1 to 18.1 mg, or about 18 % (from 102 to 84 kg ha⁻¹).

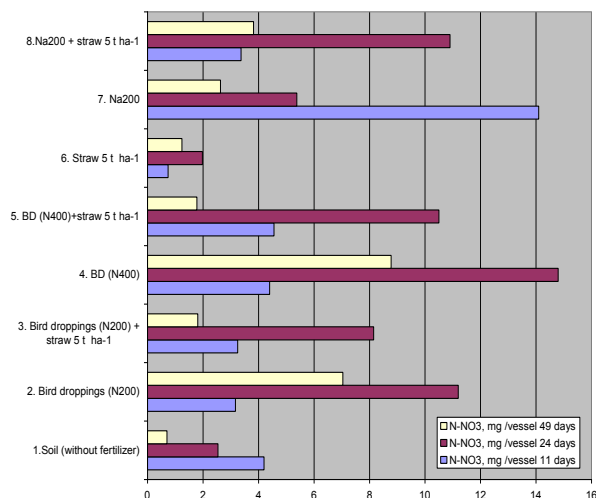


Fig. 1. The dynamics of nitrate nitrogen leaching in the model experiment

Moreover, there were noticed some differences in the dynamics of nitrogen leaching in variants with its inclusion in the composition of organic and mineral fertilizers. So, in the variant «ammonium nitrate N200» maximum amount of nitrate nitrogen is more than 64% of the amount which was detected in the washing water in the initial period of composting - 11 days. Adding straw reduced nitrogen leaching in this term more than 4 times (Fig.1).

In variants with bird droppings nature of the dynamics of nitrogen leaching was different. The maximum amount of nitrogen in the washing waters was not found at the beginning of the composting, and later at 24 and 49 hours of observation, when the mineralization of organic matter of manure, process of ammonification and then nitrification of ammonium nitrogen accumulation occurred in soil nitrate nitrogen, some of which migrated with the washing waters.

Straw has reduced of N-NO₃ losses in the variant «BD (N200) + straw 5 t ha⁻¹» 1.4 (24 days) and 3.9 (49 days) times; in the variant «BD (N400)+straw 5 t ha⁻¹» - 1.4 (24 days) and 4.9 (49 days) times (Fig.1).

A number of domestic and foreign researches have established that straw plowback into the soil compared to its disposal or incineration

reduces nitrate levels in the profile soil and reduces their movement beyond the root layer [1, 2, 6, 10, 11, 12].

So, in the opinion of Silgram M., Chambers B.J. was noted decreased nitrate leaching with straw on light soils in Norfolk and Nottinghamshire, England [10].

In their studies, Scherer H.W. and Mengel K., at two humidity levels (50 and 90% of the maximum water capacity) when applying straw were significantly reduced loss of ^{15}N in brown fallow soil [8].

According to the data of researches Ichir L.L., Ismaili M., nitrogen decline introduced with $(\text{NH}_4)_2\text{SO}_4$, labeled ^{15}N , reduced if the soil has been applied straw [1].

On the basis of studies conducted in China in cropping system with crop rotation both winter wheat and corn, it has been concluded that left straw residues increases the potential for the protection underground waters from pollution caused by nitrates by reducing the accumulation of nitrates in the soil and reduces the risk of deep migration [6].

As a result of research of the All-Russian Research Institute for Organic Fertilizers and Peat in a field experiment on sod-podzolic sandy loam soil it was noticed a significant increase in microbial biomass and organic nitrogen while adding straw to poultry manure [4].

CONCLUSIONS

Thus, as a result of studies found that the combination of cereal straw with a wide ratio of C: N and poultry manure reduced leaching of nitrate nitrogen from the soddy-podzolic soil through microbial immobilization.

The results obtained in this experiment, the positive results are the basis for further research in the field and production experience to assess the impact of straw to reduce nitrogen losses when using high doses of poultry manure.

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THE POULTRY MEAT SECTOR IN THE IMPLEMENTATION PERIOD OF THE NATIONAL RURAL DEVELOPMENT PROGRAMME 2007-2013

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Abstract

The purpose of this paper was to analyze the poultry meat sector in the implementation period of the European funds in Romania through the National Rural Development Programme 2007-2013. The NRDP 2007-2013 benefited from a budget that exceeded 8 billion euro. The study presents relevant data in the poultry meat sector in Romania compared to the other Member States of the European Union and at the same time an analysis of the price and the European measures that had a direct impact on the meat poultry sector.

Key words: European Funds, NRDP 2007-2013, poultry meat, price, production

INTRODUCTION

By its complex role and scope, in terms of rural area and population, Romania as a Member State of the European Union contributes to the sustainable development of agriculture by its agricultural sector. [5]

The Romanian agriculture was exposed to the challenges of the integration on the European agricultural market. Each sector of the agriculture had to go through a reformation and integration process in order to meet the quite harsh requirements imposed by the European Union in terms of agricultural products market. The situation on the impact of rural development on agriculture and performances in agriculture is still a topic of interest for the researchers and stakeholders in this field.[1]

Poultry farming is more and more important in the world agriculture, including in the EU countries because it provides high value food [9]. At the integration of Romania in the European Union, the poultry meat sector was extremely fragmented, there were very few integrated large units and many individual small producers.[5]

Investments were made in poultry farms. Farm investment refers to that exercise of using some finance of the present to purchase and use production resources in anticipation of recouping it in streams of income or profit

in a future date.[3]

MATERIALS AND METHODS

The sets of data used within this study analyse directly the poultry meat sector in Romania and the Member States of the European Union. Essential data were used for the programming period 2007-2013.

The information was analysed after a research and a thorough study, using the data published by the Ministry of Agriculture in Romania, the Annual Progress Report of the NRDP 2007-2013 published in 2013, the National Institute of Statistics and Eurostat. Databases were used such as Ebsco si Anelisplus in order to carry out a research that can be used in the future.

By means of the NRDP 2007-2013 the European measures could be analysed that had a direct impact on the poultry meat sector.

RESULTS AND DISCUSSIONS

This section of the study presents the data of the research carried out in the poultry meat sector.

In order to improve the poultry meat sector, European measures were foreseen within the National Rural Development Programme 2007-2013 that help develop and integrate the poultry meat sector on the European market.

Therefore, within the 4 axes foreseen in the NRDP 2007-2013 there were measures either with non-refundable financing or only 50% non-refundable financing.

Most measures that addressed the poultry meat sector were within Axis 1 – “Improving the competitiveness of agriculture and forestry”. The measures 112, 141, 121 and 123 aimed directly by the applicant's guides for the poultry meat sector. Therefore, within measure 121 at the end of the year 2013, 6.79% of total projects contracted addressed “the poultry” with a total volume of investments of Euro thousand 289,556.09.[2]

In terms of measure 112 regarding “young farmers”, the contracting of 4 projects for poultry with a cumulated value of Euro thousand 240 was finalized. Projects were also contracted on the other measures of Axis 1, but the measure 141 related to *semi subsistence farms* was the most accessed. The beneficiaries of this measure are the small-sized farms. It is known that within these holdings or small-sized farms, farmers rear poultry using traditional methods obtaining automatically an organic production because the agriculture practiced by them is

sustainable, traditional, very searched due to new European requirements. Those who accessed measure 141 benefited from 1500 de euro annually for a period of 5 years.[2,6]

Within the Axis 2 of the NRDP 2007-2013 measure 215 – “Animal welfare payments” was essential where the poultry meat sector benefited from package B within measure 215 – poultry welfare payments. Within this measure the number of agricultural holdings that received support was of 26.45% of the target of 315 holdings. An amount of Euro thousand 70,376.24 were used from the allocation of Euro thousand 372,879.98.[2]

Following the accession of the European funds in the period 2007-2013 the production of poultry meat was influenced by them in terms of accession on the European market and the local market. The process was difficult and is still not finalized. “The European market of poultry meat is stable with a total production of 11,5 million tons in 2009” [7]. Nevertheless in the period 2007-2010, in Romania, the consumption of poultry meat decreased by 14.5% compared to the European level [10], as shown in the Eurostat statistics.

Table 1. Poultry meat – thousand tons, at European Union level

	2007	2008	2009	2010	2011	2012	2013	TOTAL
Belgium	:	:	361	404	403	410	388	1967
Bulgaria	116	91	99	96	98	99	95	487
Czech Republic	217	210	194	188	170	153	148	853
Germany	1087	1192	1289	1380	1425	1428	1456	6977
Ireland	122	117	:	:	:	:	:	0
Spain	1328	1375	1317	1349	1374	1384	1343	6767
France	1716	1706	1670	1712	1733	1709	1695	8519
Italy	1029	1116	1143	1180	1220	1259	1223	6025
Hungary	376	388	360	360	383	412	394	1910
Austria	109	109	:	:	:	:	:	0
Poland	1143	1186	1267	1342	1385	1549	1652	7194
Romania	305	343	290	287	294	313	326	1509

Source: Eurostat [4]

As shown in table 1, among the countries analysed, in the period 2007-2013, the highest production is registered in France. It produced

8,519 thousand tons of poultry meat in the 6 years analysed. Unlike France, in the 6 years, Romania produced 1,509 thousand tons, i.e.

82% less than France. Starting from 2010 a constant increase can be noticed in our country in this field. This increase is due to the European funds whose measures had an immediate and positive impact on the poultry meat sector. In terms of European sector the second poultry meat producer was Poland with 7,194 thousand tons, followed by 6,977 thousand tons.

As shown in table 2 the highest price among

the countries analysed is in France. Even if it is the largest poultry meat producer, it does not influence the price which is very high.

The high price is influenced by methods for rearing chickens and processing poultry meat that very closely meet the methods and requirements of the European market, the product obtained is of very good quality. The second price is in Italy with Euro 133.24 followed by Bulgaria.

Table 2. Sale price of chicken meat/100 kg live weight

	2007	2008	2009	2010	2011	2012	2013
Belgium	86	89	82	86	95	94	95
Bulgaria	92	105	95	92	96	101	117
Czech Republic	76	91	78	81	90	92	95
Denmark	57	79	70	74	88	92	98
Germany	78	86	81	83	93	96	:
Ireland	78	85	85	86	99	:	:
Spain	109	102	101	98	115	125	:
France	:	:	:	157	176	182	196
Italy	121	115	110	105	119	122	133
Hungary	79	92	77	78	89	94	98
Austria	82	90	92	92	93	92	108
Poland	:	90	78	80	90	92	92
Romania	112	104	87	92	99	98	113

Source: Euostat [4]

In Romania, the price for 100 kg live meat is of 113,37 Euro in 2013. It is noticed an increase by 12% compared to 2012. As in the case of France it is due to the change of policies and methods of poultry rearing. Compared to the other countries analysed, the price in Romania is very high if we take into account that in the other countries analysed, except Bulgaria, the purchasing power is much higher than in Romania.

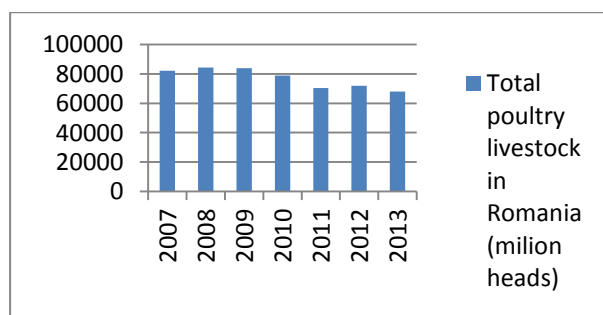


Fig.1. Total poultry livestock in Romania (Million heads) [6]

In the Fig. 1 it is shown the poultry livestock in Romania in the period 2007-2013. If in 2007 Romania had a livestock of 82,036 thousand heads, in 2013 our country registered a decrease by 17.12%.

The integration in the EU led to this decrease, even if Romania benefited from European funds; the requirements on the European market made the livestock decrease due to the barriers imposed by the EU on the poultry meat sector. Nevertheless, these barriers made the producers try to obtain better quality products and decrease the quantity produced. During the 6 years there were increase and decrease fluctuations until 2010 when the barriers were eliminated and the requirements of the European market adopted led to an increase of the livestock registered. The largest livestock registered was in 2008 when Romania had a total poultry livestock of 84,373.

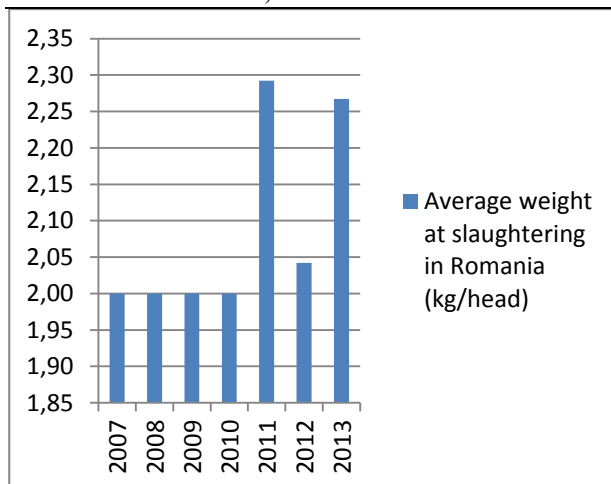


Fig.2 Average weight at slaughtering in Romania (kg/head) [8]

In terms of average weight at slaughtering in Romania it can be noticed a stability in the data analysed.

If in 2007 the average weight at slaughtering was of 2 kg, in 2013 an increase by 13.35% until 2.267 kg was noticed.

This was due to the fodder used in rearing meat poultry.

In order to increase it in weight and to make it of high quality, fodder that was very rich in vitamins and natural was used.

CONCLUSIONS

In the process of the integration of Romania in the European Union, our country adopted a new approach in terms of the agricultural sector. This approach involved very much the poultry meat sector. By the application and the implementation of the European measures within the NRDP, Romania tried and succeeded in aligning to a large extent to the requirements of the European market. Until the end of 2013, from the data analysed, we can say that the implementation of the European funds had a particular impact on the agricultural sector and especially the animal sector. The analysis carried out proves that the meat poultry sector registered improvements first of all in terms of quality and secondly in terms of quantity. Taking into account the technological performances achieved in our country within the meat poultry sector, at the end of 2013, Romania is on the 6th place in

Europe in terms of ratio between quantity and quality.

For an even much more important increase in this sector, measures on the following aspects should to be analysed and implemented:

- The valorisation of the decommissioned structures and their reintroduction in the circuit by projects financed from the European funds.

- Carrying out a rigorous control at the poultry meat for export.

- Modernization of the processing and the marketing for this sector.

- Trial to increase the offer, establishing a new target for the position of Romania at European level on the market in order to assure an increased competitiveness within the sector analysed.

- Investments in research-development for poultry meat sector

ACKNOWLEDGMENTS

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RESEARCH OF THE MASS TRANSFER AT MEMBRANE CLEANING OF BIOGAZ

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Abstract

Everyone has long known the benefits and effectiveness of biogas. Particularly, getting biogas from the agricultural waste is very promising. But, the question is if we can use such a useful and effective biogas at 100%. Today, we use only a half of the benefit, because to get the biogas we spend more energy than we get. In this regard, the work on the study of the biogas development is extremely important. The study of the biogas formation requires numerous experiments. This article analyzes the biogas mass transfer with the membrane purification and identification of the of mass transfer mechanisms through the membrane pores.

Key words: biogas, biogas installation, membrane

INTRODUCTION

The main objective of this study is to clear the biogas produced during the processing of biomass-based agricultural waste coming from anaerobic digestion [7] in the waste treatment plant.

The rational use of agricultural waste is a big and important issue of our time. [10] It is connected, on the one hand, with the possibility of using an enormous energy potential of biomass to produce liquid and gaseous fuels (biogas), and on the other hand – with the need to prevent the earth and atmosphere contamination. Every day, all we hear on the news about the global warming problem. And that the icebergs in Antarctica began to melt, the soil is not suitable for use. Also, we hear about the series of diseases with which the whole world is struggling because the air and the water are not clean. And, in addition, there is a threat that we will have the lack of gas in the future. Both of these aspects are the object of the research and experimentation.

Today a great attention is paid to the problems of methane fermentation of manure and other organic waste. The biogas facilities are being constructed and designed for the manure and agricultural waste processing into biogas and

environmentally friendly fertilizers. The use of biogas facilities on the livestock farms provides extra energy in the form of biogas and high quality organic fertilizer, and it can significantly reduce the anthropogenic pressure on the environment. [6, 8].

MATERIALS AND METHODS

The animal manure can be used as a heat-power raw material to produce biogas fuel by its anaerobic methane fermentation. From 1 ton of dry manure by the anaerobic digestion and under the optimal conditions we can obtain 340 m³ of biogas, or in terms of per head of one cattle (cattle) 2.5 m³ per day, and during the year about – 900 m³.

For the experimental verification and demonstration of the renewable energy sources capabilities, as well as for working out the regimes of anaerobic digestion of the cattle manure in the laboratory there was designed and manufactured a laboratory biogas facility with the reactor's volume of 0.25 m³ (Figure 1).

According to the scheme, the impurities were removed from the manure beforehand (wood chips, straw, stones, coarse residues of long stalked feed, etc.). Then, liquid manure purified from these impurities is sent to the

bioreactor for the anaerobic digestion.

During fermentation, a special micro-flora is developing in the manure, which successively destroys the organic materials transforming into a volatile fatty acids, and the latter under the action of syntrophic bacteria and methane are converted into the gaseous products – methane and carbon dioxide. At the same time, during the fermentation of manure its deodorization, deworming are provided, and the ability of weed seeds to germinate and translate the fertilizing substances into the mineral form is being destroyed.

The biogas is burnt in the gas units, and fermented manure is collected in a store and then it is used in the fields as fertilizer.

The biogas facility is constructed of three main units – a bioreactor for the anaerobic digestion of manure, a gasholder (the device for the manure preparation for fermentation), and assistive devices for the operation of bioreactor systems.

Table 1. Key performance of the biogas facility

Indicators	MU	Value
The total volume of the bioreactor	m^3	0.25
The volume of the gas space	m^3	0.07
Temperature processing by mesophilic - M at thermophilic - T	$^{\circ}C$	35-37 55-57
Duration of treatment	Days	20-22 at M 12-15 at T
Pump power for mixing manure	κBt	0.37
Installed capacity of electric heater	κBt	2.0
Heat exchange surface area	m^2	0.33

The bioreactor is a cylindrical container-digester of black steel with a thickness of 7 mm. The height of the digester is 1.5 m, the diameter is 530 mm. The reactor was equipped with an electric heater with a heat transfer surface area of $0.33 m^2$.

The stirring of the substrate in the reactor is hydraulic done with the help of pump and a piping system with valves. When the pump is in operation, the substrate is taken from the mixing reactor and through the pipeline system goes to its upper part. The removal of the fermented manure goes through the effluent removal conduit system when the

fresh portion of the substrate is added. To clean the reactor there is a discharge valve in its lower part. Table 1 shows the main technical indicators of a biogas facility.



Photo 1. Experimental setup for the biogas production List 1



Photo 2. Experimental setup for the biogas production List 2

To estimate the total porosity the method [2] have been used. A sample of membranes previously weighed, is saturated with a wetting liquid, and then it is weighed again and then ϵ_0 is calculated:

$$\varepsilon_o = \frac{G_{o\delta} - G_{o\delta}}{V_M \rho_{ж}}, \quad (1)$$

where, $G_{o\delta}$ - is mass of sample saturated with liquid;

$\rho_{ж}$ - liquid density.

The pores' radius was determined by the flow of the liquid forced through the membrane. The volume (V_p) of liquid passing through the membrane is measured during the time (τ) at a known constant pressure drop across the membrane, and then, the r is calculated, using the Poiseuille's equation:

$$r = \sqrt{\frac{8\mu q l}{S_o f_o \Delta P}}, \quad (2)$$

The area (S) needed for the filtration of membrane surface is defined by the formula:

$$S = 1,5 (V/v)s, \quad (3)$$

where, s – is the surface area of the control membrane;

V – is the volume of gas that must be filtered;

v – is the volume of gas filtered before the moment when there is a sharp decrease in the flow rate through the filter.

The concentration polarization is determined by the formula [6]:

$$CP = \frac{\exp\left(\frac{G_1}{\beta}\right)}{\varphi_H + (1 - \varphi_H) \exp\left(\frac{G_1}{\beta}\right)}, \quad (4)$$

Assuming that the true selectivity $\varphi_i = 1$, we get:

$$CP = \exp\left(\frac{G_1}{\beta}\right), \quad (5)$$

where, G_1 – is a specific membrane permeability;

β – is a mass-transfer coefficient material from the membrane surface in the gas volume. Conducted researches [22] of the mass transfer make the following equation possible to determine the mass-transfer coefficient:

$$Sh = 0,023 Re^{0,8} Sc^{1/3}, \quad (6)$$

where

$$Re = \frac{w d_e}{\nu}; \quad Sc = \frac{U}{D}; \quad Sh = \frac{\beta d_e}{D} \quad (7)$$

w - the average flow rate;

β - mass-transfer coefficient;

D - diffusion coefficient;

d_e - the equivalent diameter of the channel.

Permeability was calculated using the formula:

$$G = V / (St), \quad (8)$$

where, V - volume of the filtrate, L;

S - area of the work surface, m²;

t - the duration of filtration, h.

Selectivity φ was calculated according to the formula:

$$\varphi = (C_1 - C_2 / C_1) \cdot 100, \quad (9)$$

where, C_1 and C_2 - concentration of substance in the feed gas, respectively, and the filtrate, %.

RESULTS AND DISCUSSIONS

The selection of the operating pressure depends on the resistance of the membrane channel. The experimental indicators of the permeability depending on the operating pressure are shown by the following characteristic features (Fig. 1).

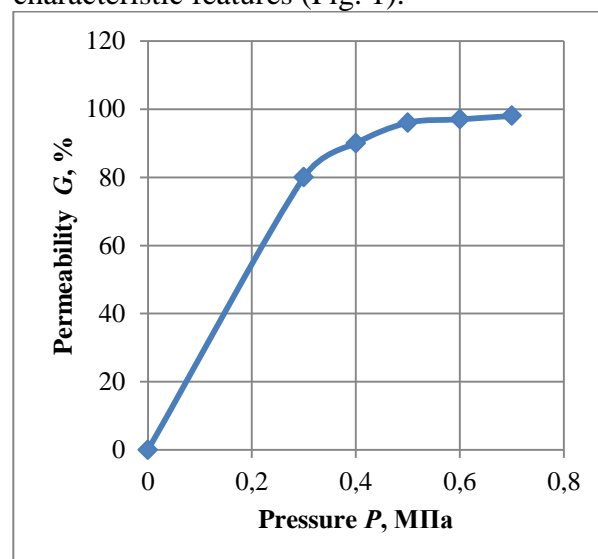


Fig. 1. The effect of pressure on the permeability.

Permeability depending on the pressure increases at the beginning, but the nonlinear relationship, and then becomes substantially constant.

Increasing the pressure increases the concentration of impurities at the surface of the membrane.

Fig. 2 shows the dependence of the selectivity of the pressure. As pressure increases, the selectivity decreases, as the pressure increases, the selectivity increases for all components, which reduces the required component.

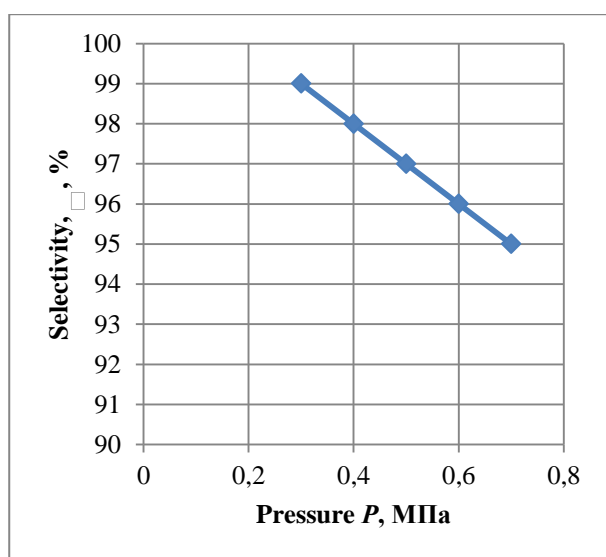


Fig. 2. Dependence of selectivity on the pressure.

In Fig. 3. shows the effect of speed on the permeability, which shows that an increase in the flow rate increases permeability to gas.

The driving force of the process is the pressure drop. Pores' sizes in the membrane or the external pressure are chosen so that the mean free path of the molecules is greater pore size, i.e. Canute was carried out in stages over Knudsen. When there is a Knudsen the flow is inversely proportional to the square root of the mass of the molecules. This relationship determines the separation factor.

In large pores, when the pore diameter is larger than the mean free path of the molecules of the adsorptive, mainly sea transport is normal, or bulk diffusion.

When we have a small size of pores, and when the mean free path of the molecules is much larger than the pore's radius, then the determinant of the rate of diffusion is the

frequency of collisions with the walls of the pores. This is called the molecular diffusion or Knudsen. The collision of the adsorbed molecules to the surface at a certain time interval, they are fixed on the active sites of the adsorbent and only after that, because of thermal motion, removed in the liquid phase.

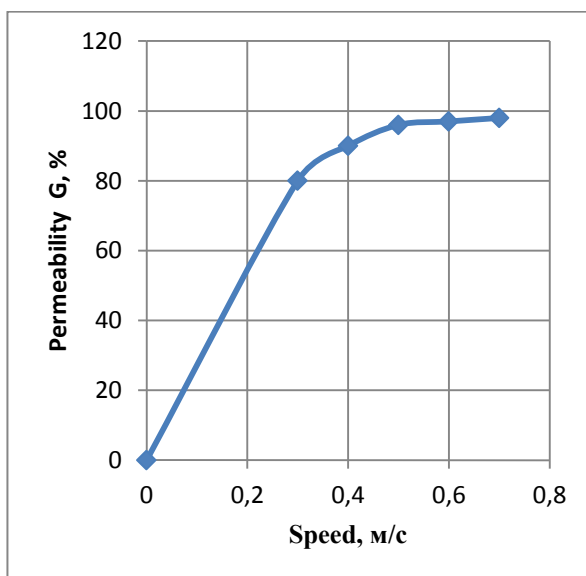


Fig. 3. Effect on the rate constant

If the pores are commensurate with the absorbing molecules, the process gets an activated character. By analogy with the ideas of Arrhenius, developed for the chemical reaction, not all molecules can penetrate the pores and be absorbed there, but only those who have some excess energy.

The basis of molecular-kinetic analysis of diffusion of small molecules (molecules of simple gases) in a polymer based on the assumption that the diffusive transport is carried out by successive periodic surges of diffusing molecules from one equilibrium position to another. The possibility of such movement is typically associated with the presence in the medium of a polymer free volume, i.e. some intermolecular gaps of different shapes and sizes due to the motions of the segments of the polymer matrix, and by moving the diffusing molecules. These provisions are taken as the basis of a number of theoretical relations obtained by researchers, which are based on different assumptions and are used to explain the experimental results to determine the

viscosity, solubility and diffusion in polymers. Therefore, when confronted with the term "free-volume theory" is often used in the qualitative interpretation of the experimental results, we must be clear that this is not a strict mathematical description of the process, and on a certain set of diverse theoretical calculations.

However, it should be recognized that the original model of the "free volume" for the qualitative analysis of the observed experimental dependencies diffusion of small molecules in polymers is productive and have sufficiently serious justification.

With increasing pressure, the diffusing gas mean free path of molecules becomes comparable and smaller pore diameter and Knudsen flow becomes either the viscous flow (Poiseuille flow) if attached to the membrane pressure gradient in either molecular interdiffusion, if both sides of the membrane constant pressure but the gas composition varies. Under the molecular interdiffusion we mean the diffusion in gases at the mean free path of the molecules much smaller than the pore size.

When there is a viscous flow then the separation of gases in the pores doesn't occur. In this case, the separation membrane can perform functions most likely as a filter only due to steric effects, i.e. delaying those molecules or aerosol particles sizes greater than the pore size.

Porous membranes, in which the regime of molecular diffusion does not seem to be used in any separation processes, although we cannot exclude such possibilities for any specific cases. Study of the processes of molecular diffusion in porous catalysts and sorbents, as well as the transition from the Knudsen diffusion to the molecular diffusion on the same objects are explored in a large number of original and review publications [9,11]. We note only that the effective diffusion coefficient in this case is usually calculated from the semi-empirical relations.

In FIG. 4 it is shown the dependence of the mass transfer coefficient of the membrane in the permeate stream from the phase velocity. The figure shows that the increase in speed increases the mass-transfer coefficient. Mass

transfer rate depends on the dynamic motion of the gas mode, providing faster delivery of molecules to the outer boundary layer than their diffusion through the layer to the inner border. The higher intensity within a certain range of mixing gas is, the shorter the path of the molecules diffusing to the surface of the membrane is, and the sooner you deliver them to the surface, which is consistent with previous findings [1].

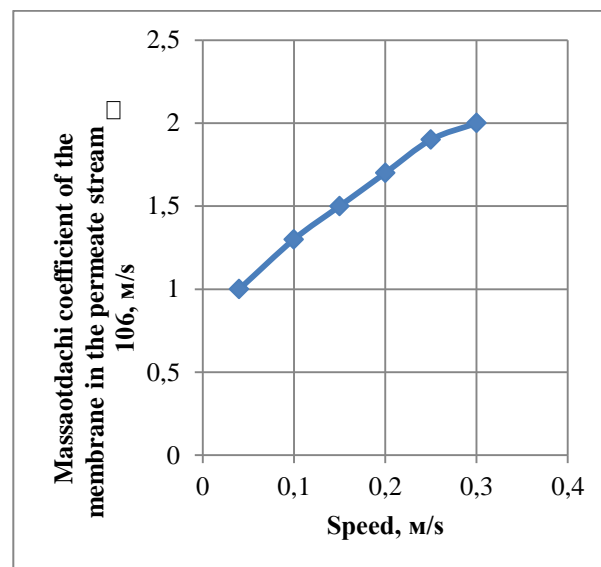


Fig. 4. Coefficient of mass transfer from the membrane to the permeate flow rate from the liquid phase.

In Fig. 5 it is shown the dependence of coefficient of mass transfer to the pores of the membrane from the inner the diffusion coefficient.

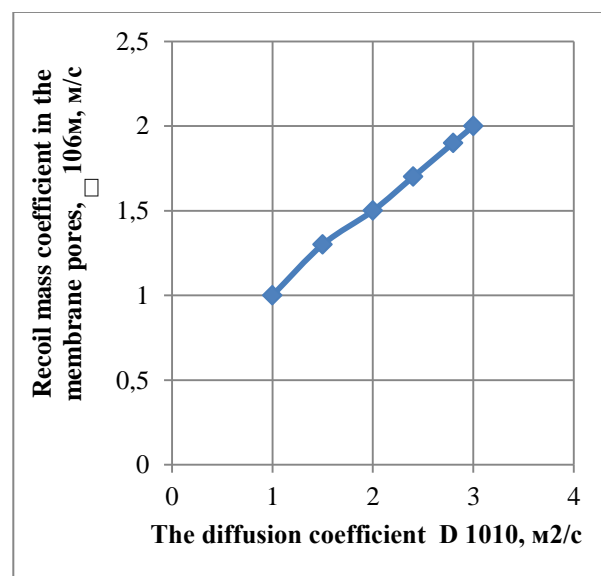


Fig. 5. Dependence of the mass-transfer coefficient in the membrane pores by internal diffusion coefficient.

The figure shows that as long as the overall speed of the process determines the resistance of the external mass transfer, the process can be intensified by increasing the intensity of mixing of the gas, which is consistent with the published data [4,5].

CONCLUSIONS

The results of this study show that the biogas facility is beneficial from an economic point of view of agriculture, provided that the technical support for the installation and its method of operation is optimally matched to the structural properties of the substrate, and its location is selected with the effective provision of biomass and allows efficiently dispose of the product gas. Besides having least-cost substrates, the key to economic success is, first of all, serviceable, not prone to frequent failures operation of the equipment, full use of the potential of the substrate, as well as optimum load of the entire system. In many areas, you can achieve significant improvements that will ensure efficient operation of the system and obtain higher profits.

Study of membrane purification of biogas makes it possible to determine the optimum process parameters affecting the efficiency of permeability and selectivity of membrane separation. Operating pressure is in the range 0.6 MPa. There were clarified the regularities of the membrane cleaning gas in a membrane unit. The dependence of permeability on the concentration, the effect of pressure on the permeability was found.

There was made the mechanism of mass transfer through the membrane pores and the main requirements for the material and structure of the membrane and the principle of membrane processes for cleaning gas. Depending on the mass transfer coefficient of the membrane in the permeate stream on the velocity of the liquid phase mass transfer coefficient in the membrane pores by internal diffusion coefficient showed that the increase in speed increases the mass transfer coefficient, as well as the fact that while the overall rate of the resistance determines the

external mass transfer process can be intensified.

We got the equation for an impurity stream passing through the membrane, depending on its full and diffusive permeability, and also the equation to calculate the speed scale on the characteristic deformation of the macromolecule. Based on the set of mass transfer mechanism, the equation for determining the gas concentration and for calculating the concentration of carbon dioxide, hydrogen sulfide, ammonia, water vapor in the area of concentration polarization was proposed. The equations were derived for the coefficient of concentration polarization mass transfer coefficient taking into account the gas flow and permeate and selectivity for ultrafiltration.

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PECULIARITIES FOR AGRICULTURAL TECHNOLOGY OF *GENTIANA LUTEA*

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Abstract

The increased demand for the pharmaceutical market puts pressure on the wild species which on the other hand need to be protected. Collecting the wild plant species for pharmaceutical purpose may become a threat for the conservation of rare species such as Gentiana lutea which was declared as protected species for Romania since 1977. The purpose of this article was to develop a technology for the cultivation of this species as a crop plant. The starting material may be either seeds either seedlings, each of them involving different negative or positive aspects. The produced rhizomes morphometrically characterized and production were calculated. The entire technological chain is described and it may be considered that Gentiana lutea may become a valuable crop species for producers as well as for the pharmaceutical industry.

Key words: crops, field cultivation, *Gentiana lutea*, pharmaceuticals, Romania

INTRODUCTION

Among the species of *Gentiana* genus, *Gentiana lutea* L. (i.e. popular name *rifling*) is known as one of the most valuable medicinal plant. It is part of Romania wild flora and it can be today harvested only in nature. After 1971, this species was declared as nature monument species by the Romanian Academy, with clear restrictions for being collected from the wild flora in our country. This was the momentum when research started for initiating the cultivation of this species. The biology of the species was studied by Heltmann [4],[5],[6] and natural dissemination gave some clues for its use as crop species.

Attempts to introduce *Gentiana lutea* in culture were reported in various countries such as: Russia (in the southwest region of the Altai Mountains), in the Baltic Republics, near Kiev [2], [3], [7], [8], [9], [10] and [11]. Following recent concerns related to food security and climate change [1] for the use of this species it was considered that the variability of the species is low in terms of differences among different populations in Europe. Given that in our country meets at

high altitudes on rocky places, through meadows, sunny slopes in culture this species was zoned in wet and cool-Carpathian regions or counties perimeter areas such as Brasov, Sibiu and Neamț [5]. The scope of this article is to present relevant parts on the entire flow of cultivation technology of the species.

MATERIALS AND METHODS

The technology of *Gentiana lutea* is presented in line with the current specification known for the crop plants.

Seeds are originating from the nature, Brașov county, the Postăvaru Mountains and morphological traits of the rhizomes were determined such as: length, diameter, weight. The experimental field was conducted in Brașov area at an altitude of 500 m, 200 m less compared to the natural habitat.

RESULTS AND DISCUSSIONS

Rotation plot

Gentiana lutea L. is a perennial plant, and as such are grown outside the crop rotation. Making culture is mainly by planting seedlings and for this reason it is

recommended that prior working the land, cleaning the field of weeds. It was observed that the cultivation of *Gentiana* is followed by the invasiveness of the weedy species which are removing, for the first stages the installation of the seedlings. In case of crops rotation we are recommending crops for green fodder legume species with a short period of vegetation (peas, beans pods) and grain crops are then able to follow this species (Photo 1).



Photo 1. *Gentiana lutea* L. in its natural habitat

Fertilization

The research that has been done so far has yet to determine fertilizer needs of the plant. Following our results we can appreciate that phosphorus is making a significant contribution to the formation of the root system and increase plant vigour. Nitrogen and potassium in combination with other nutrients, creates favourable balance harmonious growth and development of plants. Rifling requires calcium supplements which is also due to the calcareous substrate it is growing in the wild and which is highly contributing to the healthy status of the plant. In organic culture a beneficial contribution has the application of manure as a source of nutrients and the possibility of improving the physical properties of soil condition and approaching those prevailing culture in spontaneous flora.

In terms of the ratio of macronutrients (NPK), we recommend a ratio of 1: 1.5 :1. Nitrogen may be applied in doses of 120-150 kg/ha active ingredient of which 1/3 spring planting, and 2/3 years springs, for the 2nd and 3rd of

culture. Phosphorus and potassium may be supplied in an amount of 150-180 kg/ha, respectively, 120-150 kg/ha active, half of which fall in basic work to prepare the ground and the other half, the two "equally in autumn for the 1st and 2nd culture.

Autumn, with deep ploughing is given and calcium (4-5 t / ha) and manure in the amount of 25-30 t / ha.

Fertilizers applied during the growing season during performing incorporating mechanical hoeing.

Well fermented manure has a favourable action on the production of roots, the recommended dose of 20-40 t / ha should be administered prior plant.

Soil preparation

Abolition of previous culture is a compulsory and therefore the destruction by chopping crop residues remaining from previous crop field will be needed. Along with shredding plant debris, the land must undergo basic work. It is impossible to start a culture without the profound working of the soil. The seedlings are very sensitive in the first period of acclimation.

The requirements for quality and time of soil working are greater if *Gentian* is seeded directly in the field. Thus, the acclimation will be faster in case you use seeds instead of seedlings.

We recommend in the first stage a land plowing at 28-32 cm depth using 2 or 3 reversible plows furrows in aggregate harrow stars. If the soil is dry, it first executes a work surface plow or disc harrow, following that deep plowing to make optimum soil moisture. It has to be at least similar to the moisture from the natural conditions into the mountains.

Prepare seedbed for crop establishment of grooves requires attention. The land must be loose and cut to a depth of 18-20 cm to ensure optimum water storage and root development. Seedbed preparation is done by combiner or in aggregate with disc harrow teeth and adjustable to achieve a small and uniform surface layer. Soil loosening must be made from a crossing unit without reversing the layers to soil water is lost through evaporation process.

In cultures established by direct seeding field is mandatory roller work layer before and after seeding with smooth rollers.

When planting the seedling, the demands on seedbed preparation are not as high.

Propagation

Gentian is multiplied by seed or in vegetative stage. However the generative propagation is the most easy to be used even the genetic variability may be expressed.

Sowing directly in the field or use seedlings are methods for taking into account local conditions and possibilities and weighing the economic aspects as well as the soil conservation issues.

Planting of seedlings is a propagating safer but more expensive and requires the existence of a labour force. On contrary sowing directly in the field is conditioned by the lack of weeds in a crop land for rifling.



Photo 2. *Gentiana lutea* as a crop species in the field experiment

Culture establishment

It is a highly important link in the technology and culture of this species requiring the preparation in advance by taking into account all factors: biological, physical and chemicals [7]. Regardless of the method used (direct seeding or seedling field), the chosen seed shall correspond to qualitative indicators included within limits to ensure a uniform chain with vigorous plants able to highlight as much their own genetic potential in production terms (Photo 2).

For direct seeded crops, the best time for sowing is on the brink of winter in August or September. Also at this age seeding and seedling production will be performed in layers. Following studies undertaken

recommendation is to sow fresh seed in the fall. Emergence is difficult to occur next spring, quite late for Romania conditions (April-May).

The plants remain in layer until the fall or next spring when planting is definitely the place to plot.

Technical parameters – planting distance and sowing depth

The distance between rows, whether directly sown or planted seedling is 50 cm. In the case of the seedling planting, the distance between the plants in billons ranges between 15 and 20 cm. The same size range between plants in the billon is left by thinning when culture is achieved by sowing in billon further away. The density of the culture may be 10 to 14 plants / m².

In cold layers, the distance between billons is 12.5 to 15 cm. The recovered seedlings may be used in filling the gaps.

The distance between plants in the billon will be higher (40-50 cm) on seed lots that are held separately from the surface to produce roots.

Seeding depth is between 0.5 and 1.5 cm. Special care is given to planting depth when executing this work to the era of the fall. Plants are buried in soil at 1.5-2 cm more than the depth at which they grew up in layers.

In the case of standard seed or seedling for a hectare of *Gentiana lutea* are used 4-6 kg of seeds which must have physical purity between 80 and 85% and a germination of at least 50-40%.

Given the long period interval is recommended seed germination of indicator plants (lettuce, mustard) to carry out blind hoeing between billons.

On an area of 350-400 m² of layers is necessary to obtain seedlings for planting one hectare of crop. The amount of 0.4 to -0.5 kg seed is sufficient for seeding the surface layers.

For planting one hectare of seedlings 120000-150000 of exemplars are required.

For direct sowing in the field may be used Drills SUP SUP-21 and-29 or any similar technology fitted with small seeds and limiting distribution for the coulters.

Crop culture maintenance

Weed control and thinning are the major working maintenance in culture of this species. The crops grown by sowing directly in the field weed risk is particularly high because rifling seeds spring up pretty hard. Therefore, in late spring when the land was weeded it can be performed a control by treatment with Gramoxone or Reglone doses of 3-5 t/ha, applied before the advent of rifling plants at the soil surface. In organic farming this is much expensive and it needs labour work.

Although it was significant in combating chemical and agronomic methods are part of the integrated control system. In integrated weed control, biological control techniques, physical, chemical, mechanical and their integration into a sustainable strategy the primary aim.

Other maintenance, mechanical weeding, hand weeding, may begin immediately after plant emergence indicators. They are carried out during the growing season, whenever needed. The crops grown by seedling immediately after planting and mechanical and manual weeding are running. In layers outside of weed removal, thinning, bedding, watering at times to execute when necessary.

The springs for the 2nd and 3rd years shall apply doses of nitrogen, and the autumns for the 1st and 2nd years the phosphorus and potassium, have to be incorporated by mechanical hoeing.

Diseases and pests control

The scientific literature does not indicate the presence of pests and diseases in this species. However, studies undertaken by us have made observations on the fruit with seeds by a ladybug yet unidentified. This is particularly important seed crops and would probably solve through a program of insecticide treatments.

As for diseases, relatively small surfaces on which *Gentiana* is cultivated, the few diseases that met did not produce significant damage.

Harvesting

Gentian roots can be harvested when the plants have at least 3 years old. In the literature there are recommendations how that culture is harvested when plants of Gentian of 4-5 years old (Heltmann and Silva, 1970;

Claus et al., 1977). It should however be stressed that there is a risk that some of the active principles of roots, as *amarogentina*, to reduce the weight of plants with increasing age.

The time period for harvesting gentiana is set for the fall during October or later during long autumns. During this period the processes of biological activity ceased foliage and roots are slowed down.

Until the completion of studies on the dynamics of accumulation of active principles that could set a different time of harvest, can be considered optimal harvest age remains autumn.

Harvesting seeds from seed lots is when 60-75% of the grains became yellow-brown.

Harvesting module consists of small surfaces in manual removal of roots, with spade and generally used on larger areas plows beet or sloppy plows which detaches soil.

After deployment, the earth shook and roots are gathered in piles. Follow continue to work to remove dry portions, injured and with the package, remnants of leaves.

Production that can be obtained from a hectare is about 6000-8000 kg fresh roots.



Photo 3. Rhizomes of *Gentiana lutea* – production in the field experiment

If fruit seed lots rods cut with a sickle in the last whorl fruit, bring on the premises where under sheds on concrete platforms in small stacks allow them to dry. When all the seeds were given specific colour move to threshing. This can be done, depending on the amount of material with smoothing tools, combine or by tapping and shaking. Debris removal sticks, leaves, fruit is done using specific technology.

Raw material processing

Immediately after harvest occurs, the conditioning of the roots by shaping and

transport in areas for processing as fast as possible. Thus, roots are following washing, small roots removal and then leave a few days to boil at a specific temperature. The thick roots are spliced in two, and the long cut into segments of 10-15 cm.

The next step is drying, which can be achieved in natural conditions in barns, warehouses, bridges, clean, well ventilated, or in the sun on concrete platforms.

In drying, hot air drying is faster with their quality wins. Here, the optimum drying temperature is between 50° C and 40°C.

From 3.5-4.5 kg fresh roots it can be obtained 1 kg of dried roots. It is estimated that the entire production of dried root may be 1500-2000 kg / ha.

Once the roots have reached the maximum 13% humidity, they will be packaged in bags, bale and store in clean rooms, dry and airy.

Biological examination

Gentian root and conditioned obtained by the above-mentioned technology, must contain at least 33% soluble solids material.

In a macroscopic analysis, we proposed the establishment of characters seen with the naked eye or with a magnifying glass, and those which can be determined by sensing the smell and taste.

Thus the examination of fresh roots and rhizomes fragments found that they are of cylindrical shape, 51 cm to 98 cm in length, 2.8 cm - 7.9 cm in diameter (Table 1). Please note that determining the dimensions (length, thickness, etc.) was carried out in the most developed underground organ, with a ruler.

The colour is generally yellow-brown on the outside and yellow inside. The colour could be seen on a dry, both outside and inside, on fresh fracture. If this character was not different between genotypes selected.

Root surface shows longitudinal ribs and transverse striations surface rhizomes. Fracture is smooth and non fibrous and non soft.

The smell is weak and very bitter taste, which indicates the possible presence of alkaloids, glycosides and certain principles or assets. If this character was not different between selected genotypes.

From these studies it can be said that the it is formed a well developed rhizome, which starts numerous roots.

The number, size and vigour leaf spring is occurring in close correlation with the package diameter and root length of the plant went into winter.

The main morphological features of the underground organs for the 4 families identified of *Gentiana lutea* L., are presented in Table 1.

Table 1. Results concerning the morphological characteristics of the underground organs of the 10 studied families of *Gentiana lutea* L.

No	Genotype	Rhizomes			
		Diameter (cm)	Length (cm)	Branches no	Weight (g)
1.	G ₁	6.2	91	4	1,210
2.	G ₂	7.0	98	3	1,410
3.	G ₃	7.1	93	4	1,320
4.	G ₄	7.9	72	4	680

Source: Own calculation.

The analysis of measurements made in the package diameter showed a high variability, which is confirmed by the value obtained to calculate the coefficient of variation S= 34.2% (Table 2).

Although a population with a complex well represented rhizome, however there is great variation among the four families studied. Rhizome length variability had values ranging between 51 and 98 cm. These values have generated a high coefficient of variation S= 21.51% (Table 2). It should be however noted that these values depend very much on rainfall and their distribution among the vegetation period.

Table 2. General characteristics for rhizomes, morphometrical parameters – direct (variant, standard deviation) and derivatives (variability coefficient) for selected *Gentiana lutea* L

Measurements	Variant s ²	Standard deviation	Average	Variability Coefficient
Diameter (cm)	3.46	±1.86	5.44	34.20
Length (cm)	265.73	±16.30	75.8	21.51
Brench (no)	265.73	±0.699	3.6	19.42
Fresh weighth (g)	185,139	±430.28	785	54.81

If the number of branches of underground organs variability was medium, in some cultures showing interest forms with a high degree of branching high, assuming that the ramifications of failing to accumulate a higher content of active ingredients compared to the main rhizome.

The total mass of underground organs had the largest range of variation, the values being between 680 g to 1,410 g (Table 1). Thus the coefficient of variation of $s\% = 54.81$ (Table 2), had a high value. However, we can assume that a subjective question this variability, where nature and unevenness can be discussed in terms of age, because the species is perennial and plants that were performed measurements were derived from wild.

The data presented in Table 1 column 4, it can be concluded that in terms of the diameter of the package, the study population presented a variability that allows selection of works on desired genotypes.

Rhizome length per plant has a value of coefficient of variation large enough to make the selection in the direction of the character to be effective.

Number of branches of underground bodies had a middle value of the coefficient of variation. This character is of interest to the extent that would allow the successful selection of works in terms of increasing the number of branches

For the total mass of underground organs, the coefficient of variability presented a high value. This feature is particularly important because it is primarily responsible for the accumulation of active principles.

Looking at all of the obtained data, it is clear that the biological material examined and selected of Gentian 4 families were characterized by an increased genetic polymorphism. Using the selection of this material one may enable the future phenotypic and genetic differentiation, both quantitatively and qualitatively for valuable families.

CONCLUSIONS

The agricultural potential use for *Gentiana lutea* proved that this species may become a crop species of valuable importance from a

pharmaceutical point of view. Therefore, for the future it might be possible to exploit more the agricultural peculiarities of the species in the benefit of the farmers.

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INSTITUTIONAL PROBLEMS OF PIG CARCASS CLASSIFICATION SECTOR IN ROMANIA

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Abstract

The paper deals with the institutional problems faced by animal carcass classifying operators while implementing the SEUROP classification system in Romania. The research was performed in March 2015 by means of in-depth interviews with different economical operators in the pig-carcass classification sector. The main findings that need solutions in the next future are the following: still poor understanding of the benefits of the carcass classification activity by some direct beneficiaries, the need for a consolidation in current regulation, the need for a methodological framework for the uniform application of the law and a few external factors that can not be controlled by carcasses classification agencies and independent carcass classifiers but create difficulties in managing the daily activity.

Key words: institutional framework, pig carcass classification, SEUROP

INTRODUCTION

Starting 1 January 1985, SEUROP system for pig carcass classification became mandatory in all European Union (EU) member states [1]. Since then, all EU slaughterhouses have been required to weigh the pigs and to divide the carcasses into six quality classes (S, E, U, R, O and P), according to their estimated lean-meat content.

The final purpose of SEUROP carcass classification system is to “push” producers to grow pigs that meet nowadays consumers' preferences for high content lean meat. This objective is achieved by setting a mechanism of domestic prices that ensure market transparency and guarantee the producers a fair, impartial and equitable return according to the quality of their animals.

The EU system of grading pig carcasses was introduced in Romania with effect from 1 March 2006 [2]. Since then, classification activity has been implemented in all slaughterhouses and it must be performed for pig carcasses within the weight range of 50 - 120 kg, except those coming from pigs that have been used for breeding [3].

Currently, the carcass classification system in Romania is managed by Carcass

Classification Commission (CCC) [4]. The classification activity itself is performed by certified carcasses classifiers that work either as employees of independent carcasses classification agencies or as independent authorized carcasses classifiers [5]. Another important role is played by the Ministry of Agriculture and Rural Development (MARD) through its Technical Inspection Service for Animal Sector. This service, besides monitoring the application of the law and assuring nobody breaks the regulation on grading pig carcasses, is empowered to support the classification activity and to promote policies and programs in the animal classification sector [6]. Other professional organizations involved in the pork meat value chain perform only an advisory role (animal breeders associations, processors' professional organizations etc).

The direct beneficiaries of the SEUROP classification system are animal breeders (farmers) and abattoirs, because their product is traded in line with market quality requirements and they both have access to a fair payment system and updated market information. On the other hand, the national and European public authorities have access to accurate data for the development of sector

policies and market intervention mechanisms. By the end of 2014, 108 abattoirs in Romania classified a total number of 3,920,767 pig carcasses. Evolution of the annual number of carcasses classified in the period 2007-2014 is shown in Fig.1. [7]

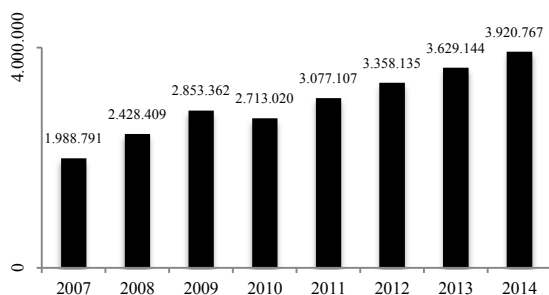


Fig.1. Annual number of classified carcasses, 2007-2014 (Source: CCC)

The accession of Romania to EU in 2007 imposed the adoption of SEUROP carcasses classification system along with many other new regulations on the meat sector in general. The actors involved in the pork meat value chain had been forced to adapt themselves to the new economic environment in a relatively short period of time. Any rapid transition period is characterized by chaos.

The aim of this paper is to provide an insight into the institutional problems encountered by pig-carcass classification providers (carcasses classification agencies and independent authorized carcasses classifiers) in Romania, after almost 9 years since the implementation of SEUROP system, in 2006.

MATERIALS AND METHODS

The research methodology applied in this study consisted in:

- Literature review: normative acts regulating pig carcass classification activity in Romania and secondary data available in reports issued by CCC;
- In-depth interviews with representatives of economical operators involved in the SEUROP classification system (CCC, representatives of carcasses classification agencies, carcasses classifiers and classification inspectors).

The research was performed in March 2015.

RESULTS AND DISCUSSIONS

The benefits of the carcass classification system are not yet well understood by all direct beneficiaries. It is necessary to develop temporary advisory services to facilitate the dissemination of information in the territory and exchange of ideas between different participants in the system.

Some slaughterhouses understood very well the benefits of grading the pig carcasses into quality classes. Therefore, they correctly and continuously implement the classification in their work and assume all obligations required in this regard. The collaboration between the representatives of the abattoir and those of different organization from the classification system is very good. Even if few and very small errors in the process might appear sometimes (very rarely), they do not substantially affect the classification activity and the slaughterhouse is interested in adopting measures to improve the classification process. It can be concluded that in such cases, the classification system reached its commercial purpose.

On the other hand, there are still slaughterhouses (usually those with a smaller capacity, but not only) where the implementation of the classification system still encounters difficulties. This happens either because of ignorance, misunderstanding of the benefits, inability to adapt or even refusal to accept the system on grounds of protection of the commercial interests.

The main problems that arise in these situations are related to the fact that slaughterhouses do not fulfill their obligations (e.g. obligations related to the standard presentation of pig carcass, carcass weighting problems, lack of communication of the negotiated price to the carcasses classifier etc.), which results in difficulties in ensuring continuity and accuracy of the classification activity.

When talking about animal breeders, the situation seems even more difficult to handle, since just a few of them really understand the usefulness of the classification activity. For many animal breeders, the classification

activity is still associated with the subsidy provided by the Government. Because of that, in practice, there are just few cases when the price between the supplier of animals and the slaughterhouse is negotiated on a lean meat content of the carcass basis. Suppliers still prefer the flat rate price (in kg/live weight) for entire batch of pigs delivered to the slaughterhouse.

In order to improve the current lack of understanding of the benefits of the classification system, MARD representatives (directly or via local structures), farmers' and/or processors' organizations, CCC, etc. should set up a system of communication both on vertical and horizontal level. A plan of regular meetings in the territory might be developed, in order to disseminate the information, get feedback on current practices and facilitate the exchange of ideas between the participants in the classification system.

In order to identify the aspects that need to be improved, periodically consultative meetings between the representatives of CCC, carcasses classification agencies and inspectors, are welcome. This topic can even be introduced in the curricula of the refreshment seminars that are periodically organized by CCC for the certified carcasses classifiers.

The current legislation is too laborious and needs to be consolidated

From its implementation in Romania in 2006, until today, the SEUROP classification system passed through a process of transformation and adaptation to the market conditions. As a consequence, the legislation had to be changed as well. At the moment, different aspects related to the animal classification activity are stipulated in several normative acts and this fact creates difficulties in fully understanding the whole process. The general opinion is that the current regulation in the field of animal carcass classification is too laborious and it requires a consolidation process.

A methodological framework for the uniform application of law and decisional transparency is very much welcome

The penalties applied in different situations are very broadly defined (as well as interval fines). This fact leaves room for

interpretation, leading to claims against penalties imposed.

A procedural manual, with examples of concrete situations from practice and proposed solutions, is necessary for the uniform application of the law.

A Department (Service) of Methodology and Technical Assistance to support the system by providing specialized technical expertise and advice regarding the classification procedure and various situations that can arise in practice is useful to avoid potential conflicts in the system.

An on-line forum to facilitate discussions between participants in the classification system and an on-line list of Frequent Asked Questions are other examples of transparent tools considered by carcasses classifiers as being very helpful in their daily work.

Other external factors that can not be controlled by carcasses classification agencies and independent authorized carcasses classifiers are considered obstacles in their development

-The activity of the carcasses classification agencies might be disrupted by the impossibility of hiring staff when needed.

The classification activity must be performed by certified carcasses classifiers. In order to get the certification, a person must attend a specialization course. At demand, CCC is organizing such courses, but usually, it waits until a group of 8-10 applicants is formed (sometimes the process lasts a few months). After finishing the course, the participant must pass an exam. Then MADR must approve the list of people that graduated the course and are proposed by CCC to become carcasses classifiers. Finally, in order to get the certification, these persons must have their name published in the Official Journal. The whole process takes quite long and in the meantime, the carcasses classification agency is not able to hire anybody to perform the classification activity.

-Two high costs components determine cash problems for classification providers while the face difficulties in recovering receivables from their clients (abattoirs)

Classification service providers (carcasses classification agencies and independent

carcasses classifiers) have to pay a tax (8% out of their turnover) to CCC, to cover its operating expenses. On the other hand, they are not members of CCC. General perception is that this fee is much too high taking into account difficulties encountered by these carcasses classification service providers in recovery their receivables from abattoirs, while neither CCC nor MADR could be involved in solving this problem.

In this context, it is recommended that a dialogue between all parties should take place, in order to clarify the implications of the level of this tax on both CCC's needs and classification providers' activity.

Another high cost is related to the maintenance of the classification equipment in the context that only two classification optical probes are homologated for the Romanian market.

CONCLUSIONS

The mentioned findings show that despite some problems, the pig carcass classification was well implemented in Romania and the number of classified carcasses grew from one year to another. However, the pig breeders, slaughterhouses, processors and traders have to realize that in the following years, globalization of pig meat market will progress at a faster rate. On this basis, they have to produce pigs which will meet the meat requirements of the final consumers. In this context, the carcass classification activity plays an important role.

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GENERAL ASPECTS RELATED TO THE SALE AND PURCHASE OF FOREIGN CURRENCY IN THE FOREX MARKET IN MOLDOVA

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Abstract

The buying-selling currency activity is a specific kind of trade within which currency is considered to be a good. The result of this trade is a price (currency rate of exchange) that depends on the demand-supply conditions existing on the market; this price may be limited from legal point of view. The purpose of this article is to define various transactions on the currency market including that of the Republic of Moldova and to single out currency transactions within foreign currency accounts of the residents and non-residents.

Key words: currency, currency operations, exchange rate, speculations, transactions

INTRODUCTION

Currently the FOREX market in Moldova is characterized by exchange rate dynamics and turnover.

Some market segments observed are the interbank market (foreign exchange transactions carried out between authorized commercial banks) and intrabank market (foreign exchange transactions conducted between banks and their customers); spot market (where settlements are carried out for two days at the latest banking) and forward market (where settlements are usually carried out over fixed periods such as: one, two weeks, one month or more).

While the exchange rate reflects the dynamic equilibrium of demand and supply of currency in the market, the turnover reflects the overall activity of the foreign exchange market participants. The main problem is to develop a simple mechanism applicable and economically argued that takes into account the peculiarities of foreign markets that will provide tools for various transactions and meet the needs of a wide range of participants: banks, insurance companies and investment funds pensions, commercial corporations and companies. The diversity of the financial instruments allows investors to manage their portfolios.

MATERIALS AND METHODS

the study has been conducted under the conditional generalization of sale and purchase transactions of foreign currency. The methodological investigations were based on the fundamental principles of accounting, the provisions of the National Accounting Standard "Exchange rate differences and the amount" [2], on the terms and conditions of foreign exchange operations [3], The Accounting Law [4], International Financial Reporting Standards [2] and publications in the field of local scientists. Preference was given to the monographic study method applying elements of analysis, observation, selection, induction and deduction.

RESULTS AND DISCUSSIONS

The activity of the sale of currencies is a specific kind of trade, and in this genre is treated as a commodity currency. What emerges from this trade is a price (exchange rate) that depends on the conditions of supply and demand on the market, this price can be legally limited. The exchange rate formation mechanism has three stages, leading to uniformity: at each bank - setting the exchange rate by a bank is based on the following factors:

The established rate during the previous day;

The ratio of supply and demand of buying and selling provisions to the bank.

The rate set by other banks operating in that market, and the exchange;

On the national market - between banks;

On the international market - between national markets. The transaction is called fixation rate quote and involves two aspects:

Selling price; Purchasing price. There is a difference between them, usually the selling price is higher than the purchasing. The foreign exchange market is subject to national regulations (the foreign exchange market in Moldova is different from the currency market in France, for example), but in addition to these national currency markets have specific legislation that arises from situations where an international foreign exchange markets, serving interests areas (economic areas of great interest: Frankfurt, Tokyo, London, New York). These markets with international character are exempt from national legislation, which makes them attractive. Sometimes the foreign exchange market transactions separate from the actual economic activities. In this sense there are:

currency speculation - Is the transaction of sale that has no economic base itself, being carried out only in order to obtain certain gains (usually undeserved); in this respect it is speculated exchange differences arising between different times and places. Who wins an accurate assessment of the exchange rate trend;

currency arbitrage – A transaction similar to currency speculation, with the difference that is made by the bank (bank only) and put into circulation and manipulated values are much higher;

State intervention - is all a transaction that involves the massive sale or purchase of foreign currency in order to maintain the exchange rate of the national currency. State intervention should be done in conjunction with financial and currency policy of the state and economic and social development of the country.

The tax legislation of international transactions is achieved naturally currency accounts available in accounts with banks, but also occurs in situations that create certain

deficits to payment obligations assumed. In these circumstances it is necessary to transfer certain amounts of currency in the portfolio of banks in other currencies, these operations are called currency arbitrage.

Arbitration can be achieved in order to exchange one currency to the other to achieve profits or FOREX existing balance. Accordingly, the arbitration will result in a balance of exchange rates and interest rates, increasing the application where the interest rate is weaker or less and increasing the supply where the rate is stronger, the higher the interest rate. Arbitration may be used on two or more markets simultaneously, taking advantage of the exchange rate or interest rate differential between the markets. The arbitration may be conducted by banking units, stock and exchange houses, but the largest share is the banks. It is accomplished by known means of communication: mail, phone, fax.

An attempt to classify arbitration may be obtained taking into account the following criteria:

In terms of opportunity this transaction, arbitration may be:

speculative arbitrage - placing certain currencies or selling them for profit which may result from the difference in rate of two currencies simultaneously recorded for two different markets - or - the currency of the same currency between two different times on the same market - or - difference of interest simultaneously on two different markets - or - interest difference between different times on the same market;

Imposed arbitrage - not intended for profit but is mainly for balancing currency positions existing in a currency portfolio. Usually, the balance is achieved by transferring funds from the bank showing that surplus currency; if the currency position is a poor recourse to force sale and purchase transactions. In these circumstances the immediate result that appears is running a currency from a market to another as needed to avoid loss due to currency depreciation caused by this transaction.

In terms of nationality or area of action, arbitration may be:

domestic arbitration - transaction partners are residents and non-residents in the country. The lower volume for currency fluctuations in this market are lower than the use of different markets. Interests are relatively close, and the differences are insignificant;

Arbitration of the foreign market - is more common and has the widest diversity due to the difference between the interest rate and national markets, different markets are more attractive. It may be of interest arbitration, sight arbitration and term arbitration.

In terms of sight arbitration and term arbitration:

Sight arbitration - sale / purchase made in the accounts within 48 hours of tge closing date of the transaction;

Term arbitration – transactions of selling / buying of carrying final transaction in a subsequent period fixed by the two partners when negotiating the transaction by the buyer or seller. These transactions occur when a currency risk by assessing the provision / depreciation concerned. Usually it has a speculative role, aiming to be buying at a smaller rate and selling at a higher rate. If currency arbitrage transactions must be properly analyzed for the risk factors (referee will estimate the future evolution of the currency and according to this estimate will win or lose). These currency arbitrage transactions are difficult and require experience and spontaneity.

The role of the foreign exchange market is determined primarily by the possibilities offered by participants in economic exchanges for choosing and obtaining the most convenient credit and payment means. Financial markets are a barometer of international currency in international economic exchanges.

The introduction of the euro has produced profound changes in the financial and currency markets, competition between the area of influence of the dollar and the euro is increasingly fierce.

Transaction time - presumably following the conclusion of the contract at the time of the delivery of the goods to be done after a certain period.

Transactions spot - involve conducting sale

and purchase of foreign currency directly or within 48 hours, so that when the transaction coincides with the formation of the exchange rate.

Hedging transactions - transactions which a buyer / bank undertakes on the one hand to pay an amount in foreign currency at a certain time, and on the other hand borrows the same amount in the same currency, the same repayment period. In this way foreign buyer shelters the potential risk of currency depreciation for the period in question and possibly the loss is compensated by equal gain obtained by borrowing, which is a transfer of risk to the lending bank.

Swap transactions - are common transactions between a client and a bank or between two banks simultaneously terminating a transaction spot and one term, but in another currency. In this way you can change the term, market and even the title. From the economic point of view, swaps involve a mutual granting of foreign currency loans with an interest rate agreed between the two partners. On international financial markets are of particular importance because imply a very important movement of cash.

Below I present the main transaction taking place in the currency markets. This transaction takes place mainly in international trade, given that it is necessary to provide the financial resources for these transactions. However, in addition to foreign exchange transactions that take place in connection with international trade, there are other transactions that go beyond exchange (currency speculation, currency arbitrage, state intervention). Currency speculation is made of natural / legal, government intervention is made, obviously, state, and foreign arbitration is conducted by banks; in any of these three situations who will win out in the one to guess the currency in which the investment trends. It is known that residents and non-residents may open accounts in local currency and foreign currency with licensed banks in accordance with the legal provisions governing the opening of bank accounts. Within the framework of foreign exchange and foreign currency accounts in national currency by residents and non-residents opened with

licensed banks recorded funds from any legal source, including interest amounts due on those accounts. In transactions in foreign currency accounts in the national currency by residents and non-licensed banks open on payments and transfers (including related fees and interest paid to licensed banks) shall be made in accordance with the legislation of the Republic of Moldova currency.

For payment / transfer of non-cash foreign exchange operation within individual will present the following documents to the licensed bank, but are not limited to:

- a) ID;
- b) written request for the payment / transfer signed by the individual concerned;
- c) documents, unless expressly specified in this Regulation or in other normative acts of the National Bank in foreign exchange regulation;
- d) certificate /notifying / proper authorization.

Individual residents may transfer abroad of funds for family expenses for each family member - an individual who is a resident abroad and transfers of funds for family expenses for each family member - non-resident individual, as follows:

- a) single transfer amount not exceeding 1000 euro (or their equivalent) - without submission to the licensed bank of documents confirming the kinship/marriage relation or establishing guardianship/trusteeship;
- b) single transfer amount exceeding 1,000 euro (or equivalent), but not exceeding 10000 euro (or their equivalent) - upon submission to the licensed bank of documents confirming the kinship/marriage relationship (birth certificate, certificate of marriage, etc.) or establishing guardianship / trusteeeship;
- c) transfer in the amount exceeding 10000 euro (or their equivalent) - the submission to the licensed bank of documents confirming the kinship/marriage relation or establishing guardianship/trusteeship, as well as documents confirming the necessity of payment/transfer by individual in whose favor the transfer and containing data on the amount of the payment / transfer [3].

Individual residents establishing their residence abroad may transfer abroad of funds held by the proprietary upon submission to the

licensed bank of the following documents:

- a) the identity of the natural person resident in the exit visa is applied in Moldova by authorized bodies of the Republic of Moldova (passport, issued a Moldovan national or a stateless person for leaving/entering in Moldova or the national passport of foreigner);
- b) documents confirming ownership proprietary funds subject to transfer amounts from Moldova (eg contract of sale - buying real estate, securities, certificate of inheritance);
- c) certificate on the absence or existence of arrears to the national public budget issued by the tax authorities of the Republic of Moldova on behalf of the person establishing residing abroad. The certificate referred must meet both of the following conditions: confirm the absence of arrears to the national public budget, to be released no earlier than 5 working days before the date of submission to the licensed bank of the written request of making the transfer and not before the following day after the transaction of property sale or other transaction, after which they were obtained funds subject to transfer;
- d) other documents that are considered necessary for the individual to submit for the transfer in setting residing abroad [3]. For the account in the transaction of foreign exchange funds, the individual is to submit the following documents to the licensed bank, but are not limited to: ID; written request for submission of cash signed by the person; documents, unless expressly specified in this Regulation or in other normative acts of the National Bank in foreign exchange regulation; authorization. The written request for submission of funds must contain the following data, not limited to: the purpose of deposit funds that are indicated in detail; name and, if applicable, number and date of the document supporting - if submission is made based on a supporting document, name, number and date of the authorization; kinship / marriage relation / relationship guardianship / trusteeeship with the individual in whose favor the deposition is made - the submission of funds for family expenses. In the foreign exchange transactions, cash accounts non-resident individuals in national currency in foreign currency and traveler's checks in

foreign currency may be submitted by third persons resident as follows: 1) If filing by a person of funds for family expenses: a) in an amount not exceeding 1000 euro (or their equivalent) - without submission to the licensed bank of documents confirming the kinship / marriage relation or establishing guardianship / trusteeship; b) worth more than 1000 euro (or their equivalent), but not exceeding 10000 euro (or their equivalent) - upon presentation to the licensed bank of documents confirming the kinship / marriage relation or establishing guardianship / trusteeship; c) in the amount exceeding 10000 euro (or their equivalent) - upon presentation to the licensed bank of documents confirming the kinship/marriage relation or establishing guardianship/trusteeship, as well as documents confirming the necessity of transfer/payment by the individual in for which the deposition is made and contain information about the amount of payment / transfer; 2) If a person deposits cash in foreign exchange transaction other than that indicated in point 1) is not subject to authorization: a) in an amount not exceeding 1000 euro (or their equivalent) - without supporting documents; b) in the amount exceeding 1,000 euro (or their equivalent) - upon presentation to the licensed bank of documents, confirming the purpose of the payment / transfer and containing data on the amount thereof; 3) when depositing funds in the foreign exchange operation is subject to authorization - the submission to the licensed bank of the justifying documents containing data on the amount of payment / transfer and authorization issued by the National Bank of Moldova [3]. Legal resident entities may make payments / transfers within foreign exchange operations without cash without providing supporting documents licensed banks where is performed: a) transfers to their accounts opened abroad under the authorization of the National Bank, which provide the possibility of making transfers from those accounts to accounts with licensed banks and contain no requirement to submit supporting documents to the licensed bank; b) transfers to other accounts opened theirs at the same or another licensed bank; c) transfers

unique form of donations within foreign exchange operations in the amount not exceeding 1000 euro (or their equivalent) each transfer; d) transfer the licensed bank account in another bank account opened in the bank licensed or non-resident; e) payment abroad of state tax established by the foreign state. Legal residents abroad can make payments / transfers within foreign exchange operations without cash without supporting documents if carried out: a) transfers the name of the same account holder; b) payments / transfers by representatives of international organizations, diplomatic missions, consular offices, other official representative offices of foreign states accredited in the Republic of Moldova and international organizations; c) payments / transfers by non-resident legal persons are institutions implementing technical assistance projects in Moldova, for the purposes of implementing the projects mentioned only in relation to individuals; d) payments / transfers by non-resident banks; e) transferred, as a donation in exchange operations in the amount not exceeding 1000 euro (or their equivalent) per transfer - if they are carried out by non-resident legal persons, other than those specified in subparagraph b) of this point; f) payment abroad of state tax established by the foreign state [3]. Non-resident legal persons can perform in Moldova payments / transfers within foreign exchange operations without cash without supporting documents if carried out: a) payments / transfers in national currency; b) transfers in foreign currency on behalf of the same account holder; c) payments / transfers in foreign currency by non-resident banks; d) the single transfers in foreign currency in the form of donations within foreign exchange operations in the amount not exceeding 1000 euro (or their equivalent) each transfer; e) foreign currency payment of the state fee established by the Republic of Moldova.

Without supporting documents of legal resident entities' accounts opened with licensed banks can be deposited funds: a) fully or partially unused who previously received from the respective legal entities' accounts written request indicating the deposition of funds to date and purpose prior

receipt of funds from the account in question (not limited to such information); b) to pay court fees or other charges / taxes established by legislation of the Republic of Moldova payable to the national budget; c) collected from individuals in cases under the law of the Republic of Moldova in the course of the activity under the law does not require possession of a document issued by the competent authorities of the Republic of Moldova legal person certifying the right to carry out certain activities; d) high / seized / confiscated by the competent authorities under the laws of the Republic of Moldova; e) as a donation in the amount not exceeding 1000 euro (or their equivalent) from individual philanthropic and sponsorship. Without supporting documents of legal resident entities' accounts opened with licensed banks can be deposited funds: a) if the deposit accounts of diplomatic missions, consular offices, other official representations of foreign states, representatives of international organizations accredited in the Republic of Moldova and international organizations within their activity in Moldova; b) in the case of legal persons resident deposit accounts, which are institutions implementing technical assistance projects in Moldova, for the purposes of implementing the projects mentioned only in relation to individuals; c) fully or partially unused who previously received from the respective accounts of legal entities, except as indicated in letter a) of this section, indicating the written request of deposit of funds to date and purpose prior to receipt of cash to the account (not limited to such information); d) the submission of receipts from the sale of goods / services by legal entities resident passengers working on vehicles in international traffic and the submission of receipts in local currency from the sale of transport documents by the representative enterprises resident transport; e) in the case of legal persons resident deposit accounts other than those indicated in paragraph a) of this section, the funds as a donation in the amount not exceeding 1000 euro (or their equivalent) from individual philanthropic or sponsorship. Without supporting documents of legal

residents' accounts opened with licensed banks funds can be released: 1) the accounts of diplomatic missions, consular offices, other official representations of foreign states, representatives of international organizations accredited in the Republic of Moldova and international organizations - in order to release funds to individuals within these institutions in Moldova; 2) the non-resident legal entities' accounts, which are institutions implementing technical assistance projects in Moldova, the use of funds for the purposes of implementing the projects mentioned only in relation to individuals; 3) representations accounts resident legal entities, other than those specified in point 1) of this section: a) national currency - the purpose of paying current expenses relating to their activities in Moldova; b) Foreign currency - for expenses related to travel under the laws of the Republic of Moldova; 4) intended to pay court fees and other charges / taxes established by legislation of the Republic of Moldova; In case of receipt by businesses of payments / transfers: a) documents justifying making / confirm the need for legal entities payments / transfers which according to legislation can be made in cash (eg, contracts, invoices, court decision) and, where appropriate, data on Payments / transfers; b) documents issued by the competent authorities of the Republic of Moldova legal persons resident certifying the right to carry out certain activities in which foreign exchange legislation of the Republic of Moldova allows to receive cash in foreign currency and traveler's checks in foreign currency (for example, the license for duty-free shop, certificate of performance issued ground resident legal entity operating in the field of civil aviation that provide ground) - if the Moldovan legislation establishes the need to have such a document for certain activities; c) the documents specified in other normative acts of the National Bank governing certain foreign operations.

CONCLUSIONS

The factors which determine the development of the foreign exchange market are:

- world trade liberalization tend to increase

economic exchanges between countries and increasing the role of currency markets;

- increasing the share of international credit in foreign trade volume;

- increasing the share of certain national currencies in all economic exchanges.

Any natural resident in the Republic of Moldova can transfer without submission to the licensed bank of documents, money as a donation in the amount not exceeding 1000 euro (or their equivalent), as follows: single transfer abroad in favor of resident individual who is abroad; single transfer abroad in favor of diplomatic mission, consular or other official representative of the Republic of Moldova abroad; single transfer in favor of an individual / legal resident.

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PROFITABILITY IN THE CONTEXT OF THE NEEDS AND REQUIREMENTS OF SUSTAINABLE FARMS DEVELOPMENT

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Abstract

Market economy requires from any farm particular efforts for the profitability of products and organizational structures as well as for the increase in a higher pace of the profitability of each product in order to achieve the level of competitiveness imposed by the competitive market and the modernization needs of agriculture from the given stage. Under the new conditions created by globalization and environmental requirements, modernization is closely related to promotion of sustainable development for agriculture and the entire countryside. Holdings must strive in their work towards sustainable, competitive profitability, which can not be admitted as maximum at all costs, taking into account the environment and human health. Thus, should any financial analysis include not only physic but also the value of natural resources and the environment? Therefore, it is necessary to introduce the concept of sustainable agriculture, adapted to the conditions of each country, as an organizational capacity to grow in the future, effectively and rationally exploiting its natural, economic and social resources, in harmony with the surrounding environment, in the benefit of the producers and ensuring food security for current and future generations.

Key words: farm, production, profitability, sustainable agriculture development

INTRODUCTION

Farms should make continuous efforts to keep pace with the requirements of the market economy in order to increase the profitability of products and organizational structures as well their competitiveness in a changing business environment.

Under the new conditions created by globalization and environmental requirements, modernization is closely related to promotion of sustainable development for agriculture and the entire countryside. Holdings must strive in their work towards sustainable, competitive profitability, which can not be admitted as maximum at all costs, taking into account the environment and human health. Thus, should any financial analysis include not only physic but also the value of natural resources and the environment?

Therefore it is necessary to introduce the concept of sustainable agriculture, adapted to the conditions of each country, as an organizational capacity to grow in the future, effectively and rationally exploiting its

natural, economic and social resources, in harmony with the surrounding environment, in the benefit of the producers and ensuring food security for current and future generations. Defining the concept of sustainable development is extremely complex. Sustainable development means "that set of measures which ensures unlimited stability of an economic and social structure based on environment protection and can lead to a significant increase in population welfare". [2]

Sustainable agriculture development represents "its organizational capacity to grow in the future, effectively and rationally exploiting natural, economic and social resources it possesses, in total harmony with the environment, for the benefit of current and coming producers, ensuring food security for current and future generations." [17]

Sustainable agriculture on the long term improves the quality of the environment and of the natural resources on which agriculture depends; it provides food and fibre needs for the population; it is economically viable and improves the quality of life for farmers and

for society as a whole [18]

MATERIALS AND METHODS

The agricultural household takes decisions regarding agricultural production. The production process is an interaction with the ecosystem and this interaction affects the surrounding and socio-cultural environment and the economic aspects of welfare. The results of the surrounding environment also change the ecosystem and have indirect long-term effects on and the changes in the production process as a decision cycle repeat themselves.

Sustainable development of agriculture cannot be solely economic, based on the principle of immediate maximum profit; but must become a sustainable development able to optimize the resource-needs report, taking into account four factors: population (as consumer products), natural resources and natural environment (health of earth, water, air), industrial production (upstream and downstream of agriculture) and pollution.

Sustainable development of agriculture cannot escape the efficiency criteria, efficiency that must be analyzed in three dimensions: economic, ecologic and social [17]

Studies undertaken in order to analyze the world we live in under these respects, reveal two conflicting views:

- according to economic indicators that assess the health of the world economy, "the world is in a reasonable, good condition and ...long-term economic forecasts are promising" [5]

- according to suitable indicators measuring the health of the environment, "every major indicator shows a deterioration of the natural systems on every continent" [5]

Currently, in most cases, economic efficiency increases precisely on the account of the other two. Economic efficiency is achieved at the expense of social efficiency both at the level of every country as well as on a global scale, manifesting large discrepancies in terms of satisfying social needs generated by similar disparities of income; but also at the expense of ecological efficiency by not taking responsibility for environmental costs generated by their economic activities and

their transfer the whole mankind. In this sense, practices of economic profitability on short term must be criticized, which lead to impairment of future values (positive and negative) and overvalue of the present, in other words to "inflate" the rise (flow) to the detriment of assets (stocks) [12]

So bear in mind the economic or commercial libertinism, which imposes the profit laws above the laws of ecology, the laws of nature and measures taken in this regard. In this sense there may be taken measures by introducing fiscal penalties on the polluter pays principle and a system of incentives in the pricing and taxation field for clean food production. Such a measure would be to increase the profit tax rate (for profit resulting from activities with obvious interference in ecosystems balances) with an additional quota determined by the impact of such economic activities over the overall environmental balance in the geographical area in question, based on the following model:

$$P_n = P_i - I_p$$

$$I_p = P_i (C + K_e)$$

where:

P_n - net profit

P_i - taxable profit

C_i - profit tax rate established under the laws in force

K_e - additional share of profit tax for activities generating natural imbalances [9]

In this issue, Europe has realized that environmental protection is creating development and profit [4]

It should be noted that between sustainable development and sustainable agriculture one cannot put the equal sign (there are countries in which, although agriculture presents sustainability in the national economy, it does not follow the concept of sustainable development).

In order to be sustainable, agriculture must meet nine main attributes: productivity, profitability, energetic efficiency, wildlife balance, quality of life and social acceptance, quality of soil, water, and air [10]

SAS components (Sustainable Agriculture System) are: [15]

1. Crop and rational rotation of crops - has the effect of maintaining and improving the

productive potential of the soil, reducing energy, chemical fertilizers, pesticides costs, without requiring additional investments.

2. Structure of cultures - enables work scaling, reduces peak work, a more efficient use of inputs, reduces production risks in the event of disasters.

3. Application of organic manure from storage and incorporation of plant residues, manure, compost, green manure, intermediate crop, sludge and domestic waste - helps restore soil humus (determinant factor of fertility, with implications for the physical, chemical and biological plants processes).

4. Chemical fertilizers - can only be used in addition to organic fertilizers and only in moderate doses. In order to minimize their negative effects (accumulation of toxic compounds with nitrogen in plants, groundwater pollution, soil acidification) their periods and ways of managing must be controlled.

5. Soil tillage – they produce physical and mechanical changes in soil mass and influence further on the conduct of other processes: chemical, biological, decisively determining soil quality and its productivity potential.

6. Integrated management of plant and animal protection - is a strategy that leads to reducing the use of pesticides (using methods with minimum impact on the environment – changing pesticides and herbicides in time, minimum but effective doses without remaining in the soil etc.) giving priority to agro-technical and biological measures of bio-pesticides, finding genetically resistant species and hybrids etc.

7. Conservation of resources (soil, water, biodiversity from soil and soil) - in this sense, every technological measure applied must be analyzed according to its short and long term effect on each resource and on the system as a whole.

8. The use of internal resources – determines increase in efficiency, adjusts the power circuit within the system and protects the surrounding environment.

9. Integration of the vegetable sector with the animal sector - resulting in a complex and stable system in which internal resources are

being used more efficiently, and the circuit of substances is complete (plant products are being used as food for the animal sector and manure is used as organic fertilizer) thus reducing production costs and the threat of pollution under full utilization of labor.

10. Sustainable rural development - aims a rational and balanced use of all natural, economic and human resources of the area, providing conditions for increasing productivity, conservation and renewing resources, harmonization of natural factors with economic ones, system stability.

11. Research - aims improving the national system for priority identification; determining ways of funding and subsidies; effective training of qualified personnel; organizing research units on demonstration plots; promoting technological transfer activities and technical advice on: new plants, animal breeds, new technologies, bio-engineering operations, machinery and equipment systems, greenhouses projects; supplies of biological material from upper links; performing expertise and biological assistance to producers in the form of projects and programs on greenhouses and gardens; direct support from the budget; low-interest government loans; direct contracts with producers; programs funded by international organizations; resources form the production of research stations. [16]

It can quantify the effect of a single element of progress or interaction with other elements, allowing reliable conclusions in determining the breakeven point.

The research aims to highlight those variants in which the technical maximum is nearest to the economic optimum [21] information and documentation are becoming realistically speaking the "engines" of regional sustainable development [8]

RESULTS AND DISCUSSIONS

Production of raw materials, combined with operation of biogas plants make biogas technologies economically attractive and help increase farmers' income.[11] In addition to the additional income they obtain new and important social functions, such as energy

providers and waste treatment operators. [10]

In this context we cannot ignore, aspects related to the development of genetically influenced agricultural products, through laboratory studies - which, while providing increased production and higher profits for producers, negatively affect human health.

In this matter, the European Community has adopted regulations on controlled use of GMO-s (genetically modified organisms) through Directives no. 90-219 and 90-220/ April 1990. In Romania, this issue is regulated by OG 34/2000 on green food products, approved by Law no. 38/2001, harmonized with EU regulations. However, penetration and spreading on a larger scale in Romanian agriculture of genetically modified organisms represents a real danger to human health and to the quality of the environment, because: "it turns the population and its territory into a field and an object of experimentation for obtaining results regarding new biological technology without elementary means of prevention and precaution regarding their potential negative consequences." [12]

A form of sustainable agricultural system is represented by the organic growth of cereals, industrial, horticultural and viticulture crops, in practice we identify three new streams [6] in farm: organic, biological and bio-dynamic farming, resulting in obtaining high yields, healthy, while preserving the health of the earth, plants, animals and humans.

The future belongs to science, technology and modern technologies, genetic creations that can revolutionize agriculture, association and cooperation systems based on private and public properties [7]

Science brings great advantages over competition and is always behind efficiency. "Who does not appeal to science can be considered dead in capitalism. [3]

Unlike conventional agriculture, which believes that a farm is like a production unit that practices intensive technologies, sustainable agriculture considers the farm a complex system composed of subsystems, each of which has limits physical, biological and social limits.

Activity in a farm with sustainable agriculture must be based on the use of natural processes,

on the biological and renewable farm resources. A feature of this work is the preservation of internal resources (soil with its characteristics, water, biodiversity etc.). It combines traditional techniques with new technologies, it uses modern equipment while using conservation methods.

For a product to be recognized as traditional it must meet the following conditions:

- be made of traditional raw materials;
- to present a traditional composition or a production mode and/or traditional processing;
- being traditionally itself, or express traditionalism;
- comply with specifications;
- traditionalism is not due: its geographical origin or provenance or application of a technological innovation. [20]

An agricultural system would be sustainable if the production, yield, nutrients contained in cereal crops and manure that are lost through erosion would be matched by the absorbed ones, in the form of artificial fertilizers and fertilizer newly created by the decomposition of rocks in the base layer. All additional inputs such as energy, water, chemicals and artificial fertilizers should also be durable inputs. The energy consumed at harvest, such as that used for tractors and irrigation pumps, should come from renewable sources such as: collecting solar energy or hydroelectric generation. Any use of solid fuels and water, both renewable resources, will be excluded [22]

Such stringent definitions may be difficult for those who accept them. Sustainable agriculture is still struggling to achieve environmental objectives such as: promoting biodiversity, recycling of nutrients, creating fertilizers and efficient water use, having large implications in terms of economic and social point of view. [14]

CONCLUSIONS

An issue that requires deepening in the future is "the state of the supplier for de-pollution of agriculture" [13] condition insufficiently studied, which will be the subject of an investigation, both for the alternative natural

environment, agriculture, as well as for other human-agricultural activities.

Changes in its activity can be divided into three categories:

- Understanding the biophysical connections between ecosystem and production;
- Finding operational indicators of various aspects of sustainability;
- Determining the relative size of each of the welfare aspects.

Surveys were conducted in all three areas, but the most progress has been achieved in the first and second category. Agronomists and engineers have developed biophysical models of agricultural production that can simulate plant growth as well feeding flowers, soil and water. Regarding the indicators for sustainability issues, these are not difficult to be defined for objective measures of economic performance, the only obstacle being represented by gathering relevant information and noticed with great difficulty at the farm level. These may be indirectly measured by income and expenditure categories.

Quantitative measurements of social and cultural aspects are difficult to be performed and probably will never be complete, but measurement results such as the number of employees in rural environment or agricultural workers could be possible.

Romania has huge potential of bio-ecological resources within mountain areas, alpine and sub-alpine corridor it occupies a surface of over 4.5 million ha of which more than 1 million ha is exploited sustainably, other 95,000 ha were declared parks and nature reservations.[1]

Under current Romanian agriculture conditions, in the context of transition to a modern, efficient agriculture, which fall within the concept of sustainable and organic agriculture, there still are "pollution boiling points", serious accumulations in the environmental degradation, inadequate developed legislative framework, a poorly informed population with less interest in environmental issues, therefore measures are needed to be taken to educate and inform farmers, acknowledging the importance of respect for the environment, the only

alternative of an agricultural progress, which is suitable for integration into the European Union, even if it "is difficult and only achievable on the long term, involving serious costs, certainly will affect productivity gains."

[19]

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PARTICULARITIES REGARDING THE CALCULATION AND PROFITABILITY ANALYSIS OF FARMS

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Abstract

In contrast to the industry, in the agricultural production process, specific factors intervene, which determine peculiarities in the use of labor, means of production and work items. The specific factors acting in the agricultural production process: land, plants, animals, soil and climate conditions, give special features regarding the development strategy, but also regarding the production processes with the two sides: technological and economical, causing certain features with effects on the methodology of economic analysis. These features of farm profitability analysis were briefly presented in this study.

Key words: capital, earth, farm, production, profitability, rent

INTRODUCTION

In contrast to the industry, in the agricultural production process, specific factors intervene, which determine peculiarities in the use of labor, means of production and work items.

Thus, through their own training, existence and development characteristics, the specific factors acting on the agricultural production process - land, plants, animals, soil and climate conditions development and modernization of the travel offer represented by natural and anthropic resources [7] - give special features regarding the development strategy, but also regarding the production processes with the two sides: technological and economical, causing certain features with effects on the methodology of economic analysis. These features of farm profitability analysis will be presented in the following.

MATERIALS AND METHODS

Earth – the basis of agricultural production - has the character of a particular production factor which gives it an exceptional importance. Economic activity in agriculture is related directly and indirectly to earth, as the main means of production, with different production potential according to different areas, affecting yields per surface unit area,

nature and the level of allocation of production factors, products cost and implicitly farm profitability.

Compared to other means of production, land has a number of features that give it a specific role in agricultural production:

- It is a non-replaceable or hard replaceable production factor;
- It is limited as surface, but not limited as productive power, having the ability to increase its fertility through investments;
- It can not be copied and is irreplaceable for agriculture;
- As a means of production it can not be moved, which gives the agricultural process addiction to a certain space and a certain organizational structure of production;
- Rationally used, land does not wear out; it improves its productive power.

Earth can be used intensively or extensively, reservations for profitability growth regarding production volume depend in a decisive proportion of the intensive side with certain limits, required by the new concept of sustainable development.

In the profitability analysis it is also necessary to use the indicator "benefit at 100 ha", it constitutes the primary means of agricultural production.

Ground rent is the net income created in agriculture which pays the land factor.

Calculation of ground rent is needed to establish the amount of rent (cost land factor) for calculating the agriculture tax for policy and income support to farmers.

Interdependencies between price, cost, profit and rent are very close. Without the calculation of each economic category stated, one can not determine the levels of other.

Economic evaluation of the land included in the farm heritage is required in the calculation of depreciation and needs to be included in the cost, all of which influence the farm profitability (land price is directly proportional to the profit per hectare and inversely proportional to the interest rate). [5]

For modern management, buying, renting, leasing or renting land are matters of economic analysis and must be assessed by production costs that they generate in long term.

Capital in agriculture has numerous features and peculiarities that must be taken into account in the profitability analysis, in taking and implementing decisions.

It is a well known fact that the economy can destroy its own systems of support by consuming the fix means of the natural capital. [1]

Fix capital (under its three forms: land, machinery and equipment, breeding and working animals) has a long life and is limited. It also has a heterogeneous character in space and by type of farm units.

Working capital is being used in a production cycle, can be assimilated with intermediate consumption (seeds, planting material, feed, fertilizers, chemicals, water and production animals). His characteristics are being approached differently by its component elements and the importance of increasing the speed rotation and the allocations necessary to obtain a unit of value added are being considered.

RESULTS AND DISCUSSIONS

Production structure - material support of economic structure - is expressed by the proportion between production costs generated by combining and merging branches, particularly the proportion of fixed

and variable costs and their impact on revenue or farm profit.

The production structure can be:

- Extensive (characterized by the predominance of cereal crops in the cultivated land and production of goods and other crops which weakly exploit the land) - which determines farms to increase their areas in order to achieve higher-income;

- Intensive (characterized by high share of livestock in total agricultural production or by a high share of intensive crops within vegetable production) - in this case a higher income is being yielded by increasing allocations of variable factors per hectare and per animal.

The organization process of new production structures in our country is carried out uniformly in time and space, under forms and types of agricultural units: under branch or product, at organizational levels (exploitation, farm, sector), by phases of the technological process and area expertise.

Along with deepening the specialization the diversification of specialized units occurs, not only by branches or product but also flow technology phases.

The complex profile of an agricultural business (plant, zoo technical and industrial) also the organizational structure of these units (farms and sectors, departments etc.) is necessary to pursue the contribution of each branch of production and organizational links to forming the company's profitability.

Reserves for profitability growth on the total enterprise depend also on the rational profiling and specialization of the unit, especially the harmonious combination of crop production with animal one.

Structural interdependencies influenced by the random nature of agricultural production and the specific impact of used resources in the context of growing competition require a systemic approach to structural elements of the agricultural enterprise in order to identify optimal solutions operating within free market conditions.

The production system is original not only regional, but also in each farm due to the randomness of agricultural production, the need to maintain biological balance, diversity

of natural and economic conditions. As a result, resource and agricultural products management takes features from other economic sectors and require case by case approach.

The choice of the production system is the basis of the production scheduling process in all its component phases.

Creating a favorable structure for production of goods on recipients, delivery periods and quality categories, also delivery to the state fund, on each hectare and per animal, a bigger quantity of production determines the increase of the average production prices, as a reserve of increase for the profitability of commodity products.

One of the main environmental problems of today's society is the continuously increasing production of organic wastes. In many countries, sustainable waste management have become major political priorities in order to reduce pollution and greenhouse gas emissions and to avoid, as much as possible, global climate changes. This problem becomes more and more present in our country too. [3]

Farm work plays an important role in agricultural production; it is the determining factor for valuing land capital and operating capital.

The economic importance of living labor stems from the fact that it has a high percentage in the farm production costs (up to 25% depending on the species, culture, growing system) [6], raising social aspects especially in family households, where it represents a fix unpaid expense.

Correlative forms of involvement of earnings and monthly cost with other synthetic indicators, production and gross value added in agriculture are essential, as it is the main element conditioning the very quality of life. The monthly cost of labor influences in direct, both total production as well as gross added value in agriculture. [2]

Agricultural work has technical, economic and social characteristics variable according to its complexity and intensity, as follows:

- It varies in time due to weather conditions and biological factors, which generates a series of consequences for the employability

of the workforce and schedule of agricultural work especially in the vegetable sector;

- Working conditions in agriculture are difficult; wages can not express enough the efforts of farmers;

- Because human behavior can not be included in strictly logical and rational schemes, quality and structure of the human factor prevails on its quantity.

Long production cycles (the duration of the production processes is ten times higher than in other branches), the influence of natural conditions, use seasonality of natural and human resources, due to the mismatch between labor time and production time require tracking dynamic profitability.

In stock finished products at the end of the year with destination to be delivered and included in total income, affect total return (determine an increase of the benefit from total activity).

Profitability can be known only after the final production cycle, after completing the calculation.

CONCLUSIONS

In agricultural units primary and secondary processes occur with major implications in the management and organization of the agricultural unit. Here, technological processes are intertwined with biological ones; they even overlap [6] which give a fundamental feature, which must be taken into account in economic and financial decisions and in the fiscal policy adopted. Thus, taking action with living organisms that multiply, develop and produce in time after biological transformations, the costs incurred will be recovered much later, together with capitalization and trading. [4]

Also be taken into account are the risk and uncertainty factors that manifest in agriculture, both natural ones - droughts, floods, frost, diseases, pests, as well as the predictable ones - soil, relief, climate, resulting in considerable action on the production obtained, which is variable according to the nature of the production.

An important percentage in agriculture and in the expenditures amount have transport and

surveillance activities, due both to the long distances, as well as the repetition need of some on the same surface.

Production technologies ensure under given circumstances, obtaining high crop yields with minimal costs. The new technologies must ensure obtaining of unpolluted, high quality, cheap and large amounts products.

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STUDY ON ECONOMIC DEVELOPMENT OF SOUTH-EAST REGION IN ROMANIA

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Abstract

This paper shows the economic development of the South- East Region of Romania, since 2007 until present. The research questions are the following: which are the main indicators that can determine the economic development on the level of Region and, also, which are the predictions about economic development of the Region? In this order were identified and analyzed significant economic indicators, such as gross domestic product at regional level; gross domestic product by category of resources; GDP per capita; number of private entrepreneurs; the number of active local units; staff of active local units; gross and net investments. Economic development of the South- East Region is possible because of foreign investments that contributed to replace old technologies with new technologies, to create jobs and increase productivity. For this study data were taken from the National Institute of Statistics and the National Forecast Commission.

Key words: GDP, gross investments, South- East Region, Romania

INTRODUCTION

South East-Region has an area of 35,762 km² and contains six counties such as Constanta, Tulcea, Braila, Galati, Buzau, Vrancea. This region holds 15% of the total area of the country, is the second largest of the eight regions of Romania [12]. It was found that, the specifics of this region are the disparities between the points of consolidation activities in the industrial sector and the tertiary complex industrial centers, tourist areas and grain and vineyard area [4,6,7]. Counties in South-East Region presents a differentiated of attractiveness degree for investors. In these areas the companies with foreign capital contributed to the development of the entrepreneurial environment. According to data from the National Trade Register Office in July 2012 in South-East Region were registered companies with foreign capital as follows: Constanta-19 companies (the

subscribed share capital in national currency 12.2 thousand lei ; Galati -2 companies (0.4 thousand lei); Braila-3 companies (0.9 thousand lei); Buzau-1company (22.3 thousand lei); Vrancea-1 company (0.2 thousand lei); Tulcea 4 companies (4.6 thousand lei) [15]. Currently, the South-East has 10,726 companies with foreign participation, coming on the 5th position among the eight regions of Romania. Regarding the capital subscribed, South-East is on the 6th position with Euro billion 1.83. In this region, Constanta County is in the top with over 6,000 companies with foreign participation totalizing Euro 768 million capital. The opposite is Vrancea county with 707 firms, but with a share capital of 14,500,000 euros only. In the situation in which we take into account only the number of firms with foreign participation, Tulcea County recorded the fewest companies, namely 463. The most numerous investors

come from Holland, Italy and Germany [18]. An important role in socio-economic development of the South-East are the numerous natural resources. It is necessary to mention gas, oil reservoirs, salt, granite. South-East Region can be developed in the future, if will be used appropriate the Danube ports and tourist resources [12].

MATERIALS AND METHODS

The data were taken from the National Forecasting Commission and National Institute of Statistics. Also, the data were assured from journals and specialized books. Data were retrieved and processed resulting in information which was used in the paper. For the present work, were analyzed more specific indicators such as gross domestic product at regional level; gross domestic product by category of resources; GDP per capita; number of private entrepreneurs; the number of active local units; staff of active local units; Gross and net investments the investments. Analysis of key indicators was performed using the usual statistical methods. Also, the analysis of the material is based on economic interpretation and correlation between indicators.

RESULTS AND DISCUSSIONS

The analysis begins with 2007, a representative year for Romania because of accession to the European Union on 1st January. This year is significant for the national economy, but also for the regional economy, as it does, on the one hand allowed access to a growing number of foreign investors, on the other hand a large number of people of working age have left European Union to work. Another turning point for the economy is the economic and financial crisis in late of 2008. This has produced negative effects until 2012. For these reasons the study started with analysis of GDP both nationally and at regional. In table 1 is shown the evolution of GDP in 2007-2012. GDP is the most synthetic indicator of Romania and in the analyzed period varied from one period to another one [1,2,3]. In 2012 there is an

increase in this indicator with 42.6% compared to 2007. For the period 2010-2012 there was a decrease in FDI (foreign direct investments) and never reached inflation target. [17] In Southeast Region there is an increase in the GDP of 44,446.4 million lei in 2007 to 63,313.2 million lei in 2012. In 2012 the highest value of this indicator was recorded in Constanta (25,032.9 million lei) and the lowest value was recorded in Tulcea (4,860.5 million lei). In South East's contribution to national GDP was 10.6% in 2012.

In table 2 is shown the evolution of GDP by resource category in South-East in 2007-2012. Gross domestic product based on work carried out resulted in the most important economic branches. Note that the contribution of gross value added was different [2]. The data presented in this table can be seen an increase in GDP in 2012 compared to the reference year (2007).

Table 3 presents the evolution of GDP per capita in the South East-Region in 2007-2013. GDP per capita is a very important indicator of economic analysis underlying the South East-Region of Romania. In case of using GDP/capita at regional level check the existence of a breach in the performance of the region compared to other regions [5]. This indicator highlights the standard of living for the population of the South-East, the productivity caused by the investments and demand for goods and services. GDP per capita in the region is below the national average. In 2013 GDP per capita in South-East Region increased by 14.9% compared to 2007. GVA's (Gross Value Added) analysis shows the trend of the regional economy, namely that it is based on services [8]. In table 4 shows the forecast on the evolution of GDP /capita in the South-East of Romania. For the period 2015-2017 is expected to increase this indicator GDP per capita in all counties in South-East Region. These increases are between 12.2%-13.1% a in 2017 compared to 2015.

After analyzing data of table 4 can easily observe significant differences between counties.

Constanta County stands out from the other

counties, so for 2017 are estimated 9,929 GDP per euro.

Table 1. Evolution of GDP in South East Region, during 2007-2012 (million lei)

Specification	2007	2008	2009	2010	2011	2012	2012/2007 (%)
Romania	418,257.9	524,388.7	510,522.8	533,881.1	565,097.2	596,681.5	142.6
South East Region	44,446.4	54,042.6	53,357.8	56,735.2	59,515.8	63,313.2	142.4
Braila	5,621.3	6,675.7	6,783	6,263.9	7,062	7,028.8	125.0
Buzau	6,206.7	7,789.1	7,740.1	7,845	7,967.7	8,603.9	138.6
Constanta	16,316.9	19,307.6	19,680.6	21,245.8	22,203.6	25,032.9	153.4
Galati	8,533.6	10,608.7	9,745.2	11,066.5	11,343.5	11,484.7	134.5
Tulcea	3,225.5	4,128.8	4,011.9	4,525.8	5,205.5	4,860.5	150.6
Vrancea	4,542.4	5,532.7	5,397	5,788.2	5,733.5	6,302.4	138.7

Source: National Institute of Statistics, TEMPO-Online, www.insse.ro, 2015; own calculations, [11]

Table 2. Evolution of GDP on category of resources in South East Region, during 2007-2012 (million lei)

Specification	2007	2008	2009	2010	2011	2012	2012/2007 (%)
Agriculture, forestry and fishing	2,610.2	5,277.2	4,772.6	5019.8	6,657.6	4,556.4	174.5
Mining and quarrying; manufacturing; production and supply of electricity and heat. gas. steam and air conditioning; water distribution; sanitation. waste management. remediation activities	10,460.1	12,230.2	12,063.9	16,494.2	17,766.4	16,834.4	160.9
Construction	4,744.8	6,374.6	6,309	6,049.8	5,176.3	6,445.2	135.8
Wholesale and retail trade; repair of motor vehicles and motorcycles; transport and storage; hotels and restaurants	8,814.7	9,923	10,005.9	7,173.8	6,935.2	10,732.5	121.7
Information and communication	642.5	704.5	658	727.8	615.6	815.2	126.8
Financial and insurance	539.2	662.9	619.1	583.7	323.6	749.4	138.9
Real Estate	4,572.1	4,160.7	4,882.9	5,448.4	5,054.9	5,684.5	124.3
Professional activities, scientific and technical; activities of administrative services and support service activities	1,363	1,567.5	1,448.8	1,749.5	2,104.1	1,917.2	140.6
Public administration and defense; social security insurance; education; Health and social care	4,590.1	6,175.5	6,172.5	6,183.3	5,993.2	6,009.9	130.9
Entertainment activities, entertainment and recreation; repair of household goods and other services	964.4	1,140.3	1,217.2	1,347.8	1,566.6	1,790.8	185.6
Regional gross value added (RGVA)	39,301.1	48,216.4	48,149.9	50,778.1	52,193.5	55,535.5	141.3
Taxes on products	5,196.7	5,946.2	5,339.4	6,139.9	7,124.7	7,662.8	147.4

Source: National Institute of Statistics, TEMPO-Online, www.insse.ro, 2015; own calculations, [11]

Table 3. Evolution of GDP/capita, during 2007-2013 (euro/capita)

Specification	2007	2008	2009	2010	2011	2012	2013	2013/2007 (%)
South East Region	4,687	5,380	4,446	4,581	4,869	5,063	5,387	114.9
Braila	4,293	5,170	4,399	4,537	4,834	4,134	4,391	102.2
Buzau	3,833	4,310	3,584	3,708	3,952	4,214	4,484	116.9
Constanta	6,798	7,780	6,521	6,709	7,119	7,439	7,899	116.1
Galati	4,195	4,832	3,827	3,938	4,179	4,516	4,802	114.4
Tulcea	3,886	4,572	3,690	3,806	4,048	4,465	4,778	122.9
Vrancea	3,536	3,852	3,162	3,242	3,424	3,730	3,969	112.2

Source: National Prognosis Commission-The projection of main economic and social indicators in Territorial Profile until 2017, November 2013; The projection of main economic and social indicators in Territorial Profile until 2014, March 2011 ; own calculation, [10]

This growth of GDP per capita will be based on increased activity in the regional industry and tourism. We must not forget the

significant contribution made by Constanta port. The lowest GDP per capita of 4,953 euro will be provided in Vrancea County in 2017.

Table 5 shows the evolution of private entrepreneurs. The analysis refers to the number of familial enterprises, on the one hand, and independent persons, on the another hand. It is found that familial enterprises decrease in 2013 compared 2007.

Number of family enterprises has significantly decreased in 2013 compared to 2007.

Table 4. Forecasting of GDP/capita, during 2015-2017 (euro/capita)

	2015	2016	2017	2017/2015 (%)
South East Region	6,023	6,379	6,800	112.9
Braila	4,931	5,229	5,578	113.1
Buzau	5,036	5,340	5,692	113.0
Constanta	8,803	9,309	9,929	112.7
Galati	5,361	5,677	6,046	112.7
Tulcea	5,341	5,665	6,045	113.1
Vrancea	4,414	4,660	4,953	112.2

Source: National Prognosis Commission, The Projection of the main economic and social indicators in Territorial Profile until 2017, November 2013; own calculation [10]

While in 2007 there were 14,213 family enterprises, in 2013 we find only 2,341 such companies. The decline is 83.6%. In terms of private entrepreneurs, independent individuals Southeast Region in 2013 is recorded only a modest increase of 3.2% compared to 2007. In the period under review the number of private entrepreneurs registered an oscillating trend. Table 6 shows the evolution of local units active in the South-East in 2007-2013. One can easily find a variation from one period to another one. One thing is certain, active local units decreased by 13.6% in 2013 compared to 2007. According to data published in 2011, in South-East was created a number of 16120 new enterprises and the rate was by 4.2% [13].

Table 7 presents the evolution of the turnover in local units active in the South-East Region between 2008-2012. Turnover is presented both total and on specific size classes of enterprises. The total turnover recorded a growth of 17.1% in 2012 compared to 2008. This increase in turnover correlates with the evolution of local units active in the same period.

As the number of these units decreased and increased turnover, we conclude that this

increase is not based on an increase in economic competitiveness in turn was due to price increases. All the data presented in this table may notice a decrease in turnover for the enterprise over 250 employees. This decrease is 5.1% in 2012 compared to 2008. Another issue is presented in table 8. Is about the evolution of gross and net investments. Also, is presented number of personnel during the period 2008-2012. Three indicator decreased in 2012 compared 2008, as follow: gross investments (-14%); net investments (-8.2%); personnel (-16%). After analyzing the evolution of gross investments related local units active in 2009 compared to 2008 reveals that in the Southeast region are part of the growing trends in terms of the share of investment sectors: manufacturing, construction, real estate transactions. We found a trend of decreasing share of investments in transport, trade, storage and postal and courier activities [16]. Decreased of personnel in local units active are closely with reducing the number of firms that acted in the local economy. In the South-East Region, Constanta is a leader in terms of number of employees and salaries. In this county we find 182,000 employees, with an average monthly wage of 1,503 lei, 2.1 percentage points above the national average. It must be recalled that, Constanta county has a third of the workforce in the South-East. In this county has the lowest unemployment rate of 5.5% compared to 9.6% rate recorded in the counties of Galati and Buzau [14]. To economic development of the South East-Region is required:

- increasing the degree of attraction the investments, especially in counties where unemployment rate is high, by upgrade of infrastructure;
- an appropriate exploitation of natural resources;
- creation of a more flexible labor market in order to adapt job offer to the requirements of entrepreneurs;
- modernization of the agricultural sector and diversifying economic activities;
- increasing competitiveness on medium and long term [9].

Table 5 . Number of private entrepreneurs, during 2007-2013

Specification	2007	2008	2009	2010	2011	2012	2013	2013/2007 (%)
Familial enterprises (number)								
South East Region	14,213	4,549	3,246	1,759	1,692	1,472	2,341	16.4
Braila	1,951	757	476	324	319	100	321	16.4
Buzau	1,174	170	21	:	:	343	290	24.7
Constanta	4,738	979	545	519	520	222	488	10.2
Galati	3,847	1,531	1,411	643	600	508	857	22.2
Tulcea	1,346	222	255	77	74	200	147	10.9
Vrancea	1,157	890	538	196	179	99	238	20.5
Independent persons (number)								
South East Region	25,117	29,653	31,240	31,139	30,489	28,331	25,932	103.2
Braila	3,089	3,256	3,715	3,822	4,205	3,490	3,983	128.9
Buzau	5,137	5,270	5,424	5,041	4,271	4,317	4,505	87.6
Constanta	7,100	9,511	9,648	9,722	9,265	8,255	7,917	111.5
Galati	2,689	4,862	5363	5,531	5,978	5,991	4,931	183.3
Tulcea	3,576	3,101	3,110	3,099	2,849	3,129	1,524	42.6
Vrancea	3,526	3,653	3,980	3,924	3,921	3,149	3,072	87.1

Source: National Institute of Statistics, TEMPO-Online, www.insse.ro , 2015; own calculations , [11]

Table 6. Active local units, during 2007-2013 (number)

Specification	2008	2009	2010	2011	2012	2013	2013/2008 (%)
South East Region	67,203	65,939	60,002	54,972	56,997	58,101	86.4
Braila	7,445	7,306	6,605	6,056	6,248	6,377	85.6
Buzau	10,553	10,367	9,498	8,397	8,751	8,890	84.2
Constanta	24,256	23,874	21,606	19,950	20,536	20,904	86.1
Galati	13,062	12,742	11,526	10,435	11,039	11,321	86.6
Tulcea	4,937	4,819	4,475	4,219	4,492	4,506	91.2
Vrancea	6,950	6,831	6,292	5,915	5,931	6,103	87.8

Source: National Institute of Statistics, TEMPO-Online, www.insse.ro , 2015; own calculations, [11]

Table 7. Turnover of active local units, during 2008-2012 (million lei, current price)

Specification	2008	2009	2010	2011	2012	2012/2008 (%)
Total	103,706	90,059	97,577	108,884	121,541	117.1
0-9 people	19,808	18,043	20,882	22,902	24,356	122.9
10-49 people	24,907	23,223	25,278	28,172	34,892	140.0
50-249 people	22,468	21,442	21,963	25,095	27,628	122.9
250 people and over 250	36,523	27,351	29,454	32,715	34,665	94.9

Source: National Institute of Statistics, TEMPO-Online, www.insse.ro, 2015; own calculations ,[11]

Table 8. Gross and net investments, personnel, during 2008-2012

Specification	UM	2008	2009	2010	2011	2012	2012/2008 (%)
Gross investments	Million lei	12,643	9,610	11,651	12,035	10,880	86.0
Net investments	Million lei	8,522	6,388	7,959	7,581	6,972	81.8
Personnel	Number	536,666	480,348	436,646	446486	450,920	84.0

Source: National Institute of Statistics, TEMPO-Online, www.insse.ro, 2015; own calculations, [11]

CONCLUSIONS

Taking into account all the consideration above, a final answer to the research questions is that significant economic indicators are found, such as GDP at regional level; GDP by category of resources; GDP per capita; number of private entrepreneurs; number of active local units; gross and net investments. These indicators have a central role for describe the economic development of South-East Region. Also, these indicators are a real support in predictions about economic development. This conclusion has implications for the design of economic development.

Resorting to data was found the following:

-GDP per capita in South-East Region increased by 14.9%, in 2013 compared to 2007;

-GVA indicate the trend of the regional economy, which means that regional economy is based on services;

-Number of family enterprises has decreased significantly in 2013 compared to 2007;

-Active local units decreased by 13.6% in 2013 compared to 2007.

-Total turnover increased by 17.1% in 2012 compared to 2008;

-The increase of turnover is based on an increase of price;

-Gross investments decreased at a rate of 14%, in 2012 compared to 2008;

-Net investments decreased by 8.2% in 2012 compared to 2008;

-Personnel of active local units decreased by 16% in 2012 compared to 2008;

The decline of active personnel in the local units active are closely linked to the reduced number of firms operating in the local economy.

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RESEARCH ON PORK MARKET IN ROMANIA

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Abstract

The paper presents the evolution of pork market in Romania, starting from the year 2009 till present. The research is based on a set of specific indicators such as: pig stock, obtained pork production, basic price, consumption, import, export, etc. The data used in this research were taken from the National Institute of Statistics, Ministry of Agriculture and Rural Development and FAOSTAT. The analysis of pork market in Romania is a quantitative study and the used indicators varied from a year to another. The evolution pork market in Romania was determined by economic and financial situation in the country, and also by the fluctuations in the international meat market. Pork production is influenced by many factors, among which consumer demand occupies an important place. Consumer demand is influenced by the price of pork and the price of other categories of goods, consumer incomes and preference.

Key words: market, pork, price, production, Romania

INTRODUCTION

Pig farming sector has an important place in the economies of the world, because a significant share of the world population consumes pork and pork preparations. In general, meat consumption is important for the functioning within normal parameters of the human body, because it contains high quality protein and minerals. The nutritional characteristics of meat are closely correlated with several factors, such as: animal species, sex, age, feeding, season and methods of processing and preparation of meat destined to human consumption.[14].

Romania has a long tradition in pig farming at household level, but also in the industrial system. Before 1989, there were grown 18-19 million pigs, most of them destined to export. After 1989, some of the many units profiled in raising pigs either were privatized or went out of business. Romania's entry into the European Union generated important effects on the national economy, but an important aspect is the increasing competition among the European pork producers. Currently, the pig stock accounts for 5 million heads, which represents 40-45% of consumer need. The economic and financial crisis led to lower

investments, lower investment growth in swine industry, with a negative impact on the domestic production. Because of this, the domestic production does not meet demand in the domestic market. According to the statistical data, pig farming in the family households is more extended than in the industrial system. [23].

MATERIALS AND METHODS

In order to carry out this research, the empirical data were taken from specialized institutions such as: FAOSTAT, Institute of Statistics and Ministry of Agriculture and Rural Development. For the achievement of a relevant analysis of pork market, there were consulted journals, studies, textbooks etc. Pork market analysis is based on a number of indicators, such as: pig stock, pork production, consumption, foreign trade, etc. This study was based on the use of statistical usual methods.

RESULTS AND DISCUSSIONS

Pig stock is an important indicator for the pork sector because the number of pigs have a close impact on pork production. [4]

The evolution of pig number at national and regional level is shown in Table 1. The analysis referred to the period 2009-2013. In this table, the data are structured as follows: the total, private sector, individual holdings. The pig registered a decreasing trend in the period with some exceptions.[2, 9, 10].

In 2013, at world level, the pig stock declined by 10.6 % compared to 2009. At macroregionla level, the descending trend is also maintained. Pig stock differ from a region to another. The macroregion 4 in onthetop position, in 2013, counting 1,623,848 pigs, representing 31.3% of the national stock. In the oposite side, it is the macroregion 3 with the smallest stock, in 2013, having 985,351 pigs, representing 19 % of the total number of pigs.

According to FAO Data base, in 2010, Romania came on the 10th position regarding pig stock, having 3.1% of the pig number

existing in Europe. Germany is the country with the highest number of pigs, being followed by Spain, Rassion Federation, Poland, France, Denmark, the Netherlands, Italy, Ukraine, Belgium, Romania etc [16].

In 2013, according to the data cited by Agerpres, Romania was placed on the 9th position concerning pig stock. On the first positions in hierarchy there were, in order, the following countries: Germany, Spain, France, Denmark, the Netherlands, Poland, Italy and Belgium [21]. The data published by the National Institute of Statistics at the beginning of the month of May mentioned 4,518 million heads, reflecting a decline by 0.2 % compared to the same period of the year 2013. [12].

The forecast for the year 2025 provides as the pig stock to reach 10,000 thousand heads in Romania [15].

Table 1. Evolution of pig stock by ownership form at national level and by macroregion (heads)

Specification	2009	2010	2011	2012	2013	2013/2009 (%)
ROMANIA	Total					
	5,793,415	5,428,272	5,363,797	5,234,313	5,180,173	89.4
	Private sector					
	5,785,756	5,412,681	5,356,458	5,226,998	5,173,209	89.4
Macroregion 1	of which: Individual agricultural holdings					
	4,265,310	3,680,282	3,763,220	3,587,972	3,497,747	82.0
	Total					
	1,360,965	1,217,943	1,215,516	1,190,729	1,170,981	86.0
Macroregion 2	Private sector					
	1,359,489	1,216,283	1,212,979	1,188,816	1,168,767	85.9
	of which: Individual agricultural holdings					
	1,191,544	1,020,438	1,017,038	963,215	945,818	79.3
Macroregion 3	Total					
	1,560,545	1,478,933	1,449,947	1,384,077	1,399,011	96.5
	Private sector					
	1,557,514	1,475,426	1,446,521	1,382,403	1,397,642	89.7
Macroregion 4	of which: Individual agricultural holdings					
	1,086,666	929,219	962,440	957,998	928,521	85.4
	Total					
	1,160,456	1,112,234	1,075,106	1,033,227	986,333	84.9
Macroregion 3	Private sector					
	1,159,834	1,105,622	1,074,291	1,032,284	985,351	84.9
	of which: Individual agricultural holdings					
	846,668	761,109	827,496	762,197	700,182	82.6
Macroregion 4	Total					
	1,711,449	1,619,162	1,623,228	1,626,280	1,623,848	94.8
	Private sector					
	1,708,919	1,615,350	1,622,667	1,623,495	1,621,449	94.8
Macroregion 4	of which: Individual agricultural holdings					
	1,140,432	969,516	956,246	904,562	923,226	80.9

Source: [18]; own calculations

In Table 2, it is presented the evolution of the number of pigs per 100 ha in the period 2009-2013. At national level, the number of pigs decreased from 65.9 heads in 2009 to 58.9 heads in 2013. The highest density of pigs was recorded in the macro-region 1, 84.13

heads/ha in 2013. The macro-region 2 is at the opposite site, with a density of only 45.6 heads/ha heads in 2013. It should be noted that the density of this macro-region is below the national average.

Table 2. Evolution of pig stock per 100 ha by ownership form at national and macroregional level in the period 2009-2013 (heads)

Specification	2009	2010	2011	2012	2013	2013/2009 (%)
ROMANIA	Total					
	65.9	59.3	59.6	58.2	58.9	89.3
	Private ownership					
	66.7	60	60.3	58.8	59.3	88.9
Macroregion 1	Total					
	84.9	84.10	84.11	84.12	84.13	99.0
	Private ownership					
	85.5	70.2	73.3	71.8	74.1	86.6
Macroregion 2	Total					
	51.3	47.2	47.2	45	45.6	88.8
	Private ownership					
	51.7	47.7	47.6	45.5	45.9	88.7
Macroregion 3	Total					
	56.6	55.3	53.1	51	49.3	87.1
	Private ownership					
	57.6	55.7	53.6	51.5	49.7	86.2
Macroregion 4	Total					
	81.8	71.3	73	73.1	76.1	93.0
	Private ownership					
	83.3	73	74.2	74.3	76.8	92.1

Source: [18]; own calculations

In Table 3 it is presented an overview of the pig stock on March 1st, 2014, both in the private sector, and at national level. According to data published by the Ministry of Agriculture and Rural Development, at national level at the date mentioned above, there were 4,349,356 pigs, of which: 8,306 heads in the state sector and 4,341,050 heads in the private one. In the private sector, pigs can be found in the industrial units, companies and associations, family farms. In table 4 it is presented the evolution of pigs' live weight, destined to be slaughtered for human consumption, at the national and macro-regional level, by ownership, during the period 2009-2013. It was noticed a decrease in live weight at the national level, from 584,868 tons in 2009 to 546,530 tons in

2013. At the level of individual agricultural holdings, there is a higher reduction of pigs' live weight.

This decrease accounted for 21.3% in 2013 compared to 2009. At the macro regional level it can be seen a different situation from a macro-region to another. In Romania for the year 2025 it is expected an increase by 13,000 tons pig live weight.

The Ministry of Agriculture and Rural Development has released an Operative Technical Report on the situation of animal husbandry at 31 March 2014.

Regarding the obtaining and marketing of swine production, the situation is the following one: [19]

Table 3. Pig stock at the date March 1st, 2014 at national level, in the state and private sector (heads)

Crt.No	County	Total Sectors	State Sector		Sector privat			
			Total	Of which:	Total	Of which:		
				Industrial units		Industrial units	Societies and private associations	Family farms
1.	TOTAL	4,349,356	8,306	0	4,341,050	1,178,608	678,265	2,484,177
2.	ALBA	81,698	178		81,520		1,838	79,682
3.	ARAD	226,053			226,053		119,831	106,222
4.	ARGES	180,308			180,308	49,249		131,059
5.	BACAU	54,222			54,222	16,579		37,643
6.	BIHOR	196,886			196,886	40,347	18,606	137,933
7.	BISTRITA N.	41,120			41,120			41,120
8.	BOTOSANI	40,251			40,251			40,251
9.	BRASOV	100,082			100,082	43,644	2,760	53,678
10.	BRAILA	204,073			204,073	165,694		38,379
11.	BUZAU	84,164			84,164		18,933	65,231
12.	CARAS S.	49,540			49,540		7,175	42,365
13.	CALARASI	127,163			127,163	79,025		48,138
14.	CLUJ	81,304	1,431		79,873		4,164	75,709
15.	CONSTANTA	146,168	518		145,650	81,423	582	63,645
16.	COVASNA	31,123			31,123			31,123
17.	DAMBOVITA	60,820	79		60,741		7,238	53,503
18.	DOLJ	114,339	2,742		111,597		25,760	85,837
19.	GALATI	71,872			71,872		26,183	45,689
20.	GIURGIU	35,041			35,041		12,426	22,615
21.	GORJ	69,690	54		69,636			69,636
22.	HARGHITA	28,300			28,300		580	27,720
23.	HUNEDOARA	38,851	50		38,801		13,324	25,477
24.	IALOMITA	125,647			125,647		81,632	44,015
25.	IASI	88,772			88,772		20,462	68,310

26.	ILFOV	49,523	1,731		47,792	18,770	4,628	24,394
27.	MARAMURES	76,400			76,400		19,700	56,700
28.	MEHEDINTI	66,694			66,694		11,997	54,697
29.	MURES	78,211	45		78,166	21,082	33,437	23,647
30.	NEAMT	121,845			121,845	58,087	7,350	56,408
31.	OLT	149,100			149,100		44,264	104,836
32.	PRAHOVA	65,504			65,504	13,851		51,653
33.	SATU MARE	126,407	155		126,252		44,212	82,040
34.	SALAJ	63,641	79		63,562		14,630	48,932
35.	SIBIU	58,066			58,066	26,078	659	31,329
36.	SUCEAVA	59,204			59,204		4,960	54,244
37.	TELEORMAN	133,827			133,827	13,905		119,922
38.	TIMIS	657,521			657,521	493,555	16,773	147,193
39.	TULCEA	87,626	1,244		86,382	57,319	255	28,808
40.	VASLUI	56,400			56,400		7,000	49,400
41.	VALCEA	96,054			96,054		24,595	71,459
42.	VRANCEA	125,412			125,412		82,311	43,101
43.	M.BUCURESTI	434			434			434

Source: [20]; own calculations

-at national level, the total production obtained from the state and private was 115,948 tons;

-the production obtained in the state sector was 99 tons, and was entirely sold in the market. Of this production, 46 tons were directly marketed, and 53 tons went to public or private industrial units;

-the production obtained in the private sector was 115,948 tons;

-the family consumption was 18,752 tons, of production achieved in the private sector;

-of the 97,097 tons carried out in the private sector, 14,921 tons were sold on the open market and 82,176 tons were directed marketed to the state or private industrial units.

At present, besides production, a special

attention is paid to price, because it determines the profitability of an economic unit.

In the modern economy, the price represents an important indicator both for producers and consumer. Price is the amount of money that is required and/or offered to purchase a unit of satisfaction or production factors [1]. In other words, the price is the amount of money that the buyer owns and is willing to give to producer at the time when the exchange takes place in the market [5]. The price is part of the marketing mix, with a significant influence on the activity of economic agents, in general, to the marketing especially because it has a large influence on: sales, market share, position on the national market and not least on profit. In the marketing mix, although the price is an

abstract variable, this is the most valuable tool because it is the only element that generates profit compared with other ingredients that cause only expenses.

Table 4. Evolution of live weight of the pigs destined to be slaughter for consumption, at the national and macroregional level, by ownership in the period 2009-2013 (tons live weight)

Specification	Ownership forms	2009	2010	2011	2012	2013	2013/2009 (%)
ROMANIA	Total	584,868	552,734	556,694	554,978	546,530	93.4
	Private Sector	583,847	552,105	556,159	554,523	546,139	93.5
	Of which: Individual agricultural holdings	355,996	310,974	271,156	288,477	280,523	78.7
Macroregion 1	Total	146,146	118,998	123,709	122,658	118,479	81.0
	Private Sector	145,936	118,887	123,576	122,485	118,302	81.0
	Of which: Individual agricultural holdings	117,926	94,941	81,002	85,495	85,650	72.6
Macroregion 2	Total	147,165	145,671	155,464	149,691	145,455	98.8
	Private Sector	146,872	145,382	155,212	149,607	145,375	98.9
	Of which: Individual agricultural holdings	83,919	81,457	70,183	93,076	83,984	100.0
Macroregion 3	Total	118,101	110,742	92,245	90,427	86,020	72.8
	Private Sector	118,007	110,641	92,152	90,359	85,978	72.8
	Of which: Individual agricultural holdings	71,230	64,603	51,924	46,997	43,913	61.6
Macroregion 4	Total	173,456	177,323	185,276	192,202	196,576	113.3
	Private Sector	173,032	177,195	185,219	192,072	196,484	113.5
	Of which: Individual agricultural holdings	82,921	69,973	68,047	62,909	66,976	80.7

Source: [18]; own calculations

In table 5 it is presented the evolution of several categories of prices for pork in Romania in the period 2009-2013. There are

presented the following price categories: basic price and annual average acquisition price.

Table 5. Evolution of the basic price and annual average acquisition price for pork in Romania in the period 2009-2013

Specification	2009	2010	2011	2012	2013	2013/2009 (%)
Pork	Basic price (Lei/ton)					
	7,374	7,076	6,860	7,640	8,350	113.2
	Annual average acquisition price (Lei/kg live weight)					
	5.1	4.93	5.21	6.7	6.16	120.7

Source: [18]; own calculations

The base price has increased from 7,374 Euro /ton in 2009 to 8,350 Euro/ton in 2013. It is

imposed to remind that, the basic price includes producer price plus subsidies by

product, tax by product being excluded [18]. The average purchase price for pork has increased by 20.7% in 2013 compared to 2009.

The Economic Accounts for Agriculture related to swine species are shown in table 6. The accounts are expressed in terms of the prices of the previous year and current prices. These accounts represent a system of interconnected accounts which provide a more systematic, comparable and complete image in agriculture, in order to make the analysis of the production process and primary income in the agricultural branch [22].

The Economic Accounts for Agriculture is the basis for analyzes, forecasts and political decisions.

For swine species, the producer's price value increased from Lei million 3,954.18 current prices in 2009 to Lei million 4,265.71 current prices in 2013.

The subsidies were found only in 2009 (Lei million 7.43 current prices) and in 2010 (Lei million 52 prices).

For the pork market, meat consumption is an indicator which reflects, on the one hand, consumer preferences, and on the other hand it reflects the living standard of the population [3, 6, 7].

In Table 7 it is shown the evolution of the average monthly consumption per person at the national level and by urban and rural area.

Table 6. Economic Accounts for Agriculture in Romania, in the period 2009-2013 (swine)

Specification	2009	2010	2011	2012	2013
Economic Accounts for Agriculture (current prices, Lei million)					
Value at the producer's price	3,954.18	3,762.81	3,531.58	3,859.55	4,265.71
Subsidies by product	7.43	52	-	-	-
Value at the basic price	3,961.61	3,814.81	3,531.58	3,859.55	4,265.71
Economic Accounts for Agriculture (prices of the previous year, Lei million)					
Value at the producer's price	3,352.46	3,967.67	3,593.36	3,465.51	3,902.99
Subsidies by product	208.1	7.45	49.65	-	-
Value at the basic price	3,560.56	3,975.12	3,643.01	3,465.51	3,902.99

Source: [18]; own calculation

The average monthly consumption of pork per person determine average monthly expenses related to buying this type of meat.

In Table 8, it is shown the evolution of average monthly expenditure for buying pork at national level and at macro-region level.

From the data, it can be seen an increase of the average monthly consumption in 2013 compared to 2009, both nationally and in the urban and rural areas.

Table 7. Evolution of average monthly consumption of pork per person in Romania in the period 2009-2013 (Kilograms)

Specification	2009	2010	2011	2012	2013	2013/2009 (%)
Pork	TOTAL					
	0.891	0.904	0.939	0.986	0.989	110.9
	URBAN					
	1.013	1.019	1.027	1.087	1.113	109.8
	RURAL					
	0.743	0.765	0.831	0.865	0.837	112.6

Source: [18]; own calculations

Table 8. Evolution of average monthly expenses per person for purchasing pork, at the national and macro-regional level in the period 2009-2013 (Lei)

Specification	2009	2010	2011	2012	2013	2013/2009 (%)
Average monthly expenses per person	TOTAL					
	9.55	9.49	9.41	10.61	11.74	112.9
	Macro-region 1					
	10.13	10.06	9.77	11.29	12.48	123.1
	Macro-region 2					
	7.43	7.16	7.53	8.91	10.08	135.6
	Macro-region 3					
	11.49	11.41	10.8	11.88	12.81	111.4
Macro-region 4						
9.56	9.9	10.07	10.76	12.01	125.6	

Source:[18]; own calculations

After analyzing of the data presented in the above table, it can be seen an increase of the average monthly expenditure for pork both nationally and at macro-region level. This growth was due, on one hand, to the increase of the acquisition prices for pork, and, on the other hand, to the increased consumption.

In Romania, the annual consumption is around 11 million pigs, of which 40% is assured by the domestic production and 60 % from import [8].

In 2010, according to data from the Ministry of Agriculture and Rural Development, the imports of fresh or chilled pork came on the first position in the hierarchy of agro-food. the imports came from the intra and extra community markets, being around 198,914 tons, with a value of Euro million 304.7.

In 2011, the expenditures related to imports of live pigs and pork exceeded Euro million 350.

From a quantitative point of view, in 2011 there were imported 230,000 tons (33 thousand tons of live pigs and about 200 thousand tons of fresh frozen or chilled meat) [11].

In the first ten months of 2014, pork was on the first position in the hierarchy of imports. The quantity imported was 129,000 tons, representing an increase by 7 % compared to the same period of 2013. For the first ten months of 2014 , the value of imported pork was over Euro million 231.4. It should be mentioned that the Romanian pork was strongly affected by the negative developments on the international market. Due to the export restrictions in certain

regions of the world, some of pork produced in the European Union was imported from Romania at prices very low prices compared to the prices of the domestic producers. In this situation, the Romanian producers were forced to sell their production below the production cost [17]. It is necessary to highlight the following aspects: imported pork is purchased at low prices, but this does not cause a decrease in consumer prices [13].

Romania's exports were negatively influenced both by external and internal factors. Among the internal factors we mention the pig vaccination for the eradication of classical swine fever. Because of this, since 2003 the pork deliveries to the EU market were prohibited. In 2007, the European Commission decided to extend the pork export restrains until 31 December 2009 [11]. An important external factor which hindered the export of pork, but also has negatively influenced the pig farming in Romania, it was the embargo established in some regions where pork is highly consumed.

In order to support the pig sector, at the national level it is running a program whose purposes are the following ones:

- stimulating the organization of competitive and profitable pig farms in rural areas;
- improving the quality of pork carcasse;
- increasing the income of pig breeders;-
- shifting from the production for own consumption to the production destined for the market.

Another important aspect at the national level is represented by the alignment to the EU standards, in terms of how to award subsidies

in order to balance the producer's selling price with the expenditure related to the product achievement[19].

CONCLUSIONS

The analysis of the pork market in Romania allowed to draw the following conclusions:

-pig stock registered a downtrend in period 2009-2013. For 2025, it is forecasted as the pig number to reach 10,000 thousand heads pigs;

- at the national level, the number of pigs per 100 ha declined from 65.9 heads in 2009 to 58.9 heads 2013;

-at the national, a decrease of pig live weight was registered from 584,868 tons in 2009 to 546,530 tons live weight in 2013. For 2025, the production is projected to increase to 13,000 live weight tons;

-the average purchase price for pork increased by 20.7% in 2013 compared to 2009;

-the average monthly consumption per person increased in 2013 compared to 2009, both at the national level and in the urban and rural areas;

-the average monthly expenses for pork increased both nationally and at the macro-region level;

-about 60% of consumption is covered by imported pork.

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BEEF MARKET IN ROMANIA

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Abstract

This scientific paper presents the cattle market dynamics in Romania during 2007-2013. In order to realize this research there were used certain indicators, as following: herds of cattle, realized beef production, selling price, human consumption, import and export. The data were collected from the Ministry of Agriculture and Rural Development, National Institute of Statistics and Faostat. During the analysis, the presented indicators were modified from a period to another, because of both internal and external factors. Consumption demand is being influenced by: beef price, beef quality, price of other meat categories, consumers incomes, population's food consumption pattern and so on.

Key words: beef, consumption, market, price, Romania

INTRODUCTION

Cattle breeding sector is a traditional one in Romania, especially for population in rural areas. Producing beef has a double advantage, both for the producer and for consumer. For producer, breeding cattle has numerous advantages such as:

- Low energy consumption and the nature of forages which he exploits;
- Source of income for population in rural and mountain areas;
- Workforce stability for residents in rural area;
- Production is realized with low costs [17].

Beef has an important place within the

structure of agricultural products in every country [2].

Beef consumption has an advantage for population because it has a great content in proteins, minerals and vitamins. In comparison with other types of meat (pork and lamb meat), beef has the lowest content in cholesterol and saturated fat [10].

Its biological value is being presented in table 1.

Nowadays, globally, beef is very sought after pork, there is a huge discrepancy between beef supply and demand, highlighting the fact that one could start profitable business in breeding cattle field.

Table 1. Biological value of beef in comparison with other animal products

Appreciation Index	Beef -adult cattle-	Beef -young cattle-	Pork	Cow milk	Eggs
Biological value	69.79	62	74 - 75	90	94
Coefficient of global usage	76	62	71 - 79	86	94
Protean efficiency	3.2	2.9	3,0	2.9	3.8

Source: [17]

In the recent period of time, beef market recorded an ascending trend because consumption grew on emergent markets such as China, Argentina and Brazil. Global beef

market is dominated by four representative companies, as following: Tyson Foods, JBS, National Beef Company and Cargill Meat Solutions. These enterprises covered more

than 70% of the market, in 2013 [16]. Regarding the evolution of beef market in Romania, one could estimate an extension of this market, becoming more attractive for all operators within this sector because the European Union gives a financial support, not negligible. Concerning the total beef consumption (adult and young cattle) for 2020, one could estimate an increase of consumed meat (215 thousand tons). For 2030 there is predicted a doubling of beef production in comparison with the one in 2010. As beef production increases, one could observe an increase of population's average consumption, as follows: in 2020, the consumed quantity will be of 10 kg/ capita. In 2030, beef consumption will be equal to the European average one [11].

MATERIALS AND METHODS

The statistical data which were used for accomplishing this research were given by Ministry of Agriculture and Rural Development, National Institute of Statistics and Faostat. In order to better highlight the dynamics of beef market there were consulted many speciality magazines, books, studies and reports. In order to realize the analysis of beef

market there were used many indicators, among which: herds of cattle, realized beef production, human consumption, external trade.

RESULTS AND DISCUSSIONS

The dynamics of herds of cattle both at national and regional level, during 2007-2013 is being presented in table 2.

In accordance with data given by the National Institute of Statistics, one could easily observe that the total number of cattle decreased during the analyzed period, from 2,818,983 heads in 2007 to 2,022,408 heads, in 2013. During 2007 and 2011 there were recorded consecutive declines for herds of cattle.

The herds of cattle differ a region to another. In 2013, the north-east region recorded the biggest herd of cattle (524,521 heads). Starting with 2012, one could observe a growth of herds of cattle. Regarding the herds of cattle, Romania is among the 10th countries that breed cattle in the European Union: France, Germany, United Kingdom, Ireland, Italy, Spain, Poland, Holland and Belgium [8].

Table 2. Dynamics of herds of cattle both at national and regional level (head)

Specification	2007	2008	2009	2010	2011	2012	2013	2013/2007 (%)
ROMANIA	2,818,983	2,683,611	2,512,296	2,001,105	1,988,939	2,009,135	2,022,408	71.7
North-West Region	453,616	413,146	405,039	348,075	347,662	348,878	351,552	77.4
Center Region	389,545	366,449	360,448	320,403	313,255	316,131	320,786	82.3
North-East Region	698,521	689,961	651,004	506,137	510,817	515,339	524,521	75.0
South -East Region	320,539	312,390	292,040	231,400	231,879	240,415	238,677	74.4
South Muntenia Region	399,709	371,700	342,121	238,761	237,696	234,459	232,359	58.1
Bucharest – Ilfov Region	19,254	17,925	17,310	8,142	7,171	7,429	6,676	34.6
South-West Oltenia Region	315,860	304,805	259,419	195,695	196,712	193,519	194,177	61.4
West Region	221,939	207,235	184,915	152,492	143,747	152,965	153,660	69.2

Source: [14]; own calculations

In table 3 there is presented the dynamics of cattle number for 100 hectares of agricultural

land, both at national and regional level during 2007-2013.

At national level, one could observe a decrease from 21.4 cattle in 2007 to 15 cattle in 2013. At regional level, the same descending tendency is being maintained in 2013 in comparison with 2007. In 2013, the highest number of cattle per 100 ha of agricultural land was in the North-East Region (27.3 heads).

At the opposite side, the smallest number of cattle was assigned for 100 ha, being recorded in the West Region (9.0 heads). According to some data publish in Farm Magazine and Agricultural Newspaper, in 1990, the number of cattle reported to 100 ha of agricultural land was 45.2 heads in 1990, but having a significant reduction to 14.9 heads in 2013. In which it concerns the number of inhabitants per a cow, it increased from 2.54 in 1990 to 6.87 in 2010. Globally, this reference index is represented by a cow per 5 inhabitants, in comparison with only 2.38 cattle heads in France, 2.66 cattle heads in Denmark, 3.26 cattle heads in Holland and 3.56 cattle heads in Belgium [18] . Referring to the number of cattle per 100 ha of agricultural land, Romania does not have an advantageous

position; by contrast, it is at the end of the ranking, being followed only by Bulgaria [8]. Holland is the country with the biggest number of cattle per 100 ha of agricultural land, 227.7 heads (2013), being followed by Belgium (186.1 heads) and by Ireland (139.2 heads) [12]. The weight dynamics of live cattle designed to slaughter for consumption, both at national and regional level for 2007-2013 period is presented in table 4. In 2013 meat production registered the following structure: poultry (49.4%); pork (45.77%); beef (4.35%); sheep and goats (0.48). Beef production is on the third place, being visible surpassed by poultry and pork. According to data from the National Institute of Statistics, in 2013, there were slaughtered 139,632 cattle at national level [3]. The number of slaughtered cattle oscillated one region to another, as following: North-East (73,650 heads); South-East (14,258 heads); South-Muntenia (11,973 heads); South-West Oltenia (16,924 heads); West (994 heads); North-West (11,007 heads); Centre (10,826 heads); Bucharest – Ilfov (-).

Table 3. Dynamics of cattle number for 100 ha of agricultural land both at national and regional level, during 2007-2013 (heads)

Specification	2007	2008	2009	2010	2011	2012	2013	2013/2007 (%)
ROMANIA	21.4	20.4	19.1	14.6	14.7	14.8	15.0	70.0
North-West Region	23.8	22.1	22.3	18.5	18.5	18.5	19.2	80.6
Center Region	22.6	21.4	20.5	17.8	17.3	17.4	17.4	76.9
North-East Region	35.1	35.5	33.8	25.4	27	27.2	27.3	77.7
South -East Region	15.4	14.3	13.4	10.3	10.4	10.7	10.6	68.8
South Muntenia Region	17.7	16.4	14.7	10.5	10.3	10.2	10.1	57.0
Bucharest –Ilfov Region	21.1	20.1	17.2	7.1	7.5	7.8	9.2	43.6
South-West Oltenia Region	21.1	19.5	16.5	12	12	11.8	12.3	58.2
West Region	13.7	13.4	12.4	8.7	8.6	9.2	9.0	65.6

Source: [14]; own calculations

Referring to cattle slaughtered in specialized industrial units, in 2013, there was a growth

with 3.6 % than in 2012. Cattle slaughters were representative within North-East regions

(52.8%), South-West Oltenia (12.1%) and South-East (10.2%) [13]. At national level, cattle production expressed in tons live weight recorded a decrease from 333,282 tons in 2007 to 192,206 tons in 2013. In specialized abattoirs, in 2013, slaughtered cattle's live weight was of 60,476 tons than in 2012. Referring to carcase weight, this was of 29,338 tons, into specialized abattoirs. Cattle carcase weight was of 29,338 tons in 2013 than 28,714 tons in 2012. It had a different evolution one region to another as following: North-East (14,846 tons); South-East (2,866 tons); South-Muntenia (2,517 tons); South-West Oltenia (4,052 tons); West (254 tons); North-West (2,327 tons); Centre (2,477 tons); Bucharest-Ilfov (-) [4].

The average weight for pig species at abattoirs level was of 433.1 kg in 2013 than 437.3 kg in 2012 [13]. Nowadays, the price represents a very important indicator both for producer and consumer.

Market economy functions in normal conditions based on supply and demand, while the central axis is represented by price. In economy, price has the role to adjust the market.

This could be possible only in conditions of a normal competitive environment [9]. In table 5 is being presented the dynamics of base price and annual average one.

Base price increased from 4,490 Ron per tone to 6,980 Ron per tone in 2013, which signifies an increase of 55.4%.

Regarding the annual average price of acquisition, it recorded a crescent tendency during the analyzed period.

In 2013, for beef, it was double than in 2007. In 2007, the demand for beef was diminished than in 2006 [7].

First of all, the price is influenced by farmers' costs. In order to realize a picture of cattle breeding sector in Romania, there are being used "Economic Accounts for Agriculture". These are presented in table no. 6.

There must not be forgotten the fact that "Economic Accounts for Agriculture" represent a solid support for realizing some pertinent analysis, predictions and least, but not last they are important for political decisions (14).

For cattle species, the value for producer's price decreased from 1414.75 million Ron (current prices) in 2007 to 1339.45 million Ron (current prices) in 2013.

In table 7 is presented the monthly average consumption per capita at national, urban and rural level.

Analyzing the data in table 7 one could observe a decrease of average consumption per capita from 0.284 kg in 2007 to 0.201 kg in 2013. This decrease is due to: a growth of prices for beef; a decrease of money purchasing power; population's consumption preferences; beef quality; appearance of some diseases at cattle and so on [1].

Also, one could notice that the population in urban areas consume more beef. In 2013, there was recorded within the urban areas a monthly average consumption of 0.257 kg per capita in comparison with the rural sector, where the consumption had a value of 0.134 kg per capita.

Monthly average expenditures for buying beef are connected to the consumed quantity and to market price.

The dynamics of monthly average expenditures per capita for buying beef during 2008-2013, is being presented in table 8.

At national level, monthly average money expenditures per capita for buying beef decreased from 3.92 Ron in 2008 to 3.83 Ron in 2013, representing a decrease of 2.3%. Decreases are also recorded in 2013 in comparison with 2007, at the 1st Macro-region (-16.1%) and the 3rd one.

At the opposite side there were registered increases in 2013 in comparison with 2007, in the 2nd Macro-region (+12.2%) and the 4th one (+10.4%). These expenditures depend on consumption preferences and consumers' incomes [5].

According to data given by Faostat, Romania imported a number of 12049 live cattle in 2011 in comparison with 5984 ones in 2007, representing a doubling of imports.

There must be remembered that there were imported breeds of superior quality with a higher productivity. In 2011 imports value was of 15,925 thousand dollars in comparison with 11,028 thousand dollars in 2007.

Table 4. Weight dynamics of live cattle designed to slaughter for consumption, both at national and regional level for 2007-2013 (tons, live weight)

Specification	2007	2008	2009	2010	2011	2012	2013	2013/2007 (%)
ROMANIA	333,282	306,373	264,155	205,347	211,971	198,510	192,206	57.6
North-West Region	61,048	51,180	46,135	30,320	29,863	28,603	25,252	41.3
Center Region	46,843	44,708	39,449	33,605	44,831	38,255	35,248	75.2
North-East Region	67,823	67,808	57,229	53,708	50,384	50,532	50,671	74.7
South -East Region	34,837	31,506	23,720	18,991	18,963	17,797	20,595	59.1
South Muntenia Region	63,727	55,673	54,434	35,636	33,332	31,465	29,411	46.1
Bucharest –Ilfov Region	2,656	3,015	1,379	1,304	1,068	803	818	30.7
South-West Oltenia Region	34,195	31,899	26,089	18,903	17,788	16,688	16,536	48.3
West Region	22,153	20,584	15,720	12,880	15,742	14,367	13,675	61.7

Source: [14]; own calculations

Table 5. The evolution of base price and annual average one of acquisition for beef in Romania, during 2007-2013

Specification	2007	2008	2009	2010	2011	2012	2013	2013/2007 (%)
Beef	Base price (Ron/tonne)							
	4,490	8,109	9,672	5,655	6,500	6,640	6,980	155.4
	Annual average price (Ron/kg live)							
	2.98	3.52	4.79	4.85	5.51	5.73	6.0	201.3

Source: [14]; own calculations

Table 6. Economic Accounts for Agriculture in Romania for cattle species, from 2007 to 2013

Specification	2007	2008	2009	2010	2011	2012	2013	2013/2007 (%)
Value to producer's price	Economic Accounts for Agriculture (current prices – millions Ron)							
	1,414.75	770,4	1,129.26	887,69	1,079.76	1,282.41	1,339.45	94.6
Subventions for products	254.72	709,94	770.18	0,8	-	-	-	-
Value to base price	1,669.47	1480,34	1,899.44	888,49	1,079.76	1,282.41	1,339.45	80.2
Value to producer's price	Economic Accounts for Agriculture (prices of previous year-millions Ron)							
	1,685.43	694,63	828.78	903.41	938.56	1,255.37	1,274.2	75.6
Subventions for products	65.84	125,07	763.73	616.14	0.85	-	-	-
Value to base price	1,751.27	819,69	1,592.51	1519.55	939.41	1,255.37	1,274.2	72.7

Source: [14]; own calculations

Referring to beef imports, they registered a decrease in 2011 (437 tons) than in 2007 (1,793 tons). The value of beef imports was of 14,897 dollars in 2011. During the first nine months in 2014, cattle exporters in Romania

delivered calves for 95.0 million Euro. In terms of value, exports earnings place Romania on the 2nd place through the European Union, concerning exports of live cattle.

Table 7. Dynamics of monthly average consumption of beef per capita in Romania, from 2007 to 2013 (Kg)

Specification	2007	2008	2009	2010	2011	2012	2013	2013/2007 (%)
Beef	TOTAL							
	0.284	0.297	0.271	0.228	0.195	0.194	0.201	70.7
	URBAN							
	0.361	0.393	0.346	0.289	0.255	0.245	0.257	71.1
Beef	RURAL							
	0.19	0.18	0.179	0.154	0.123	0.132	0.134	70.5

Source: [14]; own calculations

Table 8. Dynamics of monthly average expenditures per capita for buying pork both at national and macro-regional level, during 2009-2013 (Ron)

Specification	2008	2009	2010	2011	2012	2013	2013/2008 (%)
Monthly average expenditures per capita	Total						
	3.92	4.21	3.72	3.29	3.44	3.83	97.7
	Macro-regions 1						
	3.62	3.29	3.04	2.68	2.85	3.04	83.9
	Macro-regions 2						
	4.07	4.79	4.02	3.58	4.05	4.57	112.2
	Macro-regions 3						
	4.62	4.88	4.19	3.79	3.66	3.95	85.4
Macro-regions 4							
3.17	3.54	3.49	2.95	2.93	3.5	110.4	

Source: [14]; own calculations

France is the European Union's leader in the export of live cattle because it has the biggest cattle live stock. At the opposite side, processed beef exports in 2013 were 8.3 times lesser than the value of live cattle. This situation placed Romania on the 17th place in Europe [20]. There must be remembered the existence of competitiveness regarding import beef, leading to a deterioration between internal supply and demand [6]. Starting with 2015, the European Union resumes beef exports to United States, after an embargo that lasted 17 years. This export interdiction happened because of mad cow disease. In this context, Romania is getting ready and hopes to regain the access on the American market. Romania was one of the ten countries that exported meat to markets outside the European Union [19]. In order to relaunch the sector of cattle breeding, there must be considered the following aspects:

- Growth of cattle herds and production;
- Increasing of slaughter weight ;
- Increasing productivity within forages production sector;
- Reducing costs with beef processing;
- Financial support in order to organize exploitations in associations

-Realizing an organized system for supplying abattoirs with animals and so on [15].

CONCLUSIONS

After analyzing the beef market in Romania, one could consider the following conclusions:

- Cattle herd registered a descendent tendency during 2007-2013;
- The number of cattle for 100 ha agricultural land has been reduced from 21.4 heads in 2007 to 15 heads in 2013;
- Is being recorded a decrease of live cattle weight designed to slaughter for consumption, from 333,282 tons live weight in 2007 to 192,206 tons live weight in 2013.
- Average acquisition price for beef doubled in 2013 than in 2007;
- Beef monthly average consumption per capita decreased in 2013 than in 2007;
- At national level, beef monthly average expenditures recorded decreases in 2013 than in 2007.
- The value of live cattle exports exceeds the value of processed beef exports.

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THE INFLUENCE OF TECHNOLOGY MEASURES ON THE REDUCING EFFECT OF DROUGHT AT MAIZE CROP

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Abstract

The climate phenomena of drought, aridity and desertification are increasingly present more often and continues to worsen as a result of the negative effects that technological progress intensively exerts on environment, especially on the climate. The present work aims to determine the influence of soil tillage, plant density and hybrid used on the diminishing effect of drought by maize crop with the intention of finding the best option to work. The associated influence of the soil tillage, plant density and hybrid used on the production of maize determined the highest yields by performing the combinator on the soil tillage, as basic tillage, using a density of 55,000 plants / ha and using hybrid PR36V52. Replacement the combinator tillage with plowing or direct seeding determined to obtain lower production up to 2000 kg/ha regardless of the hybrid used. In similar climatic conditions of agriculture in 2013, recording a poor distribution of rainfall, accompanied by a high temperature control throughout the growing season will mark the achievement of normal production the maize crop, between 5005 - 7950 kg/ha and the average production recorded a value of 6652 kg/ha.

Key words: drought, plant density, soil tillage

INTRODUCTION

The general picture of the effects of drought, outlined very clearly in recent years has undergone major changes as a result of increasing global climate change. To establish sustainable farming conservation tillage is necessary especially in the arid areas of the world. The minimum tillage and direct seeding are some of the methods that farmers apply recently for a long-term farming with minimum fuel cost (Kosutic et al, 2005). [4] The other experimental results showed that yield performance between conventional method and reduced tillage were not significant (Akbarnia et al, 2010). [1] One of the most important negative consequences of modern agricultural production is the soil physical degradation, which is caused to intensive tillage practices (Hamza and Anderson, 2005, Rusu et al., 2006). [3, 6] Compaction causes deterioration of soil physical properties, evidenced by increasing the penetration resistance, high specific resistance to soil tillage operations and soil structure stability, with direct impact on yield

and production costs (Botta et al., 2007, 2008) [2]. Liebig et al. (2004) made a research in which they examined interactive effects of tillage, crop sequence, and cropping intensity on soil quality indicators for two long term cropping system experiments. [5] Replacing the soil plowing with discing tillage to base depth of 10-12 cm over 1-2 years did not significantly affect the production (Sin și colab., 1986). [7]

MATERIALS AND METHODS

The experiments were designed to determine the influence of soil tillage, plant density and hybrid maize production on soil and climate conditions in the South of Romania.

To determine the optimal technology for growing maize hybrids was watched react differently to different methods of tillage and density and the interaction of these factors. It was also watched hybrids behaved in terms of quality indicators.

Observations and measurements were conducted during 2013 and graduations following factors:

- soil basic work: a1 - plowing + disc + combinator + planting, a2 - combinator + planting, a3 - Direct planting
- Plant density: B1 55 000 plants / ha, b2 - 65,000 plants / ha
- Hybrid Corn: c1 - Olt, c2 - Mostistea, c3 - PR36V52

Experience has been placed in a uniform field in terms of fertility and microrelief on chernozem soil class. Module type two-factor experiment was arranged after the subdivided parcels method in three repetitions.

RESULTS AND DISCUSSIONS

The effect of soil tillage on corn production in the conditions of 2013 is presented in Table 1. The data showed that the highest yield of 7431 kg / ha was obtained as the result of using on the soil the combinator. Replacing it with the plowing soil tillage caused decreased production of 677 kg / ha, the difference is significant. Also, the work of seeding directly applied as a technological component compared with the combinator + planter resulted a decrease of production with 2020 kg / ha, the difference being highly significant.

Table 1. Analysis of variance to experience regarding the influence of tillage, density and the variety on the production of maize in 2013

Variant	SS	DL	S ²	F _C	Ft		Significance
A	38034600	2	19017300	85.1	6.94	18.00	**
E _A	893438	4	223359				
B	5121422	1	5121422	137.1	5.99	13.74	**
A X B	466886	2	233443	6.25	5.14	10.92	*
E _B	224088	6	37348				
C	642673	2	321336	6.27	3.40	5.61	**
A X C	121742	4	30435	0.64	2.78	4.22	
B X C	61610	2	30805	0.64	3.40	5.61	
AXBXC	18773	4	4693	0.10	2.78	4.22	
E _C	1146964	24	47790				

Source: Own calculations.

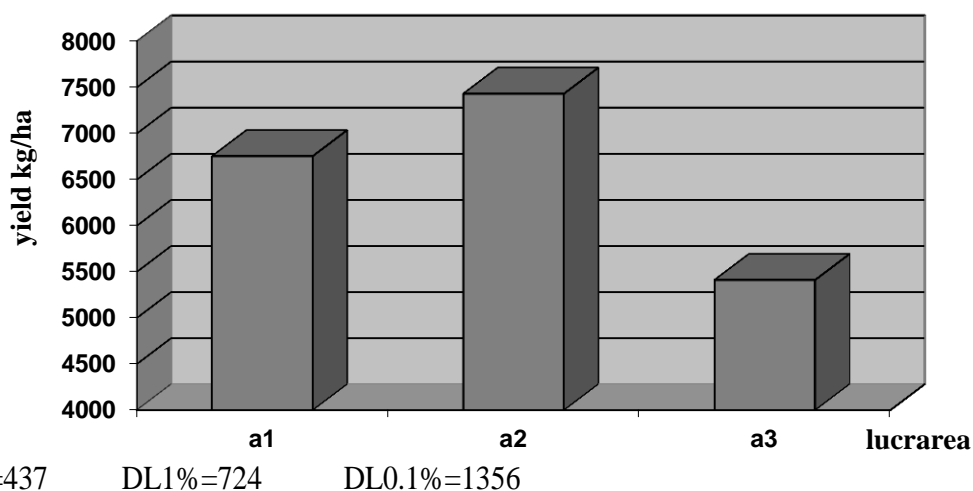


Fig.1. The influence of soil tillage on the production of maize (kg/ha) in 2013

Own calculation and design

The influence on the production of maize hybrid in terms of 2013 is shown in Table 2.

The data show a differentiation of hybrids that reflect their biological peculiarities, especially those related to adaptation to climatic conditions.

In terms of 2013, the hybrid Mostiștea obtained a production of 6,556 kg/ha,

compared with hybrid PR36V52, which won 6,652 kg/ha and the hybrid control Olt obtained 6,388 kg / ha. The difference of 168 or 264 kg/ha between the two hybrids and control variant are very significant.

Table 2. The influence of hybrid on maize production (kg/ha) in 2013

Variant	Yield (kg/ha)	%	Differences (kg/ha)	Significance
C1-Olt	6,388	100	Mt	
C2-Mostiștea	6,556	103	168	
C3-PR36V52	6,652	104	263	**
	DL5%=150	DL1%=204	DL0.1%=273	

Source: Own calculations.

The influence of soil associated to the tillage and to the production of corn hybrids under the conditions of 2013 is shown in Figure 2. From the data presented it appears that the highest yields were obtained by using as basic tillage the combinator before planting, regardless of hybrid use. Replacing the combinator tillage with autumn plowing +

disc + combinator or direct seeding, resulted a lower yields obtained with 800 -2,040 kg/ha hybrid Mostiștea, and 695 -2,074 kg/ha hybrid PR36V52.

When making multiple comparisons between variants of soil tillage and the hybrid used results the same superiority options.

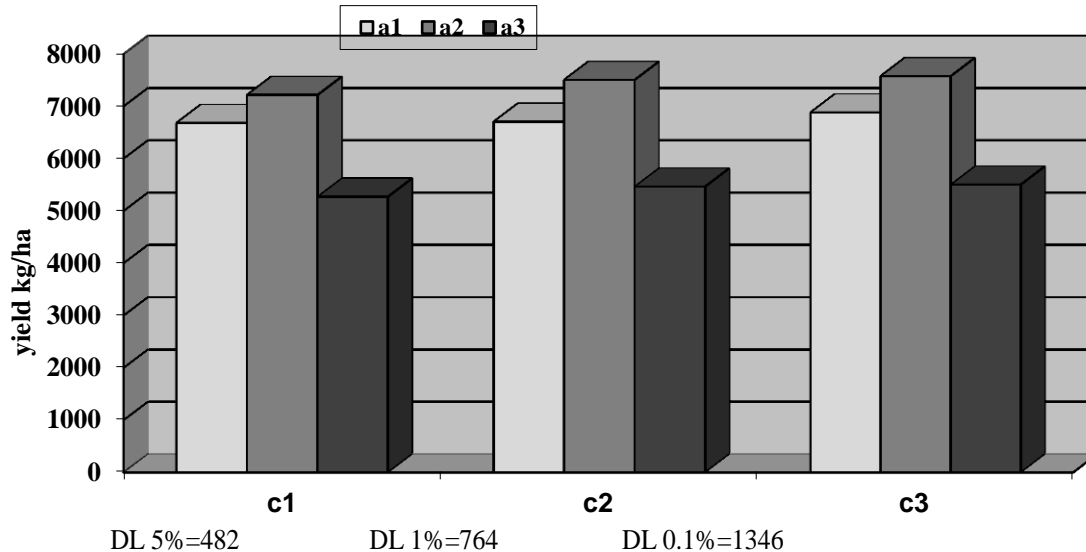


Fig.2. The influence of soil tillage on the production of maize depending on the hybrid
Own calculation and design.

Comparing averages graduations factor A - tillage, amid using two densities, which is studied in three hybrids: the highest yields were obtained using the combinator variant soil tillage and using the density of 55,000 plants per (7,580 kg/ha, 7,950 kg/ha, respectively 8,026 kg/ha).

By performing basic tillage by plowing Autumn + disk + Combinator using a density

of 55,000 plants/ha, in terms of 2013, the average yields obtained was 6,860 kg / ha for hybrid Mostiștea, 7,130 kg / ha on hybrid PR36V52, compared to control Olt hybrid with 6,850 kg/ ha (Fig.3.)

Agricultural year in 2013, even records a high thermal conditions during the growing season will mark the achievement of normal maize production (5,553-8,026 kg/ha).

The experimental data on the influence of basic soil tillage and plant density on yield of maize highlight the major role of these factors (Table 3).

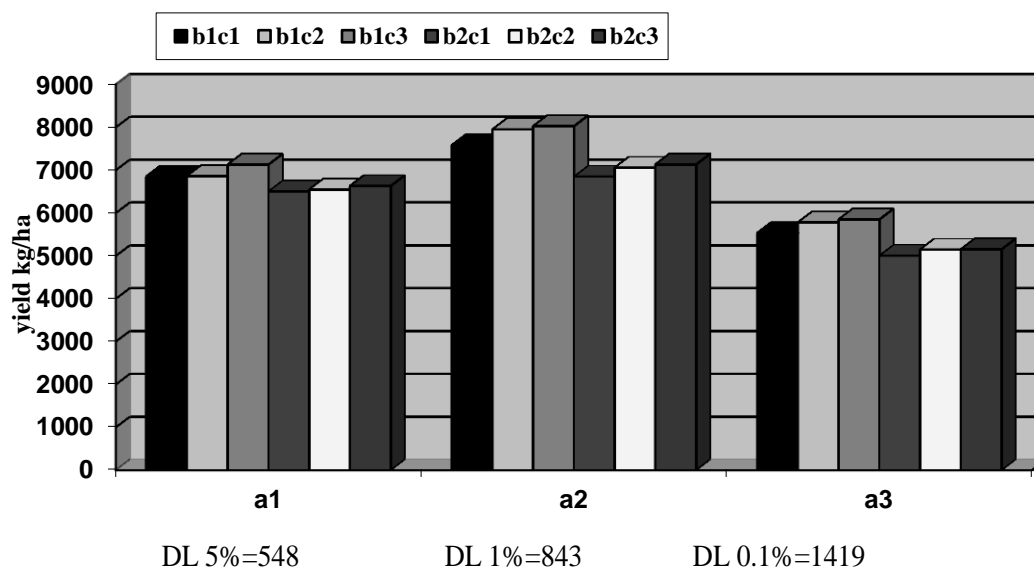


Fig.3. The influence of soil tillage on the production of maize depending on density and hybrid
Own calculation and design.

Table 3. Summary data regarding the influence of soil tillages, density and the hybrid on the production of maize

	Variant	C1-Olt	C ₂ -Mostiștea	C3 – PR36V52	Yield (kg/ha)
A ₁ -plow + disk+combinator	b ₁ -55.000 pl/ha	6,853	6,860	7,130	6,948
	b ₂ -65.000 pl/ha	6,506	6,546	6,630	6,561
A ₂ -combinator+planting	b ₁ -55.000 pl/ha	7,580	7,950	8,026	7,852
	b ₂ -65.000 pl/ha	6,850	7,056	7,123	7,010
A ₃ -direct planting	b ₁ -55.000 pl/ha	5,533	5,780	5,850	5,721
	b ₂ -65.000 pl/ha	5,006	5,146	5,153	5,102
Average yield		6,388	6,556	6,652	6,532

Source: Own calculations.

Table 4. Interaction factors

Interaction factors	DL Values		
	5%	1%	0.1%
Comparison between variants of tillage	437	724	1,356
Comparison of density variations	128	195	313
Comparison of the hybrid variations	150	204	273
Comparison between tillage variants at the same density	465	761	1,400
Comparison between variants of the same version on hybrid density	215	303	433
Comparison between variants of the same ground work on hybrid version	482	764	1,346
Comparison between tillage variants at the same density and hybrid	548	843	1,419

Source: Own calculations.

CONCLUSIONS

In normal conditions, but at high temperatures, maize culture technology in the studied variants consists in the preparation of the seed bed by using the combinator before

planting, with a density of 55,000 plants/ha using the hybrid PR36V52 or Mostiștea.

If the maize crop is planting directly in similar climatic conditions of 2013 will lead to a decline in production, irrespective of the genetic value of hybrid use. The experimental results on the influence of

the basic tillage of the soil, and plant densities, and the hybrid corn on yield used to show the importance of these factors.

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STATE AND IMPLEMENTATION OF THE MEASURE „RESTRUCTURING AND CONVERSION OF VINEYARDS” IN BULGARIA

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Abstract

Development of vineyard sector in Bulgaria is determined from one side by appropriate natural and climatic conditions and existing vineyard structure, as well as the traditions in selection of varieties and technology in wine producing. The aim of the paper is to analyze and assess the financing in the vineyard sector for the period 2007-2013 under the measure "Restructuring and conversion of vineyards" and on this basis to make generalized conclusions for, implementation of the measure in the previous programming period and to provide guidelines to enhance the potential of the sector through the use of funding in the new programming period. The paper presents the analysis of the possibilities for funding under the measure "Restructuring and conversion of vineyards"; analysis of the fund distribution of the measure for the period 2007-2013; analysis of the disbursed budget; analysis of maximal financial support per ha for different activities, evaluation of financial application and impact of the measure.

Key words: *measure, restructuring, vineyard*

INTRODUCTION

Development of vineyard sector in Bulgaria is determined from one side by appropriate natural and climatic conditions and existing vineyard structure, as well as the traditions in selection of varieties and technology in wine producing. For the period 2001- 2013, areas under vineyard decreased about 3 times (Table 1). This is explained by the restructuring process in the sector, the loss of some markets of local wine and implemented policy for vineyard.

In 2013 the areas covered by vineyards in the agricultural holdings accounted for 58 236 hectares. If compared to 2012, the areas covered by vineyards in the farms have been reduced by 7%. The areas occupied by ill-kept vineyards as a result of social, economic or agronomic reasons covered about 5 thousand hectares. Around 42% more than 2012 were the newly planted vineyards, and these that are not entered into fructifying period are 2 %. It is observed that the area of ill-kept vineyard is almost the same as in the beginning of the period in 2001 such as for 2013.

Table 1. Vineyards in Bulgaria in the period 2001—2013, hectares [1]

Year	Areas covered by vine plantations, ha	Ill-kept vineyards outside farms, hectares	Total areas covered by vineyards, hectares
2001	146,995	4,190	151,185
2002	129,998	15,200	145,198
2003	103,019	28,050	131,069
2004	95,551	34,029	129,580
2005	94,724	32,118	126,842
2006	85,320	43,537	128,857
2007	97,387	22,954	120,341
2008	88,570	22,246	110,816
2009	74,018	27,416	101,434
2010	56,968	25,707	82,675
2011	52,567	25,901	78,468
2012	62,701	14,640	77,341
2013	58,236	4,900	63,136

MATERIALS AND METHODS

Results and conclusions in the paper are based on the results of university research project [9] and information from annual reports of the Executive agency on wine and vine and Ministry of agriculture and food.

The aim of the paper is to analyze and assess the financing in the vineyard sector for the period 2007-2013 under the measure "Restructuring and conversion of vineyards" and on this basis to make generalized conclusions for the implementation of the measure in the previous programming period, and to provide recommendations to enhance the potential of the sector through the use of funding in the new programming period. To realize the aim of the paper were made:

- analysis of the possibilities for funding under the measure "Restructuring and conversion of vineyards";
- analysis of the fund distribution of the analyzed measure for the period 2007-2013;
- analysis of the disbursed budget for the analyzed measure;
- analysis of maximal financial support per

ha for different activities included in measure "Restructuring and conversion of vineyards";

- evaluation of financial application and impact of the measure.

RESULTS AND DISCUSSIONS

Financial support by measure „Restructuring and conversion of vineyards“

One possibility for the development of the vineyard sector is financing under the measures of the National support program for the wine sector, which is implemented in Bulgaria as a financial instrument for the period 2008/2009 - 2013/2014.

National support program for the wine sector 2008/2009 - 2013/2014 includes three measures for support financed by EAGGF as follows [2]:

- ✓ Measure —Restructuring and conversion of wine vineyards;
- ✓ Measure —Insurance of the harvest;
- ✓ Measure —Promotions of wines in third

countries;

One of the measures which have an important role for the development of the sector in the country is "Restructuring and conversion of vineyards". Three main activities are supported under the measure "Restructuring and conversion of vineyards". They are as follows:

- ✓ Conversion - changing the composition of the plantation varieties by grafting of varieties classified for the wine-growing regions of the country;

- ✓ Replanting with or without relocation of vineyards (vineyard restructuring), with or without change of the variety with the possibility of increasing the number of vines per hectare and / or changing formations with or without change of the supporting construction;

- ✓ Improved methods and technologies for vineyard management through:

- increasing the number of vines per hectare;
- changing formations with or without change of the supporting construction;
- building of facilities to protect against damage inflicted by wild animals and birds;
- building of erosion control facilities;
- building of irrigation facilities - drip irrigation;
- building of terraces;
- reconstruction of existing terraces;

Financial support for the measure "Restructuring and conversion of vineyards" is max 75 % of the investment for conversion and restructuring of vineyards, for increasing the number of vines per hectare, for changing formations, for building of irrigation facilities. Financial support for building of terraces and reconstruction of existing terraces is max 50% of the investment and financial support for building of facilities to protect against damage inflicted by wild animals and birds and building of erosion control facilities is max 30 % from the investment.

The compensation for loss of revenue under Article 3a, paragraph 1, item 2 of Regulation 1/2009 on procedures for granting financial assistance from National support program 2008/2009 - 2013/2014 for beneficiaries of the financial measure "Restructuring and conversion of vineyards" covers a period of

three years after the uproot of vineyard.

The maximal financial support per ha for different activities included in measure “Restructuring and conversion of vineyards” for each financial year is define with Ordinance of the Minister of agriculture and food. The maximal financial support per ha is for the activities connected with “Replanting with or without relocation of vineyards (vineyard restructuring), with or without change of the variety with the possibility of

increasing the number of vines per hectare and / or changing formations with or without change of the supporting construction” and “Increasing the number of vines per hectare”. Less financial support is for the activities connected with “Building of facilities to protect against damage inflicted by wild animals and birds”. The maximal financial support for the period 2007-2013 is presented on the table 2.

Table 2. Maximal financial support per ha for different activities included in measure “Restructuring and conversion of vineyards” for all the financial years during the period 2007-2013 [4,5,6,7,8]

Activity	Financial support per ha in Euro
Conversion - changing the composition of the plantation varieties by grafting of varieties classified for the wine-growing regions of the country	9,291
Replanting with or without relocation of vineyards (vineyard restructuring), with or without change of the variety with the possibility of increasing the number of vines per hectare and / or changing formations with or without change of the supporting construction	17,698
increasing the number of vines per hectare	17,551
changing formations without change of the supporting construction	3,409
changing formations with change of the supporting construction	7,358
building of facilities to protect against damage inflicted by wild animals and birds	636
building of erosion control facilities	1,645
building of irrigation facilities - drip irrigation	around 5,112*
building of terraces and reconstruction of existing terraces;	around 5,624 **

*It depends on the space between rows

** it depends on the slope

Beneficiaries of this measure have to be the following groups of farmers:

- ✓ Owner, tenant or lessee of the fruit-bearing vineyard, registered as a vineyard holding under Article 23 a, paragraph of the Law for the wine and alcohol beverage;
- ✓ A producer who manages vineyard holding with a minimum area of 0.1 ha, which is outlined in the identification system for agricultural parcels;
- ✓ A candidate who has made regular annual declaration under Article 22, paragraph 1 of Law for the wine and alcohol beverage that must demonstrate that the vineyard is fruitfulness;
- ✓ A farmer with replanting rights, occurred after uproots of existing vineyard and who has the right for grafting in order to change the varieties of vines.

Each producer of wine grapes, who intends to

apply the measure "Restructuring and conversion of vineyards" have to prepare "Preliminary plan for restructuring and conversion of vineyards". Preliminary plans for restructuring and conversion of vineyards must be submitted no later than May 10 of the financial year in the Regional unit of the Executive agency on vine and wine (EAVW). Individual plan for restructuring and conversion of the wine is approved by the Executive Director of EAVW after the deadline for submission of preliminary plans (applications) for the financial year. Employees of Regional unit of EAVW accept and verify the submitted Individual plan for restructuring and conversion by comparing the data with the dossier of the farmer and in case of incompleteness and / or inaccuracies they shall inform the farmer to correct them not more than 5 working days. The farmer

must correct incompleteness and / or inaccuracies in the plan within 10 days from the date of notification.

After the document check within 5 working days the regional unit of EAVW sent for processing, registration and approval all the documents and submitted plan at the office of EAVW. Within one month Executive Director of EAVW approves or rejects the plan by sending a notice to persons with a copy to State fund of Agriculture. For approval of the restructuring plan the farmers don't owe a charge.

Analysis of implementation of the measure “Restructuring and conversion of vineyards”

National Support Program for the wine sector for the period 2008/2009 - 2013/2014 is with a budget 84.97 million euro including the budgets of the Ministry of agriculture and food, Executive agency for wine and vine (EAWV) and National vine and wine chamber. The highest amount of funds for the period 2009-2013 is provided for the measure "Restructuring and conversion of vineyards", such as provided funds increased almost twice, from 12.54 million euro to 21.70 million euro. Table 3 shows approved by the European Commission funds under the measure "Restructuring and conversion of vineyards".

The total budget of the measure is 91.06 million euro, which is about 8 times more

than the budget allocated to the other two measures.

Table 3. Distribution of resources in National support program for “Restructuring and conversion of vineyards”, thousand euro [2]

Year	Restructuring and conversion of wine vineyards	% of the total budget
2009	12,548	80.39
2010	17,114	80.60
2011	17,772	80.70
2012	21,927	80.98
2013	21,702	81.15
Total	91,063	80.81

The planned funds in the program for the period 2009-2013 for the analyzing measure range from about 12 million euro in beginning of the period and increased to 21 million euro at the end of the period

During the period 2009-2012 the number of beneficiaries applying for measure “Restructuring and conversion of vineyards” is decreasing. They decrease from 117 in 2009 year to 73 in 2012, but in 2013 the number of beneficiary significantly increases – 150. The average area reconstructed vineyards per 1 beneficiary for the analyzed period decreased and from 34 ha in 2009 to 18 ha in 2013 (Table 4). This is explained by the fact that relatively small vineyards are interested in this measure.

Table 4. Number of beneficiaries, and surfaces of vineyard restructured by measure “Restructuring and conversion of vineyards” [10]

Year	Benefi-ciaries (number)	Surfaces of vineyard restructured (ha)	Average of restructured surface per beneficiary (ha)
2008	143	n.a.	n.a.
2009	117	3,987.8315	34
2010	76	1,912.0887	25
2011	94	2,297.7	24
2012	73	n.a	n.a
2013	150	2,675.9	18

The budget of the measure for restructuring and conversion in 2009/2010 amounts 21.23 million euro and the disbursed budget is 14.32 million euro. In the financial year 2010/2011 budget is of 22.02 million euro, and contracted projects amounts 5.86 million euro

and in financial 2012/2013, the paid amount is 18.33 million euro. The value of the funds paid for financial year 2013 was the highest for the period. Data show that the interest of the producers to the utilization of allocated funds has increased significantly.

Percentage of the used resources from the determined budget for the period 2007-2013 is between 51% and 69%. The used recourses

for the financial year 2010/2011 are only 27% (Table 5).

Table 5. Determined and disbursed budget for the measure "Restructuring and conversion of vineyards" [1]

Year	Determined budget for the measure (Euro)	Disbursed budget for the measure (euro)	% of used recourses
2007/2008	18,044,087	11,911,671	66
2008/2009	14,977,000	7,711,272	51
2009/2010	21,234,000	14,318,486	67
2010/2011	22,022,000	5,864,000	27
2011/2012	27,077,000	17,379,192	64
2012/2013	26,742,000	18,333,877	69

The National support program for the wine sector for the next programming period 2014-2018

In the next programming period 2014-2018, National support program for the wine sector provided four measures - "Restructuring and conversion of vineyards", "Promotion", "Green harvesting" and "Investments". According to the Program, the measure "Promotion" will improve the image of produced wines in the European Union outside the scope of the internal market and will increase exports of products by conquering new markets.

Support will be aimed at strengthening trade opportunities to export wines with guaranteed quality, thus achieving an increase in the average price of domestic exports [3].

Restructuring of vineyards remains a priority for the next programming period, as it leads to improvements in production potential, increase the average quality of raw materials and improve the competitiveness of producers.

Measure "Green harvesting" will give a guarantee regarding the realization of the production of wine producers and provide some stability in their economic efficiency, which is reflected positively in a social context and contribute to the sustainability of the wine sector. The measure "Investments" will increase marketing and competitiveness of wine products.

Determined budget in the Program amounts 133.78 mln.euro.(Table 6). The highest is the amount of funds provided for the measure "Restructuring and conversion of vineyards" - 80.78 mln. euro, followed by the measure

"Investments in enterprises" - 42.49 million euro. Regarding measures "Restructuring and conversion of vines" and "Promotion" funds provided for the new programming period are relatively less, but there were included two new measures under the program.

Table 6. Determined budget in the National support program for the wine sector 2014-2018, million euro [3]

Measure	Determined budget
Restructuring and conversion of vineyards	80.78
Green harvesting	3
Investments	42.49
Promotion	7.5
Total	133.78

CONCLUSIONS

Based on the analysis of measure "Restructuring and conversion of vineyards" could be made some conclusions as follows:

➤ There is a significant support for the wine sector for the period 2009 - 2013 in the field of "Restructuring and conversion of vineyards", which achieved the highest rate of funds utilization and realized projects.

➤ The maximal financial support per ha is for the activities connected with "Replanting with or without relocation of vineyards, with or without change of the variety with the possibility of increasing the number of vines per hectare and / or changing formations with or without change of the supporting construction" and activities connected with "Increasing the number of vines per hectare", but less financial support is for the activities connected with "Building of facilities to protect against damage inflicted by wild

animals and birds”.

➤ Data connected with the high percent of disbursed budget for the measure “Restructuring and conversion of vineyards” show that the interest of the producers to the utilization of allocated funds has increased significantly, indicating a broadening of the investment base in the sector.

➤ The decreasing average area reconstructed vineyards per 1 beneficiary for the analyzed period (18 ha) show that relatively small vineyard holdings are interested in this measure.

➤ Due to the favorable structural impact of the measure “ Restructuring and conversion of vineyards” on the vineyard sector during the previous programming period is expected during the next period this measure to play an important role in increasing market orientation and competitiveness of the producers in this sector.

➤ Utilization of funds under the Program for the period 2014-2018 should contribute to the adaptation of wine production to market demand, to increase producers’ incomes, and to preserve rural areas from depopulation.

➤ Utilization and effective use of funds provided under the measures of state support for the wine sector will prove significant role for the development of the wine sector and promotion of Bulgarian producers at national and European level.

[7]Ordinance 03-RD/1863, 01.08.2011 of the Minister of agriculture and food for the defining the funds for measure “Restructuring and conversion of vineyards” for the financial year 2011/2012

[8]Ordinance 03-RD/1701, 06.07.2012 of the Minister of agriculture and food for the defining the funds for measure “Restructuring and conversion of vineyards” for the financial year 2012/2013

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[2] MAF, National support program for the wine sector 2007-2013

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CLUSTER ANALYSIS OF NATURAL DISASTER LOSSES IN POLISH AGRICULTURE

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Abstract

Agricultural production risk is of special nature due to a great number of hazards, relative weakness of production entities on the market and high ambiguity which is greater than in industrial production. Natural disasters occurring very frequently, at simultaneous low percentage of insured farmers, cause damage of such sizes that force the state to organise current financial aid (for instance in the form of preferential natural disaster loans). This aid is usually not sufficient. On the other hand, regional diversity of the risk level does not positively affect the development of insurance. From the perspective of insurance companies and policymakers it becomes highly important to investigate the spatial structure of losses in agriculture caused by natural disasters. The purpose of the research is to classify the 16 Polish voivodeships into clusters in order to show differences between them according to the criterion of level of damage in agricultural farms caused by natural disasters. On the basis of the cluster analysis it was demonstrated that 11 voivodeships form quite a homogeneous group in terms of size of damage in agriculture (the value of damage in cultivations and the acreage of destroyed cultivations are two most important factors determining affiliation to the cluster), however, the profile of loss occurring in other five voivodeships has a very individual course and requires separate handling in the actuarial sense. It was also proved that high value of losses in agriculture in the absolute sense in given voivodeships do not have to mean high vulnerability of agricultural farms from these voivodeships to natural risks.

Key words: agriculture, cluster analysis, natural disasters, insurance, losses, risk management

INTRODUCTION

Economic stability of the agricultural economy sector may be disturbed by various random events, such as natural disasters or diseases in cultivations and animals. Weather is a significant factor in agriculture, which does not submit to traditional methods of risk control. Weather conditions are a serious source of uncertainty in agribusiness. Drought or excessive precipitation threaten harvest practically worldwide. As a result of global climate change variability of temperature in the world increases and apart from this more and more often weather phenomena take the form of extreme events. These risks affect not only cultivation, but also the efficiency of breeding farms, the use of artificial fertilisers or demand for different types of agricultural products. This means that natural risk touches upon different areas of economy directly or indirectly related to agriculture. Governments of countries remain neutral to hazards, by

organising and financing diverse forms of aid for farmers aggrieved by natural disasters.

As an instrument of stabilisation of agricultural farms (micro perspective) and agricultural economy as a whole (macro perspective), agricultural insurance can perform the role of development stimulus, improvement in quality and improvement in the degree of agribusiness modernisation, and, as a consequence – growth in its competitive capacity on the EU market (Strupczewski, 2014:69) [12].

Geographic location of Poland at the contact of continental climate and Atlantic climate impact, and large surface of the country, cause considerable regional differences in potential consequences of natural risks. Often aggregated data analysis to the level of a country does not reflect variability of local losses. It creates a hazard of inadequate determination of the potential effect of natural hazards on agriculture, and hence the adaptation needs towards natural disasters.

Uneven distribution of natural risks posing a threat to cultivation and agricultural real estate is one of development barriers of agricultural insurance.

The paper can act as a guide to policymakers who are interested in understanding the structure of losses in agriculture, as it can influence public financial aid for farmers affected by natural disasters. This article highlights certain issues that both policymakers and insurance companies can utilize further for their own purposes to design better risk management tools of mitigating natural disaster losses in agriculture. Finally, by providing relevant data on nature of financial losses in agriculture, the paper delivers broader perspective on factors determining agriculture development.

The purpose of the research is an attempt to classify voivodeships into clusters showing differences between them according to the criterion of sizes of damage in agricultural farms caused by natural disasters.

The subject of the research are losses in agriculture (cultivation and fixed assets) caused by various kinds of natural risk, which occurred in the period 2010-2013 in Poland.

Natural threats in agriculture – outline of the issue

Classification of kinds of risks in agriculture

Understanding the sources and the nature of risk is the main condition of building an appropriate policy of risk management. Necessary factors are: the analysis of distribution, frequency of incidence and the financial effects of hazards most important from the point of view of the continuity of farms operation. However, the starting point for advanced analyses should be preparing an appropriate typology of risks that could occur in agricultural operations.

Agriculture, to a greater extent than other branches of economy, is exposed to natural risk, especially because of the fact that taking this kind of risk may take catastrophic sizes. The specific nature of agricultural production risk results from many reasons rooted in specific nature of agriculture as a branch of economy (Pope, 2003:128; Stroinski, 2006:22-23). [9,10]

The demand for agricultural raw materials is characterised by higher concentration than consumption demand for ready-made food products. It means that farmers and final recipients are the takers of prices, which are affected by price shocks on the international market. Many agricultural producers are guided by the guess that markets are not fair for them because of asymmetry of the market force.

(i)Agricultural produce are goods characterised by low price flexibility of demand AND supply. Profit flexibility of many agricultural raw materials is also at a low level as compared to production goods or services. For this reason, various kinds of market shocks have greater impact on the agricultural sector.

(ii)The dependence of a production cycle on biological factors, which are characterised by long period between decision-making and obtaining final effects.

(iii)Scarce possibility of alternative use of arable land (except for land located in the vicinity of cities).

(iv)Direct exposure of agricultural cultivations to continuous weather conditions (rain, sunlight, wind, frost, hailstorm, diseases, pests) and limited possibilities of protection against them.

(v)Limited impact of an agricultural producer on the location of cultivations, and consequently some group of farms may be exposed to recurring losses arising from repeated events in a given area.

(vi)Small possibilities of farm's property protection arising from "open" nature of conducted activities (theft, loss, vandalism).

(vii)Agricultural and animal production does not give the possibility of exact planning of sizes of production and potential revenue (fluctuations of agricultural market prices, fluctuations in crops).

(viii)Substantial impact of policy of the state on the earned income from agricultural operations (e.g. Common Agricultural Policy of the EU, minimum prices system, subsidising agricultural production, protection actions).

(ix) Seasonal nature of production and capital intensity and inconvenience of warehousing of ready-made products.

(x) Agrarian culture and agricultural production methods are diverse worldwide.

(xi) Growth in mechanisation in agriculture denoting risk of accidents at work.

The above described specific characteristics of agricultural production, conditioning agricultural production on climatic and biological factors, the dynamics of natural factors, conditioning product prices on market conditions – are key determinants of typology of risk present in the agricultural production sector.

Risks found in agriculture can be divided into two basic groups (Pope, 2003:127) [9]:

(a) price risk – resulting from agricultural market liberalisation, (b) production risk – related to the occurrence of unfavourable unforeseeable events (e.g. natural disasters, embargoes for export of agricultural products).

Considering the range of impact, OECD introduces the following risk typology (OECD, 2008) [7]:

-*specific risk* (idiosyncratic), referring in micro-scale to single business entities. The risk level depends on individual decisions and is partially conditioned by the level of knowledge and management skills;

-*common risk* (interdependent) in the mezo-economic scale and owing to risk factors affecting groups of entities with common characteristics (e.g. farms specialising in specified direction of production) or entities in the areas limited territorially (local communities);

-*system risk* is present in the macroeconomic scale and covering events potentially

influencing the overall business entities or their substantial part in a regional scale. System risk, also called basic, is determined by external forces and cannot be controlled by single persons or entities. Within this risk category there can be distinguished, among others, market, political, currency, inflation risk and a number of factors related to the forces of nature.

Hardaker *et al.* (1997) [2] mentioned six risks typical of agribusiness:

-*personal risk* – accident at work or death of a farm owner,

-*material risk* – destruction or loss of tangible assets of a farm,

-*production risk* – variability of income arising from the impact on the financial result of diverse internal and external factors,

-*price risk* – variability of purchase prices of agricultural produce,

-*institutional risk* – the possibility of unexpected change in the agricultural market as a result of public administration intervention,

-*financial risk* – loss of liquidity, changes in interest rates, depletion of own capital.

Jerzak (2006) [4] when proposing his own typology lists only four, though quite extensive groups of agricultural risks:

-*natural risk* (the presence of natural disasters),

-*technological risk* (technical progress),

-*organisational risk* (planning, controlling and organising agricultural production),

-*economic risk* (the impact of macroenvironment on prices, means of production, agricultural policy, demand, form of ownership, structure of income).

Table 1. Risk categories in agriculture

Type of risk	Micro (specific)	Mezo (trade)	Macro (general)
Market /price	---	Change in land prices, new requirements of the food industry	Changes in product prices and means of production prices caused by shocks, commercial policy, endogenic changeability
Production	Hail, frosts, non-infectious diseases, personal risk, assets risk	Rain, land sliding, environment contamination	Flood, drought, plagues, infectious diseases, technologies
Financial	Changes in income beyond farms	---	Changes in interest rates and value of financial assets
Institutional - legal	Legal liability	Changes in local policy (regulations)	Changes in regional and national policy, regulations of environmental protection, payments for agriculture

Source: Majewski *et al.*, 2008:167[5]

A synthesis of the so far presented risks classifications may be a holistic and multi-dimensional matrix of kinds of risk in agriculture presented in Table 1.

Natural risks in agriculture

In plant production the basic risk factors are unfavourable weather conditions, such as: drought, hurricane, hailstorm, spring frosts or heavy rains.

They cause not only direct losses in yield of cultivated plants, but may also worsen the quality of products, sometimes substantially

(e.g. hail damage fruit, deterioration in biochemical parameters under drought conditions, intensifying outbreaks of plants diseases at excessive precipitation).

The natural and random nature, partially connected with the course of weather, is also observed in the case of occasional intensification of presence of pathogens of cultivated plants (weeds, insects) which may lead to any unpredicted falls in harvest or generate increased costs of plant protection (Majewski et al., 2008:168). [5]

Table 2. Natural risks in agriculture

Content	Fire	Hurricane	Flood	Hailstorm
General risk characteristics	-fires in agriculture constitute 25% of all fires, -small fires prevail (90%), medium fires are approx. 10%	-sudden occurrence -mass losses occur often -variable intensity of risk during the year and in long-term periods	-may reach mass and catastrophic sizes -mostly floods caused by precipitation occur -for the crops the most severe flood is in June-July	-mainly damage to cultivations -small fluctuations of loss ratio in the long-term perspective -occurrence from May to August
Frequency of damages	-10 fires per 1000 agricultural buildings, - 1 fire per 206 farms	-11.7 damage per 1000 agricultural buildings	-1.22% of area of cultivations in Poland annually on average	-1.32% of area of cultivations in Poland annually on average
Risk intensity	Average degree of damage of a brick building 38%	Damage relate mainly to roofing and the roof structure	The average degree of cultivation damage from 36 to 75%	The average degree of cultivation damage from 25 to 35%
Average structure of material losses	-buildings 55% -cultivation 16% -dead inventory 12% -home movables 10% -livestock 6% -building materials 1%	-buildings 85% -movable property 9% -cultivation 6%	-cultivation 97% -movable property 2% -buildings 1%	Types of cultivations most vulnerable to hailstorm: orchards, tobacco, hemp, vegetables
Regional division of losses	-lack	-the largest hazard: Central Pomerania, the Suwałki Region, the Beskidy region, Bieszczady Mountains, the Mazovia region	-the largest risk along the course of the Oder and the Vistula rivers	-southern Poland

Source: prepared by the author on the basis of (Stroinski, 2006) [10]

Risk factors in animal production are first of all related to the hazard of the presence of epidemic diseases of systemic nature. Directly, they can cause significant losses in animal herds (in extreme cases a total elimination of animals in the herd) in the areas limited to the regional or local scale. Indirectly, they may cause decrease in demand and prices of particular products, thus adversely affect the situation of all producers on a national or supranational scale.

Stroinski (2006) [10] published interesting study of hazards present in agriculture from the point of view of insurance companies.

The most important information regarding fire, flood, hurricane and hailstorm risk are

gathered in table 2.

For buildings in an agricultural farm the largest hazard are hurricanes and fires, as they are characterised by the frequency of occurrence and intensity of impact. While fires create normally individual risk, hurricanes may cause mass damage, though concentrated on a limited area. Agricultural cultivation can be harmed as a result of flood or hailstorm, namely risks towards which it is difficult to use effective prevention methods within a broad area. No wonder that in the light of the data, flood may destroy even 75% of cultivation (regardless of its type). The destructive impact of hailstorm mostly affects orchards, vegetables, tobacco and hemp. The

presence of flood and hailstorms is subject to clear regional division, as opposed to fires.

MATERIALS AND METHODS

The classification of voivodeships into clusters showing differences between them according to the criterion of sizes of damage in agricultural farms caused by natural disasters has been the goal of this research work.

In this purpose, the losses registered in agriculture (cultivation and fixed assets) caused by various kinds of natural risk, and occurred in the period 2010-2013 in Poland have been taken into consideration.

The analysis has been based on the data of the Agency for Restructuring and Modernisation of Agriculture (ARMA) collected in connection with the aggrieved farmers filing applications for payment of the so-called "natural disaster loans", i.e. preferential loans for resuming production in agricultural farms and special departments of agricultural production where damage were caused by drought, hail, heavy rain, negative effects of wintering, spring frosts, flood, hurricane, lightning, soil slide or avalanche. The collected data relate to: the value of damage in cultivations, the value of damage in fixed assets, the number of aggrieved agricultural farms, area of damaged cultivations.

Voivodeships were adopted as research objects. The statistical analysis included total values including the whole temporary range of the research. Arithmetic mean could distort the results in the event of extreme events.

Research procedure includes the following stages of procedure: (1) identification of the objective of the research, (2) definition of research hypotheses, (3) preliminary data analysis, (4) identification and selection of independent variables, (5) ordering data set with agglomeration method, (6) validation of agglomeration results with the use of k-means, (7) verification of hypotheses and formulation of conclusions.

Implementation of the scheduled research will make it possible to empirically verify the following research hypotheses:

H1. High value of loss in agriculture in the absolute perspective in a given voivodeship does not have to mean high vulnerability of agricultural farms from this voivodeship to natural risks.

H2. There is spatial diversity of distribution of damage in agriculture caused by natural risks.

The article consists of three basic parts and introduction and summary of conducted research. After formulating the research problem, objective and research hypotheses in the introduction, the special character of agricultural activity was discussed, along with the typology of kinds of risk connected with agriculture, and a review was made of the most important natural hazards affecting agribusiness in Poland. The next part of the article presents a number of analytical statements showing forming losses in agriculture across voivodeships. Then, cluster analysis was conducted by voivodeships with the use of agglomeration method and k-means, which was presented in detail in the third part of the study. At the end a summary was made of the concerned issues, with particular focus on the issues of agricultural insurance.

The details about the mathematical models used in this research are presented within the paragraph Results and Discussions.

RESULTS AND DISCUSSIONS

Preliminary data analysis

Record losses in agriculture in the period of 2010-2013 were observed in the Mazowieckie Voivodeship – both in cultivations (PLN 1.3 billion) and in fixed assets (PLN 372 million). They constituted 27% of all damage in agricultural farms (Fig. 1 and Fig. 2).

The region is regularly affected by natural disasters, which is proven by an exceptional level of losses in subsequent years. In critical 2013 the share of value of destroyed cultivations in the Mazovia region in relation to the whole country was 56%, and concerning fixed assets – 81%. At the same time it is difficult to indicate one main cause of such large damage. The problem is rather high intensity and the frequency of the

presence of such hazards as: flood, hailstorm, hurricane, intensive rainfall, frosts.

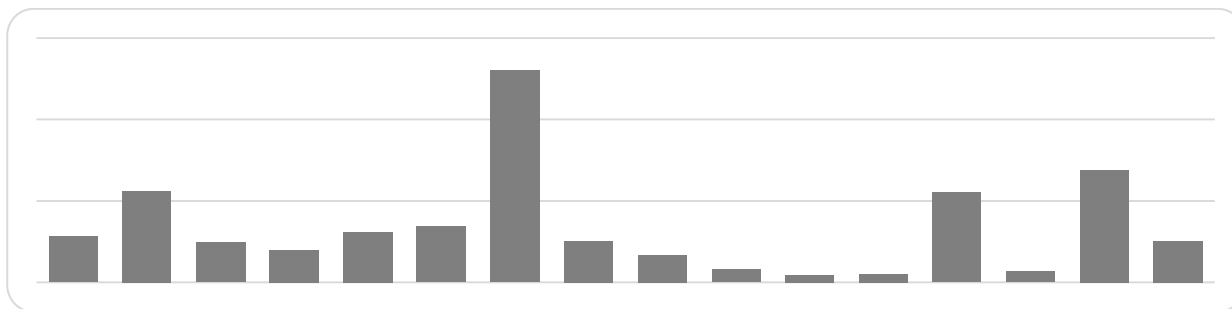


Fig. 1. The size of losses in cultivations in the period of 2010-2013 (million PLN)

Source: prepared by the author on the basis of ARMA data.

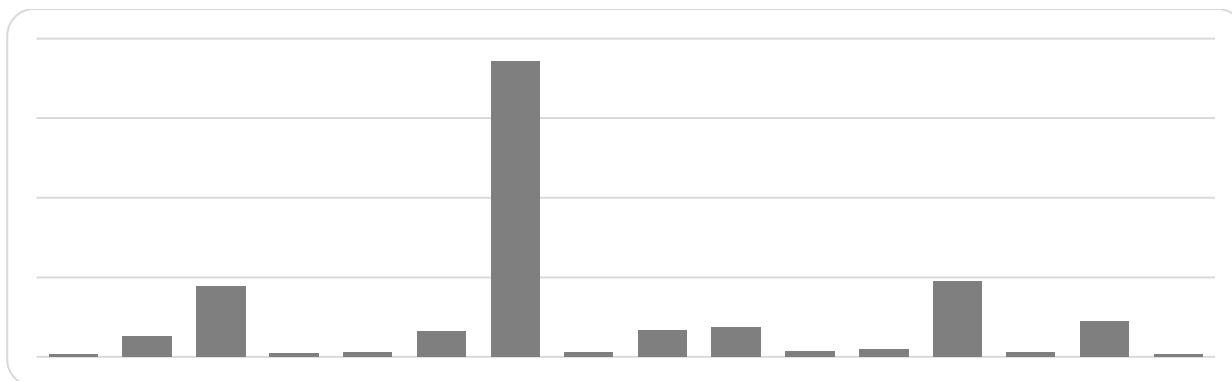


Fig. 2. The size of losses in fixed assets in the period 2010-2013 (million PLN)

Source: prepared by the author on the basis of ARMA data.

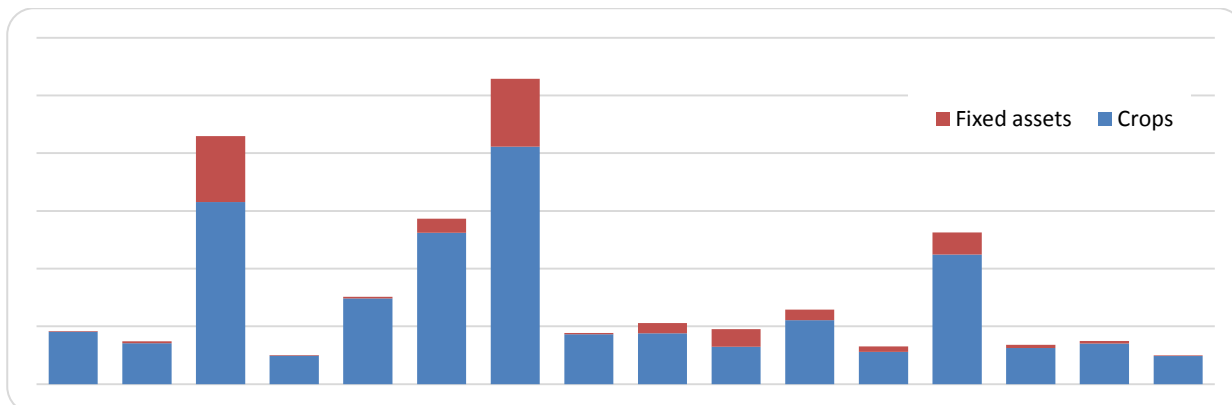


Fig. 3. The average value of losses per 1 ha of damaged area in the period 2010-2013 (thousand PLN)

Source: prepared by the author on the basis of ARMA data.

The areas endangered to a significant extent with natural disasters also include voivodeships: Wielkopolskie, Świętokrzyskie and Kujawsko-Pomorskie (losses in cultivations in the range of PLN 550-700 million, and in fixed assets – below PLN 100 million).

The analysis of average level of damage per 1 hectare of destroyed cultivations reveals substantial deviation in the result of four voivodeships (Mazowieckie, Lubelskie,

Małopolskie, Świętokrzyskie) from others (Fig. 3). This may prove concentration of agricultural production within cultivations representing the highest value (e.g. vegetables, orchards) or multiple occurrences of accidents on this area.

Considering the average volume of losses recorded in the aggrieved agricultural farms (Fig. 4), it is possible to note a clear division into three groups of voivodeships.

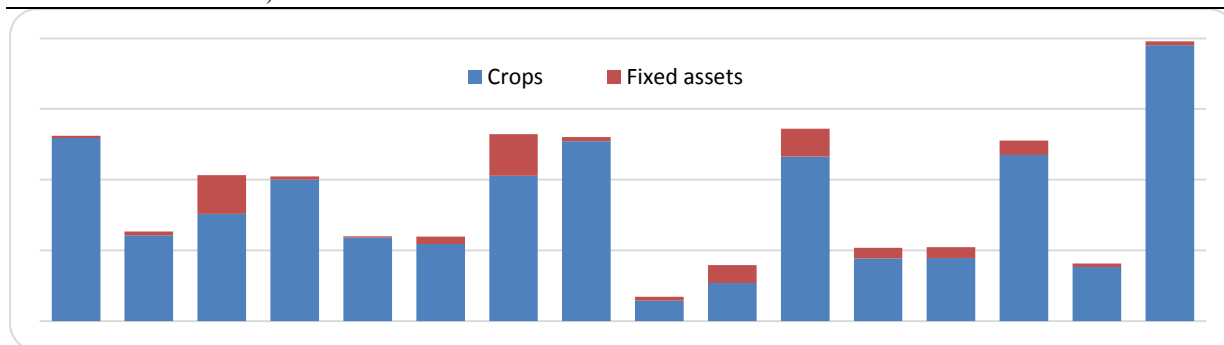


Fig. 4. The average value of loss per 1 aggrieved farm in the period 2010-2013 (thousand PLN)
 Source: prepared by the author on the basis of ARMA data.

The largest sensitivity to destruction occurred in the Zachodniopomorskie Voivodeship (nearly PLN 80 thousand losses per farm in the period of 4 analysed years). The second group is formed by farms with average susceptibility to damage (from PLN 40 to 55 thousand) – Voivodeships: Dolnośląskie, Lubelskie, Lubuskie, Mazowieckie, Opolskie, Pomorskie and Warmińsko-Mazurskie. In the remaining regions the value of this ratio does

not exceed PLN 26 thousand – group of low-susceptibility to damage.

The size of losses in particular voivodeships should be also analysed in the context of potential of a given region measured by the total number of agricultural farms as well as whole arable lands. The relation of damage size and resources related to agriculture in the region allows determining the average annual susceptibility to natural risk ratio (Fig. 5).

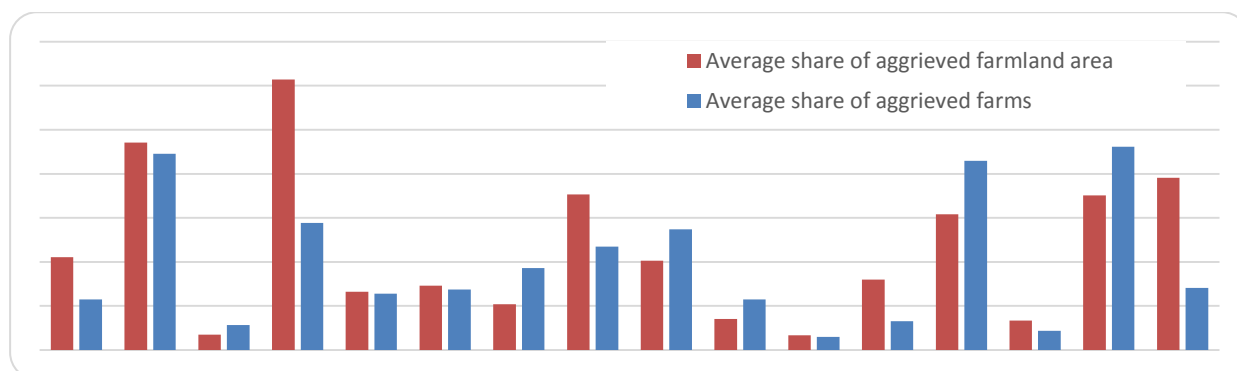


Fig. 5. Susceptibility to natural risk by voivodeships
 Source: prepared by the author on the basis of ARMA data.

Mazovia, where the largest losses occurred in the absolute perspective, paradoxically belongs to voivodeships with the lowest vulnerability ratios, both in the area perspective (average participation of the aggrieved arable lands) and concerned (average participation of aggrieved farms). The most aggrieved voivodeship turned out to be the Lubuskie Voivodeship, where on average damage occurred on every eighth hectare of cultivations. A little lower range of damage in cultivations was recorded in the Kujawsko-Pomorskie Voivodeship (9.4%) and the Zachodniopomorskie Voivodeship (7.8%). As regards the percentage of

aggrieved farms, the highest ratios were observed in three voivodeships: the Wielkopolskie Voivodeship (9.2%), the Kujawsko-Pomorskie Voivodeship (8.9%) and the Świętokrzyskie Voivodeship (8.6%). The above conclusions confirm at the same time H1 hypothesis made in the introduction that distributions of losses in the absolute and relative perspective do not correspond. A proper assessment of sizes of damage in voivodeships requires reference to the potential of the region and the degree of agricultural development within its area.

Determination of comparison objects and selection of diagnostic variables

In accordance with the previously outlined objective of the research and formulated hypotheses, objects of comparisons were voivodeships as the highest level of the administrative division of Poland. The selection of diagnostic variables was made on the basis of the statistical criterion that includes the information value of variables. In the statistical criterion two factors are taken into account: discriminatory ability of

variables and their capacity (Panek et al., 2013:21-23) [8]

Discriminatory ability of variables (variability in respect of the examined objects) is measured by means of a classic variability coefficient. From the data set we eliminate variables, whose variability coefficient does not exceed the stated threshold value adopted at the level of 0.1. All the variables were accepted (table 3).

Table 3. Definitions and descriptive statistics of variables

Variable name	Description	Arithmetic mean	Standard deviation	Variability coeff. (%)
LOSS_CROP	Total value of damage in cultivations in the period of 2010-2013 (PLN)	337,755,177	319,263,338	94.53
LOSS_ASSETS	Total value of damage in fixed assets in the period of 2010-2013 (PLN)	48,322,944	90,982,657	188.28
AREA	Total area of destroyed cultivations (ha) in the period of 2010-2013	151,257	132,105	87.34
FARMS	The total number of aggrieved agricultural farms in the period of 2010-2013	14,288	13 606	95.23
SHARE_FARMS	Average percentage of aggrieved farms in the overall number of farms in the voivodeship	0.039	0.029	73.64
SHARE_AREA	Average percentage of area of damaged cultivations in the overall area of arable lands in the voivodeship	0.046	0.034	74.59

Source: prepared by the author.

Capacity (information potential) of variables means the level of correlation with other variables. Information capacity of variable is the greater, the weaker it is correlated with other variables and at the same time the stronger it is correlated with variables that are not taken into account in the finally adopted set of diagnostic variables. Correlation is interpreted as transfer of the same information in compared objects. The basic verification method of information capacity of quantitative variables is a matrix of Pearson's linear correlation coefficients (see table 4). On the contrary, a complex tool of information capacity analysis of variables-the so-called parametric method – was prepared by Z. Heellwig in 1968[3].

At the beginning the critical value of the correlation coefficient r^* should be determined, above which two variables will be assessed as excessively mutually correlated. This can be done by means of a formal method using the procedure of verification of significance of correlation of

diagnostic variables. At the beginning r^* value is determined using the following formula (Panek et al., 2013:23) [8]:

$$r^* = \sqrt{\frac{t_{\alpha,s}^2}{t_{\alpha,s}^2 + n - 2}}$$

where:

$t_{\alpha,p}$ – value from distribution table t - Student for $s=n-2$ degrees of freedom and the adopted level of significance α ($\alpha = 0.05$).

From the distribution board of t - Student the value was read of statistics $t = 2.7764$ for the level of significance $\alpha = 0.05$ and $s=4$ degrees of freedom.

Then the critical value r^* was calculated:

$$r^* = \sqrt{\frac{2,7764^2}{2,7764^2 + 6 - 2}} = 0.8114$$

Border value of the correlation coefficient was calculated by means of a formal method and is thus 0.8114.

Further stages of selection of variables are determined by the so-called parametric method.

Table 4. Pearson's linear correlation coefficients matrix between the variables

No.	Variables	1	2	3	4	5	6
1	LOSS_CROP	1.0000	0.8456	0.4707	0.7240	0.4792	0.1277
2	LOSS_ASSETS	0.8456	1.0000	0.0075	0.4813	0.0906	-0.2317
3	AREA	0.4707	0.0075	1.0000	0.5666	0.7642	0.6873
4	FARMS	0.7240	0.4813	0.5666	1.0000	0.7617	0.1762
5	SHARE_FARMS	0.4792	0.0906	0.7642	0.7617	1.0000	0.7056
6	SHARE_AREA	0.1277	-0.2317	0.6873	0.1762	0.7056	1.0000

Source: prepared by the author.

The procedure of a parametric method proceeds according to the following scheme (Panek et al., 2013:24):

1. Determination of the median of each R correlation matrix column:

$$R_{j'} = M_j(r_{jj'}) \quad , j, j' = 1, 2, \dots, m$$

Application of position measure, such as the median, allows to increase the resistance of the obtained results to values of diverging diagnostic variables (Mlodak, 2006:31) [6].

2. Finding a column, for which R_j is the highest.

3. In the indicated column, the selection of elements with absolute values greater than values the threshold value r^* (0.8114) and the identification of lines corresponding to these elements.

The variable corresponding to the distinguished column is called a central variable, while the variables corresponding to the distinguished lines – satellite variables (of a given central variable). Satellite variables duplicate information included in the central variable and therefore they should be removed from further analysis.

4. Reduction in correlation matrix R by crossing out columns and lines corresponding to central and satellite variables.

5. Repetition of steps 1-4 until exhausting the set of acceptable diagnostic variables.

The final set of diagnostic variables will include all the identified central variables and isolated variables (i.e. variables, which were not substantially correlated with any other variable).

As a result of performing the above described procedure, variable LOSS_ASSETS was rejected. The remaining five variables were qualified for further research taking into account the criteria of discriminatory ability and information capacity.

Stimulation of variables

The application of a multi-dimensional comparative analysis requires that the diagnostic variables have a uniform nature – a stimulating factor (Panek et al., 2013:33) [8]. On the basis of substantive premises it may be concluded that all the variables found in the study are destimulants, as their high values in the examined objects are undesirable from the point of view of a given phenomenon (the higher values of measures describing the number and the value of damage in agriculture, the worse for the voivodeship).

Owing to the fact that variables are destimulants and are measured on a quotient scale, a quotient transformation was used that transformed them into stimulating factors – also measured on the quotient scale. The form of this transformation is as follows (Panek et al., 2013:33) [8].:

$$x_{ij}^S = b[x_{ij}^D]^{-1}$$

where:

x_{ij}^D – the value of j variable destimulants in i object,

x_{ij}^S – the value of j variable after transformation into a stimulating factor in i object,

b – constant used in an arbitrary manner, here $b = 1$.

Standardisation of variables

Standardisation transformation is intended to obtain the comparability of variables (at least in the aspect of units of measurement) and standardisation of their scope of variability. It is required in the case of taxonomic methods (Panek et al., 2013:35) [8]. Considering the nature of variables, standardisation was selected by way of classic standardisation, as a result of which the arithmetic mean assumes the value of 0, and standard deviation the value of 1.

Elimination of negative variables values

Obtaining the required in taxonomic research

characteristics of a positive value of variables took place as a result of applying the following transformation Grabinski et al., 1989:28) [1].:

$$z'_{ij} = \begin{cases} z_{ij} \text{ gdy } \min_{i,j}\{z_{ij}\} > 0 \\ z_{ij} + \varepsilon \text{ gdy } \min_{i,j}\{z_{ij}\} \leq 0 \end{cases}$$

provided that:

$$\varepsilon = -\min_{i,j}\{z_{ij}\} + \frac{1}{5}S(z)$$

where:

$S(z)$ – standard deviation calculated from all elements of the matrix of standardised input data.

Parameter value ε amounted to 1.132327.

The finally prepared set of variables after conducting their stimulation, standardisation and elimination of negative values is presented in Table 5.

Table 5. Independent variables prepared for agglomeration analysis

Voivodeship	LOSS_CROP	AREA	FARMS	SHARE_FARMS	SHARE_AREA
Dln	0.645586	0.573141	0.995709	1.035040	0.645908
Kpm	0.371626	0.241502	0.479977	0.275939	0.340303
Lbl	0.732207	2.226029	0.778582	2.084942	3.413902
Lbs	0.885006	0.451108	1.069958	0.418430	0.282433
Łdz	0.597954	0.844580	0.602148	0.929440	0.974390
Młp	0.548763	1.327969	0.555624	0.864228	0.890044
Maz	0.215078	0.564508	0.437886	0.640983	1.214919
Opo	0.702475	0.602459	1.053565	0.511949	0.423000
Pdk	1.023227	0.923260	0.447793	0.439883	0.667284
Pdl	2.072078	1.433456	0.826258	1.029156	1.751128
Pom	3.635462	4.314020	4.226787	3.984677	3.567498
Ślk	2.927351	1.761199	1.512076	1.800490	0.820876
Świ	0.376334	0.717144	0.440202	0.285800	0.470894
Wma	2.361958	1.585224	2.845524	2.706754	1.839381
Wlk	0.320473	0.200000	0.402772	0.266990	0.424546
Zpm	0.701659	0.351635	1.442374	0.842533	0.390730

Source: prepared by the author.

Ordering the data set by means of agglomeration method

Agglomeration, as one of the methods of hierarchy clusters analysis, allows to group similar objects. The measure of similarity are distances between the objects, and most often the so-called Euclidean distance is used. It is a particular case of Minkowski metric, applicable to variables measured on the ordinal quotient scale. It measures section length $d_{ii'}$ connecting objects in multi-dimensional space, which can be expressed by the formula (Panek et al., 2013:44) [8].:

$$d_{ii'} = \sqrt{\sum_{j=1}^m (z_{ij} - z_{i'j})^2}$$

The results of analysis have the form of a tree diagram, which graphically illustrates clusters of similar objects owing to defined diagnostic variables. The system of connections in the tree diagram makes it possible to specify

mutual location of objects with respect to each other and groups of objects created in subsequent steps of the procedure.

From among the existing agglomeration methods, it was decided to use two: **the farthest neighbourhood method (full binding)** and **the Ward's method**. This selection results from the intention of the Author, so that the effect of grouping are "clumps" of non-one-element objects³⁵.

The tree diagram contains larger average distances between bindings, thanks to which the results of agglomeration are more legible (Panek et al., 2013:108) [8].

On the other hand, the advantage of the Ward's method is its high efficiency. It results from the use of approach based on variance analysis. In pursuit of minimising the sum of

³⁵A reverse result than the intended one would be grouping results resembling "chains" of objects, created, for example, as a consequence of using the nearest neighbourhood method. "Snowball" effect is created, where a big group "attracts" single observations.

squares of deviations inside clusters ESS^{36} , the pairs of clusters are chosen, which as a result of connection will give a cluster with minimum diversity.

As a result of the agglomeration procedure by the **method of full binding** (using the Euclidean distance) a tree diagram was obtained shown in Fig. 6.

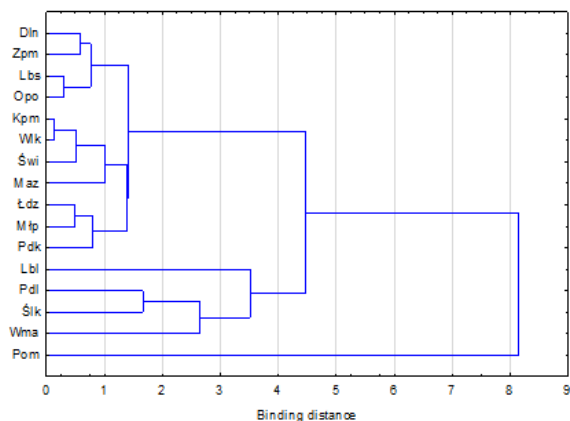


Fig. 6. A tree diagram was made by means of a full binding method

Source: own calculations made in the Statistica program.

In order to determine the place of 'cut-off" the diagram was analysed of binding distance in respect of binding stages (Fig. 7).

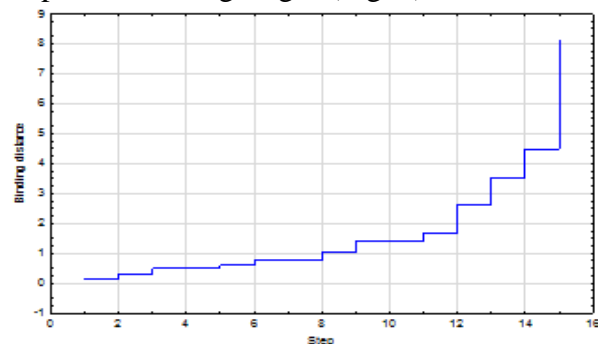


Fig. 7. The diagram of binding distance in respect of binding stages – full binding method

Source: own calculations made in the Statistica program.

The place where there is clear flattening (longer vertical line), determines the optimum cut-off point. Step 13 was decided to be taken with the binding distance equal to 3. This means that four clusters were formed.

Then agglomeration was made with the **Ward's method**, whose course is illustrated in the tree diagram in Fig. 8. Like before, after

analysis of the binding distance diagram in respect of binding stages (Fig. 9) a cut-off point was selected at the distance equal to 3 and the thirteenth step of agglomeration procedure, which resulted in the formation of four clusters.

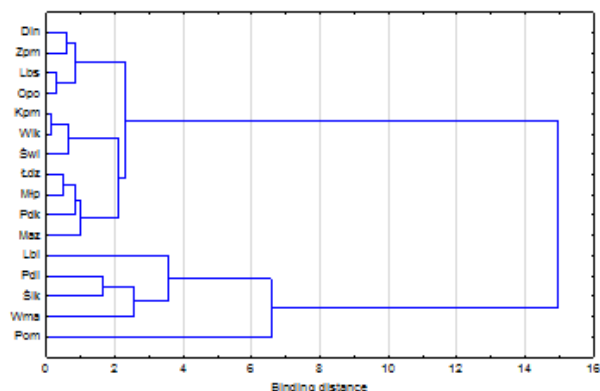


Fig. 8. The tree diagram made by means of the Ward's method

Source: own calculations made in the Statistica program.

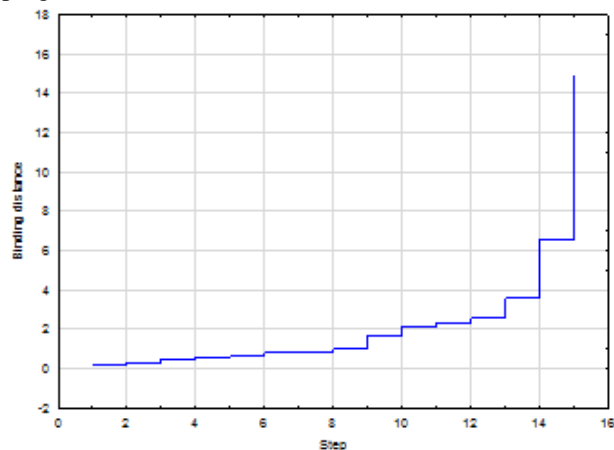


Fig. 9. The diagram of binding distance in respect of binding stages – the Ward's method

Source: own calculations made in the Statistica program.

Table 6 presents a comparison of agglomeration results with the Ward's method and full binding method.

Both agglomeration methods rendered identical results of voivodeship division into clusters.

The created group significantly vary among themselves. Apart from two one-element clusters, a cluster was created with 11 voivodeships. What is interesting, such a great cluster is created already at the initial stage of the agglomeration process at a relatively limited binding distance (full binding method: 1.5; Ward's method: 2.3). This proves very

³⁶ ESS (Error Sum of Squares).

similar properties of regions included in it and the lack of possibility to separate a greater

number of smaller clusters.

Table 6. Summary results of agglomeration procedure

Full binding method		Ward's method	
Cluster number	Elements of cluster	Cluster number	Elements of cluster
1	POM	1	POM
2	LBL	2	LBL
3	PDL, ŚLK, WMA	3	PDL, ŚLK, WMA
4	DLN, KPM, LBS, ŁDZ, MAZ, MŁP, OPO, PDK, ŚWI, WLK, ZPM	4	DLN, KPM, LBS, ŁDZ, MAZ, MŁP, OPO, PDK, ŚWI, WLK, ZPM

Source: prepared by the author

Grouping with the k-means method

The k-means method is the most often used non-hierarchical taxonomic method of grouping. Its result is division, in which no cluster is a sub-cluster of another set. The starting point of the analysis is setting the *a priori* specified number of clusters (*k*) that will be formed in a way to minimise the intra-group variability and maximise the inter-group variability. Research procedure is of iterative nature, where the researcher has the opportunity to impose the upper limit of the number of iterations, after which stopping the process of grouping takes place.

K-means analysis is supposed to verify the correctness of the grouping results with the agglomeration method.

This research contains grouping with cases up to 4 clusters, specifying the maximum number of iterations for 15. The selection of initial centres of clusters took place by way of maximising initial distances between clusters.

As a result of analysis with the k-means method, the following division of voivodeships into clusters was obtained:

Cluster 1: PDL, ŚLK, WMA

Cluster 2: DLN, KPM, LBS, ŁDZ, MŁP, MAZ, OPO, PDK, ŚWI, WLK, ZPM

Cluster 3: LBL

Cluster 4: POM

The essence of each cluster can be recognised as a result of means analysis within each of them (Fig. 10). When interpreting the diagram it should be remembered that the data for analysis were subject to stimulation (with destimulants into stimulating factors), therefore, the highest means values indeed mean their lowest levels in raw data (and thus

a more preferred situation).

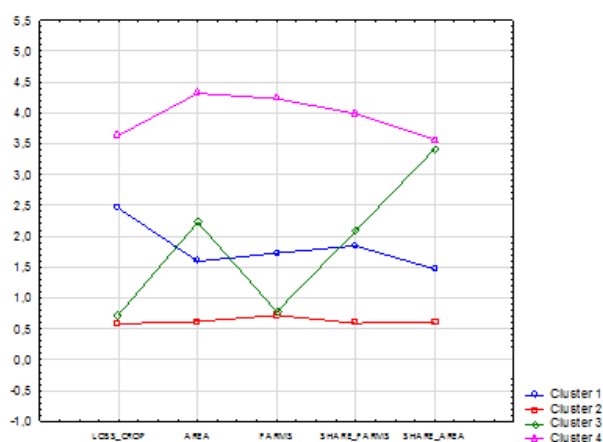


Fig. 10. The diagram of means of each cluster

Source: prepared by the author

The Pomorskie Voivodeship (Cluster 4) is a region, in which the lowest values of losses in agriculture were recorded in each of five examined variables. Cluster 3 represents the Lubelskie Voivodeship, where the percentage of area of arable lands affected by losses in relation to the total area of arable lands within the voivodeship belonged to the lowest. On the contrary, losses in cultivations expressed by value were shaped there on a relatively high level. Voivodeships characterised by relatively low values of losses in cultivations with slightly increased values of average other variables created cluster no. 1 (the Podlaskie, Śląskie and Warmińsko-Mazurskie Voivodeships). The remaining 11 voivodeships create cluster 2, characterised by the highest average values of every diagnostic variable. These are thus regions, where agricultural farms suffered due to natural risks to the greatest degree.

These conclusions confirm the authenticity of

hypothesis H2, in accordance with which there is clear spatial diversity of distribution of damage in agriculture caused by natural risks.

The results of variance analysis, supplementing the interpretation of the k-

means method show (F and q values) that LOSS_CROP variables and AREA constitute the main criterion determining affiliation to clusters (table 7).

Table 7. The results of variance analysis

Variable name	Between SS	df	Internal SS	df	Statistics F	p-value
LOSS_CROP	15.01131	3	0.988692	12	60.73197	0.000000
AREA	14.86739	3	1.132606	12	52.50687	0.000000
FARMS	12.62868	3	3.371317	12	14.98368	0.000232
SHARE_FARMS	13.78141	3	2.218585	12	24.84721	0.000020
SHARE_AREA	14.46465	3	1.535347	12	37.68439	0.000002

Source: prepared by the author

CONCLUSIONS

Agricultural production risk is of special nature due to a great number of hazards, relative weakness of production entities on the market, greater than in industrial production unpredictability of variability of phenomena (Strupczewski, 2014:596) [11]. In addition, it is intensified by the difficulty of adjusting once undertaken actions resulting from a long cycle of agricultural production.

Natural disasters occurring very frequently, at simultaneous low percentage of insured farmers, cause damage of such sizes that force the state to organise current financial aid (for instance in the form of preferential natural disaster loans). This aid is not sufficient.

Regional diversity of the risk level, substantially does not positively affect the development of insurance. In voluntary insurance, the premium should reflect the real level of exposition to risk. This means that in areas with over-average risk there will be small demand for insurance caused by high cost of protection. On the other hand, relatively low premiums in the areas with low hazard may prove an insufficient incentive in the absence of the sense of need to buy insurance. The subsidising mechanism of premiums by the state, which is present in insurance of agricultural cultivations and farm animals, should aim at equalling the level of premium within the whole country, contributing to the increase in commonness of insurance.

Apart from the problem of diversity of

territorial intensity of risk level, there are two issues difficult to solve, limiting the possibility of insurance of agricultural producers: asymmetry of information and moral hazard.

The first factor is related to information asymmetry between the producer desiring to obtain insurance and the insurance company. It involves subjective and endogenic (namely dependent only on the agricultural producer) conditions affecting the management result, including income being the object of possible insurance. The problem is that the insuring party, i.e. the agricultural producer, knows much more about the potential risk and its factors in production than the insurer. Also much depends on their diligence and other volumes hard to observe and assess. Such asymmetry concerning information and real risk assessment may involve the problem of temptations of abuses. This is a risk due to which the tendency of insurance companies to enter into such insurance contracts decreases.

The temptation of abuses (the so-called moral hazard) is present when the insured party, after buying an insurance policy, as a result of this changes the way of production and management, neglects diligence, resigns knowingly from welfare or otherwise tries to increase the potential dimension or probability of losses, and hence damages. It is about intentional actions leading to risk and losses. On an agricultural farm these can include defined negligence in the use of procedures, in untimely e.g. use of chemicals, such as fertilisers, plant pesticides, in feeding, in

counteracting diseases, etc. As a result, it is assumed that insurance in agriculture should only cover the events and accidents leading to unintended losses, where it is possible to exclude possible impact of subjective factor, dependent on the farmer (Majewski et al., 2008:51) [5].

On the basis of the cluster analysis it was demonstrated that 11 voivodeships form quite a homogeneous group in terms of size of damage in agriculture (the value of damage in cultivations and the acreage of destroyed cultivations are two most important factors determining affiliation to the cluster), however, the profile of loss occurring in other five voivodeships has a very individual course and requires separate handling in the actuarial sense.

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ASSESSMENT OF MAIN MINERAL WATER ROMANIAN MARKS FROM THE PERSPECTIVE OF SOME TOXICOLOGICAL PARAMETERS

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Abstract

*The paper aimed to analyze 15 Romanian brands of mineral waters and in this purpose they were bought from a hypermarket. The content of nitrates, nitrites and pH have been determined for each of the 15 mineral waters using the modern known techniques. A number of two-thirds (66.67%) of the producers did not specify the nitrates content of mineral waters on the label. The firms which mentioned the content of nitrates on the label have not been correct as the tested value of nitrates was higher than the one stated on the label. The mean of nitrates in the tested mineral waters was 5.89 ± 2.88 mg/l, well below the maximum limits (50 mg/l). The fact that most producers do not specify the mineral waters nitrites content, this is not a health issue for consumers, because the research results showed that the presence of nitrites in the Romanian mineral waters is extremely low, somewhere besides the detection limits of the analytical method used. The nitrites content of tested mineral waters was significantly lower in waters with a greater pH. In fact, the increasing the pH of mineral waters by one unit, determined the reducing of nitrites amount by about 32% ($r = 0.57$ *). As a practical conclusion, consumers could use this criterion in choosing the type of water they want to drink.*

Key words: nitrates, nitrites, pH mineral waters

INTRODUCTION

There is at least an advertising campaign of some mineral waters companies in the local market, which insists on the purity of the mineral waters. The term "purity" of a water has a series of connotations that makes it difficult to define. The expression "the purest mineral water in the world" remains an empty word if there is no predefined standard for this purity. For example, by their very nature, mineral waters are not pure compared with the purest water, namely distilled water.

Consumption of mineral waters is based precisely on their ability to provide a range of essential salts for the purposes of metabolic processes smooth running. From this perspective, the purity of mineral waters is certainly a defect. We are interested in the mineral waters to be microbiologically pure, since the presence of some microorganisms threaten our health. At the same time, we are interested in the waters to be free of nitrites or nitrates, because of the toxigenic potential.

On the other hand, each of us have different needs in terms of water consumption. People with kidney stones seek oligo-alkaline waters. People with cardiovascular disease seek low-sodium mineral waters, possibly rich in magnesium and calcium etc. Therefore, the most appropriate term to characterize a mineral water, in terms of all categories of potential consumers is a classic one, used to characterize all products from the food industry, namely innocuity.

Inocuity represents a quality of a product to be not harmful to consumers [2]. Besides air, water is the substance through which the body performs most intense exchanges with the environment. The recommended daily intake of water (30-40 ml / kg) makes it an important element in achieving a healthy lifestyle [3].

In order to assess innocuity in the case of mineral waters, we tested 15 samples of mineral waters, in terms of nitrites (NO_2^-) and nitrates (NO_3^-) content. A further determination of relevance for certain

categories of consumers was water pH.

MATERIALS AND METHODS

In the first week of March 2014, 15 samples of mineral waters produced by 15 Romanian brands, were bought from Auchan supermarket in Titan Shopping Center (Bucharest). The type of mineral water, its source and producer names are shown in Table 1.

Table 1. Mineral water brand names and main key identifiers

No. sample	Commercial name	Source	Producer
P1	Bucovina uncarbonated	C7 SECU, Dorna Candrenilor, Suceava	Rio Bucovina SRL
P2	Bilbor	Q1, Bilbor, Harghita county (height rate 1114, Călimani mountains)	Bilbor Mineral Water SRL
P3	Zizin	F2, F4, Zizin, Braşov county	Apemin Zizin S.A.
P4	Dorna - Izvorul alb	White spring, Dealul Floreni -Dorna Candrenilor village, Suceava county	Coca Cola HBC SRL
P5	Apa Craiului	Spring water no. 5, Gâlgoaie, Dâmbovicioara, Argeş county	Cheresta Dimbovicioara SRL
P6	Aqua Carpatica	Băjenaru spring, Păltiniş, Suceava county	Carpathian Springs S.A.
P7	Keia uncarbonated	Zăganului spring, Ciucaş, Prahova county	Nicolțana S.A.
P8	Perenna Premier uncarbonated	Călina, Caraş Severin county	Apollini Company SRL
P9	Cheile Bicazului	Bicazul Ardelean (drilling FH1), Neamţ county	Natural Aqua Group SRL
P10	Borsec uncarbonated	Făget Borsec, Harghita county	Romaqua Group S.A.
P11	Herculane uncarbonated	Domogled, Băile Herculane, Caraş Severin county	Carpatina S.A.
P12	Carpatina light mineral	Toşorog, Neamţ county	Carpatina S.A.
P13	Perla Covasnei	F1, Târgu Secuiesc, Covasna county	Covasn pearl S.A.
P14	Hera	Hera, Budureasa, Bihor county	European Drinks
P15	Tuşnad Spring fairy	Tuşnad, Harghita county	Apemin Tuşnad S.A.

The content of nitrates, nitrites and pH was determined for each of the 15 tested mineral waters.

The acid fenoldisulfonic reaction method was used to determine the concentration of nitrates. In this purpose, the formation of a yellow nitrofenolsulfonic derivative was needed to be involved. This substance had the photometrically determined intensity, at 480 nm, proportional to the nitrates content in the sample [4].

Saltzman method was used to determine the Nitrites content. The method made use of the property of nitrite ions to form, through a chemical reaction, a colored azo complex that can be photometrically evaluated.

Ther nitrite ions react with sulfanilic acid in an acid medium to form a diazonium salt, which, in its turn, is coupled with N-naphthyl ethylenediamine, at pH = 2-2.5, to form a violet azo compound, whose absorbance is measured at a wavelength of 520 nm [4].

A digital pH-meter was used to determine pH. The pH varies at the variation of the potential difference between a glass electrode and a reference electrode, placed in the water sample to be analyzed [4].

RESULTS AND DISCUSSIONS

The nitrites, nitrates contents and pH, in the tested samples used in this study and written on the labels of mineral waters samples are comparatively shown comparatively in Table 2.

From Table 2, it can be seen that the tested mineral waters had a pH range of variation between 6.4 and 7.8. This coincides partly with the range of variation recorded on the tested mineral waters labels (5.76 to 7.83).

On uncarbonated waters Bilbor, Hera and Tusnad labels the pH is not specified, so that its value did not enter into our calculation, but the first two mineral waters (Bilbor and Hera) had slightly alkaline pH (pH 7.4) and Tusnad mineral water was slightly acid (pH = 6.8).

The tested mineral waters mean value of pH was 7.37 ± 0.42 (n = 15), higher than that recorded on the appropriate labels, respectively pH = 7.25 ± 0.56 (n = 12).

Table 2. pH, nitrites (NO₂⁻) and nitrates (NO₃⁻) content in mineral waters

No. Sample	Declared/ tested	pH, T ⁰ C	Nitrites (NO ₂ ⁻) mg/l	Nitrates (NO ₃ ⁻) mg/l
P1	declared	7.05	< 0.01	4.71
	Tested	7.7 (22.2°C)	0.014	5.420
P2	declared	-	-	-
	tested	7.4 (23.3°C)	0.023	4.700
P3	declared	7.4	< 0.003	-
	tested	6.7 (23.3°C)	0.023	7.580
P4	declared	7.49	-	4.13
	tested	7.6 (23.3°C)	0.019	5.840
P5	declared	7.57	-	-
	tested	7.6 (23.3°C)	0.020	6.060
P6	declared	7.7	-	1.85
	tested	7.7 (23.3°C)	<LOQ	3.500
P7	declared	7,83	-	-
	tested	7.8 (23.4°C)	<LOQ	7.400
P8	declared	7.29	< 0.003	2.1
	tested	7.4 (23.4°C)	<LOQ	3.980
P9	declared	7.6	-	-
	tested	7.3 (23.4°C)	<LOQ	14.60
P10	declared	7,43	-	-
	tested	7.5 (23.4°C)	<LOQ	4.580
P11	declared	7.25	-	-
	tested	7.7 (23.5°C)	<LOQ	4.680
P12	declared	6,65	-	-
	tested	6.4 (23.5°C)	0.023	6.100
P13	declared	5.76	-	< 0.083
	tested	7.0 (23.5°C)	0.023	2.260
P14	declared	-	-	-
	tested	7.4 (23.5°C)	0.021	3.800
P15	declared	-	-	-
	tested	6.8 (23.5°C)	0.020	7.800

LOQ for NO₂⁻ = 0.014 ppm (The detection limit of the method, very significant); LOQ for NO₃⁻ = 1.306 ppm

The difference between mean values of pH was not statistically significant (Student test value was $t = 0.55$) (Fig.1).

We also observed that there are differences between the tested pH values and those recorded on the labels. The most obvious of these was the case of water Perla Covasnei (with an extra of 1.24 pH units from the

label).

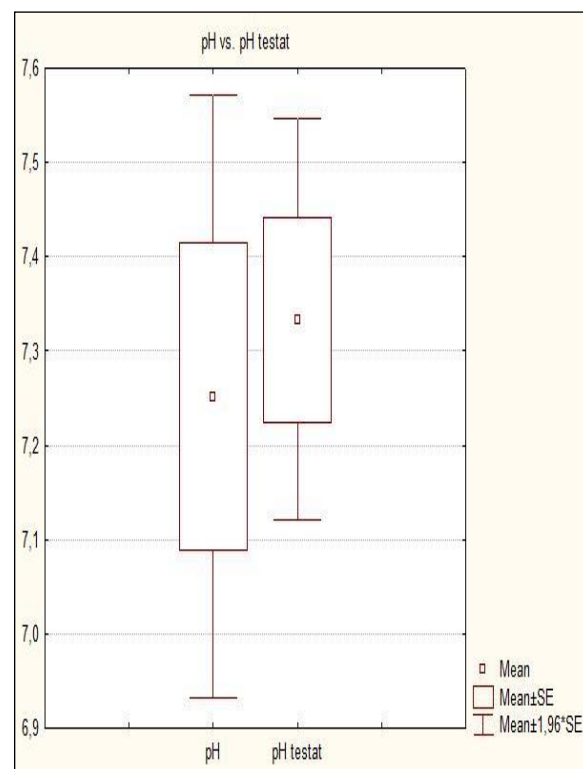


Fig. 1. Comparison between the mean values of pH (tested and recorded on the labels)

Large deviations were observed for Bucovina, Zizin and Herculane waters (figure 2). For Bucovina, Zizin and Perla Covasnei, the differences are large enough to declassify those mineral waters in the pH range suggested by the labels.

Thus, Bucovina alkaline water is presented as neutral, acidic Zizin water is presented as alkaline and neutral Perla Covasnei water is presented, according to the label, as acidic. Mineral waters can be, under certain conditions, important sources of nitrites and nitrates. Most of the producers tend to minimize the mineral waters contribution to daily exposure to substances with toxigenic potential, but the phenomenon is not insignificant.

Mineral waters consumed in recommended amounts (30-40 ml/kg) might be important sources of exposure, where consumers are already exposed to these substances via daily diet (fruits, vegetables, and meat products).

From table 2 we can see that a number of two-thirds (66.67%) of the producers did not specify the content of mineral waters in nitrates.

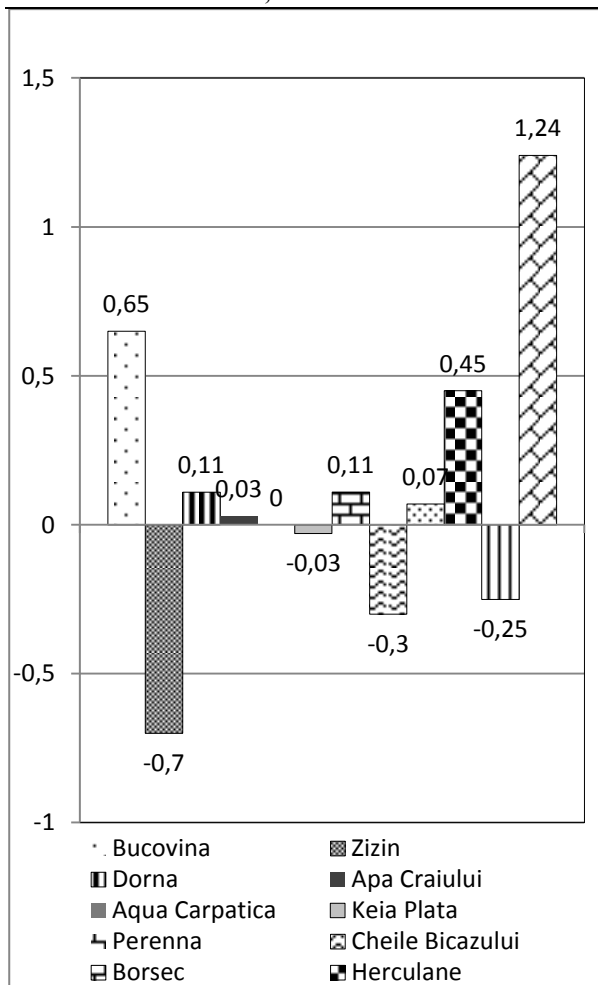


Fig. 2. Individual deviations of the mineral waters pH from the values recorded on the labels

Where this happens, the nitrates content tested value is much higher than that recorded on the label (Fig. 3).

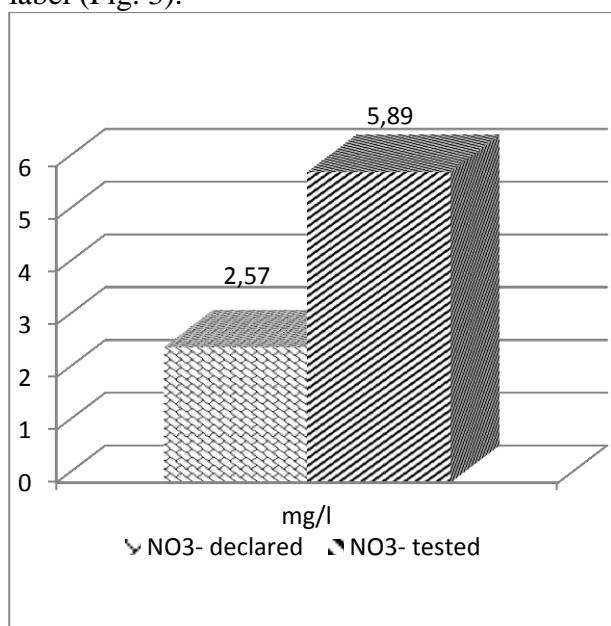


Fig. 3. Mean values of nitrates content in mineral waters

The mean showed 5.89 ± 2.88 mg/l. However, the nitrates content mean of mineral water samples was much lower than the limit imposed by the World Health Organization for drinking water (50 mg/l).

The largest amount of nitrates (14.6 mg/l) was observed in Bicaz mineral water and the lowest in Perla Covasnei water (2.26 mg/l).

There were no significant differences between regions, concerning the nitrates content in uncarbonated mineral waters.

The smaller amounts of nitrates were found in the Western region waters (4.15 ± 0.46 mg/l) and the largest quantities in the waters of the North (6.39 ± 3.72 mg/l) (Fig. 4).

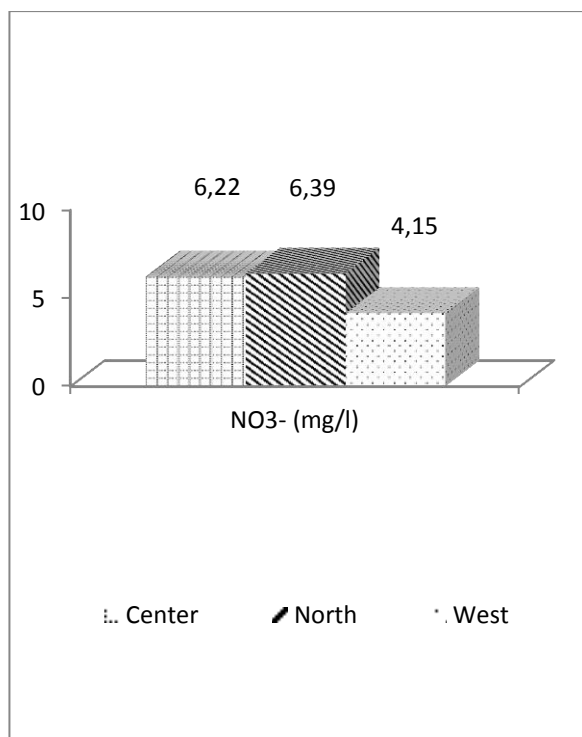


Fig. 4. The nitrates content main values in mineral waters, according to their origin

Table 2 shows that most of the producers did not specify on the labels the nitrites content of mineral waters.

However, the fact is not a problem, because our results showed that the presence of nitrites in uncarbonated mineral water was extremely low, somewhere next to the detection limits of the used analytical method.

Even the nitrites main obtained 0.012 ± 0.011 mg/l (n=15) was below the detection limit of the method.

This was due to the fact that for a number of 6

samples, representing 40% of the tested mineral waters, the nitrites content was below the limit of detection.

However, the nitrites content of tested mineral waters is well below the maximum limits of 0.5 mg/l, which makes the mineral waters in Romania to be safe for consumption.

The nitrites content of tested mineral waters was significantly lower in the waters with a higher pH (Fig.5).

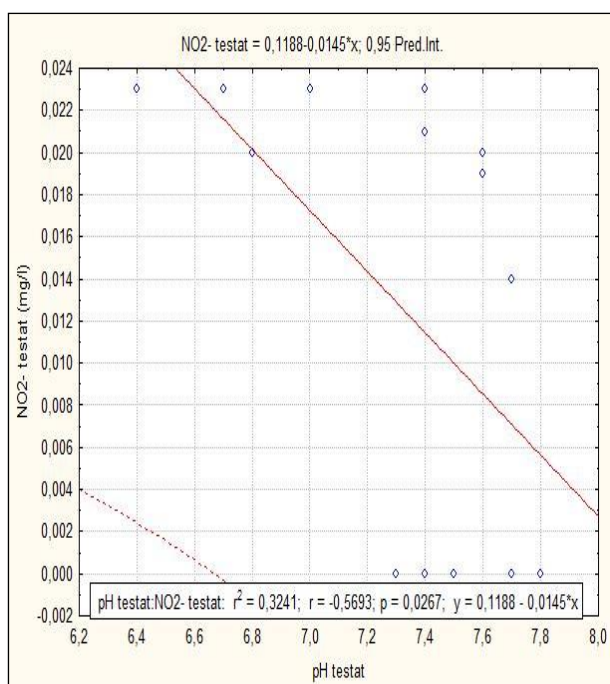


Fig. 5. Regression NO_2^- - pH for mineral waters

In fact, the raising of pH by one unit caused a decrease in the nitrites amount of about 32% (the coefficient of determination $r^2 = 0.32$). This can be a criterion to guide consumers in choosing the type of water.

CONCLUSIONS

Base on the analysis made on these samples of mineral water, it was possible to draw several important conclusions.

The pH mean of the tested mineral waters was 7.37 ± 0.42 , higher than that recorded on the labels (7.25 ± 0.56), but not significantly different.

The Perla Covasnei mineral water presented in addition 1.24 pH units from the value recorded on the label. Noticeable deviations were also observed for Bucovina, Zizin and

Herculane mineral waters.

Large differences in pH declassified certain waters in the pH range suggested by the labels. Thus, the alkaline water Bucovina is presented as neutral, acidic water Zizin is presented as alkaline and neutral Perla Covasnei is presented as acidic.

Two thirds (66.67%) of the producers did not specify on the labels the nitrates content of mineral waters. Where this happens, the nitrates content tested values were much higher than that recorded on the labels.

Real nitrates content mean of tested mineral waters was 5.89 ± 2.88 mg/l, well below the maximum limits (50 mg/l).

Most of the producers did not specify on the labels the nitrites content of mineral waters. In 40% of mineral waters, which had the nitrites content specified on the labels, it was found that it was below the detection limit.

The nitrites content of mineral waters was significantly lower in waters with a greater pH. The raising of pH by one unit caused a decrease in the nitrites amount of about 32% ($r = 0.57^*$). This phenomenon can be a criterion to guide consumers in choosing the type of water.

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CHALLENGES OF AGRICULTURAL COMPANIES FROM THE PERSPECTIVE OF LABOUR PRODUCTIVITY AND FUNDING ACCES

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Abstract

The development of agriculture was a priority for the member states of the European Union since its foundation, the Common Agricultural Policy being one of the most ancient politics at the European level. Agriculture is a sector which has a special economic and social importance for Romania. The paper aimed to identify the challenges of the agricultural companies from the perspective of labour productivity and funding access. In this respect, a series of economic indicators as the contribution of agriculture to GDP, the value of agricultural production, the evolution of reference interest rate, the evolution of credits for agriculture, were studied. the conclusion was that in order to improve labour productivity, it is needed a higher qualification of the occupied population in agriculture and the significant improvement of technological endowment of this sector and, from the point of view of funding access, it is necessary the continuous support of the companies which carry out their activity in agriculture, but not only by the diminution of difference interest rate.

Keywords: agricultural machinery, companies, labour productivity, production value

INTRODUCTION

The development of agriculture was a priority for the member states of European Union since its foundation, the Common Agricultural Policy being one of the most ancient politics at European level. Agriculture is a sector that presents a special importance for Romania both economically and socially. However, the contribution of this sector to the formation of GDP continuously decreased, reaching 5.2% in 2014 according to National Commission for Prognosis.

Within this sector, in 2014, around 102,000 companies carrying out agricultural activities were registered at the Trade Register [7]. Most of these companies are opened in the sector of animals growing, their number exceeding 43,000 and on the second place, it is the sector of perennial plants, where the number of companies is 32,000.

The crisis had also negative consequences on the companies that carry out their activity in the agricultural sector and pointed out numerous vulnerabilities of this sector. As it is mentioned within a study elaborated by PWC, the most important challenges that the

agricultural sector has to face now are the low productivity and the big necessity of funding [3].

MATERIALS AND METHODS

The purpose of this research paper consisted in the identification of the challenges of the agricultural companies from the perspective of labour productivity and funding access. In this respect, I analysed a series of economic indicators as the contribution of agriculture to GDP, the value of agricultural production, the evolution of reference interest rate, the evolution of credits for agriculture, etc. This study is a descriptive and comparative one and the data used were taken from the database of World Bank and Eurostat.

RESULTS AND DISCUSSIONS

The productivity of agricultural sector is influenced by a series of factors including the quality of biological and bio-capacity of plants and animals [10], the characteristics of this sector and the access of farmers to professional qualification. From the point of

view of this sector's characteristics, Romania is distinguished by:

- the significant proportion of the agricultural lands [1] of the total surface of the country (59.7% in 2012 according to World Bank Data , being on the fifth place in the European Union, after Great Britain (71%), Denmark (61.6%), Ireland (65.8%) and Greece (63.3%);
- numerous agricultural exploitations (3,8 million) with a medium surface of almost 3.4 hectares [2];

- the most significant proportion of the employees in agriculture, 29 % , from the total of employees at national level in the European Union in 2012, compared to Croatia (14%), Greece (13%) and Poland (13%).

All these characteristics denotes the fact that the agricultural sector of Romania is low developed. As expected, this fact is also supported by the low level of labour productivity, as we can see from the table below[9].

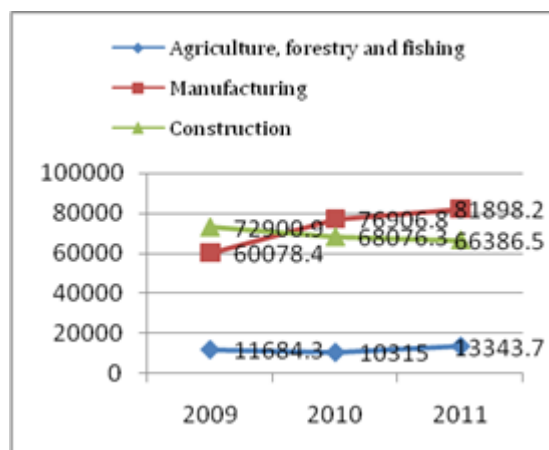


Fig.1.Labour productivity by employed person in Romania, 2009-2011 (Lei/person)

Source: National Institute of Statistics

Though the contribution of agriculture to the formation of GDP was constantly reduced in Romania according to the graphic below, the level is still over the European average.

However, 6.3% of GDP in 2013 values only Euro Million 4,500.89 according (Fig.2.)[6]. In 2013, the total value of agricultural production in the EU-28 was Euro Million 53,848.2 and the value of agricultural production of Romania represented only 8.4% of it.

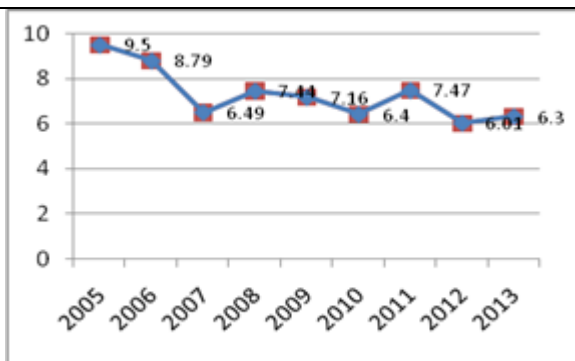


Fig.2. Agriculture, value added in the EU, 2007-2013 (% GDP)

Source: data.worldbank.org

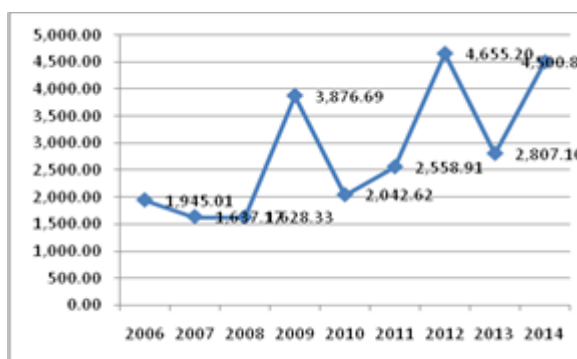


Fig.3. Production value for agriculture at basic price (Euro Million)

Source:http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=aact_eaa01&lang=en

Therefore, the agricultural sector of Romania is characterized by numerous small farms with a lot of employees and therewith by a low value of agricultural production but with a significant proportion of GDP.

The most important challenge of agricultural companies, from labour productivity perspective, is the qualification of the occupied ones because they are a lot and less productive.

At the same time, the increase of labour productivity is also a consequence of the technical endowment. According to the World Bank [5], in Romania, in 2009, there were almost 200 tractors per 100 sq. km of arable land, six times less than in Poland and four times less than in Spain.(Table 1).

The low level of technical endowment is both a consequence of the difficult access to funding and of the credit conditions.

Though the monetary policy promoted by the National Bank of Romania is expansionary, the reference interest rate reached 2.25% in

February 2015 and the access of the companies to funding is still difficult.

Table 1. Agricultural machinery, tractors per 100 sq. km of arable land

Year	2005	2006	2007	2008	2009
Romania	192.6	195.3	200.6	200.4	201.2
Poland	1,183.7	1,209	1,242.5	1,246	1,257.9
Spain	759.6	786.3	807.3	825.1	831.2

Source: 2014, World Development Indicators, The World Bank,

<http://data.worldbank.org/indicator/AG.LND.TRAC.ZS?page=1>

In the period October 2013 - March 2014, the bank funding was not an option frequently used by companies and this fact is also mentioned in the semestrial report elaborated by NBR and concerning the access of the companies to funding [4]. These companies used rather the internal funding sources. Therewith, the perceptions of these companies concerning the practiced founding conditions were not modified beside those mentioned in the previous report that analyses the period April - September 2013.

The reference interest rate was continuously decreased, being now at 2.25%, by 1.75 % less than in November 2013 (Table 2).

Table 2. Evolution of reference interest rate in Romania in period August 2013 - February 2015

Date	Reference interest rate(%)
6 August 2013	4.50
1 October 2013	4.25
6 November 2013	4.00
9 January 2014	3.75
5 February 2014	3.50
5 August 2014	3.25
1 October 2014	3.00
5 November 2014	2.75
8 January 2015	2.50
5 February 2015	2.25

Source: Benta Adrian, Reference interest rate of Romania' National Bank reduced to 4%. Consult its dynamics in the last 3 years, <http://legestart.ro/rata-dobanzii-de-referinta-bnr-ului-fost-redusa-la-4-consulta-evolutia-acesteia-ultimii-trei-ani/Official> Monitor No.. 683/2013 where it was published The RNB Note No.33/2013 concerning the RNB reference interest rate

Besides the high level of the interest rates, the high level of fees, the requirements concerning the guarantees, the contract

clauses and the bureaucracy are also considered important obstacles in order to obtain the funding.

The constant reduction of the reference interest rate influenced positively the evolution of the credits granted to agriculture, forestry and fishing.

Nevertheless, although the bank credits destined to agriculture increased constantly[8], their percentage for the total granted credits is still very low (3.9% in 2012) in comparison with the big necessity of funding of agricultural sector.

Table 3. Evolution of credit granted to agriculture, forestry and fish-farming, 2009-2012

		2009	2010	2011	2012
Total credits from which:	Euro Mil.	54,811	65,279.9	70,822.6	69,076.1
	%	100	100	100	100
Agriculture, forestry Fishing	Euro Mil.	1,512.9	1,918.6	2,489.9	2,668.5
	%	2.7	2.9	3.5	3.9

Source: Presidency Commission for Public Policy for Agriculture Development

Analysing the funding sources of the companies on fields of activity, according to NBR poll, one may notice that the companies which had more borrowings in period October 2013 - March 2014 are those which carried out their activity in agriculture and industry.

However, though 34% of the agricultural companies that participated to NBR poll appealed to bank credits, these perceived more difficult the access to funding than the companies from the other sectors.

Besides the productivity and the access to finance, the performance of companies from agriculture sector is influenced also by the regulatory framework, the decisions regarding fiscal policy, infrastructure, the performance of companies from industry, etc.

The increase of labour productivity requires a higher qualification of the occupied population in agriculture and the significant improvement of technological endowment of this sector.

Regarding funding access, it is necessary the continuous support of the companies which carry out their activity in agriculture, but not only by the reduction of interest rate.

CONCLUSIONS

The development of agriculture was a priority for the member states of European Union since its foundation. Agriculture is a sector that presents a special importance for Romania both economically and socially. Even though the agricultural sector has potential (a large agricultural land, numerous holdings, significant proportion of the employees in agriculture from the total of employees at national level), it is not effectively used.

The contribution of agriculture to GDP is approximately 3 times higher than that in the European Union, but the value of agricultural production represents only 8% of the entire EU agricultural production.

The development of agricultural sector it is a priority for public policy due to its importance in feeding population, increasing employment and ensuring sustainable economic growth. In order to increase the performance of agricultural companies, it is necessary to simplify the crediting conditions and also for increasing labour productivity a better technical equipment and higher qualified people are required.

ACKNOWLEDGEMENTS

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INNOVATION AMONG INTANGIBLE ASSETS (IA)

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Abstract

The purpose of this article is to highlight the existence and importance of innovation present among intangible assets. In the new economy, the knowledge society, innovation is one of the most commonly used terms, along with globalization and sustainable development. This study has an important role in both the short and long term, through proper understanding of the terms of innovation, intangible assets and strategy. The primary purpose of this article is played by understanding and easy identification of innovation amongst those assets above. Most recent studies highlight the idea that can be identified more indirect benefits of innovation. These can be listed as follows: improving the image, better customer loyalty, and ability to attract new ones. This research was focused on the advice of the Executive Directors given by the study of the year 2011 from PricewaterhouseCoopers, on innovation as a means of running the enterprise and also throughout this study we have been highlighted misconceptions related innovation and last but not least the study conducted during 2001 - 2004 by the Romanian Government in order to place a strategic priority Scientific Research.

Key words: Europe 2020, growth, innovation, intangible assets

INTRODUCTION

Depending on the context in which it is used or studied the concept of innovation, can have different definitions and interpretations of each other. A first definition can be made according to origin either English or French, meaning that innovation defines both a process and a result thereof, as follows:

a. Innovation defined as the process → refers to the activity which includes research, design, production and distribution are considered main stages in a system of interactions, with exchanges between the different functions and different participants, whose experience, knowledge and capabilities are enriched and resulting in an **innovation**.

b. Innovation defined as the result → new product, process, process or service.

- In accordance with the wide range of definition of this concept, innovation can be defined as synthetic **transformation of an idea** into a:

- new or improved product launched on the market;
- operational process (technology) new or improved use in industry or other economic activities;

- new type of social service;
- organizing a new type of activity.

Product innovation: new or significantly improved existing products means producing and marketing a product technologically modified.

Changes can be highlighted by changing the basic characteristics of the product, leading to the enhancement and / or services that they offer consumer product, or the creation of new functions.

Minor technical or aesthetic changes are not considered innovations because changes do not affect the performance properties, cost or materials used in the product.

Product life cycle has a strong influence on the scale and pace of product innovation.

Process innovation: technological processes and procedures, new or significantly improved constitute a significant change in a product processing technology, which involves the use of new equipment, new management, new ways of organizing or altogether.

Innovation processes can have the following main effects:

- Increased productivity and increased production inputs and / or lower cost, which ensures product quality and price flexibility;

-Changing facilities, equipment and improving the working methods of the company;

-Radical changes that occur when transform the manufacturing technologies and new products.

On the economic level, innovation as a process has multiple roles:

-Setting long-term goals;

-Tracking renovation and widening the range of products and services and markets;

-Introduction of new methods of production, supply and distribution;

-Requiring changes in management, work organization, working conditions and level of qualification of the workforce;

-Determining renovation of industrial structures and the emergence of new sectors of economic activity.

Process innovation is the core characteristic of the knowledge society triad **science - technology - market**.

Intangible called intangible assets are identifiable non-monetary assets category, out of physical substance-specific capital and intellectual property, which include knowledge on the results of research and development (embodied in the concept studies, scientific, specialized treaties, documentation, patents, certificates of innovative etc.), brands or trademarks, trade secrets and industrial advertising titles, software, copyrights, licenses, user training and education activities etc. . Education is a component of sustainable development, but also an activity that generates intangible assets [10].

According to IAS 38 "Intangible Assets", **an intangible asset** is a non-monetary asset, identifiable, without physical substance material, economic value, which can be found in the legal and contractual rights [7].

Intangible assets have considerable implications for the financing of the knowledge society vision [9]. They are the most important resources of an economic entity because the light can analyze their technical - material basis and revenue related to its evolution in time and continued capacity development [8].

The appearance of these elements is due to the

need for evaluation [1], accounting and recovery of ideal elements - intangible presented as patents, trademarks, models, copyrights, franchises, software etc. , or as competing elements such as the direct market research - development, quality management organization etc. [2].

According to a recent study provided by PricewaterhouseCoopers identified some misconceptions related to innovation which should be remedied quickly so that the innovation process can provide the lightness results.

These might be:

1:Innovation can be delegated. Any innovation action can only start from the top. Business leaders are the ones who set the tone change that can shake the foundations informal structure of an organization and can change an entire corporate culture. If the head of the organization will not reward innovation, will not protect the entire process and will not change the internal working relationships to foster innovation, the effort may fail.

2:Middle managers are natural allies of innovation. In fact, managers do not excel in terms of embrace innovation as a natural process to streamline the business. Their tendency to increase profits through operational efficiency rather urges the rejection of new ideas that may deviate from verified growth paths.

3:Innovative talents work only for money. We are aware that the ultimate motivation of people is highlighted rewards innovators related to the successful launch of new products and services. Money alone will not determine the success of an innovation effort. In addition to money, are equally important and compensation measures, such as public recognition of the efforts and holding a certain degree of autonomy.

4: Innovation is born from lucky accidents. In fact, innovation means a huge effort and disciplined search for new solutions, in a process which often end up clogging experiments. In this situation, the key to success is given only by discipline tests.

5: Innovation cannot be measured. Contrary to this LP, innovation can and should be

measured. It is up to the business manager to identify indicators like ROII (**return on innovation investment** - ROI of innovation). This innovation should be part of the same rigor as with other areas of business, all based on the premise that in the initial stages of the innovation process uncertainties and risks are very high levels.

Innovation occupies the highest place of prioritizing industries where technologies are constantly changing customer expectations reworded, or where the convergence of technologies means a profound impact on business models.

MATERIALS AND METHODS

This paper is based on literature study both national and international in order to identify the direct link between innovation activity and intangible assets. The correct understanding of the terms of innovation, intangible assets and strategy, research becomes an important issue in both the short and long term. The analysis refers to the year 2011 of the study from PricewaterhouseCoopers, the advice of the Executive Directors on innovation as a means of running the enterprise and also throughout this study we have been highlighted misconceptions related to innovation and not Finally the study conducted during 2001 - 2004 by the Romanian Government in order to place a strategic priority Scientific Research.

I have also introduced the situation of innovations of such economic elements in the EU illustrated in Romania, which prompted a study and comparison with other countries through a report provided by the European Commission in 2013. It contains a survey study conducted during January-February 2013 on the 8715 respondents in the EU27, including Romania. In this study were used Eurobarometer survey, interviewing methods and confidence intervals.

RESULTS AND DISCUSSIONS

In the period 2001 - 2004, Romanian Government Scientific Research places a strategic priority. The program identifies the

most important issues and actions to be taken of them:

- 1.Improving the legal and institutional framework for research and development and capitalization of research and development results (R&D).
- 2.Defining strategic areas and ensure their funding priority.
- 3.Updating the financial system for research, development and innovation.
- 4.Development of R&D infrastructure quality.
- 5.Development of human resources in R&D.
- 6.Distribution capacity development of new knowledge.
- 7.Stimulation and capacity of absorption and distribution of research results in economic and social development.
- 8.Adapting R & D & I (research, development and innovation) the requirements of EU integration.

However, strategy still is generous and coherent and implementation lagging behind affects the potential success.

According to the study provided by PricewaterhouseCoopers (11 July 2011) summarized in Table 1 below, we see that 43% of heads of organizations in the pharmaceutical industry, the entertainment and media believes that their biggest opportunities for growth into a year since the crisis and 2011 are included in launching new products and services [3]. The structure of the business is changing rapidly, so companies are forced to adapt on the fly (see Table 1).

The changes existing among industries listed in the table above, are due to an increasingly globalization. Thus it can be seen that 41% of businesses in the pharmaceutical industry is expected that most innovations are developed in countries other than the country of origin of the business. The result will be the identification of innovations that will generate competitive advantages for the right markets. Businesses that take place mostly in mature markets need to differentiate between when the majority taking place in emerging markets looking to advance on the value chain in order to reduce dependence only labor cost advantage, an advantage extremely labile.

Thus, we can say categorically state that innovation exceeded the allocation of

resources to people in white coats to work on various projects in laboratories mysterious isolated from the rest of the world.

Table 1. CEOs view innovation as a means of running the business (%)

Categories of industries	1. The main way to grow	2. Efficiencies for an edge	3. Significant revenue opportunity
Communications	49	41	43
Entertainment & media	43	17	33
Pharma & life sciences	43	15	36
Business & professional services	41	12	26
Forestry, paper & packaging	35	12	8
Technology	34	34	42
Chemicals	34	34	29
Transportation & logistics	32	40	33
Metals	32	32	25
Insurances	32	30	28
Industrial manufacturing	32	26	33
Automotive	28	38	36
Total financial services	26	31	28
Consumer goods	25	25	33
Retail	21	20	19
Oil & gas	20	33	24
Utilities	19	15	11
Engineering & construction	18	23	19

Source: www.ittrends.ro [12]

Currently the innovation process has come to represent rather a continuing need for improvement and reinvention of products, processes, services and even brands. Such a process involves more people than before, in processes, structures and practices more rigorous. Presenting an overview, we note that 78% of business respondents believe innovation as generating "sufficient" new revenue opportunity for cost savings over the next three years.

EU 2020 is the Strategy of EU to promote smart, sustainable and inclusive growth. It created a ten-year strategy (being launched in 2010), in which the EU aims to support economic growth and employment from then until now but in the future. Its objective is more than overcome the crisis in which our economies now gradually recovering. The strategy aims to tackle the shortcomings of our development model and create favorable conditions for smart, sustainable and inclusive growth.

To do this until the end of 2020, the EU has set five key objectives regarding: **employment, research and development, energy / climate, education, social inclusion and poverty reduction** (also Table 2).

Table 2. The goals of Europe 2020

Goals	The goals description
Employment	75% employment rate of the population aged 24-60 years
Research and development	3% of GDP
Energy \ Climate	20 \ 20 \ 20: <ul style="list-style-type: none"> • 20% reduction in greenhouse gas emissions; • Increase renewable energy by 20%; • Increase energy efficiency by 20%.
Education	School dropout rate - less than 10%; The percentage of university graduates - 40%
Poverty	Reduce by at least 20 million the number of people living in poverty

Source: www.ec.europa.eu [11]

The five objectives listed in the above table are supported by seven flagship initiatives which provide a framework for the EU and national authorities mutually reinforcing their efforts in priority areas for the Europe 2020 strategy, such as **innovation, the digital economy, employment, youth, industrial policy, poverty reduction and energy efficiency**.

Table 3. The flagship initiatives of the Europe 2020 strategy

Smart Growth	Sustainable Growth	Inclusive Growth
Innovation <i>Innovation Union</i>	Energy and climate <i>A resource-efficient Europe</i>	The labour market <i>New skills and jobs</i>
Education <i>Active Youth</i>	Competitiveness <i>An industrial policy for the globalization era</i>	Fighting poverty <i>European platform against poverty</i>
Digital Society <i>A Digital Agenda for Europe</i>		

Source: www.ec.europa.eu [11]

Innovation is essential for growth and competitiveness as one of the core elements of the strategy 2020. Moreover, the EU aims at becoming "an Innovation Union".

Through its regional policy and research and innovation, the EU promotes smart and sustainable urban development. Future

research and innovation program of the EU Horizon 2020, which will take place in 2014-2020, will focus more than ever on the financing of the whole "innovation chain" from scientific discoveries to market development. Future EU regional funding programs and they also will be focused on innovation, such as the creation of infrastructure for research.

Smart growth refers to the idea of innovation supported by the Innovation Union, lifelong education (leader being active youth) and especially the digital society: we all need to acknowledge and cope with digitization era; according to the new digital economy and information society develops inversely with human skills development.

Sustainable growth and focuses on development, protection and conservation of energy and climate by creating a Europe responsible for the efficient use of resources. We must learn to protect and preserve the environment in which live together.

Inclusive growth is addressed directly to urban development and hence human resources by developing labor market with the help exploit the skills acquired and by creating and providing new jobs and especially the organization and implementation of actions to combat poverty and creating a European platform for monitoring analysis and interpretation of this phenomenon affecting all mankind.

In the knowledge economy, IA and innovation should contribute more to a company and represent a competitive advantage of a country. At the firm level, they constitute a substantial part of the market value, along with tangible assets. In the United States and Europe, macro, investments in IA amounted wealth and living standards.

Unlike tangible assets which include physical properties, such as machinery, buildings and equipment, intangible assets, such as software and databases, brand equity, human capital, organizational structure, research - development, copyright and licenses, cannot be touched or seen their value is hard to measure.

However, IA causing or leading to the emergence and operation of the innovation

process, contributing more in a firm determines a country's competitive advantage. For example, US companies invest more in their own intangible assets rather than in the tangible ones, indicating a major shift towards a knowledge-based economy.

Traditional accounting practices associate IA with a cost of doing business, not as an investment in growth and innovation. Without the concrete internal and external data on intangible assets, managers must rely on intuition to make important decisions about investment assets, while investors find it difficult to assess the potential profitability of companies. It is time for a fresh look of how private companies these critical assets.

The presence of innovation amongst IA is a real competitive advantage for economic recovery.

IA is essential for innovation and renewal organizations today, "in most businesses, they exceed the physical assets, both in value and contribute to economic growth" [5]. Moreover, IA allows other types of capital accumulation and, as such, is a central resource for organizations.

A very interesting study is also the one in 2013, provided by the European Commission. This is actually a survey study that aims to highlight the categories of IA investing companies to see what kind of resource categories used in investing such items, estimate the benefits obtained as a result of investment in IA and the link between innovation projects and investments in these important items. The investigation focused on companies in the 27 EU Member States, including Romania. The survey refers to companies using one or more persons in areas such as manufacturing, services and industry. The sample was selected from the international database, with additional sample of the local sources when necessary.

According to the study, the activities which most likely have had investment on domestic resources are improving business processes (60%), training (58%) and the company's reputation and branding (2%). It was found that at least half of companies have invested using internal resources for organizing and improving business processes (60%), training

(58%), and company reputation and branding (52%). Only 41% of companies have invested in creating products and design services, 39% in software development and only 32% in research and development [4].

The company's reputation and branding is the only area where at least half the company predicts investing at least for two years. Specifically, 11% of their investment benefits are expected to last more than ten years. In 2011, at least four out of ten companies have invested up to 5% of turnover in training (44%) and organizational or business process improvement (40%) using internal resources. More than a third (37%) invested up to 5% on the company's reputation and branding (37%) and only 29% have invested this money in software development. Based on internal resources, a quarter of companies (25%) have invested up to 5% for the product or service design, while 20% of this amount invested in research and development [4].

Training - is one of the IA deemed to have the shortest duration of benefits. 51% of respondents were on the opinion that these benefits will be felt for more than two years.

Regarding the company's reputation and branding was proved that in 2011, Romanian companies invested 5% of internal resources, unlike the US (34%), Slovakia (33%), followed by Polish and French companies (both 22 %) [4].

36% of Romanian companies are investing in the design of products and services, 32% in software development and only 24% in research and development.

From turnover obtained Romanian companies are investing in training activity only 15%, unlike Japan which allocates nearly half that amount. 92% of Romanian companies tend to say that they do not invest anything in the company's reputation.

88% of Romanian companies claim that in 2011, have not invested anything in the organization or business process improvement activities from external suppliers.

Most of the companies in each country claim that in 2011, have not invested anything in software development from external suppliers. The same support and 92% of the

Romanian companies surveyed.

Manufacturing companies say they have not invested anything in company branding and reputation from external suppliers (73% vs. 66% - 67%), as well as for the research - development (77% vs. 82%) [4].

The company is smaller, the more likely there will not be any investment in each of these activities. For example 73% of companies with 1-9 employees have not invested anything in the ESP software development, compared with 32% of those with 250 or more employees. This pattern is repeated for training, corporate reputation and branding, organizational and business process improvement, product or service design, research and development.

Companies say that one of the main priorities is to develop new products and services are more likely to be made at least some external resources for investment in research and development (22% vs. 13% -16% for other priorities). Those that during 2009 - 2011 have introduced new or significantly improved products, services, or processes, marketing strategies or methods of distribution, or organizational structure or management methods are more likely to be invested in each area of intangible investment asked, compared to companies that would not make such changes. For example 31% of companies have introduced marketing strategies or new or significantly improved distribution methods, external resources invested product or service design, compared with 17% of those who did not make these changes [4].

As a conclusion we mention that spot the two activities that are most likely to invest using internal resources are improving business processes (60%) and training (58%). The two activities that are most likely to be attracted by foreign investment in resources are the training (38%) and the company's reputation and branding (30%). According to the survey, one in ten companies that have invested in the company's reputation and branding benefits are expected to last more than 10 years. In general, the highest percentage of such predictions is recorded for the period up to two years. For example, 50% of Romanian

companies expect investments in research - development to be felt for more than two years [4].

Companies in the services sector (49%) are most likely to expect that the benefits of their investments in organization and business process improvement to last less than two years, especially when compared with companies in the industry (40%). The same situation for investment in the company's reputation and branding (40% vs. 35% for the other sectors) [4].

Covering all areas of investment, companies with 50-249 employees are most likely to expect benefits to be felt over a period of at least two years, particularly where research and development (72% vs. 47% -59%) and especially software development (57% vs. 41% -50%) [4].

Companies in the industry are most likely to be targeted more than 5% of the investment in training (25%) and the company's reputation and branding (28%) in innovation projects. Those in the services sector are most likely to be used more than 5% of their investments in research and development (28%) to innovation projects [4].

CONCLUSIONS

Skills and qualifications of employees are considered the largest recipient of investment in IA. Companies that have invested in any of those IA were asked if their company would have benefited from investments in a number of areas. 53% of the companies refer to their employee's skills and qualifications. Also, a high percentage of companies argue that such investments have increased sales. More than a third (37%) says that was part of a lot of benefits in terms of market share, while 36% say this about the company's profit margin.

All companies were asked if they had introduced a number of new issues or to make significant improvements to their business during 2009 - 2011. More than four in ten (42%) have introduced new products, services or processes or have significantly improved and 28% claim to have introduced new organizational structures and management methods or have made significant

improvements, while 27% have introduced new marketing strategies or methods of distribution [4].

Finally, companies that have introduced new improvements in one of the areas discussed above, and that also invested in IA, were asked to specify what percentage of these investments (in 2009-2011), were related to specific innovation projects (not to innovation in general).

More than a quarter of companies say that more than 5% of their investments in R& D have been linked to innovation projects (26%), while 25% say the same for investments in products or services design. Only a quarter (23%) say that more than 5% of their investments were for the company's reputation and branding, and the organization or business process improvement was related to innovation projects, while 20% say that they work on investments in software development and 19% on investment in training [4].

On the other hand, one of five companies (20%) say that none of their investments in software development, R&D and design of products and services were not related to innovation projects [4].

In building the knowledge society must be aware of the idea that knowledge has become the main factor of production and progress, and the need for innovation and learning processes, considered fundamental for sustainable growth.

The presence of innovation amongst intangible assets is a real competitive advantage for economic recovery.

To enable innovation within organizations, research and development functions are no longer sufficient to successfully compete in an international market dynamics.

Different organizational IA should be aimed at optimally innovation, and organizations that should allow the existence of a culture of innovation, creating an atmosphere and internal stakeholder relationships that promote flexibility for innovation and change.

The role of IA for organizational innovation is done in time, because "*innovations are created primarily by investments in IA*" [6].

By studying the literature of studies of

communication, marketing, psychology, information technology, and human resource management, we identify six dimensions in terms of specific innovation contribution of IA, from the individual to society. These are not exhaustive, but especially highlight the most important economic areas in which these elements are related to organizational innovation.

In the literature we identified the idea that the "old economy" discuss tangible elements such as traditional machines, production lines and others, and according to the new economy, the knowledge society talk about intangibles as: software - links, design, reputation brand, migration to knowledge intensive activities and development of the service sector.

Innovation refers to the production of as many outputs, not ideas or happiness.

Summarizing innovation means an additional output to the use of additional physical capital and labor. It also can mean additional production obtained from the use of new knowledge.

In conclusion, all the research and all specialized studies reveal that IA provides an important contribution to organizational innovation.

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FEASIBILITY OF INVESTMENT IN CHERRY ORCHARD

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Abstract

The main purpose of this paper is to correctly determine the investments required to establish cherry orchard, as well as to point out the best option to ensure the quality, productivity and competitiveness of the relevant products. The feasibility of investments for planting cherry orchards is considered according to the following method: preparation of investment budgets for planting and maintenance of cherry orchards before fructification for three technologies of fruit cultivation (traditional, intensive and super-intensive), the budget for the cherry orchard during the fructification period, and the comparison of the obtained results of calculation. The traditional orchard technology is more extensive, easier to implement, needs least investments per hectare and has lower economic effects, the intensive technology needs large investments per hectare and, therefore, allows obtaining more advantageous economic results, while the super-intensive technology is the most expensive, implies the greatest investments per hectare, and allows obtaining the best economic results. Given the above-listed findings, it may be concluded that intensive orchards allow obtaining cherries of homogenous quality, have a high productivity per hectare and at lower costs.

Keywords: cherry orchards, competitiveness, feasibility investments, income and expenditure budget, productivity, profit, return of investment, technology

INTRODUCTION

The globalization of the world economy and the technical – scientific progress provides new possibilities for increasing the efficiency of more levels of the agriculture. The integration objective of the Republic of Moldova in the international economic system as a competitive partner imposes a qualitative change of the actual situation within the agro-food sector. For Moldova, the achievement of this task can be reached through prior orientation towards the production and export of high value agro-food products, for which there are profitable and modern markets.

Under market economy conditions, agricultural entrepreneurs should analyze in detail the start-up of a business to determine correctly the implementation of business and the investment amount. The investment budget during planting and maintenance of the cherry orchard before fructification should be analyzed from the following points of view:

-The most important aspect is whether the selected technology allows ensuring **quality,**

productivity and competitive price during fruit production. Only the high quality and productivity of cherries will make our business competitive and will facilitate access of our products to strategic fruit markets. [1]

-The amount of necessary investments and return on investment in the shortest time.

-An important aspect is the optimal use of production factors in the enterprise.

These are the most important aspects which should be taken into consideration when planting cherry orchards and, to ensure correct decision making, the farmer should avail of technological and specific economic information to take right decision.

MATERIALS AND METHODS

As materials for analysis and research we considered the Statistical Yearbooks of the Republic of Moldova, the data offered by the Ministry of Agriculture and Food Industry regarding the developments in the agricultural sector and, particularly, high value agriculture, the data collected from agricultural enterprises

dealing in cherry production by applying various cultivation technologies. To analyze and substantiate the feasibility of investments for planting cherry orchards, these materials were considered according to the following method: preparation of investment budgets for planting and maintenance of cherry orchards before fructification for three technologies of fruit cultivation (traditional, intensive and super-intensive), the budget for the cherry orchard during the fructification period, comparison of the obtained results of calculation, and formulation of final conclusions on the analyzed issue – feasibility of investments. [2] [3]

On the basis of calculations, it was established that the intensive technology of cherry cultivation is the best one for agricultural entrepreneurs, as it offered real opportunities to compete with fruits produced on regional markets in terms of price and quality.

RESULTS AND DISCUSSIONS

Further we are going to present economic information for the made investments in planting 1 ha of cherry orchard using three technologies: traditional (rootstock Mahaleb),

intensive (rootstock Maxima 14) and super-intensive (rootstock Gisela 6).

An important factor in planting a cherry orchard is the selection of the field and namely: it is possible to plant where there are minimum 1500 hours of sunshine, 36 degrees of global temperature, 9-11,5 degrees of average temperature and over 600 mm precipitations; permeable in order to avoid water ponding; excluded from planting fields excessively wet and without drainage as well as those with phreatic level under 1,5 m; the soil should have neutral reaction, weak acid or weak alkaline; the fields should be exposed to sun, south exposition, S-E or S-W, avoiding northern expositions.

In the table below you may find a comparative analysis of differences between technologies of cherry cultivation that the entrepreneur should know in order to select the most optimal and efficient method when starting up a private business.

The investment budget for planting the cherry orchard is a financial tool through which the expenditures and necessary financial resources for a certain period of time are forecasted.

Table 1. Analysis of technical indicators in cherry orchards cultivated according to different technologies

Specification	MU	Cultivation technologies of cherries		
		Traditional variant (Mahaleb)	Intensive variant (Maxima 14)	Super-intensive variant (Gisela 6)
Planting scheme	m	5 X 4	5 X 3	4 X 2
Number of trees per hectare	trees	500	667	1,250
Average harvest that may be obtained	t/ha	7.0	12.0	16.3
Time for return on investment (per harvest)	year per harvest	1.12	0.92	1.39
Time for return on investment since plantation	years	7.12	5.92	6.39
Number of years upon fructification	years	6	5	5
Period of use	years	25	20	15

Source: Calculations made by authors



Photo 1. Traditional orchard (Mahaleb)



Photo 2. Intensive orchard (Maxima 14)



Photo 3. Super-intensive orchard (Gisela 6)

The presented calculations will serve as a basis for economic reasoning while selecting the optimal variant for planting an orchard.

In Table 2 you may find systematized information from investment budgets for planting and maintaining cherry orchards

before fructification using three variants of fruit production technologies: traditional (rootstock Mahaleb), intensive (rootstock Maxima 14) and super-intensive (rootstock Gisela 6).

Table 2.Total investments for planting and maintaining cherry orchards before fructification

Specification	Cultivation technologies of cherries					
	Traditional variant (Mahaleb)		Intensive variant (Maxima 14)		Super-intensive variant (Gisela 6)	
	Lei	%	Lei	%	Lei	%
I. Cost of production means	38,421	44.5	53,050	51.6	183,691	69.1
II. Mechanized services	19,024	22.1	20,366	19.8	27,275	10.3
III. Manual operations	13,125	15.2	13,467	13.1	24,083	9.1
IV. Contingencies (10%)	15,703	18.2	15,893	15.5	30,710	11.6
TOTAL	86,273	100.0	102,775	100.0	265,758	100.0

Source: Calculations made by authors

For planting 1 ha of traditional orchard, the farmer needs approx. 86.3 thousand lei. For 1 ha of intensive orchard – the investments will increase with 142% (investments are foreseen for drip irrigation system) in comparison to the traditional orchard and for 1 ha of super-intensive orchard – by 3.45 times (the investments for protective nets against hail are not taken into account).

If comparing the data from the table, we come to the following situation:

- ✚ The traditional variant is the less intensive (more extensive) easily achievable for farmers, requires lowest investments per ha and resultantly - the lowest economic results obtained from the operational activity;
- ✚ The intensive variant can be implemented by farmers but requires large investments per ha and as a result allows to get more advantageous economic indicators from the operational activity;

Table 3.Income and expenditure budgets for maintaining cherry orchards during fructification

Specification	Cultivation technologies of cherries					
	Traditional variant (Mahaleb)		Intensive variant (Maxima 14)		Super-intensive variant (Gisela 6)	
	Lei	%	Lei	%	Lei	%
I. Net sales	103,600	X	170,400	X	230,750	X
II. Cost of production means	5,805	17.5	7,425	14.3	9,945	12.1
III. Mechanized services	2,325	7.0	3,656	7.0	4,599	5.6
IV. Manual operations	17,182	51.9	25,732	49.5	34,999	42.4
V. Contingencies (10%)	7,768	23.5	15,175	29.2	32,924	39.9
VI. Variable consumption - total	33,081	100.0	51,988	100.0	82,468	100.0
VII. Gross profit - total	70,519	X	118,412	X	148,282	X

Source: Calculations made by authors

✚ The super-intensive variant is the most expensive for farmers, requires the highest investments per ha and as an outcome allows getting the best economic results. In the table above you may find systematize

information from income and expenditure budgets for maintaining cherry orchards during the fructification periods using three variants of fruit production technologies: traditional (rootstock Mahaleb), intensive

(rootstock Maxima 14) and super-intensive (rootstock Gisela 6)

If we compare the data from the table, we come to the following situation- the wholesale price of cherries is the same for all variants and makes in 16 lei/kg:

- ✚ The traditional variant allows getting a gross profit of 70,519 lei/ha, which is rather low if we use a performant agriculture;
- ✚ The intensive variant allows getting a gross profit of 118,412 lei/ha, which is advantageous for using a performant

agriculture;

- ✚ The super-intensive variant allows getting a gross profit of 148,282 lei/ha, which is the most advantageous for using a performant and sustainable agriculture.

In the table below you may find the analysis of the economic indicators for cultivating cherry orchards using three variants of fruit production technologies: traditional (rootstock Mahaleb), intensive (rootstock Maxima 14) and super-intensive (rootstock Gisela 6)

Table 4. Analysis of economic indicators in cherry orchards cultivated through different technologies

Specification	MU	Cultivation technologies of cherries		
		Traditional variant (Mahaleb)	Intensive variant (Maxima 14)	Super-intensive variant (Gisela 6)
Total investment amount	lei	86,273	122,775	297,758
Income from sales that may be obtained	lei	103,600	170,400	230,750
Direct consumption	lei	33,081	51,988	82,468
Gross profit	lei	70,519	118,412	148,282
Unit cost of production	lei/kg	4.73	4.33	5.07
Average selling price	lei/kg	16.00	16.00	16.00
Direct consumption per MDL 1 of income from sales	lei	0.295	0.271	0.317
Profitability	%	213.2	227.8	179.8

Source: Calculations made by authors

On the basis of economic calculations for planting a cherry orchard, the specialists recommend to entrepreneurs to apply intensive technologies for cherry cultivation (rootstock Maxima 14), because it allows to get the best results with less risks.

Despite of a high profitability of cherry orchards and high demand of these fruits, the expansion of cherry orchards is subject to high natural risks. According to the data from the Ministry of Agriculture and Food Industry, at present, the total area of cherry orchards in Moldova is about 2,6 thousand ha, whereof 2 thousand are in fructification and the average yield is 3,2 t/h (according to the data of the National Bureau of Statistics from Moldova).

CONCLUSIONS

The commercialization of cherries is advantageous for entrepreneurs because they can get incomes from early sales need for

cash inflows in the enterprise cash flow and more efficient administration of the enterprises. The cherry fruits have a high demand from consumers being among the first fruits of the season with a good and stable price for the season.

Why intensive technology of cherry cultivation? The answer can be found in the following argues:

- The intensive and super-intensive orchards allow getting qualitative cherries (uniform size and quality and stable yields each year);
- The administration of intensive orchards is more efficient due to average form of the tree crown (dry pruning is easier as well as spraying, harvesting, etc.);
- The high productivity of cherries in intensive orchards allows to have unit costs of production ensuing competitiveness fact which is extremely important in competitive struggle on regional markets;
- The intensive technology is less expensive compared to the super-intensive and is a

middle variant (average) in the area of cherry production;

-The intensive orchards benefit from substantial subsidies;

-Production factors in intensive orchards are used on a high level;

The acquisition prices of cherries from the field will be high because they are among first fruits and the intensive orchards allow to have a high profitability level in these conditions.

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