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# **SCIENTIFIC PAPERS**

**SERIES “MANAGEMENT, ECONOMIC  
ENGINEERING IN AGRICULTURE AND RURAL  
DEVELOPMENT”**

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## COMPARISON OF DIFFERENT ACCOUNTING SYSTEMS: LAUR AND FADN

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### *Abstract*

*The present study was conducted to compare two different accounting systems (Laur Accounting System and Farm Accountancy Data Network (FADN) used to put forth activity outcomes of agricultural enterprises. These two systems were used to classify cost and income items of agricultural enterprises and calculation methods were compared. The survey data gathered through questionnaires made with selected enterprises constituted the material of the present study. Current findings revealed that different accounting system used to put forth annual activity outcomes of agricultural enterprises classified enterprise income and cost items in different fashions. In Laur Accounting System, enterprise costs are classified as fixed and variable costs. On the other hand in FADN system, costs are classified as intermediate consumption, amortizations and external costs. In Laur accounting system, enterprise success criteria are considered as gross profit, net product and agricultural income. On the other hand in FADN system, gross enterprise profit, enterprise net value-added and enterprise family income are considered as the success criteria.*

*Key words:* Laur Accounting System, FADN Accounting System

### INTRODUCTION

Besides a strategic function as to produce the food stuff to feed humans, agricultural is a significant sector with a great share in national income, employment and export.

In ever-developing and changing world, agricultural sector can sustain its significance under free market conditions only with the right prudential decisions. Such decisions are only possible with more efficient use of current resources through accurate information and knowledge [6].

Therefore, possible changes should be forecasted and decisions should be made accordingly. Throughout the development process of countries, the ratio of agriculture in Gross National Product (GNP) is relatively decreasing, but the sector still maintains its significance through resource-supply to production sector and industry and still provides significant employment opportunities [7].

Statistical information plays a great role in making right decisions in rural development initiatives of the countries. There are different data systems in every country to have

information about the sectors and to formulate future policies.

The similar case is also valid for agricultural sector with a significant place in economy of several countries [5].

For this purpose, a system called FADN was developed in EU countries. FADN stands for 'Farm Accountancy Data Network'. FADN is an organization allowing the countries to measure the effects of annual activity outcomes of the agricultural enterprises on agricultural enterprises. There are two basic objectives of FADN system: the first one is to perform profitability analyses for different regional and economical size classes and enterprises; the second one is to create a data set to be used in analysis of agricultural policies [4]. In FADN system, standard gross profit has been taken as the basis for 20 years in classification of enterprises based on their size and type of business. Standard Gross Profit (SGP) is a value expressing the difference between the outcome per hectare or per animal unit of plant and livestock production activities and the variable costs to get this outcome. Economic enterprise size is expressed in European Size Unit (ESU) [2].

The enterprises exceeding a certain size in ESU are defined as major operation enterprises and these enterprises constitute the main population of FADN. Because of different enterprise patterns of the Union, each member country has a certain threshold value. For instance, this value is the greatest in Belgium, Germany, Netherlands and Great Britain as 16 ESU and the value is the lowest in Bulgaria and Romania as 1 ESU [2, 3]. In the Union with 25 member countries, 5 million agricultural enterprises constitute the main population and 80 000 agricultural enterprises selected among them through sampling constitute the coverage of FADN [1].

The objective of an enterprise with an economic activity is to gain maximum profit from that activity. Enterprises initially calculate the costs and then determine the benefit and incomes of the relevant activity.

In Turkey, majority of agricultural enterprises do not keep the accounts of their activities. Therefore, it is quite hard to determine their incomes and consequently to plan their production activities.

In Turkey, Laur Accounting System is generally used in agricultural enterprises. Since the activities are not recorded, the data gathered are mostly based on farmer declarations. Farmer accounting records in Turkey was initiated in 1998. A regional pilot study was performed in 1999 to determine economic structures of agricultural enterprises and another study covering the entire country was performed in 2001. Official establishment of Farmer Accounting Data Network in Turkey was initiated in 2007 with EU supports. The implementation was initiated in 9 provinces as a pilot implementation. Arrangements were performed in 2014 to

cover 81 provinces and 5000 enterprises were proportionally distributed to provinces.

There are different income-expense calculation methods in different countries to put forth structural and economic activity outcomes of the agricultural enterprises. The present study was conducted to compare these methods and to put forth the differences between them.

## MATERIALS AND METHODS

The survey data gathered through questionnaires made with selected enterprises constituted the material of the present study. The previous relevant studies constituted the secondary data sources.

Annual activity outcomes of the selected agricultural enterprises were calculated with Laur Accounting System commonly used to put forth cost and incomes of the enterprises and European Union Farm Accountancy Data Network' (FADN) system and the results of both systems were comparatively evaluated.

## RESULTS AND DISCUSSIONS

Evaluation of annual activity outcomes of the selected enterprises based on Laur and FADN accounting systems is provided in Table 1.

While the Gross Production Value was 223,701.3 € in Laur system, Total Output was 223,872.3 € in FADN system. The reason to have different results was because Gross Production Value of Laur was composed of livestock production value, plant production value and productive fixed asset increment (PFAI) and total output was composed of livestock production value, plant production value and other incomes.

Table 1. Annual activity outcomes of the enterprises

LAUR	VALUE (€)	FADN	VALUE (€)
Gross production value	223,701.3	Total output	223,872.3
Enterprise costs	112,603.9	Intermediate consumption	73,132.2
Gross product	227,757.6	Gross enterprise income	149,584.4
Net product	115,153.5	Enterprise net value-added	138,399.5
Agricultural income	123,648.6	Enterprise family income	135,262.7
Gross profit	139,837.8	Standard gross profit	180,210.2

While the Enterprise Costs were 112,603.9 € in Laur, Intermediate Consumption was 73,132.2 € in FADN. Enterprise costs were composed of the total of fixed and variable costs. On the other hand, intermediate consumptions were composed of specific variable costs and general enterprise costs.

While the Gross Product was 227,757.6 € in Laur, Gross Enterprise Income was 149,584.4 € in FADN. Gross product was composed of gross production value and out-of-enterprise (external) agricultural income. On the other hand, gross enterprise income was composed of the difference between total output and main consumption costs and additional current subsidies and arrears of taxes.

While the gross product was 115,153.5 € in Laur, enterprise net value-added was 138,399.5 € in FADN. Gross product was composed of the difference between gross product and enterprise costs. On the other hand, enterprise net value-added was composed of the difference between gross enterprise income and amortizations.

While the agricultural income was 123,648.6 € in Laur, enterprise family income was 135,262.7 € in FADN. Agricultural income was calculated by subtracting debit interests, rents and sharecropping rates from net product and adding family labor payment equivalent. Enterprise family income was calculated by subtracting external costs from enterprise net value-added and adding investment supports and subsidies.

While the gross profit was 139,837.8 € in Laur, Standard Gross Profit was 180,210.2 € in FADN. Gross profit was calculated by subtracting enterprise costs from gross production value. On the other hand, standard gross profit was calculated by subtracting intermediate consumption costs from total output.

In agricultural economy researches, generally Laur Accounting System is used in Turkey to assess the activity outcomes of agricultural enterprises. However, this method is commonly used in scientific researches rather than being used in practice [8].

While comparing the annual activity outcomes an enterprise with the other through

Laur Accounting System, agricultural income, net product and gross profit are taken into consideration as the basic success criteria. On the other hand, gross enterprise income, enterprise net value-added and enterprise family income are considered as the basic success criteria in FADN system.

In this study, calculations with Laur Accounting System revealed average agricultural income of the sample enterprises as 123,648.6, net product as 115,153.5 and gross profit as 139,837.8.

In FADN system, average enterprise net value-added of sample enterprises was calculated as 138,399.5, gross enterprise income was calculated as 149,584.4 and enterprise family income was calculated as 135,262.7.

The different results obtained from two accounting systems were because different calculation methods are used in Laur Accounting System and FADN System.

For efficient agricultural policies, economic structures of actively operating agricultural enterprises should be determined, their production activities should continuously be monitored and their outcomes should be assessed in certain periods. Therefore, annual records of agricultural enterprises should regularly be kept for reliable investments to be made.

In EU countries, FADN system is used to determine annual activity outcomes and income-cost items of agricultural enterprises. In Turkey, "Farmer Record System" implemented since 2001 is a significant indicator for the current structure of agricultural enterprises. However, this system does not include financial and economic data.

There is a need for a system in Turkey to determine economic structures of the enterprises and ultimately to monitor current status and agricultural activities and to make reliable and sustainable agricultural policies.

With the FADN system, more accurate and reliable data can be gathered in future years and this system also yields data to be compared with the other systems.

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## FOOD AND NUTRITION SECURITY IN ROMANIA IN THE POST-ACCESSION PERIOD

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### *Abstract*

*The paper makes an assessment of the food security situation in Romania, several years after the accession to the European Union. The approach focuses on certain problems regarding food security assurance at national level, as well as aspects linked to the access to food and the population's nutritional status. The methodology used is based on the SWOT analysis of the population's food and nutrition security. This started from the current approaches to the food security concept, namely supply availability, supply stability, economic access and food use. In this context, the paper presents certain vulnerabilities of food security for Romania's population; among these vulnerabilities, at the food supply availability level, we can mention the lack of self-sufficiency in certain staple foods, such as meat, fruit, sugar and fish, in which the systematic deficit is covered by imports. At the same time, the domestic agricultural production instability, mainly in the case of crop production, raises food security problems. As regards the access to food, the low incomes and the income gaps by regions and residence areas generate food insecurity for the low-income population categories, which are most often found in the rural area. At the same time, the deficient food consumption in quality terms, the high share of calories from cereals and potatoes, as well as the low animal protein intake generate nutritional risks.*

*Key words:* food and nutrition security, rural household

### INTRODUCTION

The paper contains the findings from SWOT analysis of Romania's food security and safety several years after the accession to the European Union. This approach is part of the larger framework of Romania's Development Strategy for the next 20 years, 2016-2035, coordinated by the Romanian Academy. The approach to the food security and safety theme had in view the much too slow progress of the Romanian agri-food system, the delayed convergence with the performance indicators of the EU member states, rural poverty maintenance on large areas and last but not least, the existing problems and vulnerabilities in food security assurance for the population. These vulnerabilities emerge from the insufficient agricultural production level, from the domestic supply instability and price volatility, as well as from the deficient access to food of large population categories, under the background of income decrease and poverty in certain areas of the country.

In the recent years, the population's food security problem has come to the foreground again, due to challenges at global level, among which we can mention food demand increase together with the change of the population's diet from the new emergent states, the non-food uses of agricultural production by bio-fuel production, as well as the impact of climate changes on agricultural production and food supply. Even in the EU countries where food assurance is no longer a problem, food security has become a concern at the level of highly vulnerable communities. At the same time, most prospective evaluations take into consideration global evolutions with contradictory effects upon food security for the next years. On one hand, as an effect of strong economic growth in the emergent countries, a significant increase of food consumption per capita will take place, and even more important, a modification in the structure of diet, i.e. the shift from a consumption pattern based on cereals and other foodstuffs rich in starch to a

consumption pattern based on animal protein, in which meat and dairy products will prevail [2]. At the same time, it is expected that in the next decades the total factor productivity in agriculture will stagnate, due to reaching certain biological limits combined with the unpredictable and increasing climate change effects.

In this context, the evaluation of the food security situation becomes of utmost importance in Romania's case, as due to the still insufficiently used agricultural potential, our country may have an important role in food security assurance at regional level in the years to come, on the condition of solving up its internal problems linked to productivity and competitiveness in agriculture.

## MATERIALS AND METHODS

The first attempts to define food security, in the early 1970s, focused on the agricultural and food supply availability, as it was considered that population's food security can be reached if all the people have sufficient food to lead an active and healthy life, according to their needs. The access to food issue and the importance of economic factors conditioning it appeared later on. Gradually, the food security concept evolved, certain authors mentioning the existence of about 200 definitions for this concept, in the early 1990s [3].

Food security can be evaluated at different levels, but most references are made to the macro-economic (world, regional or national) level and at micro-economic level, i.e. at household or individual level. Depending on the level to which reference is made, the focus is laid on one or several of the four pillars of food security, namely: food availability, supply stability, economic access and utilization, represented by people's desire to have a healthy nutrition.

In the case of using the food security concept at world or national level, the focus is mainly laid on the capacity of countries to provide a sufficient agricultural supply to satisfy the population's food and nutritional needs [12]. At the same time, recent approaches [7] assign a special importance to "food

autonomy" as food security stability factor, which reduces the vulnerability to the fluctuations of domestic and world agricultural markets. Yet food availability does not ensure access to food, as the problems linked to the distribution of incomes at society level can seriously affect the access to food and food security at household level implicitly. Hence food security is finally a problem at household or individual level. It is generally considered that food insecurity and hunger are the direct result of poverty. With the economic growth and increase of incomes, the poor households will have the ability and presumptively the desire to obtain an adequate diet [13]. Although the household is used as unit of observation in most studies on the population's nutritional status, the key problem is nutrition at individual level, particularly in the case of those persons who are considered to be at nutritional risk.

Depending on the context, in this analysis we had in view the two approaches to food security: the macro-economic approach when we investigated the domestic agricultural production capacity to cover the population's consumption needs for different categories of products and the micro-economic approach when we referred to the nutritional situation of certain less-favoured categories of rural households or of certain socio-professional categories or ethnic groups.

The set of indicators used represents a combination between the indicators used by the national and international organizations for the assessment of the population's food and nutrition situation. The methodological and information sources are quite various and we list here the indicators and studies elaborated by FAO, OECD, IFPRI, Eurostat, EIU (European Intelligence Unit), Defra, Ministry of Health and Romanian Institute of Statistics.

The indicators used are selected to mostly comprehensively reflect the level of domestic agricultural availabilities and supply stability, as well as aspects in relation to the physical and economic access to food, to food use and elements related to the nutritional situation of population and of vulnerable demographic categories. The investigated data generally

cover the period 1990-2012, and we tried to compare the indicators with the similar indicators from two important agricultural countries of the European Union, i.e. France and Poland.

## RESULTS AND DISCUSSIONS

### 1. Domestic agricultural supply availability and stability

The food security issue was a permanent concern of the Romanians in the last century, even though Romania is among the European countries with the largest agricultural land areas, thus having significant resources for food production. Romania has significant agricultural areas among the EU-27 member states (14,612 thousand hectares), i.e. 8% of the arable area (5th position after France, Spain, Germany and Poland) and 8% of the area under permanent pastures (5th position after Great Britain, Spain, France and Germany). The agricultural land structure is favourable to the development of diverse agriculture: in total agricultural land, arable land accounts for 64.3%, pastures and hayfields 32.9%, while the vineyards and orchards 2.8%. The arable land per inhabitant (0.44 ha/inhabitant) is higher than the values found in important agricultural countries from the European Union, such as France and Poland.

From the food security standpoint, agricultural production is the main reliable source for the food consumption availability assurance for a country's population. With significant agricultural land resources, as well as with a population whose consumption needs became increasingly large and diversified in the last years with the growth of incomes and accession to the EU, at present Romania's agricultural production only partially covers the population's consumption needs. This because in the last 25 years, systematic deficits existed in certain important groups of foodstuffs, among which we can mention meat, milk, fruit, vegetables and fish and also cereals in the less favorable years as regards the weather conditions. The **self-sufficiency level** of domestic production was only 79% in fruit, 95% in vegetables, 82% in

meat, 94% in dairy products and 17% in fish in the year 2013. The existing problems with regard to the domestic agricultural supply sufficiency are largely the effect of the lower performance of the Romanian farming sector, generated by a complex set of factors, materialized into major gaps in the total factor productivity, in the productivity per employed person and in the average yields per hectare. One of the most important causes of this situation resides in the extremely fragmented agrarian structure and the extremely large number of small and very small-sized farms, which appeared as a result of the 1991 land reform. The consolidation process of small farms and the emergence of medium-sized farms is a process that takes time and needs adequate interventions, certain measures in this respect being also included in the rural development program 2014-2020, and the results are expected after many years or even decades. At the same time, the extremely fragmented agricultural supply obtained on these farms makes it difficult to organize the chains, mainly in milk, fruit and vegetables, and thus only a low share of these products travel from farm to consumer's table, being mainly used for subsistence consumption. Another aspect worth mentioning is the unbalanced structure of Romania's agricultural production, in the sense of the progressive diminution of the share of animal production in total agricultural production. This disequilibrium lies at the origin of gaps between the Romanian farms value added and incomes and the European ones, as the livestock production development makes it possible to better valorize the domestic production of cereals and other fodders. If we take into consideration the European Union average, in the year 2014, its production structure is well-balanced (54.5% crop production and 45.5% animal production) [5]. These values for Romania in the same year were 74.0% for crop production and 26% for animal production, while the same values for France were 59.9% for crop production and 49.1% for animal production. The assortment structure of Romania's agricultural production (2009-2013 average) is dominated by crops, among which we mention the cereals (14.9%),

vegetables (17.8%), fodder crops (13.2%) and potatoes (5.7%), and less by higher value-added products, such as wines, fruit, floriculture or the animal products. This structure also influences the stability of agricultural production expressed in value terms, as it is well-known that crop production is much more unstable than the animal production, due to weather excess effects; implicitly, a higher share of crop production generates higher instability on the global agriculture production. At the same time, **supply stability** is one of the weaknesses of domestic agricultural supply. If we refer to the cereal production, for instance, the variation coefficient in Romania for the period 2004-2012 was 27.4%. By comparison, in France, the cereal production volatility was 5.8% and in Poland 8.9%, in the same period.

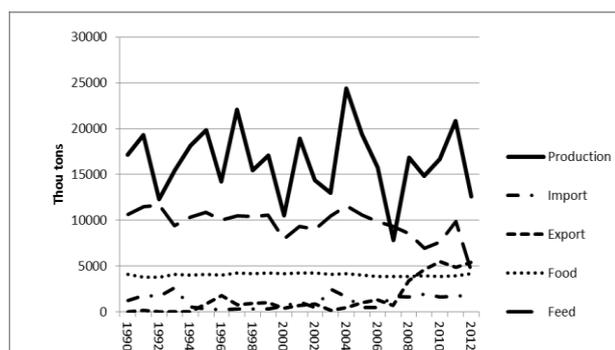


Fig. 1. Evolution of cereal production, import, export and consumption in Romania, in the period 1990-2012 (Source: FAO and Romanian Statistical Yearbook (2014)).

The deficits between consumption and domestic production are covered by imports, and the import dependency of domestic consumption is higher in Romania's case compared to the countries of reference. Thus, in wheat for instance, the import dependency, calculated as ratio of imports to the domestic supply of cereals, was 9%-10% for France, 8% for Poland and between 13%-22% for Romania in the period 2008 - 2011.

The chronic causes of domestic agricultural supply instability are the permanent and consistent decrease of effectively irrigated areas in the first place, under the background of the increasingly frequent extreme weather phenomena, mainly drought and excessive temperatures. The share of effectively

irrigated areas in total agricultural land area was lower than 10% each year after 2007, to reach only 5.94% in the year 2013. The production technologies used and the extremely low consumption of agricultural inputs as technical progress carriers represent the second factor generating agricultural production instability in Romania. There is a differentiation between the large and very large-sized farms, which practice an advanced European agriculture on almost half of the country's cultivated area, with good results and high average yields, on one hand, and the small and very small-sized farms, with a traditional, subsistence farming practice, with very poor results and low yields, on the other hand. On the average, in Romania, the fertilizer application rate per hectare is one of the lowest in the EU member states (30 kg/ha nitrogen compared to 76 kg/ha nitrogen, in France, 2013), and this is one of the main causes of the extremely low average yields per hectare in this country.

At the same time, there is an extremely low interest of public authorities in research & development in agriculture in Romania, as in the period 2007-2010, the total agricultural research expenditures decreased from 552.1 mil. RON to 170.7 mil. RON, while from the public funds from 249.4 mil. RON to 96.8 million RON [14]. At the same time, farmers' access to banking loans is quite low, which constrains the possibility of funding certain production infrastructure segments (local irrigation solutions, for instance) or the utilization of certain production technologies that could attenuate the extreme weather effects.

Among **the strengths** that can be noticed with regard to the agricultural and food supply availability, one can mention the development of the food and beverages industry sector in the last years; this sector became the second in size in Central and Eastern Europe, after that from Poland, and significant investments were made in the sector in the last decade. Many investments in the processing sector were made with EU funds, under the programs SAPARD and NRDP (2007-2013). Thus, 833 investment projects in the food industry were approved under NRDP, with a

total value of about 1700 million euro, out of which from public funds 621 million euro, but only 75% were paid by May 2015. In the period 2007-2013, the farmers spent about 527 million euro by funding certain investment projects under NRDP, in order to build up and improve the cereal storage facilities, which determined the increase of the cereal storage space by 2.5 million tons, reaching 17.3 million tons at the end of the period.

At the same time, the food retail sector has significantly developed in recent years, with one of the highest growth rates in the region. The change of the lifestyle following the economic growth and accession to the European Union resulted in the increase of consumers' openness to the modern food retail forms. Significant improvements have been also made in food safety, with the accession to the EU. Phyto-sanitary and zoo-veterinary norms in conformity with the European legislation were also implemented both in the agricultural production sector and in agro-processing. The adoption of these norms became compulsory with Romania's EU membership, although certain transitory periods and derogations existed, limited in time and to certain units, which produced only for the domestic market. At the same time, food supply diversity also increased, mainly for the processed foodstuffs, as well as in the fruit/vegetables segment, which was reflected in the increase of the population's consumption diversity. The food diet diversity in Romania, as measured by the Berry index, increased from 0.87 in the year 2004 to 0.90 in 2011 [1].

## 2. Economic access to food

The population's access to food improved in the last decade, under the background of the growth of main income sources (wages and pensions) and of the population's purchasing power implicitly. The real incomes significantly increased in the economic growth period, so that in the year 2008, compared to 1990, the real wage index was 130% and the real pension index 112%. Starting with the year 2009, real incomes began to decrease, yet they resumed their growth in the year 2013 [9].

At the same time, the relative food prices, according to the purchasing power parity, are lower in Romania compared to the EU average, yet they have increased much faster in recent years, reaching higher levels than in Poland in the year 2012. In the year 2012, compared to the average level of EU-27 of 100%, the food prices accounted for 67% in Romania, 60% in Poland and 110% in France [9]. By groups of products, the situation of relative prices in Romania was the following: 63% for cereal products, 57% for meat, 68% for fish and 93% for dairy products. The effect of incomes and prices on consumption was manifested by consumption increase in those foodstuffs considered as superior food, mainly meat, fruit, dairy products and fish. Thus, according to the data supplied by the Integrated Household Survey, in the year 2009 (when incomes reached a maximum level) compared to the year 2001, meat consumption per capita increased by 45%, fruit consumption by 58% while fish consumption by 78% (Fig. 2). At the same time, the food consumption in the products considered inferior in nutritional terms decreased in the same period, namely in potatoes, roots and even bread. It is worth mentioning that animal protein consumption increased to 60.4 grams/day (2008) from 43.7 grams/day in 2001 [8].

At the same time, **as a weakness**, in the context of the population's access to food, we cannot ignore that the population's average incomes are very low in Romania, and GDP per inhabitant expressed in purchasing power parity terms is quite low in Romania, below the EU average, on the penultimate place after Bulgaria. Thus, in the year 2014, the average GDP per inhabitant in EU-28, expressed in PPS, was 27,325 euro, in Romania 14,674 euro, in Poland 18,638 euro while in France 28,923 euro. Yet, beyond the average values, there are large population income gaps by regions, reflected by GDP per capita expressed in PPS, and these gaps grew larger in the post-accession period.

Thus, in the year 2012, compared to the European level of 100%, GDP per capita was 122% in the region Bucharest-Ilfov, while in the poorest region of the country, North-East,

GDP per capita reached only 29%. In the year 2014, in the same regions, the values were 72% for the region Bucharest – Ilfov and 23% for the region North-East.

Yet the key factor, which reflects population’s vulnerability in Romania with regard to food security, is represented by the share of food consumption expenditures in total consumption expenditures. This has very high values in our country, practically indicating that half of the consumption expenditures of households (44.9%, in 2013) are food expenditures. This indicator has even higher values in the case of the poor population (first decile of incomes), reaching 65% of the consumption expenditures in the year 2013; yet this percentage slightly decreased in the last decade (compared to 79% in 2001 and 68% in 2007). In the other European countries this share is much lower, i.e. 12.2% in France and 18.9% in Poland. Although probably there are also certain differences as regards the calculation methodology, and mainly we refer here to the evaluation of food consumption from household own production mainly in the rural area. However, in Romania these values are excessively high and reveal the vulnerability of the low-income population’s access to food, of the population from the poor areas of the country or from certain less-favoured categories.

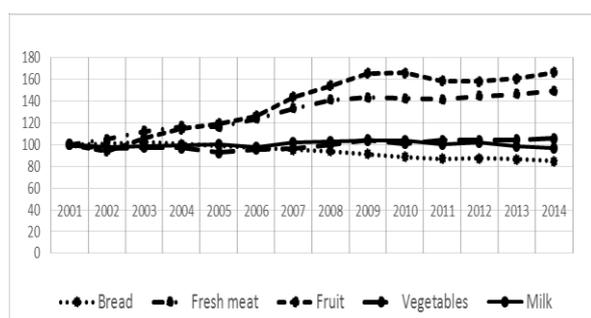


Fig. 2. Food consumption evolution in the growth period 2001-2014 (2001=100%)  
Source: Tempo on line, 2015, NIS.

Yet behind the average values, there are significant gaps between households by residence areas. Although food consumption in the rural area is quite similar to that in the urban area in terms of energy intake (Fig. 3), in terms of food expenditures, the rural

households are in a difficult situation (Fig. 4), with about three quarters of households allocating more than 50% of their consumption expenditures on food.

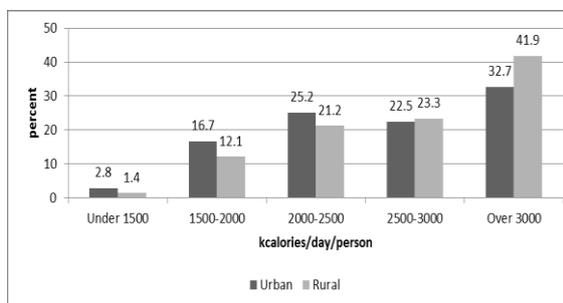


Fig. 3. Distribution of households by the food consumption expressed in calories in the 1<sup>st</sup> quarter of the year 2011, by residence areas  
Source: processing of microdata from the Household Budget Survey, NIS, 2011.

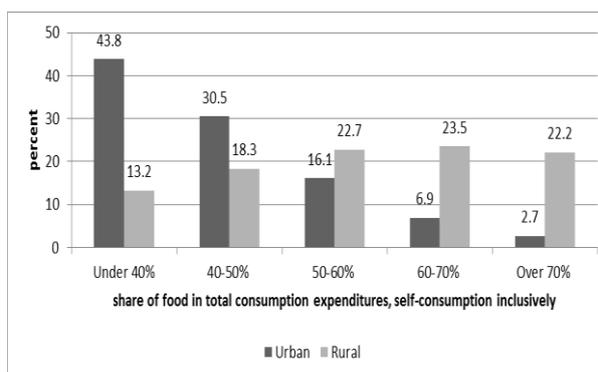


Fig. 4. Distribution of households by the share of food expenditures in total consumption expenditures in the 1<sup>st</sup> quarter of the year 2011, by residence areas  
Source: processing of microdata from the Household Budget Survey (HBS), NIS, 2011.

The HBS data also make it possible to approximate the vulnerability level of a certain segment of the population, i.e. the Roma households, in which the food energy intake is under the minimum requirements defined by FAO (about 2,000 kcal/day/person) for almost 44% of the enumerated cases (Fig. 5).

At the same time, more than half of the Roma households spend more than 60% of total consumption expenditures on food, and a great part even more than 70% (Fig. 6).

At the same time, the databases that contain the food security indicators for certain countries point to certain problems in the population’s physical access to food in our

country, if we consider the road network density in 100 km<sup>2</sup>, which is lower in Romania compared to the reference countries, and followed a decreasing trend in the last years [4].

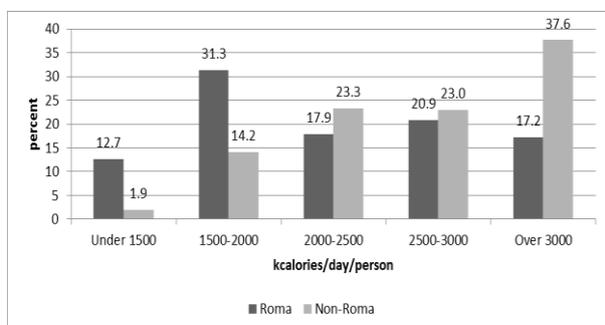


Fig. 5. Distribution of households by food consumption expressed in calories in the 1<sup>st</sup> quarter of the year 2011, for certain population segments

Source: processing of microdata from the Household Budget Survey (HBS), NIS, 2011.

Thus, for the year 2011, the road network density was 191.6 km/km<sup>2</sup> in France, 131.8 km/km<sup>2</sup> in Poland and 46.8 km/km<sup>2</sup> in Romania.

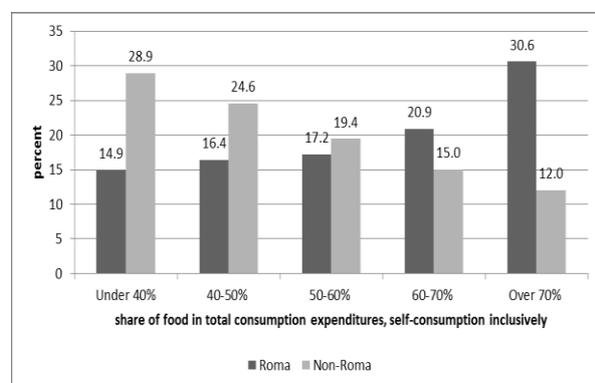


Fig. 6. Distribution of households by the share of food expenditures in total consumption expenditures in the 1<sup>st</sup> quarter of the year 2011, for certain population segments

Source: processing of microdata from the Household Budget Survey (HBS), NIS, 2011.

Another category of problems affecting the population's **food quality and safety** in Romania results from the lack of sanitary infrastructure and drinking water supply network in many localities, most often in the rural areas. Thus, the share of the population with access to improved drinking water sources is below the EU standards, where the population has full access to improved

drinking water sources, except for several countries (among which Romania). However, in Romania, this percentage increased from 75% to 83% of the population in the period 1990 – 2009, according to FAO database. In the two reference countries (France and Poland) this percentage is 100%.

At the same time, the share of the population with access to sanitary facilities also increased in the period 1990 – 2008 from 71% to 72% according to FAO data. In France and Poland this percentage reached 100%.

Another **weakness** as regards the population's access to food is represented by the small children's nutrition. In this context, Romania is one of the few EU countries in which there are problems with children's nutrition, mainly in small children in the rural area. These aspects are emphasized in the studies of the organizations concerned with these issues [10]. Thus, the percentage share of children under 5 years of age who died as a result of nutrition problems ranged from 4.3% to 3.3% in total children under 5 years old in the period 1990 – 2002. At the same time, the percentage of stunted children under 5 years old due to inadequate nutrition ranged from 11% to 15% in the above-mentioned period, and of underweight children from 3.5% to 5%. In most EU member states, there are no such problems, and these health problems in small children are specific to the poorest European countries, such as certain former Soviet states (Moldova, Ukraine) or to certain Balkan countries like Kosovo or Albania.

## CONCLUSIONS

The analysis of the food security and safety in Romania revealed several vulnerabilities, which we shall briefly present in a short list in order to select the priorities for food security improvement on the medium and long term, as follows:

- a) *Inadequate domestic agricultural supply* in a wide range of products, among which long term deficits can be found in meat, vegetables, fruit, sugar and fish.
- b) *Domestic agricultural supply instability*, mainly in the case of crop products, in cereals in particular, which indirectly affects animal

production through the feed prices.

c) *Farmgate prices* continue to be higher than the regional prices (from Hungary, Poland) in certain agricultural products, among which the most important are pork, potatoes, certain fruit and vegetables. As a result of the price convergence process on the European Single Market, these products are in difficulty and their economic performance should be improved in the years to come.

d) *The low income level* and the gaps between incomes by regions and residence areas are a food insecurity source. *Poverty incidence increase* amplifies the food insecurity in the less-favoured social categories.

e) *Inadequate road and sanitary infrastructure*, mainly in the countryside, generates food security risks and nutritional insecurity.

f) *The deficient consumption in qualitative terms*, the high share of calories from cereals and potatoes, as well as the low consumption of animal protein result in nutritional risks.

g) There are population categories identified as having *high food and nutritional risk*, among which the rural children and those from the Roma communities.

## ACKNOWLEDGEMENTS

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## ANALYSIS OF COST AND PROFITABILITY FOR ENTERPRISES ENGAGED IN GREENHOUSE CULTIVATION IN HIGHLAND CONDITIONS: THE CASE OF ELMALI, ANTALYA

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### **Abstract**

*This study investigates the economic status of the enterprises engaged in greenhouse cultivation activities in Elmalı (Antalya) and examines the contribution of the highland greenhouse production to the regional economic development, thus attempting to generate certain data that would provide guidance to future investors and enterprises that will invest in greenhouse cultivation in highland conditions. The current research was carried out in Gölova, Çukurelma, Salur, Eskisar, Zümritova, the quarters of Elmalı where greenhouse enterprises are largely concentrated. The data used in the study were collected through questionnaires from 90 greenhouse enterprises designated using the Neyman Stratified Sampling method. The research data belong to 2015 production period. The enterprises engaged in greenhouse cultivation in Elmalı (Antalya) were divided into 3 groups according to the size of their land. According to data obtained in the study, the share of greenhouse production among other business activities of the companies was 52.59%, generating an average income of 44,667 TL (Turkish Liras). The production costs of the enterprises mainly involved seedling costs (18.93%), followed by fertilizer costs (18.00%) and permanent-family labour (14.69%). The mean absolute profit of the enterprises was calculated as 43,602.69 TL. The average unit (1 kg) product cost was calculated as 0.69 TL for enterprises. The mean relative profit rate for enterprises was 1.53. As the greenhouse cultivation period in highland conditions coincides with summer months, the enterprises had no heating costs. Since greenhouse-growing activities increase business potentials and opportunities in the region, they can reduce migration from rural areas to cities. The expansion of greenhouse cultivation could be reached by reducing the unit product cost, as well as by growing appropriate products for domestic and international demand and large-scale investments.*

**Key words:** costs, Elmalı, greenhouse, relative profit, Turkey

### **INTRODUCTION**

The world population is rapidly increasing day by day. Accordingly, the issues related to food, shelter, access to clean water supplies and provision of other basic living conditions are growing exponentially every passing day. Just as every country is confronted with these issues to varying degrees, Turkey is evidently not immune from such problems [23].

With the increasing consumer needs and technological advances largely influencing agricultural sector, greenhouse production activities and organic farming have become highly important. Therefore, the difficulties in agricultural activities caused by the traditional structure have been gradually overcome, and in terms of production efficiency, the development gap between the agricultural

sector and the industrial sector has now begun to close [6].

The term 'greenhouse' refers to any structure covered with light-permeable material, such as glass, plastic etc., to ensure the optimal growing conditions for various crop plants, as well as their seeds, seedlings and saplings, by controlling temperature, relative humidity, radiation, carbon dioxide levels and air movement wholly or partly independent of the climatic and environmental conditions [18].

Turkey's vegetable cultivation in greenhouses commenced in Antalya in the 1940s. It followed a rather slow development trend between 1940 and 1960, but once plastic had become a common cover material for greenhouses in the 1970s, the sector experienced a substantial growth [3]. Turkey's greenhouse agriculture showed a

huge development over the years, reaching a total production area of 66,362.1 hectares in 2005. 95% of these greenhouse areas produce vegetables, 4% fruit, and 1% ornamental plants. Greenhouse agriculture has become more widespread in the southern cities of Turkey, with Antalya ranking first among them. The economic value of plant production in Antalya has now reached 270,946,731 USD per year. The amount of fruit and vegetable production in greenhouses has reached 3,192,788 tons per year. The number of enterprises engaged in greenhouse agriculture in Antalya is 17368, with a total greenhouse area of 76,359.2 hectares [25].

If practiced properly in the correct place, the profitability of greenhouse agriculture is quite high when compared to other agricultural practices. Considering the presence of large amounts of fertile soil in Turkey, greenhouse cultivation emerges as one of the most important factors that could reduce the rate of unemployment and (economically motivated) migration from rural to urban areas, as it can produce more yield per unit area, thus increasing the profitability in agricultural activities in rural areas [10].

As for the review of the relevant research in the literature, Özçelik and Aytaç [14], in their study conducted in the central district of Antalya, examined the physical production input in cucumber, pepper, tomato and eggplant cultivation in glass greenhouses. Using the Cobb-Douglas production function, the authors estimated input requirements for products. They found that the statistically significant determinants were the costs of pesticides and hormones in tomato production, pesticide costs in cucumber production, and labour costs in the production of peppers and eggplants. In his research titled "Greenhouse Vegetable Production Economics in Antalya Province", Yılmaz [26] examined socioeconomic structures of enterprises engaged in greenhouse vegetable cultivation in the districts of Kumluca and Gazipaşa, along with the outcome of their business activities. He investigated the greenhouse vegetable production, input use in the activity-area, economic results of the input use, as well as the relationship between the

production factors and the yield using Cobb-Douglas production function. According to the research evidence, he determined that there was decreasing returns to scale in his functional analyses conducted in glass and plastic greenhouse vegetable cultivation. He reported that decreasing and increasing certain production factors without changing the scale of the analysed production arms, namely changing the composition of inputs, could improve the yield and net income. Taking into account all the activities in greenhouse vegetable growing, the author concluded that there was inefficient use of capital and labour, with insufficient labour use compared to the capital. Karkacıer and Yılmaz Altuntaş [12] investigated the tomato and cucumber production in greenhouse and outdoor conditions in Tokat through comparative data collected from 109 enterprises. They calculated the gross margin per decare, together with net profit, net output, and net farm income. The highest gross margin was found in greenhouse cucumber production, while the highest net profit was in greenhouse tomato production. Demirkol [6], in his study titled "Product Costing in Greenhouses Corporation as to International Accounting Standards", deals with the identification of common expenses and calculation of production costs in enterprises engaged in greenhouse cultivation. The expenses of such enterprises in the production process were transferred to the expense centers formed, and then these expenses were subjected to distribution and associated with products, so the unit costs were calculated. Adak et al [1], in their study titled "The Rapidly Growing Sector in Recent Years: Highland Greenhouse Cultivation and Elmalı", examined the presence of the greenhouses in Elmalı, comparing highland greenhouse growing to the coastal greenhouse production activities and focusing on the opportunities to develop the highland greenhouse cultivation. In his research "Cost Analysis of Tomato Production in Different Farming Systems", Sipahioğlu [22] attempted to determine the cost-effectiveness of the greenhouses growing tomatoes by means of different cultivation systems in Antalya. In his study, he used data

collected from 67 greenhouses growing tomato by conventional methods and 14 greenhouses growing tomatoes by hydroponic systems. According to the results of the cost analyses, the greenhouses using hydroponic growing method enjoyed better profitability than conventional greenhouses. Özkan et al [15] studied the population structure, land properties, capital structure, and agricultural activity results of the enterprises engaged in greenhouse cultivation in Antalya. The authors calculated the average farm size as 4.82 hectares, finding that the farm capital accounted for 90.08% of the total active capital, with the operational capital representing only 9.92% of it.

This study examines the costs and profitability of the greenhouse cultivation activities in highland conditions, a circumstance resulting from the shift in summer production to highland areas.

## MATERIALS AND METHODS

The main material of this research consisted of the data collected through questionnaires from the enterprises engaged in greenhouse production activities in Elmalı (Antalya). The secondary data were obtained from certain institutions and organizations, such as FAO, TUIK (Turkish Statistical Institute), Provincial and District Food, Agriculture and Livestock Directorates. Besides, the findings of relevant national and international studies were also employed. The data used in this study belong to the 2015 production period. Based on the data from the Elmalı office of the Food, Agriculture and Livestock Ministry, the sample size was calculated as 90 enterprises, chosen from the study universe according to the Stratified Sampling Method (Table. 1).

The research data were collected from the enterprises in the study sample, which were engaged in greenhouse cultivation in highland conditions, in face-to-face interviews by using questionnaires. The surveys filled out by the data collected from the 90 enterprises designated by random stratified sampling were carefully reviewed, along with calculations and double-checks, and the

socioeconomic data related to the enterprises were then computerized. The analyses regarding the greenhouse cultivation activities involved the calculation of the enterprise size groups, as well as separate mean values for enterprises. The research data were analysed using appropriate statistical software.

Table 1. Sample size

Greenhouse size groups	Greenhouse lower and upper limits (daa)	Population (N)	Average greenhouse size (daa)	Sample (n)
I	1.00-2.99	463	1.76	24
II	3.00-7.59	294	3.86	24
III	7.60 +	55	13.25	42
Total		812	3.30	90

1 decare equal 0.1 hectare

Source: Own calculation.

The economic evaluation of the relevant activity field included the calculations of gross production value, gross profit, absolute profit, relative profit and unit costs. One of the economic results of agricultural activity, Gross Production Value can be defined as the gross income of the whole enterprise or one of the enterprise activities (crop production, animal production, animal husbandry) [9]. Gross profit is the value obtained after deducting the incurred variable expenses associated with production operations from the gross production value [24].

Gross profit = Gross Production Value - Variable Costs

Absolute profit is the difference between operating income and expenditures. The main purpose of a business is to make profit and search for ways to make the highest profit. The difference between gross production value and production expenses is called absolute profit [13].

Absolute profit = Gross Production Value - Production Costs

Relative profit is the proportion of the gross production value to the production expenses, and it explains the proportional superiority of one choice over another. Relative profit is a better way of measuring the yield or return obtained from production activities [13].

Relative Profit = Gross Production Value / Production Costs

Cost is generally defined as all sacrifices incurred in order to gain an advantage or

benefit, or a certain amount of money spent in exchange of a commodity [4]. Cost is also described as the total amount of the expenditures made on production factors utilized in the manufacturing of specific goods or services [2].

## RESULTS AND DISCUSSIONS

In the current study, Gross Production Value (GVP), one of the economic results of agricultural activity, was calculated as the sum of the revenues generated by the activities of an enterprise (such as crop production, animal production, animal husbandry) in 2015.

The mean GPV for enterprises was 170,514 TL. In terms of size groups, the highest amount of GVP was in the Group III enterprises at 274,370 TL, followed by the Group II at 94,401 TL and Group I at 64,879 TL.

In the greenhouse size groups, the GVP achieved by greenhouse production ranged from 22,824 to 223,342 TL, while the GVP from fruit production varied between 12,429 and 30,015 TL, vegetable growing 5146-11,646 TL, and animal husbandry 863-11,302 TL. The size groups standing out according to the production branches were as follows: Group III ranks first in greenhouse production with 223,342 TL; Group III in fruit growing with 30,015 TL; Group I in vegetable growing with 11,646 TL; Group III in field crops with 7,666 TL; Group I in animal husbandry with 11,302 TL (Table 2). Greenhouse production activities were the most important activities yielding the highest income in all enterprise groups. Indeed, greenhouse production accounted for 35.18% to 81.40% of the total GPV in size groups. The weighted mean GVP for greenhouse production among the enterprises in the region was 52.59%, in other words, they derived more than half of their annual GPV from greenhouse production activities. Therefore, greenhouse cultivation appears to be an important economic activity for the enterprises examined in the study.

Operation expenses are divided into two groups as fixed and variable costs. Fixed costs are the expenses that are not related to

production volume.

Table 2. Distribution of Gross Production Value (GPV) in the Enterprises

Production Branches	Greenhouse size groups			Enterprise Average	Weighted mean
	I	II	III		
	Value (TL/enterprise)				
Greenhouse production activities	22,824	58,525	223,342	125,920	44,667
Fruit growing	12,429	28,227	30,015	24,849	18,853
Vegetable growing	11,646	5,146	6,892	7,694	9,116
Field crops	6,678	1,640	7,666	5,796	4,930
Animal husbandry	11,302	863	6,455	6,256	7,365
<b>Total</b>	<b>64,879</b>	<b>94,401</b>	<b>274,370</b>	<b>170,514</b>	<b>84,932</b>
	Rate (%)				
Greenhouse production activities	35.18	62.00	81.40	73.85	52.59
Fruit growing	19.16	29.90	10.94	14.57	22.20
Vegetable growing	17.95	5.45	2.51	4.51	10.73
Field crops	10.29	1.74	2.79	3.40	5.80
Animal husbandry	17.42	0.91	2.35	3.67	8.67
<b>Total</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Source: Own calculation.

They will incur whether or not the enterprise is engaged in production of goods or services. The variable costs are the expenses associated with the production volume. These costs will be incurred as long as the enterprise maintains its production activities [21].

In the target area of this study, tomato cultivation ranked first in the greenhouse production, which was followed by cucumbers and small amounts of pepper and eggplant cultivation. The variable cost elements in the greenhouse production of the region mainly included machinery rents, seedlings, fertilizers, pesticides, irrigation, temporary labour costs, bumblebee pollination costs, shipping and marketing, and working capital interest. In the region, the weighted mean of variable expenses for the enterprises was 20,615.21 TL, which accounted for 61.66% of the total production costs.

The fixed costs of the enterprises engaged in greenhouse production mainly included the general administrative expenses, the interest equivalent of bare land value, facility amortization, interest equivalent of facility costs and other fixed expenses. The average fixed costs were 12,803.02 TL, accounting for 38.97% of the total production costs.

In terms of weighted means, the highest variable Seedlings costs were at 6,328.83 TL with a rate of 18.93% in total variable costs. It was followed by fertilizer costs at 6,019.65 TL (18.00%) and Pesticides costs at 4,182.52 TL (12.51%). In terms of weighted means, the fixed cost element that stands out among others was permanent labour costs, which stood at 4,911.71 TL, accounting for 14.69% of the total fixed costs.

Production costs are the sum of the fixed and variable costs. When we analyse these costs according to the enterprise size groups, the average production cost was 22,064.24 TL in Group I, 38,700.22 TL in Group II, and 141,670.84 TL in Group III, while the total production cost of the enterprises was calculated as an average of 82,316.91 TL (Table 3).

Table 3. Production costs in enterprises

Cost elements	Greenhouse size groups			Enterprise Average	Weighted mean
	I	II	III		
Value (TL/enterprise)					
Seedlings	4,057.68	7,469.79	27,248.87	15,790.13	6,328.83
Fertilizers	3,731.25	7,758.33	22,497.62	13,562.78	6,019.65
Pesticides	3,086.04	4,685.42	14,656.85	8,912.25	4,182.52
Shipping-marketing	1,922.29	1,507.50	4,251.19	2,898.50	1,880.78
Irrigation	297.92	626.25	2,127.38	1,239.22	498.14
Bumblebee pollination	265.42	579.17	2,155.48	1,231.11	463.21
Machinery rents	254.99	397.38	1,339.55	799.09	355.09
Temporary labour costs	185.42	243.33	1,952.55	1,025.52	286.55
Working capital interest	414.03	698.02	2,286.88	1,363.76	600.44
<b>Total variable costs</b>	<b>14,215.04</b>	<b>23,965.18</b>	<b>78,516.36</b>	<b>46,822.36</b>	<b>20,615.21</b>
Permanent-family labour	3,380.97	4,566.56	27,714.13	15,052.60	4,911.71
Facility amortization	2,365.21	5,676.04	21,521.20	12,187.56	4,416.44
Interest equivalent of facility cost	709.56	1,702.81	6,456.36	3,656.27	1,324.93
Rent of bare land	779.51	1,726.92	5,107.29	3,051.78	1,313.90
General administrative expenses	426.45	718.96	2,355.49	1,404.67	618.46
Miscellaneous costs	187.50	343.75	0.00	141.67	234.57
<b>Total fixed costs</b>	<b>7,849.20</b>	<b>14,735.04</b>	<b>63,154.48</b>	<b>35,494.55</b>	<b>12,820.02</b>
<b>Production costs</b>	<b>22,064.24</b>	<b>38,700.22</b>	<b>141,670.84</b>	<b>82,316.91</b>	<b>33,435.23</b>

Source: Own calculation.

The weighted mean value for production costs per unit area was 10,414.16 TL. The mean variable costs in total production costs were

calculated as 6,421.08 TL, while the mean fixed costs were 3,993.09 TL. Yılmaz [26], in his study on the greenhouse enterprises in Antalya, found that the enterprises achieved 88.47% of their GPV from greenhouse production activities, with 51.85% of the operating expenses involving variable costs and 45.85% fixed costs.

As for the analysis of production costs per unit area according to enterprise size groups, it was calculated as 11,511.78 TL in Group I, 9,575.31 TL in Group II and 10,303.93 TL in Group III. The analysis of variable costs according to enterprise size groups revealed that seedlings accounted for 18.39% and fertilizer costs 16.91% in Group I, while in Group II the rate of fertilizer costs was 20.05%, seedling costs was 19.30%, pesticide costs was 12.11%. In Group III, the highest variable costs were seedlings (19.23%) and fertilizer costs (15.88%), respectively. On the other hand, the examination of fixed costs according to enterprise size groups showed that the highest costs in Group I were permanent labour (15.32%), facility amortization (10.72%); in Group II facility amortization (14.67%) and permanent labour (11.80%), whereas in Group III the significant fixed cost elements were permanent labour (19.56%) and facility amortization (15.19%).

According to Cantliffe and Vansickle [5], the labour costs represented the largest share (46.99%) of the total production costs in greenhouse tomato cultivation in Spain during the production year of 1997-1998, which was followed by fertilizer costs at 23.1%, pesticides at 8.4% and seed costs at 7.4%. Özkan et al [17] found that variable costs accounted for 48.17% of the average production costs of greenhouse tomato cultivation in Antalya, while fixed costs accounted for 51.83% of total production costs.

Karaman and Yılmaz [11], in their study conducted in the same region, calculated that variable costs represented 45.84% of the total production costs, while fixed costs accounted for 54.16% in the enterprises using bumblebee pollination.

Table 4. Production costs per unit area in enterprises

Cost elements	Greenhouse size groups			Enterprise Average	Weighted mean
	I	II	III		
	Cost (TL / daa)				
Seedlings	2,117.05	1,848.20	1,986.90	1,976.51	1,971.26
Fertilizers	1,946.74	1,919.59	1,640.45	1,697.71	1,874.96
Pesticides	1,610.11	1,159.28	1,068.73	1,115.58	1,302.74
Shipping-marketing	155.43	154.95	155.12	155.12	155.16
Irrigation	1,002.93	372.99	309.98	362.82	585.81
Bumblebee pollination	138.48	143.30	157.17	154.10	144.28
Machinery rents	133.04	98.32	97.68	100.02	110.60
Temporary labour costs	96.74	60.21	142.37	128.37	89.25
Working capital interest	216.02	172.70	166.75	170.71	187.02
<b>Total variable costs</b>	<b>7,416.54</b>	<b>5,929.53</b>	<b>5,725.15</b>	<b>5,860.94</b>	<b>6,421.08</b>
Permanent-family labour	1,234.02	1,404.38	1,569.25	1,525.56	1,375.60
Facility amortization	1,763.98	1,129.87	2,020.82	1,884.19	1,529.86
Interest equivalent of facility cost	370.21	421.31	470.78	457.67	412.68
Rent of bare land	406.70	427.28	372.41	382.00	409.25
V General administrative expenses	222.50	177.89	171.75	175.83	192.63
Miscellaneous costs	97.83	85.05	0.00	17.73	73.06
<b>Total fixed costs</b>	<b>4,095.24</b>	<b>3,645.78</b>	<b>4,605.01</b>	<b>4,442.99</b>	<b>3,993.09</b>
<b>Production costs</b>	<b>11,511.78</b>	<b>9,575.31</b>	<b>10,330.17</b>	<b>10,303.93</b>	<b>10,414.16</b>
	The share in the production costs (%)				
Seedlings	18.39	19.30	19.23	19.18	18.93
Fertilizers	16.91	20.05	15.88	16.48	18.00
Pesticides	13.99	12.11	10.35	10.83	12.51
Shipping-marketing	1.35	1.62	1.50	1.51	1.49
Irrigation	8.71	3.90	3.00	3.52	5.63
Bumblebee pollination	1.20	1.50	1.52	1.50	1.39
Machinery rents	1.16	1.03	0.95	0.97	1.06
Temporary labour costs	0.84	0.63	1.38	1.25	0.86
Working capital interest	1.88	1.80	1.61	1.66	1.80
<b>Total variable costs</b>	<b>64.43</b>	<b>61.93</b>	<b>55.42</b>	<b>56.88</b>	<b>61.66</b>
Permanent-family labour	15.32	11.80	19.56	18.29	14.69
Facility amortization	10.72	14.67	15.19	14.81	13.21
Interest equivalent of facility cost	3.22	4.40	4.56	4.44	3.96
Rent of bare land	3.53	4.46	3.61	3.71	3.93
General administrative expenses	1.93	1.86	1.66	1.71	1.85
Miscellaneous costs	0.85	0.89	0.00	0.17	0.70
<b>Total fixed costs</b>	<b>35.57</b>	<b>38.07</b>	<b>44.58</b>	<b>43.12</b>	<b>38.34</b>
<b>Production costs</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

\* Statistically significant.

Source: Own calculation.

They also found that, in the enterprises not using bumblebee pollination, 41.76% of total production costs was variable costs and 56.43% fixed costs. Rad and Yarşı [20] reported that, for the enterprises engaged in greenhouse tomato production in Mersin during autumn, pesticide costs represented the highest share (8.86%) of total production costs, which was followed by temporary labour wages (8.22%), seedling costs (7.85%), chemical fertilizers and plastic cover costs (5.15%) and farm manure costs (5.04%).

In his study on a greenhouse enterprise growing tomatoes in Romania in 2002, Popescu [19] calculated that material expenses accounted for 47.4% of the total production costs, reporting that the cost of a kilo of tomatoes was 0.402 USD, with a sales price of 0.454 USD. He also determined that the profit derived from one hectare of production was 4,815 USD. Hood et al [8], in their study examining the greenhouse tomato cultivation in Mississippi, determined that the pesticide costs represented a share of 6.98% of the total production costs during autumn and 7.65% during spring. Estes and Peet [7], in their study on North Carolina greenhouse production during spring, reported that the seedling costs accounted for 4% of gross production value (GPV), maintenance costs 14% and harvesting costs 10%, while the greenhouse facility costs represented a share of 15%. The authors reported that production costs comprised 87% of gross value of production.

In our study, the weighted mean of gross profit was calculated as 24,052.50 TL per enterprise, 7,491.60 TL per decare, while the absolute profit was 11,232.19 TL per enterprise and 3,498.52 TL per decare, with a relative profit ratio of 1.34 and a unit product cost of 0.73 TL.

Sipahioğlu [22], in his study carried out in Antalya, found that the cost of tomato production in conventional greenhouses was 15,810.49 TL per decare and 1.01 TL per kilogram. The author calculated that, considering the GPV achieved by the yield in conventional greenhouse tomato production, the grower's net profit was 3,208.8 TL per decare, while the gross profit was 7,010.11

TL. Our findings regarding the net profit and gross profit per decare coincide with the results reported by Sipahioğlu [22].

In their study examining the greenhouse tomato production in the central district of Antalya, as well as Serik and Kumluca, Özkan et al [16] calculated the average net profit and gross profit per unit area for enterprises as 1,733.59 TL and 5,568.37 TL respectively. They also reported that double-period tomato cultivation generated an average gross profit of 8,993.65 TL, which was higher than the single period of cultivation (7,773.69 TL); the analysis of data according to greenhouse types revealed that the highest gross profit (9,484.93 TL) and net profit (4,442.80 TL) in glass greenhouses were derived from winter production cycle, whereas the highest gross profit (TL 4,507.07) and net profit (1,266.36 TL) in plastic greenhouses were made during summer production. When they compared the gross and net profitability of plastic and glass greenhouses, they found that glass greenhouses afforded better profitability than that of plastic greenhouses. In our study sample, the growers reported that financial reasons were determinant factors in their preference of plastic greenhouses, as they were directly associated with profits and costs.

Based on the analysis of our research data, we found that the relative profit ratio was 1.03 in Group I, 1.51 in Group II, and 1.58 in Group III, with an enterprise average of 1.53 and a weighted mean of 1.34.

Table 5. Profitability indicators and unit costs in enterprises

Cost elements	Greenhouse size groups			Enterprise Average	Weighted mean
	I	II	III		
	Cost (TL / daa)				
Gross profit (TL/enterprise)	8,609.13	34,559.82	144,826.12	79,097.24	24,052.20
Gross profit (TL/daa)	4,491.72	8,550.88	10,560.24	9,900.91	7,491.60
Absolute profit (TL/enterprise)	759.92	19,824.78	81,671.64	43,602.69	11,232.19
Absolute profit (TL/daa)	396.48	4,905.10	5,955.22	5,457.92	3,498.52
Relative profit	1.03	1.51	1.58	1.53	1.34
Unit product cost (1 kg)	0.90	0.64	0.68	0.69	0.73

Source: Own calculation.

The unit (1 kg) product cost was calculated as 0.90 TL in Group I enterprises, 0.64 TL in Group II, and 0.68 TL in Group III, with an enterprise average of 0.69 TL and a weighted mean standing at 0.73 TL. As the greenhouse area increases, so does the rate of relative profit. This value was found to be statistically significant. The increased greenhouse area was also found to reduce the unit product cost. Therefore, expanding the scale of greenhouses in the region might improve profitability.

## CONCLUSIONS

Based on the findings achieved in this study, where we examined the cost and profitability of greenhouse cultivation in highland conditions, we conclude that large-scale enterprises yield better results in terms of economic indicators.

Greenhouse cultivation is a relatively new practice in the region as it first began only in 2000s, and it is becoming a widespread production method day by day.

The overall profitability of the enterprises covered in the study was satisfactory, and this high profitability leads to the expansion of greenhouse agriculture in the region.

In conclusion, the practice of greenhouse cultivation in the region is of vital importance, as it promotes effective use of regional sources, increases the income of people in the region, and creates employment, thus reducing migration from rural areas.

Besides, it is also an important agricultural activity in that it ensures the continuity of supply for the consumer demand in the vegetable sector.

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## PROBLEMS REGARDING INPUT USE AND MARKETING STRUCTURE OF FARMS INVOLVED IN GREENHOUSE CULTIVATING IN HIGHLAND CONDITIONS: THE SAMPLE OF ANTALYA CITY'S ELMALI DISTRICT

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### *Abstract*

*The present study was aimed to determine the problems regarding the input use and marketing structure of the enterprises involved in greenhouse cultivating in Antalya, Elmalı District. Within this scope, the study was conducted in Gölova, Çukurelma, Salur, Eskisar, Zümrütova neighbourhood of Elmalı strict intensely involved in greenhouse cultivating in Antalya, Elmalı district sample. The data used in the study was obtained from 90 enterprises involved in greenhouse activities through the layered sampling Neyman method. The acquired data represents the 2015 production season. The farms involved in greenhouse cultivating in highland conditions in Antalya, Elmalı district was divided into 3 groups based on the size of greenhouse fields. According to the data obtained from the study, the share of enterprises' total gross value of production of greenhouse cultivating was calculated as 52.59 percent. Tomato comes first in the greenhouse cultivating in the research field. It was followed by cucumber. Additionally, a small amount of pepper and eggplant was cultivated. Farms market the products mostly to the commissioners and merchants. Some of the farms markets the products in Istanbul and Antalya markets which are away from the production site and this situation causes a significant marketing cost. The greenhouse cultivating provides an important income in the region and this growth trend is expected to continue. Informing producers about the input use, popularizing the producer union and ensuring the compliance with GAP were essential in the healthy development of the business.*

**Key words:** Elmalı, greenhouse, marketing problems, production, Turkey, vegetable

### INTRODUCTION

The greenhouse cultivating, which provides a higher productivity per unit area, enables the use of marginal small fields and requires a regular labour force throughout the year, covers greenhouse and production under high and low plastic tunnels. Greenhouses are the constructions which enable the production of cultivated plants during the periods unfavourable for cultivating in open field and provide the required growth conditions for vegetable production [24].

Turkey has a greater greenhouse potential compared to other Mediterranean countries. The reasons for this are; (i) there is a limited area for greenhouse in the Spain and France coasts, (ii) there is a limited area for greenhouse, since Italy and Greece coasts are rugged and mountainous, (iii) there are the

need for heating in winter and cooling in hot seasons for long-term cultivating in such countries in African coast as Morocco, Algeria, Tunisia, Libya [3].

Turkey has shown great improvement with greenhouse farming year by year and the production area reached 663,621 hectares as of the year 2015. In the 95% of the greenhouse fields, vegetables are grown, the fruit in 4% and ornamental plants in 1%. Greenhouse agriculture has become widespread in the southern provinces of Turkey. Antalya comes first among these provinces. The economic value of crop production held in Antalya has reached \$270,946,731. The amount of greenhouse vegetable and fruit production has become 3,192,788 tons. The number of enterprises involved in greenhouse cultivating is 17,368, the size of greenhouse field is 76,359.2 decare

[25].

Antalya province is composed of two sub-sectors, including certain coastal and highlands. There are large climatic differences between coastal and highland areas. The coastal areas are better suited for the cultivation of such subtropical plants as banana and citrus trees and greenhouse cultivating. The districts located in the coastal counties from west to east are; Kas, Kale (Demre), Finike, Kumluca, Kemer, Serik, Manavgat, Alanya and Gazipasa [2].

38.24% of greenhouse fields in Turkey is in Antalya. Antalya contains 82.77% of the glass greenhouse areas and 51.93% of the plastic greenhouse areas in Turkey [25]. Antalya has become the attraction point due to the fact that Antalya covers an essential part of the greenhouse fields in Turkey and makes a remarkable part of the fruit trade [25].

The greenhouse cultivating activities started with the subventions in 2001 in Elmalı and they have increased since then. While 36,600 tonnes were produced in 3,250 decare in 2009, the field and amount of production increased by 85% in 2013. According to the figures of Turkey Statistical Institute (TSI) for 2013, 67,530 tonnes of production were carried out in Elmalı in 6,110 decare area. Tomato is mostly cultivated in greenhouse fields besides pepper and cucumber. According to the 2013 data, tomato is cultivated in 5,200 decare, green pepper in 50 decare and long green pepper in 60 decare. 0.61% of greenhouse cultivating and 0.12% of tomato production in greenhouses are conducted in Antalya, Elmalı district. The presence of greenhouse cultivating in Elmalı district is increasing in amounts considerably every year.

Elmalı and Korkuteli are two most important districts of Antalya in terms of agricultural fields and fruit production. The share of these two districts in apple and pear production is over 90%. The share in chemical drug use is 10% [17].

The present study was aimed to determine the problems regarding the input use and marketing structure of the enterprises involved in greenhouse cultivating in Antalya, Elmalı district.

## MATERIALS AND METHODS

The main material of the research consists of the data obtained from the enterprises involved in greenhouse cultivating in Antalya, Elmalı district through questionnaire method. The secondary data related to the research were obtained from institutions and organizations including Provincial and District Food, Agriculture and Livestock Directorates, FAO and TSI. Additionally, we benefitted from the relevant researches conducted at national and international level. The acquired data represents the 2015 production term. The data used in the study was obtained from 90 enterprises involved in greenhouse activities through the layered sampling Neyman method. The primary data used in the study were acquired from the enterprises involved in greenhouse cultivating at highland conditions through face to face interviews and survey method.

The greenhouse cultivating at highland conditions was calculated for both enterprise size groups and average of the enterprises month by month. The data was interpreted by creating cross-tables between enterprise size groups (greenhouse field groups (I group 1-2.99 decare, II group 3.00-7.59 decare, III group 7.60 decare and over)) and socio-economic, technical variables of farms. The arithmetical average will not represent the research field average since the "Neyman method" used in the sample includes more samples from the layer with high variance. Therefore, a coefficient was obtained for each layer by proportioning the number of frequency per enterprise size group to the total number of frequency and the general average was calculated as value-based by multiplying the values calculated for each layer to the coefficient obtained for each layer in the evaluation of research data [8].

## RESULTS AND DISCUSSIONS

The criteria of the study regarding the managers of the enterprises involved in greenhouse cultivating include age, education time, experience in the agricultural activity, experience in the greenhouse cultivating, and

their preferences of new information-technologies. The results of the study regarding managers' age, education, experience in the agricultural activity, household size, experience in the greenhouse cultivating were given at Table 1. The average age of the interviewed managers was 44 years. The age of managers was 42.1 years in I enterprise group, 43.8 in II enterprise group and 45.2 years in III enterprise group (Table 1). There was no significant statistical difference between the presence of enterprise greenhouse cultivating group and manager's age indicator ( $P > 0.05$ ;  $P = 0.957$ ).

The education level of the managers was taken as years. Accordingly, the average education level of the enterprises was calculated as 7.7 years. The highest training time was at the III enterprise group (Table 1). There was no statistical relationship between enterprise size group and managers' education time ( $P > 0.05$ ;  $P = 0.540$ ).

The experience time of managers in agricultural production activity was found to be 24.2 years. Regarding the enterprise size groups, the highest experience time in agricultural activity was at III enterprise group (25.7 years) and the lowest experience time was at I enterprise group (22.0 years) (Table 1). On the other hand, there was no statistical relationship between enterprise size groups and experience time in agricultural production ( $P > 0.05$ ;  $P = 0.998$ ).

Table 1. Some characteristics of the farms

Greenhouse size groups	Age (years)	Education level (years)	Household size (years)	Experience in vegetable cultivating (years)	Experience in greenhouse cultivating (years)
I	42.13	6.83	5.04	22.00	6.50
II	43.79	7.21	5.13	23.88	6.88
III	45.19	8.50	5.33	25.74	7.81
Average	44.00	7.71	5.20	24.24	7.21
Weighted average	42.86	7.04	5.08	22.84	6.69

Source: Own calculation.

Yalçın and Boz [26] found out in their study conducted in Antalya, Kumluca district that the average age of the producers was 43 years, experience time was 13 years, size of greenhouse was 6.11 decaire and the land tenure was in the form of freehold land.

The findings of the study were similar to the

findings regarding the average age [26], but the average experience time (7.2 years) was lower. Here, it is an important factor that the greenhouse cultivating started at highland conditions in 2000s.

The Gross Production Value (GPV) as one of the results of agricultural activity's economic outcome can be defined as the gross revenue of the whole activities or one of the activities (vegetable production, animal production, cattle farming) [12].

The average GPV of the enterprises was 84,932 TL. The highest GPV of the enterprise groups was found at the III enterprise group with 274,370 TL. It was 94,401 TL in the II group and 64,879 TL in the I. group. In the greenhouse size groups, the GPV obtained from greenhouse cultivating production was between 22,824-223,342 TL, it was between 1,640-7,666 TL in field vegetables, 12,429-30,015 TL in fruit, 5,146-11,646 TL in other vegetable cultivating and 863-11,302 TL in animal farming.

Considering the agricultural production design and the share of the greenhouse cultivating in GPV, the greenhouse cultivating has the highest share with 52.59% share. It was followed by fruit with 22.20%, other vegetables with 10.73%, field vegetables with 5.80% and animal farming with 8.67%. The agricultural production type which has the highest share in the enterprise size groups is greenhouse cultivating with 81.40% in III enterprise group, with 62.00% in II enterprise group and 35.18% in I enterprise group. As the shares of greenhouse cultivating constitute an important part, these enterprises can be called as specialized greenhouse cultivating enterprises.

80.01 percent of the 31.65 decaire farm lands of the surveyed farms was owned land, %18.59 was the rented lands and %1.61 was land cultivated jointly. The share of the owned land changes between 61.42-94.47%, the share of the rented lands between 5.53-36.98% and the share of the jointly cultivated lands between 0.0-6.25% in the farm lands in accordance with the greenhouse size groups. Yet, jointly cultivated lands were not detected in the II. size groups. However, all of the greenhouse lands were owned lands in all size

groups.

The share of the irrigated land in the farm lands was 93.02% and non-irrigated land share was 6.98%. The share of the irrigated land in the enterprise lands was between 89.82-100.00% and non-irrigated land share was between 0.00-10.18% depending on the enterprise size groups. However, all of the greenhouse lands were irrigated lands in all size groups.

The number, area and share of the parcels in the total enterprise land were given at Table 2. Accordingly the number of average greenhouse cultivating parcels was 2.61 in the region and it was 1.77 in the studied farms. This value was highest in III enterprise size group with 2.45. The average field of greenhouse cultivating was 3.21 decare in the region and it was 7.99 decare in the studied farms. The greenhouse field was largest in III enterprise size group with 13.71 decare and it was narrowest in I enterprise size group with 1.92 decare. The average share of greenhouse field in the total agricultural field was 13.11% in the region and it was 25.24% in the studied farms. This value was highest in III enterprise size group with 32.87%. This share was 7.35% in the I greenhouse size group and 20.63% in the II greenhouse size group.

The results indicate that the surveyed enterprises were mostly focused on the greenhouse production. Tomato comes first in the greenhouse cultivating in the research field. The second most important production was from the cucumber. Additionally, a small amount of pepper and eggplant was cultivated in the region.

Table 2. The greenhouse presence of studied farms

Greenhouse groups	size	The number of greenhouse parcels (piece)	Greenhouse field (decare)	The share of greenhouse field in total agricultural field (%)
I		1.08	1.92	7.35
II		1.25	4.04	20.63
III		2.45	13.71	32.87
Average		1.77	7.99	25.24
Weighted average		1.21	3.21	13.11

Source: Own calculation.

Karaman and Yılmaz [13] found out that the greenhouse field of the enterprises in Antalya was 2.19 decare.

78.89 percent of the interviewed farms started their greenhouse cultivating activities with loans. This value is 83.33% in I greenhouse size group, 58.33% in II greenhouse size group and 88.10% in III greenhouse size group (Table 3).

Regarding the occupation of the respondents it was observed that 61.9% are represented by employed/self-employed individuals, followed at a great distance by students, with a ratio of 27.3%. At the opposite pole there were people who have other professions, with a ratio of 9.3%, followed by the unemployed, with 1.6% (Table 3).

Table 3. The status of farms which started greenhouse cultivating activities with loans

Greenhouse size groups	Those starting with loans	Those starting without loans	Total
I	20	4	24
II	14	10	24
III	37	5	42
<b>Total</b>	<b>71</b>	<b>19</b>	<b>90</b>
Ratio %			
I	83.33	16.67	100.00
II	58.33	41.67	100.00
III	88.10	11.90	100.00
<b>Total</b>	<b>78.89</b>	<b>21.11</b>	<b>100.00</b>

Source: Own calculation.

Farms used 47.04 kg N, 25.94 kg P and 32.42 kg K was used as pure substance per decare in greenhouse cultivating. N was mostly used in III greenhouse size group with 51.20 kg per decare, P in III group with 32.42 kg per decare and K in III group in 39.22 kg per decare (Table 4).

Engindeniz et al [6] found out in their study conducted in Antalya, Mersin, Muğla and İzmir province that the average N usage was 68.71, K was 58.69 and P was 57.99 per decare in winter season. As can be seen from the findings, the nitrogen, potassium and phosphorus levels were lower than Engindeniz et al [6] findings. The main reasons for this were different production areas and production period.

Selçuk Işıkhhan [23] investigated the nutritional status of tomato greenhouses in Elmalı district of Antalya, soil samples from two different depths, 0-20 and 20-40 cm, and

leaf were taken from 30 tomato greenhouses. She found that most of the soils had texture of clay loam, loam and sandy loam; slightly alkaline and low in organic matter; while no salinity problem was recorded and soil total N, exchangeable Ca and Mg status were generally adequate; exchangeable K low, medium and high however, plant available P, status were found to be highly good enough. She determined that P, K and Mg contents were insufficient and the greenhouse soils had high pH and lime content that could affect some problem with regards to plant nutrition. She recommended that it specifically should be paid attention to applications of P, K and Mg of which are commonly established deficiencies and have importance in terms of plant growth and fruit quality.

Table 4. The plant nutrient applications in farms

	Greenhouse size groups			Average	Weighted average
	I	II	III		
The average use amount of farms (kg per farm)					
N	85.01	191.45	702.13	401.38	151.01
P	34.44	119.14	444.64	248.45	83.28
K	46.65	145.19	537.82	302.14	104.10
The use amount per unit area (kg per decare)					
N	44.35	47.37	51.20	50.24	47.04
P	17.97	29.48	32.42	31.10	25.94
K	24.34	35.92	39.22	37.82	32.42

1 decare equal 0.1 hectare

Source: Own calculation.

In research on vegetable cultivation in greenhouses farms specifications, vegetables varieties, seedling, soil and environmental characteristics, region and climate characteristics, the technical and structural characteristics of the greenhouse, production periods and techniques, cultural and maintenance procedures were found to be effective in determining the level of input use [4][15][31][28][29][30][20][18][16][14][13][6].

The knowledge of farmers, recommendations of dealers and companies were highly important and written tariffs on the packaging and recommendations of Technical staff of Agriculture Provincial / District Directorates were important in the fertilizer dose adjustment of the interviewed farms. Considering the status of enterprises which

conduct soil analysis, only 52.22 percent of the farmers conducted soil analysis. These ratios were 59.52% and 58.33% in III and II greenhouse size groups, respectively. It was 33.33% in the I greenhouse size group. Also 11.11 percent of the farmers conduct leaf analysis. This ratio was high in III greenhouse size group (19.05%).

Considering the pesticide use of the farms, the fungicide and insecticide use were widely used by the farmers. 2,224.1 g fungicide, 281.3 g insecticide, 153.2 g acaricide and 30.3 g herbicide were used per unit area.

86.67% of the interviewed farms owns spraying schedule. 56.67% of the farms consider themselves as moderate informed regarding the agricultural protection. 65.56% of the farms take protective measures during spraying.

The recommendations of dealers and companies and knowledge of farmers were highly important and written tariffs on the packaging and recommendations of Technical staff of Agriculture Provincial/District Directorates were important in the chemical pesticide dose adjustment of the interviewed farms. Accordingly, the pesticide dose adjustment was determined in line with these recommendations.

Table 5. The factors influencing the selection of varieties in farms

Factors	Greenhouse size groups			Average	Weighted average
	I	II	III		
Farmer	4.21	4.38	4.55	4.41	4.33
Opportunities	3.92	3.79	4.17	4.00	3.89
Company's suggestions	3.88	3.58	4.10	3.90	3.82
The commissioner's suggestions	3.63	3.46	3.60	3.57	3.60
Purchaser's demand	3.58	3.33	4.00	3.71	3.51
The price of this vegetable in the previous year	3.33	3.54	3.57	3.50	3.42
The deal with the marketing company	3.13	3.17	3.74	3.42	3.17
Recommendations of Agriculture Provincial / District staff	3.13	3.08	3.10	3.10	3.14
Consultant's suggestions	3.17	3.04	3.21	3.16	3.16

Source: Own calculation.

SCALE; Barely important(1)..... Very Important(5)

The factors influencing the selection of varieties in greenhouse cultivating were given at Table 5. The factors influencing the selection of varieties were evaluated

according to the 5-point Likert scale.

Considering the general average of the farms; the recommendations of the manager, opportunities, company, commissioner and purchaser come to the forefront.

Today, bumblebees are used effectively in the transportation of pollen in greenhouse cultivating. The mass production of *bombus terrestris* is conducted under controlled conditions and it is marketed to the world by Netherlands, Israel and Belgium [27]. The usage possibilities of bumblebees in greenhouse was increased in Turkey due to Turkey's being an important greenhouse country and it was started to be used in 1997-98 production season simultaneously with other countries after two-years long demonstration activities [10].

In an experimental study regarding tomato cultivating in greenhouse, the amount of marketable fruit was found to be higher in pollination made with bumblebees compared to the application of plant growth regulators [11]. Considering the quality specifications of tomato including size, weight and number of seeds, a better quality product was obtained with pollination made with bumblebees compared to the plant growth regulator [11]. Altın [1] informs that bumblebees' application increased productivity by 11.22% compared to the plant growth regulator.

83.33% of the farms use bumblebees in greenhouse cultivating. This value was 87.50% in I greenhouse size group, 66.67% in II greenhouse size group and 90.48% in III greenhouse size group (Table 6). Karaman and Yılmaz [13] expressed in their study regarding the greenhouse cultivating in the center of Antalya that the use of bumblebees was more common in the enterprises owning big greenhouses.

The opinions of enterprises regarding the greenhouse production for the next production season were given at Table 7. While 91.11% of the farms consider increasing greenhouse production, 8.89% does not consider. This value was 91.67% in the I and II greenhouse size groups and 90.48% in the III greenhouse size group. This situation indicates that the profit obtained from greenhouse cultivating is high.

Table 6. Use of bumblebees in farms

Greenhouse size groups	Farms which does not use bumblebees		Farms using bumblebees		Total	
	N	Ratio %	N	Ratio %	N	Ratio %
I	3	12.50	21	87.50	24	100.00
II	8	33.33	16	66.67	24	100.00
III	4	9.52	38	90.48	42	100.00
<b>Total</b>	<b>15</b>	<b>16.67</b>	<b>75</b>	<b>83.33</b>	<b>90</b>	<b>100.00</b>

Source: Own calculation.

Table 7. The opinions of farms regarding the greenhouse production for the next production

Greenhouse size groups	Those not considering increasing the greenhouse area		Those considering increasing the greenhouse area		Total	
	N	Ratio %	N	Ratio %	N	Ratio %
I	22	91.67	2	8.33	24	100.00
II	22	91.67	2	8.33	24	100.00
III	38	90.48	4	9.52	42	100.00
<b>Total</b>	<b>82</b>	<b>91.11</b>	<b>8</b>	<b>8.89</b>	<b>90</b>	<b>100.00</b>

Source: Own calculation.

Fresh vegetables distort in a short time. The storage opportunities are limited compared to other agricultural products. Therefore, the products are required to be marketed and presented to the consumer immediately after the harvest. To increase the products obtained from greenhouse cultivating and to benefit from this increase depend on the improvement of marketing activities. The marketing is defined in the broadest sense as a science that examines the conditions of supply, demand, price and cost at different times and places in the stage of transporting the goods and services to the consumer [9].

The transportation channel of the products obtained from the greenhouse cultivating in the region covers the way and contractors followed by the product from producer to the consumer, as given at Figure 1. There are four wholesales market named Eskisar, Zümürtova, Salur and Elmalı operating in the region during summer months.

The main marketing channels in the sale of products consist of commissioners and merchants. Direct marketing (presentation to the producer) exists at very low rates. Some of the enterprises can market the products to the markets far away from the region (i.e metropolitan markets like İstanbul market). This situation causes a significant marketing cost.

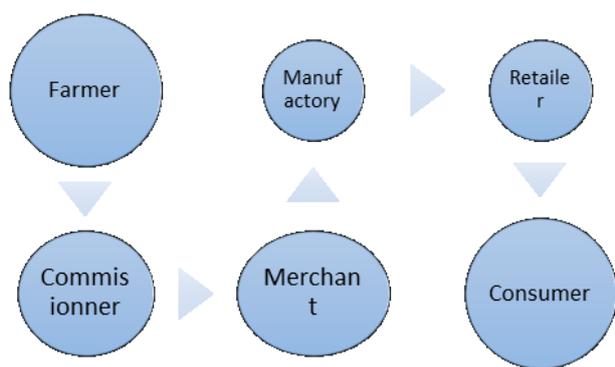


Fig. 1. The marketing channel of greenhouse production in the region  
 Source: Own calculation.

As a result of the developments and changes in international arena, the demand of consumers for quality and safe food which provides the sustainability of the environment shaped the agricultural supply. This remodelling influenced the international agricultural commerce and made it obligatory to take measures in order to ensure the confidence for the purchase of the product [7]. The first of the Sanitary and Physanitary Measure (SPS) is The Hazard Analysis and Critical Control Point and the other one is Good Agricultural Practices (GAP) applied in fresh fruit and vegetable production [22]. The documents regarding the phytosanitary are requested besides the request of supermarkets for GAP certificates in accordance with the World Trade Organization's Sanitary and Phytosanitary Measures Agreement regarding the fresh fruit and vegetable export. These certificates can be seen as a kind of non-tariff barriers, they have become one of the most important elements in the penetration to the market of the target country [21]. Good Agricultural Practices is defined as ensuring the food safety by taking agricultural production control under control without damaging the environment, people and animals. The practices are socially applicable and economically profitable and productive. Good agricultural practices are important for the producers as they are preferred in domestic and foreign market, provide producers' being in the front compared to the other producers under equal competition conditions and maintain decrease in the

production costs and increase in profitability. Considering the GAP certificate ownership of the interviewed farm's size groups, most of the enterprises did not have this certificate. Only two enterprises within the III greenhouse size group had this certificate and the ration within all enterprises was 4.76% (Table 8). Obtaining this type of certificates causes an additional cost to the producers and this situation makes obtaining harder. Özkaçar and Ören [19] inform in their study conducted in Antalya that producers did not believe that production with GLOBALGAP certificate could be popularized in Turkey and they believed that the practices did not contribute and provide a favourable income to the farmer.

Table 8. Status regarding the GAP certificate ownership

Greenhouse size groups	Those with the GAP certificate		Those without the GAP certificate		Total	
	N	Ratio %	N	Ratio %	N	Ratio %
I	0	0.00	24	100.00	24	100.00
II	0	0.00	24	100.00	24	100.00
III	2	4.76	40	95.24	42	100.00
<b>Total</b>	<b>2</b>	<b>2.22</b>	<b>88</b>	<b>97.78</b>	<b>90</b>	<b>100.00</b>

Source: Own calculation.

Table 9. Membership status of farms to the producer unions

Greenhouse size groups	Member of the producer union		Not a member of the producer union		Total	
	N	Ratio %	N	Ratio %	N	Ratio %
I	21	87.50	3	12.50	24	100.00
II	21	87.50	3	12.50	24	100.00
III	36	85.71	6	14.29	42	100.00
<b>Total</b>	<b>78</b>	<b>86.67</b>	<b>12</b>	<b>13.33</b>	<b>90</b>	<b>100.00</b>

Source: Own calculation.

Considering the membership to the producer unions according to the greenhouse size groups, the majority of enterprises had membership to the unions and 78 farms or 86.67% of the farms had membership to one of the unions (Table 9).

Considering the knowledge level of enterprises about greenhouse products' marketing; 64 farms or 71% of the farms have moderate knowledge about greenhouse products' marketing, 18 farms or 20% of the farms have a high level of knowledge and 3 farms or 3% of the farms have extremely high

knowledge. Regarding the farms with moderate knowledge, I greenhouse size group (19 farms with 79%) come to the fore.

According to the study results, the main marketing problems were given below.

- ✓ Determination of quality and price by the commissioner,
- ✓ Instability of product prices,
- ✓ Unbalanced supply and demand,
- ✓ Commissioners' paying late to the producer
- ✓ Producers' need to take the products to other regions due to the lack of market in the wholesale markets in the region,
- ✓ Producers' need to receive advance from the commissioner due to the absence of sufficient financing,
- ✓ The high level of deduction by the commissioner.

Aktaş Çimen [2] listed the marketing problems of the greenhouse producers as determination of quality and price by the commissioner, fact that producer cannot market the products directly to the merchant, merchants' acting together with the commissioner, extreme decline of prices in the seasons that product is abundant and unbalanced relationship between supply and demand. Daka et al, [5] stated in their study in Muğla that producers needed to be informed about the marketing standards of foreign markets, the number of packing plants was insufficient in the region and the export of the products could only be achieved by producer unions.

## CONCLUSIONS

As a result of the study which investigated the problems regarding the technical structure and marketing of the greenhouse cultivating farms, it was found out that the farms lacked the technical knowledge regarding especially the input use. Today, the greenhouse cultivating, which started in the region in 2000s, has continued to popularize. As the enterprise is profitable in the region, the area of greenhouse cultivating is expected to increase. The following recommendations were provided in order for the betterment of the greenhouse cultivating in the region.

- Farms in the region need to form producer union or cooperative in order for the union of forces,
- The number of wholesale markets need to be increased,
- The quality and safety of the products need to be increased by increasing the number of farmers owning GAP certificates,
- The price stability need to be ensured by encouraging the contract production,
- The producers need to be educated on the technical knowledge.

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## THE ROLE OF AGRICULTURAL CONSULTANCY IN DEVELOPING BRANDING STRATEGIES FOR TRADITIONAL ROMANIAN BRANDS

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### Abstract

*Nowadays, developing a branding strategy has become a must even for commodities. The main decision many producers face is opting for a producer brand, a geographical brand or a certification brand when trying to create a coherent value proposition for their agricultural product. Nevertheless, the main challenge they all encounter is how to build brand equity and establish a sound positioning strategy. In this paper we try to conceptualize the primary directions for action in agricultural consultancy regarding building brand equity. First we debate the necessity of branding for commodities. Secondly, we analyze the primary sources of brand equity for agricultural products in terms of value creation for consumers. Furthermore, we investigate the fundamentals of positioning strategies for agricultural commodities throughout the analysis of two case studies based on traditional Romanian brands.*

**Key words:** *agricultural consultancy, certification branding, geographical brand, producer brand, brand equity, traditional Romanian brands*

### INTRODUCTION

Under the influence of globalization, brand competition has become more prominent. In everyday life, consumers face a plethora of choices regarding what they choose to buy. Usually, a typical consumer makes between 18 and 36 different choices when visiting a local supermarket. In these circumstances, the role of branding strategies has increased because brands can simplify decision making by altering consumers heuristics [4].

Branding has become a staple even for generic products such as groceries. As a result, everyday groceries have evolved into commodities. For example, consumers don't buy a simple pineapple, but they buy a Dole pineapple or Chiquita bananas. The main reason behind these decisions is the strong brand equity that benefits the product and makes it "different" from other commodities such as fruits or vegetables. For example, branded Dole pineapples sell for higher prices than those of their competitors in most retail

markets.

Producers need to adapt from the classical view of unbranded traditional commodities towards a view based on value chain creation that includes customers as the main focal point. As large retailers like Walmart or Carrefour are more dominant now than ever, it is becoming more complicated to enter the market for unbranded agricultural products. Large retailers usually impose high quality standards and leverage their purchasing power and expertise to negotiate better prices and terms, meant to diminish buyers' risk perceptions [2].

The strategy of branding agricultural commodities is not new in developed countries. Usually these kinds of commodities are physically simple, easy to transport and sell. With the recent expansion of retail chains and grocery shops, complicated branding operations and marketing experts are not required to add value to these types of commodities [2].

Typically in such cases, "branding" resumes

to just “glossy advertising” that tries to distinguish a product from competitors by packaging or place of origin. For example, in Romania, there are numerous traditional agricultural or manufactured products that are well known from their place of origin or by their geographical associations. For example, one of the oldest such products is Sibiu salami (salam de Sibiu), originated from Mediaş, but produced on a large scale in Sibiu since 1895. It was first known as “Salami from the Sibiu custom house” and sold under a regal trademark. Later on, its name was changed to Sibiu salami. In the 50’ it was exported on a large scale in Austria, FRG, Poland, Israel, Belgium, Sweden, Switzerland, as well as the Soviet Union.

On a local scale, living in the region of origin of a regional product increases the likelihood of purchasing that product. Typically, consumers perceive the geographical indication protection label to guarantee an authentic product that meets high quality standards. Users attach more value to knowing the country/region of origin of the food products they purchase and are willing to pay more for regional products that are protected by a geographical indication protection label [10].

But in today’s competitive environment, building brand equity solely based on a geographical indication has become nearly impossible for agricultural products. For example, every Romanian knows that the best watermelons are from Dăbuleni. Farmers also know this and as a result almost every watermelon sold in any market or grocery store in Romania claim to be from Dăbuleni. In this case, brand equity is reduced to zero because there are no means for the consumer to actually verify the seller claim. Even if the claim is legitimate, a possible way to build brand equity was blocked.

In Romania, such products are well known for their superior quality, good reputation or other superior characteristics such as organic ingredients. Currently, an intensive agriculture and an extensive biological agriculture are practiced on a growing scale in Romania. As a result, ecological agriculture can locally provide a high degree of economic

efficiency and influences the emergence of a new life philosophy, for both producers and consumers [6]. Sadly, when exported, Romanian agricultural products do not benefit from these associations. The main culprit for this situation is the lack of a powerful brand that can harness these associations and catalyze them. In these circumstances there is a strong need for specialized professionals that are capable of building strong brands by adopting a holistic view on brand equity creation. This help can be centred around building a brand for a commodity or making a smooth transition from a brand based on geographical indication towards a complete brand with proper brand associations and capable of fostering consumers’ resonance with the brand. In this paper we try to conceptualize the primary directions to achieve this goal by making a branding creation benchmark between two popular Romanian brands.

## MATERIALS AND METHODS

A quick literature review showed the primary directions for action identified by agricultural consulting for most agricultural products. From a consumer’s perspective, there is a high demand for authenticity, as consumers are becoming more sophisticated [1].

The main drivers for this demand for authenticity are consumers’ increased predilection to express their desired personal lifestyle through brand preference [8] and their increased concern regarding environmental issues and organically grown food [7]. From the producer’s perspective, there is an important opportunity for outsourcing downstream activities like packaging, labelling, logistics, marketing activities or sales [3].

Consultants and marketing specialists must act primary on influencing consumers’ perceptions by developing a brand equity building process. For the purpose of this paper, we will use the traditional view on brand equity sources [4], as depicted in figure 1.

Building brand equity starts with establishing a well-known brand identity.

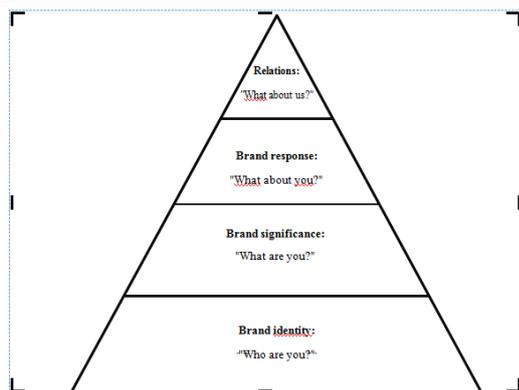


Fig. 1. Brand equity sources [4]

This identity helps the brand to be perceived as a category leader and simplifies the buying process for consumers. When facing a buying decision, brand identity helps consumers make a priori judgmental inferences about the brand [9]. If these inferences are positive, the product is embedded with a certain brand significance. This significance is composed by proper brand associations. If these associations are relevant for the product, they will trigger a brand response. The nature of this response is dictated by perceived quality [13]. If this response is positive, consumers will become loyal to the brand.

In the case of agricultural products, building brand equity must also take into account the four possible types of product brands:

- Producer brands – used to distinguish between products of different producers;
- Geographical brands – used to distinguish products by their geographical origin;
- Ingredient brands – used to distinguish products by the ingredients used;
- Varietal brands – used to distinguish products by their assortment.

For a better clarity, in the context of agricultural consultancy we will only discuss building brand equity for geographical brands versus producer brands.

## RESULTS AND DISCUSSIONS

In order to be successful, the process of building strong brand equity must be approached in a holistic manner [9]. As a consequence, developing a brand positioning strategy represents a key part of this process.

In the most basic way, brand positioning can be defined as the act of putting a brand in the mind of its consumers [4]. Basically, this process can be described as a series of actions to find a “window” in the mind of each individual consumer. In order to achieve this, companies must first identify target consumers. Afterwards they must develop category parity points that help consumers include a product in a certain product category. Only after all these stages are defined can the process of strategic differentiation begin, by developing points of differentiation in regards to competition. Usually, strategic differentiation is not possible without following the means-end value chain (figure 2). The points of differentiation must be unique and relevant for consumers in order for the positioning process to be complete.

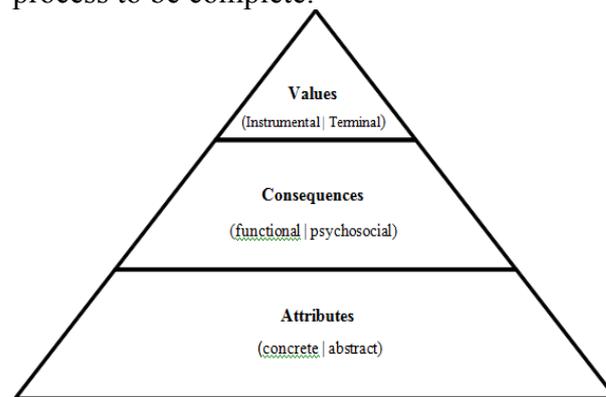


Fig. 2. Means-end value chain [12]

Traditionally, the brand positioning process begins with identifying profitable consumer segments. Targeting consumer segments is problematic in highly competitive environments - as in the case of agricultural products - because the already existing markets are divided into very small segments with complex consumer profiles. Brand positioning consists in designing the company's offer and image so that it occupies a distinct and valued place in the target customer's mind [4]. In the context of an agricultural product, the positioning process can make the product important for the consumer by differentiating it from other similar but lower quality products. A strong emphasis should be put on quality, because

agricultural products must elicit a high degree of sustainability in order to be successful [11]. In this context, the role of agricultural consultancy is to create relevant points of differentiation while maintaining points of parity based on sustainability. We will further exemplify and analyze this process.

### **Topoloveni Jam**

Topoloveni Jam is a traditional Romanian brand present on the market in different forms since 1956. It is manufactured from plums through a traditional method attested since 1914 and is a 100% bio product without additives or added sugar. The name of the brand is eponymous with the region where its production was first attested: Topoloveni – Argeş district.

On a local level, the brand already has a strong brand identity. Primary brand associations are related to consumers' childhood and happy memories regarding breakfast. In these circumstances, the brand name Topoloveni was a very strong candidate for nursing numerous brand extensions. Brand consultants explored the possibility of successive brand extensions that would increase profits and evoke positive brand associations. Primary associations used were "100% with natural ingredients" and "no additives or added sugar". Packaging and labelling was done in a traditional manner, with a strong emphasize on natural symbols as brand imagery. As a result, the traditional plum gourmet is complemented with Quince Gourmet, walnuts Gourmet, Jerusalem artichoke gourmet, apricot gourmet, sour cherry gourmet, sea buckthorn gourmet, blueberry gourmet and black cherry gourmet. Nevertheless, Topoloveni also launched successful brand extensions in the form of line extensions in all countries from the European Union. As a result, the brand response was favourable and consumers have become loyal to the brand.

In terms of brand positioning, Topoloveni Jam is positioned as a premium brand. In terms of attributes, the positioning statement is centred on the "100% natural ingredients" brand claim. There are no abstract attributes used. Primary consequences highlighted are functional and strongly related to consumers'

wellbeing and health. A main point of difference is the seal of approval represented by the Royal House supplier status possessed by the brand.

Despite using a geographical brand association, Topoloveni Jam proved successful due to the proper branding decisions and a high quality of the product. The most notable factor of their success was the multi-channel, multi-brand approach to branding. We can conclude that the help of marketing consultancy proved invaluable in building this brand and managing its subsequent line extensions.

### **Bear Power Berries**

The case of Bear Power Berries is more complex. As fruits, all berries are highly perishable. Local farmers were losing at least 40% of their merchandise every season. In the case of most commodities, the surplus is usually exported, but in the case of berries demand is extremely limited. The solution to this problem was a remarketing strategy for berries under an attractive brand name. Basically, the pressure for fresh berries was first relieved by freezing the fruits. While berries are a known product in most countries of the European Union, frozen berries had a low consumption level.

The brand name Bear Power berries was chosen in the hope to make the brand extremely attractive to kids. The brand quickly built a strong brand identity centred alongside its core value proposition: "a desert that helps kids become more powerful". The association with the "mystic fruits" greatly helped the brand in this avail. In fact, the brand response was so powerful that the brand had major difficulties in terms of availability during the first years. To solve this problem, the brand was repositioned as a premium desert since 2014 and the prices were increased with 40% on average. Given these changes, profits skyrocketed by almost 100%. In terms of brand positioning, a value proposition based on instrumental values was used. Consultants opted for a reverse positioning strategy due to a negative preexistent association between frozen food and health. The primary consumer segment targeted consisted of children and teenagers

who desire an atypical dessert, departing from traditional sweets. The resulting positioning strategy was created on the basis of functional benefits necessary for agricultural commodities. This approach allowed producers to circumvent their shortage of expertise and their limited production capacity in order to gain competitive advantage.

We can conclude that the case of Bear Power berries represents a good example of branding excellence when it comes to producer commodities brands.

## CONCLUSIONS

When faced with choosing undifferentiated products and in particular commodities, consumers are less prone to thoroughly evaluate decision making or be consistent in their decision because they view the buying decision as a trivial act [5]. As a result, carefully implemented branding strategies are needed. In this article we have explored such strategies. We have also shown how agricultural consultancy can be used to create strong brand equity for commodities such as agricultural products.

From a theoretical standpoint, the primary contribution of this article is to highlight the primary role of agricultural consultancy in developing branding strategies for traditional Romanian brands. With a careful consideration of the current situation, a well thought branding strategy based on brand equity creation and an attractive brand positioning, small producers can export their goods with increased payoffs. Also, we have shown that sustainability practices are extremely important in brand communication because they are becoming increasingly relevant to consumers, especially in the category of food. Therefore sustainability should be part of the brand positioning statement for agricultural products.

From a managerial standpoint, we have provided a holistic approach to brand management that completely surpasses the limitations of the traditional means for adding value to commodities. Traditionally, only geographical indications were used in the branding process of commodities. Despite the

benefits of such strategy, we have shown that creating a producer brand is also possible by using a brand positioning process centered on the means-end theory value chain. Linking consumer values through attributes or consequences may prove beneficial for agricultural brands due to strong brand equity leveraging effects. In the case of agricultural products, creating a portfolio of brands and/or assortments for a variety of consumers and channels is mandatory for creating and sustaining competitive advantage.

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## ANALYSIS OF THE SUPPORT MECHANISM OF THE PILLAR I AND THE RESULTS IN THE ROMANIAN AGRICULTURAL EXPLOITATIONS SOUTH-MUNTENIA REGION

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### **Abstract**

*The European Community support agriculture in the pre- and post-accession was represented by the funds allocated to our country in the two pillars of the CAP. Pillar 1 – who was defined by the direct payments to farmers under EAGF and Pillar 2 – made of SAPARD Funds and EAFRD RDP 2007-2013. The following analysis is based on upon the income inequality decomposition methodology that allows, on one side, to assess the degree of concentration of income categories of farms and, on the other side, to assess the effect of the change on the income sources that constitute the total farm income. By taking into account the Gini coefficient and decomposing the income inequality by using a series of criteria such as: the standard value, the main production type obtained etc. we have reached a series of interesting conclusions that may well prove useful to both academia and decision makers. Summarizing the results below, we can see that the support through Pillar II leads to disparities but its influence is very low. Grants awarded by Pillar I are of the utmost importance to the formation of income and therefore they influence more directly the inequalities between farms. Under these circumstances we believe that in order to improve the distribution of income between farms is necessary to increase the subsidies, especially those granted trough complementary national payments that allow the alleviation of general disparities from the prices of the agricultural production between different agricultural sectors and the support of land consolidation in order to achieve a more equitable distribution of the direct payments at the farm levels.*

**Key words:** analysis, agricultural holding, Pillar I, Pillar II, support mechanism

### **INTRODUCTION**

During the 2007-2014 period, the Agency for Payments and Intervention in Agriculture (APIA) has implemented support measures for farmers financed through the European Agricultural Guarantee - EAGF as direct payments under the Single Area Payment Scheme - SAPS as well a support measures financed from the national budget and the European Agricultural Fund for Rural Development - EAFRD as complementary national direct payments - PNDC (2014 TNA-transitional national aid).

The direct payment schemes and the complementary national direct payments were regulated trough Government Emergency Ordinance no.125/2006 approving the direct payment schemes and the complementary national direct payments, which are granted in the agricultural sector since 2007 and to amend art. 2 of Law no. 36/1991 on

agricultural companies and other forms of association in agriculture, approved with amendments by Law no. 139/2007, as amended.

The direct payment schemes granted since 2007, as mechanisms to support agricultural producers are:

- Single Area Payment Scheme (SAPS);
- Payment scheme for energy crops;
- Separate sugar payment scheme;
- Complementary national direct payments (PNDC) in the vegetable;
- Complementary national direct payments (PNDC) in the livestock sector.

Since 2014 were granted TNA (transitional national aid), mechanisms to support agricultural producers for the two sectors, vegetable and livestock.

### **MATERIALS AND METHODS**

The analysis of income distribution at the farm level is a subject of great interest in the

specialty literature, especially given that one of the objectives of the common agricultural policy is to reduce the inequality among farmers. This topic of research is even more important as support, especially because direct payments are concentrated within the large farms, while small farms are subsidies dependent (Moreddu, 2011). Given that income formation differs by country, region or type of holding, the findings of different studies are contradictory.

Moreover a very topical subject is represented by the concerns about community support evaluation of the influence on income distribution inequality.

Under these circumstances, in order to quantify how much of income inequality change is explained by awarding grants, we applied in the current paper a methodology of breakdown of revenues by source of income calculation which is based on a series of indicators for assessing the concentration and inequality.

The methodology was applied to the data from the database RICA at the level of 2012 and was based on a series of indicators (net income from agricultural production; subsidized crop production; subsidies animal production; rural development and other grants; subsidies intermediate consumption; payments decoupled) selected on three criteria for the classification of agricultural holdings:

- average standard value on a farm:
  - 2000 - <8.000 EUR
  - 8000 - <25 000 EUR
  - 25 000 - <50 000 EUR
  - 50 000 - <100 000 EUR
  - 100 000 - <500 000 EUR
  - > = 500 000 EUR
- type of production obtained (TF 8 Grouping classification of RICA): field crops; horticulture; wine; other permanent crops; milk; other grazing livestock; other animals granivorous; mixed.
- specialization of production (TF14 classification of RICA): field crops; other field crops; horticulture; wine; orchards – fruits; milk; sheep and goats; cattle; granivorous; mixed animals; mixed crops and livestock.

Each data set was characterized by descriptive analysis indicators generated using functions provided by Excel Data Analysis, one of the most important indicators being the **Gini coefficient**.

**The Gini coefficient** - an indicator that measures the equity of distributions - if equals '0' we have equality and if equals '1' we perfect inequality (Shryock *et al.*, 1980):

$$GI = \left( \sum_{i=1}^n x_i y_{i+1} \right) - \left( \sum_{i=1}^n x_{i+1} y_i \right)$$

**The Concentration index** is calculated based on the Gini coefficient and may have values between [-1,1]:

$$C = \frac{n}{n-1} GI$$

**The Gini coefficient developed by Lerman and Yitzhaki** (1985) which identifies how much of the total income inequity is due to the "k" source of income (Lerman *et al.*, 1985):

$$G = \sum_{k=1}^K R_k G_k S_k$$

where:  $S_k$  - share of their income in total income  $k$ ;  $G_k$  - Gini coefficient of income source  $k$ ;  $R_k$  -  $k$  correlation source of income to total income (between [-1,1]) (Leibbrandt *et al.*, 1996):

$$R_k = \frac{\text{cov}[Y_k, F(Y)]}{\text{cov}[Y_k, F(Y_k)]}$$

**Coefficient of relative concentration of their income** ( $g_k$ ) (Adams Jr, 2002):

$$g_k = R_k \frac{G_k}{G}$$

where:  $g_k$  - relative concentration of income sources  $k$  with total income inequality (Interpretation:  $g_k > 1$  - inequality increases  $g_k < 1$  - inequality decreases)

**Absolute change** - change due to changes in their income inequity  $k$  (Kaditi *et al.*, 2011):

$$\text{Absolute\_Change} = S_k (G_k R_k - G)$$

**The percentage change in Gini** due to a change of 1% of their income (%) (Adams Jr, 2002):

$$\% \text{Change} = \frac{S_k (G_k R_k - G)}{G}$$

## RESULTS AND DISCUSSIONS

The analysis of breakdown revenue by source of income in 2012 is based on a series of

indicators selected on three criteria for the classification of farms: average standard value on a farm; type of production obtained (TF 8 classification of RICA); specialization of

production (TF14 classification of RICA). Descriptive characterization and inequality indicators (concentration) income is presented in the following table (Table 1).

Table 1. Descriptive analysis and the evaluation of income inequality

		Criteria for group		
		Standard value	The type of production	Specialization
<b>Total income</b>	Minimum	2618	325	325
	Maximum	989771	24467	34913
	Average	208991,8	6047,75	6536,18
	Standard variation	387218	7858,334	9694,725
	Gini coefficient	0,723143	0,558601	0,628647
	Concentration ratio	0,867772	0,638402	0,681034
<b>Net income from agricultural production</b>	Minimum	2049	-983	-983
	Maximum	612194	12065	16599
	Average	122672,7	3710,38	4051,45
	Standard variation	240931,6	4026,871	4644,281
	Gini coefficient	0,734546	0,425317	0,41774
	Concentration ratio	0,881456	0,486076	0,459514
<b>Crop production subsidies</b>	Minimum	0	0	0
	Maximum	7431	160	160
	Average	1358,5	26,13	21,27
	Standard variation	2980,84	56,746	51,086
	Gini coefficient	0,793379	0,816388	0,851593
	Concentration ratio	0,952055	0,933014	0,936752
<b>Animal production subsidies</b>	Minimum	34	0	0
	Maximum	71593	1570	1570
	Average	12230,83	223,25	174,36
	Standard variation	29082,16	546,924	468,234
	Gini coefficient	0,814964	0,836086	0,862451
	Concentration ratio	0,977957	0,955527	0,948697
<b>Other subsidies</b>	Minimum	181	11	10
	Maximum	62037	2585	3801
	Average	15251,17	459,13	523,82
	Standard variation	24060,23	872,954	1099,343
	Gini coefficient	0,676154	0,715389	0,712284
	Concentration ratio	0,811385	0,817588	0,783513
<b>Intermediate consumption subsidies</b>	Minimum	4	0	0
	Maximum	25965	837	1261
	Average	5971,5	168,63	162
	Standard variation	10233,07	308,905	386,829
	Gini coefficient	0,716277	0,761397	0,841853
	Concentration ratio	0,859533	0,870168	0,926038
<b>Decoupled payments</b>	Minimum	350	192	192
	Maximum	208005	8617	12703
	Average	50238,17	1417,63	1557,73
	Standard variation	81208,91	2916,286	3703,026
	Gini coefficient	0,689479	0,691066	0,713871
	Concentration ratio	0,827374	0,789789	0,785258
<b>Rural development</b>	Minimum	0	0	0
	Maximum	4972	312	472
	Average	1269	42,63	45,55
	Standard variation	2075,843	109,316	141,706
	Gini coefficient	0,71189	0,853739	0,898566
	Concentration ratio	0,854268	0,975702	0,988423

Source: Treatments after FADN (RICA)

The high rate data for selected variables among different categories of farms determined as presented above reveal high levels of concentration (Gini coefficient tends to 1) and therefore a high inequality in income distribution, The evaluation of Gini coefficients reveals the following (Fig. 1):  
 - the inequity of distribution is more reduced

in the case of classification in accordance with the type of production;  
 - the income inequity between very small farms and very large ones is pronounced, but the distribution of income from agricultural production presents a low concentration within the classification by type of production or specialization;

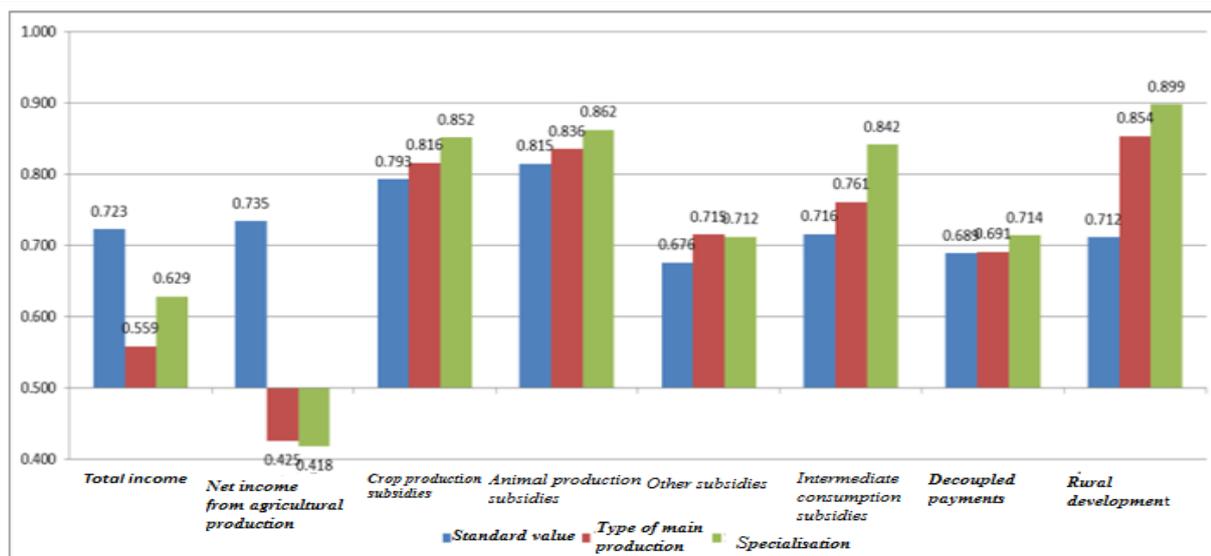


Fig. 1. The evaluation of the Gini coefficient on income categories  
 Source: Treatments after FADN (RICA)

- the main subsidies granted through Pillar I (complementary national payments for crop and livestock) have very high Gini coefficients in the three categories of classification;
- decoupled payments presents a fairer distribution at farm level;
- we encounter the same situation in the case of the support provided through Pillar II which has the highest disparities between values and demonstrates the concentration of support only to certain categories of exploitations.

Given the conditions emphasized by the indicators of evaluation of the inequality of revenues distribution at the level of farms we consider that is necessary to identify the degree of influence of each income source over their total income, for each criterion of

classification.

Decomposition of income inequality - Criterion: The standard value

The analysis by categories of standard value of the decomposition on income sources reveals that, although the Gini coefficients are high and almost similar, their correlation value with the total income ( $R_k$ ) was very low for the support through Pillar II demonstrating that these revenues were more equitable shared between farms (Table 2). The contribution of income sources to the creation of the total income reveals that the value of the agricultural production results in almost 56.7% of the inequality, the rest being grants influence. Of these, the most important contribution is that of the decoupled payments (26.2%).

Table 2. Decomposition of income inequality– Criterion: Standard value

Income	The share of total income ( $S_k$ )	Gini coefficient for income source ( $G_k$ )	Correlation coefficient ( $R_k$ )	Contribution income source of income inequity ( $S_k G_k R_k$ )	Coefficient relative concentration of their income ( $g_k$ )	Percentage of contribution to income inequity ( $G_k/G*100$ )
Net income from agricultural production	0.587	0.735	0.942	0.406	0.966	56.699
Crop production subsidies	0.007	0.793	0.839	0.004	0.930	0.604
Animal production subsidies	0.059	0.815	0.770	0.037	0.877	5.131
Rural development	0.006	0.712	0.496	0.002	0.494	0.300
Other subsidies	0.073	0.676	1.161	0.057	1.096	7.999
Intermediate consumption subsidies	0.029	0.716	1.070	0.022	1.071	3.060
Decoupled payments	0.240	0.689	1.132	0.188	1.090	26.208
				0.7160		

Source: Treatments after FADN (RICA)

Decomposition of income inequality - Criterion: the main production type obtained

The analysis by type of production of the decomposition by income sources reveals that although the Gini coefficients are high and almost similar, their correlation value with the

total income ( $R_k$ ) was very low for the support through Pillar I - subsidies for crop and animal production - demonstrating that these incomes were more equitable distributed between farms (Table 3).

Table 3. Decomposition of income inequality– Criterion: Type of main production

Income	The share of total income ( $S_k$ )	Gini coefficient for income source ( $G_k$ )	Correlation coefficient ( $R_k$ )	Contribution income source of income inequity ( $S_k G_k R_k$ )	Coefficient relative concentration of their income ( $g_k$ )	Percentage of contribution to income inequity ( $G_k/G*100$ )
Net income from agricultural production	0.614	0.425	1.156	0.302	1.094	67.107
Crop production subsidies	0.004	0.816	0.234	0.001	0.426	0.184
Animal production subsidies	0.037	0.836	0.052	0.002	0.097	0.356
Rural development	0.007	0.854	0.479	0.003	0.910	0.642
Other subsidies	0.076	0.715	0.652	0.035	1.038	7.878
Intermediate consumption subsidies	0.028	0.761	0.543	0.012	0.921	2.567
Decoupled payments	0.234	0.691	0.590	0.096	0.907	21.266
				0.449		

Source: Treatments after FADN (RICA)

The contribution of the revenue sources at the creation of the total income reveals that the value of the agricultural production leads to approx.67.1% of inequality, the rest being grants influence. Of these the most important contribution is that of the decoupled payments (21.3%), followed by intermediate consumption subsidies and other subsidies.

The analysis by type of specialized farms of the decomposition on income sources reveals that, although the Gini coefficients are high and almost similar, their correlation value with the total income ( $R_k$ ) was very low for the subsidies for livestock production and for the support through Pillar II, thus demonstrating that these incomes were more equitable distributed between farms (Table 4).

Decomposition of income inequality - Criterion: Specialization production

Table 4. Decomposition of income inequality– Criteria: Production specialization

Income	The share of total income ( $S_k$ )	Gini coefficient for income source ( $G_k$ )	Correlation coefficient ( $R_k$ )	Contribution income source of income inequity ( $S_k G_k R_k$ )	Coefficient relative concentration of their income ( $g_k$ )	Percentage of contribution to income inequity ( $G_k/G*100$ )
Net income from agricultural production	0.620	0.425	1.274	0.336	1.111	68.839
Crop production subsidies	0.003	0.816	1.399	0.004	2.341	0.762
Animal production subsidies	0.027	0.836	-0.311	-0.007	-0.533	-1.423
Rural development	0.007	0.854	0.472	0.003	0.826	0.576
Other subsidies	0.080	0.715	0.705	0.040	1.034	8.284
Intermediate consumption subsidies	0.025	0.761	0.560	0.011	0.875	2.168
Decoupled payments	0.238	0.691	0.616	0.101	0.873	20.794
				0.488		

Source: Treatments after FADN (RICA)

The negative value of the income subsidies for livestock production reveals a negative correlation with the total income and diminishes the total Gini value. The contribution of the sources of revenue to the creation of the total income reveals that the value of the agricultural production leads to approx. 68.8% of inequality, the rest being the

grants influence. Of these the most important contribution is that of the decoupled payments (20.8%) and of the intermediate consumption subsidies.

**CONCLUSIONS**

By evaluating the effects of the changing sources of income on the total income we

notice the magnitude of the effect of increasing or decreasing inequality of income distribution between farms. The results obtained demonstrate the following:

*Criterion: the standard value:*

-decoupled payments, intermediate consumption subsidies and other subsidies lead to increased inequality between farms of different economic dimensions;

-1% increase in income from agricultural production leads to increasing inequality by 2%, while increasing by 1% increase in income from decoupled payments lead to increased inequality by 2.17%;

*Criterion: type of production:*

-income from agricultural production and other subsidies lead to greater inequality between farms that acquire different products (cereals, wine, horticulture, etc.); 1% increase in income from agricultural production leads to increasing inequality 5.76%;

-subsidies generally lead to a decrease in inequality between them, in particular the subsidies for livestock production (a decrease of 3.33%) and direct payments (2.17%);

*Criterion: specialization of production:*

-income from agricultural production, other subsidies and production subsidies lead to increased inequality between animal farms specializing; 1% increase in income from agricultural production leads to increasing inequality by 6.85%;

-subsidies generally lead to lower inequality between farms, particularly subsidies for livestock production (4.1% decrease) and direct payments (to 3.04%).

Summarizing the results above, we can see that the support through Pillar II leads to disparities but its influence is very low. Grants awarded by Pillar I are of the utmost importance to the formation of income and therefore they influence more directly the inequalities between farms. Our results reveals that a 1% change in subsidies granted by Pillar I:

- have a negative effect leading to increased inequalities between farms of different sizes;
- have a positive effect leading to disparities between different farms specialized in specific sectors or products.

Under these circumstances we believe that in order to improve the distribution of income between farms is necessary to increase the subsidies, especially those granted through complementary national payments that allow the alleviation of general disparities from the prices of the agricultural production between different agricultural sectors and the support of land consolidation in order to achieve a more equitable distribution of the direct payments at the farm levels.

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## RESEARCH ON THE EVOLUTION AND THE STRUCTURE OF FARMS IN ROMANIA

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### Abstract

*The paper presents the evolution and structure of farms in Romania in 2013 in relation to their situation in 2003, but the existing situation in the EU in 2009. The distribution of the agricultural area of farms by size types varies from country to country, and a distinct situation is found in Romania. Research methods used were comparative analysis, absolute and relative deviation from the previous period. The conclusions drawn from this analysis, shows a reduction in the total number of farms in 2013, especially small farms as a result of the comas has, and an increase in holdings with an area of over 10 hectares, thanks the same process. The present situation in Romania causes the creation of subsistence farms, the main form of farm being family type farm.*

**Key words:** agriculture, agricultural unit, evolution, size farm

### INTRODUCTION

At the EU level, more than half of the arable land is distributed in farms over 50 hectares (61.4%) and only a percent of 5.5% of the agricultural area was in farms between 0-5 ha. [7] [10]

In Romania, the situation on the size of farms and their small dimension is much discussed [9]. The many small family farms with small surface in use is determined by the characteristics of the Romanian agriculture, namely: strong fragmentation of land ownership more than 40 million parcels, and the existence of many farms viable economically, with aging population involved in this sector and with inadequate and obsolete agricultural equipment compared to EU agriculture strongly mechanized through mechanization, automation, chemical treatment, biotechnology, high skilled labour force [8].

All these problems lead to a physical separation of small and medium farms in terms of dimensioning (less than 5ha).

### MATERIALS AND METHODS

For presenting the farms situation in Romania, the comparative analysis of statistical data for

the period 2003 – 2012 was used, which are found in the latest publications of EUROSTAT.

Surveys made by Eurostat provide harmonized data on the structure of agricultural farms in the European Union, particularly regarding the land use, livestock and labour force. Every ten years a survey is made in the form of basic agricultural census and three intermediate surveys among the two basic ones, with an interval of two to three years between them. The data were processed and interpreted in terms of quality and quantity.

In Romania, the statistical survey is based on a representative sample, formed of about 313,000 farms without legal status, which was extracted from a total of 3,828 thousand agricultural farms without legal status, registered in the General Agricultural Census 2012 and included in the Statistical Register of farms and all farms with legal status (The National Institute of Statistics). These statistics have been made in order to properly design the implementation, monitoring and evaluation of the Community Agricultural Policy (CAP).

Comparative analysis used in the comparison of specific indicators own farms, in different

periods of time or in the same time period in Romania and the EU.

**Absolute deviation and relative deviation** indicator, was calculated as the difference between their value, from the beginning to the end of the period, recording positive values respectively negative ones.

## RESULTS AND DISCUSSIONS

Romania has an agricultural surface of 61.7% of total surface, being among the first places in the European Union.

In Romania the agricultural surface per capita/inhabitant is of 0.65 ha, from a total of 14,700,000 ha, ranging among the first 6 countries in Europe, and as arable surface it holds 5<sup>th</sup> place, with a surface of 0.45 ha per capita/inhabitant, being the second agricultural producer in the Central and Eastern Europe, after Poland. [1].

In Romania, over 4.2 million farmers own an average of 2.3 ha, and it is broken into parcels that cannot make a competitive agriculture and about 3.5 million farms have land less than one hectare.

The Romanian farms or agricultural units are private family type farms, where all activities are supported by the family members and the production is rarely used outside the farm, only for own consumption.

C. Mănescu *et al.* considers **family farm** the basic unit in agriculture, the family is the main source of labour force. In some countries, restrictions were imposed of limiting the formation of large corporations in agriculture to stimulate the maintenance and development of family farms. Most small and medium farms in Western Europe have a diversified character practicing besides farming and tourism, services or products processing [7].

In Romania in 2007, there was the largest number of farms or agricultural units reported to the European Union (3.93 million), representing one third of total at the Community level, with an average area of 3.4 hectares, being one of the lowest. In the period 2003-2012 and 2013, the number of farms in Romania decreased with 14% reaching 3.86 million, and in 2013 it reaches to 3.28 million, according to Eurostat data.

Table 1. Existing structure of agricultural holdings in the EU and Romania on class size in years 2012 – 2013 compared to 2003

Size type (ha)	UE		Romania 2003		Romania 2012		Romania 2013	
	Number of farms (thousand)	Structure (% of total number)	Number of farms (thousand)	Structure (% of total number)	Number of farms (thousand)	Structure (% of total number)	Number of farms (thousand)	Structure (% of total number)
0 - 5	9,644.82	70.4	4,205.1	93.8	3,457.0	92.9	3,281.4	92.1
5.1 - 10	-	-	218.9	4.9	182.2	4.9	193.8	5.4
10.1 - 20	2,553.16	18.6	37.4	0.8	43.5	1.2	49.6	1.4
20.1 - 50	804.31	5.9	9.5	0.2	17.9	0.5	18.7	0.5
≥ 50.1	698.11	5.1	14.1	0.3	21.1	0.6	20.2	0.6
Total	13,700.4	100	4,484.9	100	3,721.8	100	3,563.7	100

Source: EUROSTAT 2012

In Romania, in 2013, the number of agricultural holdings was down from 3,563.7 the previous year, with 4.72% due mainly to the consolidation process. It was a decrease in the number of small farms with an area of 0-5 ha by 5.07% compared to 2012 and increase the number of farms with an area of 5.1-10 ha with 11,700 farms, those with surface between 10.1-20 ha with 6,100 holdings, as well as those with between 20.1 and 50 ha area with 1200 holdings.

Like structure in 2013 compared to 2012,

there was a decrease in the percentage owned by small farms (0-5 ha) by 0.8% and increase the share of holdings with larger, between 5.1 to 10 ha, up 0.5%.

In terms of absolute deviation in the number of farms in the years 2012 to 2013 compared to 2002, shows the following:

- And massive progressive reduction in the number of small farms with 0-5 ha area, representing 17.79% in 2012 and increase to 21.96% in 2013 compared to 2003;

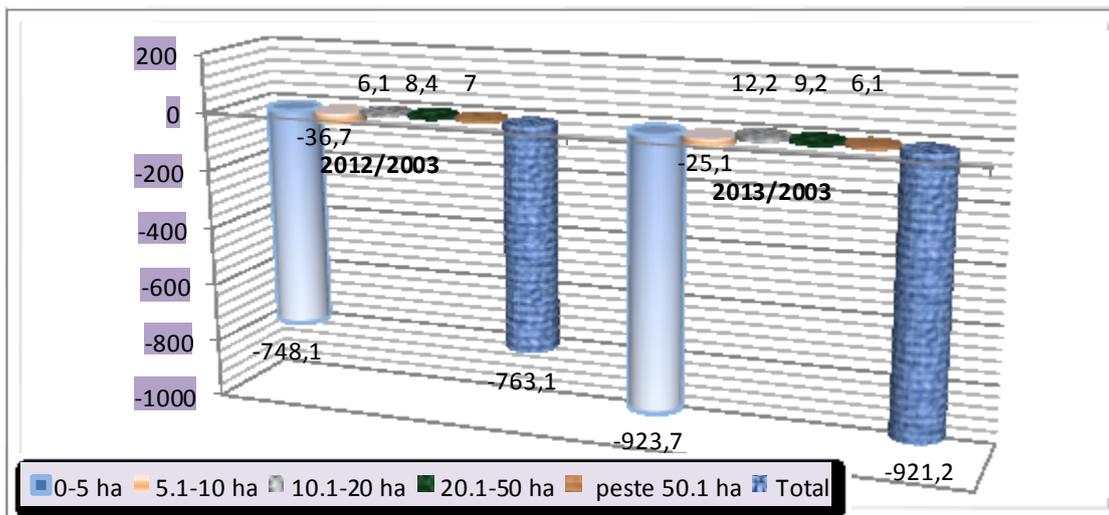


Fig. 1. Absolute deviation in the number of farms by size categories in Romania in 2012 and 2013 compared to 2003

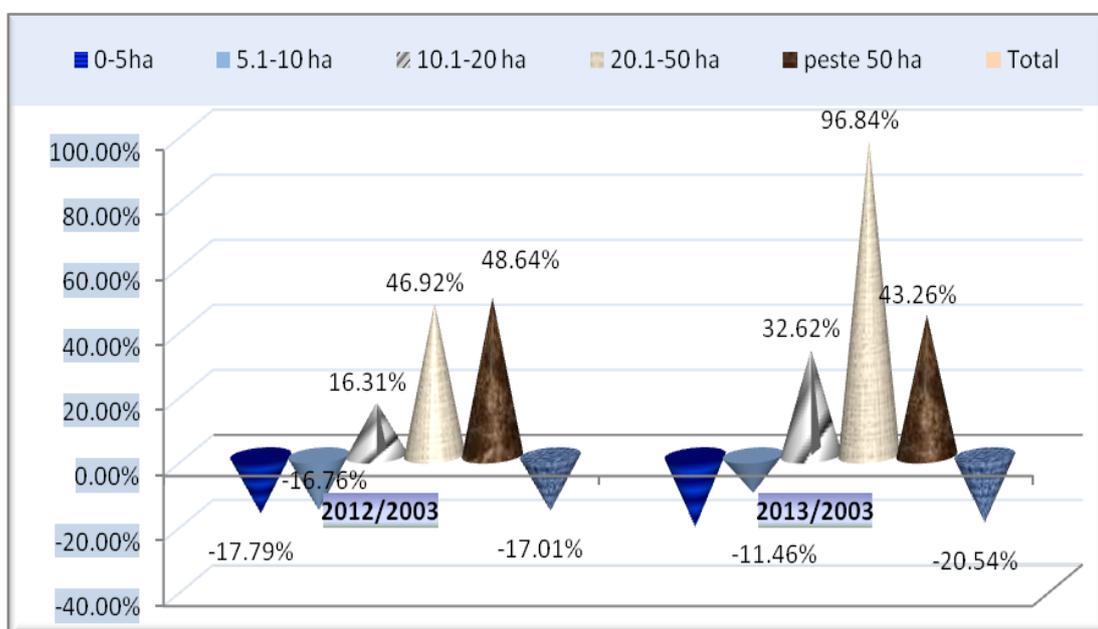


Fig. 2. Relative deviation in the number of farms by size categories in Romania in 2012 and 2013 compared to 2003

- Reducing the number of farms with an area between 5.1-10 ha in 2012 in relative sizes, represent 16.76% in 2012 and 25.7% in 2013 compared to 2003;

- Increasing the number of farms with areas between 10.1-20 ha, ha 20.1-50 and over 50 ha, shows that the merger process was carried out at a steady pace during the survey period;

- Overall, the deviation absolute and relative number of farms in the years 2013 and 2012 compared with 2003 were negative, which indicates a decrease in their numerically with 17.01% in 2012 and 20.54% in 2013. (Figure 2).

Analyzing the situation reported by European statistics and Eurostat, we find that in

Romania the number of farms with the area between 0-5 ha, occupies the highest percentage (92.9%), compared to the situation at European level that is smaller (70.4%). A percentage of 4.9% of farms have in use land with surfaces between 5.1 to 10 ha size that is not in the European level. In the European Union - 27, the farms with surfaces between 10.1 and 20 ha, have a percentage of 18.6% and in Romania are only in a percent of 1.2% of total farms (Table 1).

Romania has a very low number of farms with large use surface ( $\geq 50$  ha), only a percent of 0.6%, which is reflected by the lack of agricultural machinery and equipment and an agricultural consultancy system, needed to

make performing agriculture.

The used agricultural surface, which has the average on agricultural farm is 1.73 ha in 2003 and 1.95 ha in 2012, although in 2009 it was 2.29 ha: (Agricultural Census 2010).

According to the General Agricultural Census 2012 dominant arms in Romania (92.9%) have surface between 0 and 5 hectares, and the surfaces are distributed in much smaller size types (Table 2).

From the analysis of the below mentioned data, it can be seen that in Romania, there are farms that use surfaces smaller than 0.1 - 0.5 ha, farms that occupy a percent of 4.6%, then a percent of 11.2% have in use surfaces contained between 0.5 – 1 ha, being followed by a percent of 26.3 % of farms with land in use with surfaces contained between 1-2 ha. The rest of 57.9 % have in use surfaces larger than 2 ha.

Table 2. Agricultural surface of farms with size between 0.1 – 5 ha, used on categories of use (thousand ha), 2013 compared to 2010

Size type (ha)	Utilized agricultural area (UAA) on usage categories (thousand ha)										% of total surface	
	Arable land		Family gardens		Pastures and hayfields		Permanent crops		Total			
	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013
Less than 0.1	2.73	2.81	12.63	14.16	1.98	1.50	2.12	2.12	19.47	20.59	0.5	0,55
0.1 – 0.3	48.12	46.81	35.95	34.53	19.25	15.68	17.05	18.84	120.39	115.86	3.1	3,1
0.3 – 0.5	76.66	74.33	1.74	14.40	28.96	25.27	12.93	13.53	120.29	127.53	1.0	3.42
0.5 - 1	268.62	252.31	27.02	21.52	109.23	94.64	26.57	25.98	431.45	394.45	11.2	10.58
1 - 2	643.36	601.31	33.92	27.04	287.18	250.70	46.05	46.90	1,010.52	925.95	26.3	24.85
2 – 5	1,397.93	1,342.6	39.57	32.12	717.66	689.94	73.86	77.0	2,229.03	2,141.09	57.9	57.5
Total	2,437.42	2,319.6	150.83	143.7	1,164.26	1,077.7	178.58	184.3	3,849.52	3,725.47	100	100

Source: General Agricultural Census, 2012; The farm structure survey in 2013

In terms of utilized agricultural area in Romania farms between 0-5 hectares in size, it is found that the largest areas were used by holdings of 2-5 ha in size by up to 58% in the analyzed period, followed the size of 1-2 ha holdings, 26.3% in 2010 and 24.85% in 2013. Farms with SAU between 0-0.5 ha have reduced weights, so under 0.1 ha were only 0.5%, with an area between 0.1-0.3 ha farms are owned by 3.1%, and between 0.3-0.5 ha a rate of 1% in 2010, increasing to 3.42% in 2013.

Absolute deviation of SAU in agricultural holdings owning arable land was negative (-4.83% relative deviation) in 2013 compared to 2010, which shows a decrease of 17.8 thousand hectares owned surfaces.

Family gardens also had a decrease of SAU in 2013 compared to 2010 by 7.1 thousand hectares, which represents 4.68% negative deviation relative.

Pastures and hayfields have also recorded a negative deviation in 2013 compared to 2010

with 86,530 ha which represents a decrease of 7.43%. A deviation relative positive value of 3.24%, recorded permanent crops, up 5,870 ha in 2013 compared to 2010 (Figure 3).

The number of these subsistence farms, reduces the performance of agriculture and maintain the general agricultural efficiency at a low level.

Currently the approximately 3.5 million farms with less than one hectare of land in use, prevents them from accessing EU funds. Thus, the problems that appear and develop are due to the fragmentation of the farms as regards funding (Figure 4).

The structure and size of farms in Romania are not yet compatible with those of the member countries of the European Union and therefore urgent measures for structural adjustment are required [3].

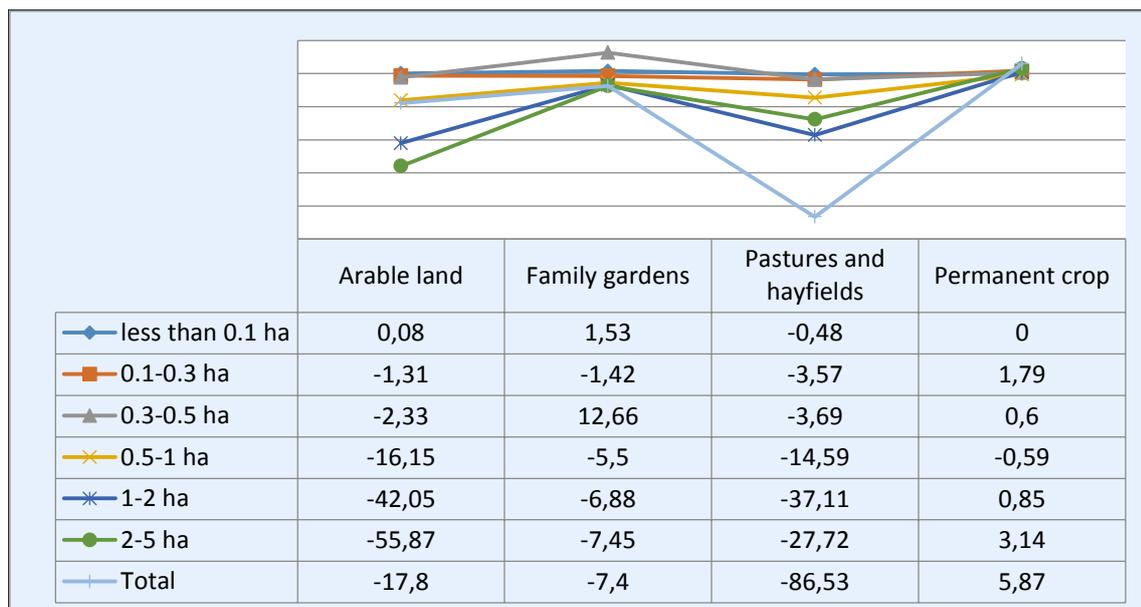


Fig. 3. Deviation absolute of small agricultural areas, by use in Romania in 2013 compared to 2010

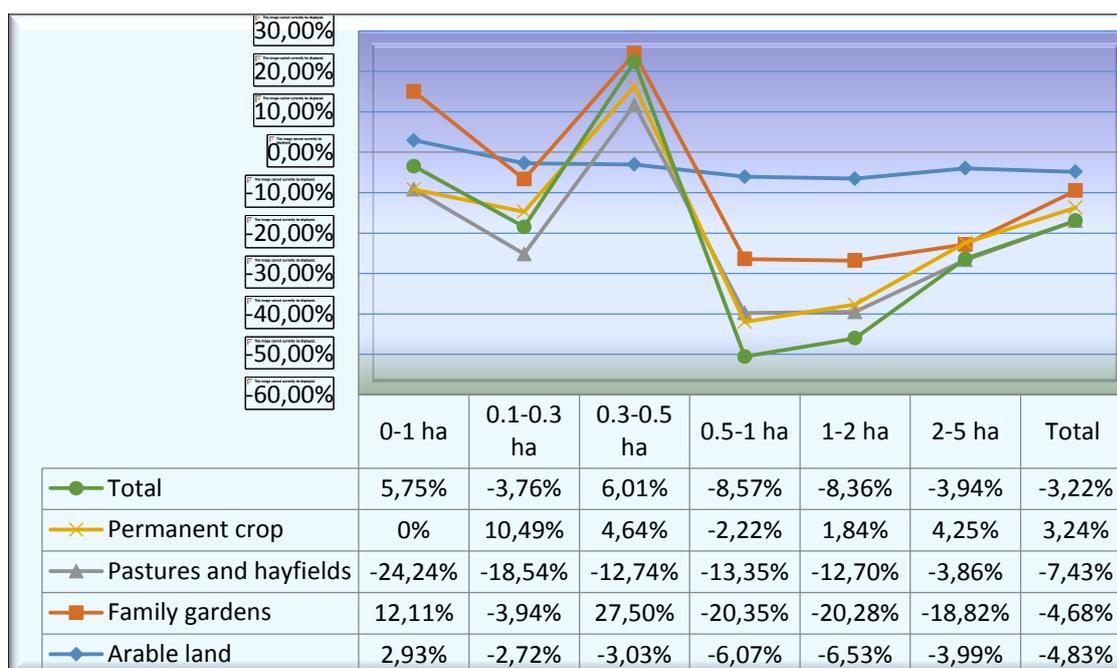


Fig. 4. Deviation relative of small agricultural areas, by use in Romania in 2013 compared to 2010

The viable solution for the Romanian agriculture recovery can be represented by the promotion of the agricultural cooperatives, which can contribute to the socio-economic development of the country by supporting the semi-subsistence farms, the potential of small agricultural units and the possibility of modernizing the technical and material base [2] [12].

Losing more than half of the Romanian agriculture, represented by small and

medium-sized farms and the rural depopulation are consistent elements for the justification of such an initiative.

## CONCLUSIONS

In the analyzed period 2003 - 2012, there were not major changes in the evolution of the size and structure of the agricultural farms in Romania, and almost half (48%) of small farms in the EU are subsistence farms and

were identified in Romania.

In Romania prevail farms/small farms with less than 5 ha, but there is a trend of consolidation of the agricultural areas used and the number of small farms, occupying a share of 92% of farms. Sized farms, the development of which the stakes are small but growing share in 2013 compared to 2010. In Romania, in 2013, the number of farms was 3,563.7, down from the previous year, with 4.72% as a result of the merger.

The average area of farms in the EU is four times higher (12.6 ha) than in Romania, 2013 (3.66 ha).

Deviation absolute and relative number of farms in the years 2012 to 2013 compared to 2002 was generally negative, except in size between 20.1 to 50 ha farms where there have been increases. In terms of utilized agricultural area farms between 0-5 hectares in size, it is found that the largest areas were used by holdings size 2-5 ha, followed by holdings of 1-2 hectares in size while OR farms with between 0-0.5 ha have very low weights.

OR absolute deviation in agricultural holdings owning arable land was negative in 2013 compared to 2010. gardens and pastures and hayfields, also had a decrease in OR 2013 compared to 2010 and a negative deviation relative.

After 1989, Romania has become one of the countries with the smallest physical size of farms, in 2012 the physical size of farms is 3.5 ha, our country being on the lowest place in EU.

One of the main objectives of the rural development policy for a country with agricultural potential that wants to influence the EU market, is to reduce the large number of subsistence farms.

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## A FEW CONSIDERATIONS ON THE INVESTMENTS IN THE AGRI-FOOD SECTOR OF THE REPUBLIC OF MOLDOVA

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### Abstract

*For all countries, agriculture is the strongest factor in the harmonization of economic development. In our country, the agricultural activity also has a significant contribution to the gross domestic product, even though this contribution was down from 36.14% in 1990 to 15.23% in 2014, when the share of this branch was 2.9 times higher than in Romania (5.36%). In our country's agriculture, significant changes have been produced generated by the agrarian reform that "can be efficient only on the condition of the development of market relations". The starting point in the efficient development of any branch of the national economy, of agriculture implicitly, in the market relations conditions, is the emergence of new generations of products, of adequate technologies for obtaining these products, which need significant investments. In this context, the present paper is investigating the current as well as the needed level of investments in the agri-food sector. As a result of the analysis, several proposals that may contribute to the improvement of the current situation are presented.*

**Key words:** agriculture, credit, efficiency, investments, reform

### INTRODUCTION

By its Declaration of Independence (August 27, 1991), the Republic of Moldova took a firm position on consolidating its place among the democratic nations of the world and on developing a prosperous economy, which undoubtedly require significant changes both in form and content.

The path that the national economy, the agri-food sector inclusively must follow, through the reform towards the famous "better", when the generation of products and their production technology are changing so fast that the value of goods, services and/or material assets can change the situation practically "overnight", needs considerable investments.

It is obvious that an assiduous concern in investments should exist, for the design and application of certain investment projects that would minimize the failures and avoid giving up obtaining the desired result. It is absolutely clear that all those who get involved in the agri-food sector must amplify their efforts to find more certainty sources, and these sources

would exclude or at least would limit the risks and uncertainty.

The respective situation determines us to amplify and intensify the scientific research that should guide us correctly to the next step in the long journey to the "bettering" condition.

#### State of knowledge

The national and international research studies try to investigate the investments applied in the agri-food sector. However, even though this issue has been debated at different official meetings from our country, approached on the occasion of scientific events and in different national and international publications, the application of investments in the agri-food sector has developed quite slowly and in a controversial manner.

The respective situation made us investigate the evolution of investments in the agri-food sector. Our present study made it possible for us to come with a few modest recommendations on the application of investments that can contribute to the national agriculture prosperity increase.

**MATERIALS AND METHODS**

The normative acts of the European Union and of the Republic of Moldova, manuals, monographs and other publications on this theme, the materials of the national and international conferences helped us understand and explain the evolution of investments in the agri-food sector and made it possible for us to identify the factors that influence them.

The quantitative analysis is based on the data selected and processed by the authors from the Eurostat database, from the statistical yearbooks and other publications of the National Office of Statistics, from other official information of the institutions from the Republic of Moldova. The study of the empirical information, the analysis of linkages provided us with relevant information and explanations in relation to the phenomena and processes that take place in the evolution of investments in the agri-food sector.

**RESULTS AND DISCUSSIONS**

The average annual volume of the physical means of production with agricultural destination was down from MDL 5,233

million in 1995 to MDL 3,764 million in 2000, i.e. by 18%, to steady increase afterwards up to MDL 11,716 million in the year 2012, i.e. 3.1 times.

The average annual volume of the physical means of production per household was down from MDL 5.05 million in 1995 to MDL 2.79 million, to increase afterwards to MDL 7.87 million in the year 2012.

It is obvious that our country has to develop and update its values so as to ensure the sustainable development of national economy, of the agri-food sector inclusively.

**Evolution of investments**

Investments are the decisive factor in the improvement of the technical-material basis, in promoting efficient technologies, for environment protection, vocational training, etc. However, in order to obtain the expected result, investments should be oriented towards the regeneration or procurement of equipment, machinery and implements.

The investments in total fixed capital in our country (Table 1) increased from MDL 0.84 billion in 1995 to MDL 1.76 billion in 2000 or 2.1 times, and from MDL 7.8 billion in 2005 or 4.4 times as against 2000; they reached MDL 20.85 billion in 2014, being 4.3 times as high compared to 2005.

Table 1. Investments in material assets on the long term (MDL billion)

Item	1995	2000	2005	2010	2011	2012	2013	2014
Fixed capital investments, <i>of which:</i>	0.84	1.76	7.80	13.80	16.45	17.15	19.13	20.85
- public	0.35	0.76	2.55	4.14	4.82	5.29	6.24	7.48
- private	0.46	0.39	2.74	5.58	7.68	8.29	9.45	9.96
- mixed (public + private)	0.01	0.08	0.26	0.22	0.27	0.14	0.21	0.24
- foreign	0.02	0.09	0.69	1.55	1.53	1.27	1.36	1.42
- enterprises with mixed capital (national and foreign)	0.01	0.43	1.56	2.31	2.15	2.16	1.88	1.74

Source: authors' calculations based on the Statistical Yearbooks of the Republic of Moldova[3]

In the period 1995-2014, the investments increased by all ownership forms. While the investments in material assets in the public sector on the long term increased 21.4 times, in the private sector they increased 21.6 times and in the segment of the economy with foreign capital the investments increased 71 times. Throughout the years, the structure of investments has experienced significant changes. While in the year 1995 the long-term

investments in material assets in the public sector accounted for 41.7%, those in the private sector accounted for 54.8%, with foreign capital 2.4%, in the year 2014 these accounted for 35.9%, 47.8% and 6.8% respectively.

Even though the share of investments dedicated to the construction and erection works was down from 64.3% in 1995 to 52.3% in 2014, these investments still prevail.

The share of investments in equipment, implements, inventory and transport means increased from 27.4% in 1995 to 43.1% in the year 2014.

Table 2. Investments in material assets on long term (MDL billion)

Item	1995	2000	2005	2010	2011	2012	2013	2014
Fixed capital investments, <i>out of which:</i>	0.84	1.76	7.80	13.80	16.45	17.15	19.13	20.85
- construction and erection works	0.54	0.76	3.91	7.08	7.95	8.78	9.88	10.91
- equipment, implements, inventory, transport means	0.23	0.89	3.50	5.71	7.43	7.45	8.09	8.98
- other works and capital expenditures	0.07	0.11	0.38	1.02	1.07	0.92	1.16	0.96

Source: authors' calculations based on the Statistical Yearbooks of the Republic of Moldova [3]

Yet this increase is not sufficient to replace those categories of worn-out and obsolete assets by other new and more performant categories.

The investments have obviously brought a direct contribution to maintaining and/or developing the overall national economy branches. In the period 1995-2014 the fixed capital investments increased in all the

national economy branches. Thus, in agriculture, hunting economy and forestry, investments increased from MDL 0.09 billion in 1995 (table 3) to MDL 2.3 billion in 2014 or 26.5 times, 14.4 times in the processing industry, 29.9 times in transport and communications, 61.7 times in wholesale and retail trade, 75.8 times in education and 98.5 times in healthcare.

Table 3. Fixed capital investments, by types of economic activities (billion lei)

Item	1995	2000	2005	2010	2011	2012	2013	2014
Fixed capital investments, <i>out of which:</i>	0.84	1.76	7.80	13.80	16.45	17.15	19.13	20.85
- agriculture, hunting and forestry	0.09	0.06	0.46	1.05	1.82	1.66	1.85	2.30
- processing industry	0.16	0.26	1.14	1.43	2.11	2.31	2.87	2.31
- constructions	0.02	0.03	0.20	0.42	0.46	0.48	2.12	2.35
- wholesale and retail trade	0.04	0.16	0.79	1.52	1.99	2.12	2.22	2.47
- transport, communications	0.08	0.77	1.66	3.47	3.60	3.63	2.16	2.39
- education	0.012	0.037	0.11	0.36	0.46	0.52	0.63	0.91
- healthcare	0.013	0.006	0.08	0.65	0.69	0.81	0.91	1.28

Source: authors' calculations based on the Statistical Yearbooks of the Republic of Moldova [3]

In the year 1995, the investments in agriculture, hunting and forestry accounted for 10.7%, in the processing industry 19%, constructions 22.2%, wholesale and retail

trade 4.8%, education 1.4% and healthcare 1.5%; in the year 2014 they accounted for 11.0%, 11.1%, 11.3%, 11.8%, 4.4% and 6.1% respectively.

Table 4. Fixed capital investments in agriculture (MDL million)

Item	1995	2000	2005	2010	2011	2012	2013
Fixed capital investments for agricultural production, <i>out of which:</i>	90.7	58.9	425.1	1045.6	1808.2	1641.8	1785.1
- public	25.5	8.2	42.9	30.8	47.5	46.1	32.8
- private	64.5	46.2	341.0	862.5	1444.1	1434.7	1647.8
- mixed (public + private)	0.7	3.8	6.4	0.9	3.0	0.7	0.5
- joint venture enterprises	-	0.3	30.3	123.2	234.5	92.4	26.4
- in enterprises of foreign investors	-	0.4	4.5	28.1	78.9	67.9	77.5

Source: authors' calculations based on the information selected from <http://www.statistica.md>[5]

It is worth mentioning that the fixed capital investments in agriculture are mainly oriented to the private sector. While in the public sector the investments increased from MDL 25.5 million in 1995 (table 4) to MDL 32.8

million in 2013 or 1.3 times, in the private sector they increased from MDL 64.5 million to MDL1647.8 million or 25.5 times.

The structure of investments by ownership form has significantly changed. While in the

year 1995 the share of fixed capital investments for agriculture development accounted for 28.1%, while in the private sector 71.1% of total, in the year 2013 these shares represented 1.8% and 92.3% respectively.

Until 2004 the foreign investors had been absent in national agriculture, then their contribution increased from MDL 0.4 million, accounting for 0.7% of total in 2000 to MDL 77.5 million accounting for 4.3% of total in

the year 2013. Even though the contribution of foreign investors increased 193 times in the respective period, its share in total investments was only 4% in 2013, which is insufficient.

Even though the total investments for environment protection and rational use of natural resources increased from MDL 6,060 thousand in 2000 (Table 5) to MDL 72,369 thousand (current prices) in 2014, i.e. 11.9 times, this figure is quite modest.

Table 5. Investments in environment protection and rational use of natural resources (MDL thousand)

Item	2000	2005	2010	2011	2012	2013	2014
Total, of which for:	6,060	43,939	41,521	31,050	73,479	65,955	72,369
- protection and rational use of water resources	1,315	23,062	14,250	14,819	15,196	39,377	43,938
- protection and rational use of land	4,723	20,877	19,698	15,208	9,789	22,810	26,312
- protection of air	-	-	0.0	0.0	45,477	1,694	-
- other	22	-	7,572	1,022	3,018	2,073	2,119

Source: authors' calculations based on the information collected from <http://www.statistica.md> [5]

The investments for the protection and rational use of land resources prevailed in the period 2000-2011 when they increased 3.1 times. The investments for the protection and rational use of water resources increased from MDL 1,315 thousand in 2000 to MDL 43,938 thousand in 2014 or 33.4 times. Only in the years 2012 and 2013 investments in atmospheric air protection were made in our country.

***Investment potential identification in the agri-food sector***

The investment potential is represented by the total technical, material, financial and human resources that a system has or can attract in order to reach certain objectives in the limits of certain time horizons [1].

The investment potential of the agri-food sector is determined by the level and quality of resources it has or can attract to reach the proposed goal. The agri-food sector and/or the agricultural holding need investment funds:

- on short term, the level of which frequently varies throughout the year depending on internal or external factors, such as the case of circulating assets. The short-term finance presupposes covering the current needs.
- on long term and of high value, such as the case of tangible fixed assets. The long-term finance of the agri-food sector presupposes covering the finance needs with permanent

character or for longer periods of time.

The investments in the agri-food sector, both on short- and on long-term, can be made from:

- own sources (own capital operation, self-finance);
- attracted sources (credits or loans, subsidies, collaboration with other partners, etc.);
- programs with international funding [7].

Internal finance plays a main role in the financial policy of the agricultural holding. The internal funding strategy of investments on any agricultural holding is the synthesis of the production, trade and financial modalities orienting their activity.

The internal funding source flow of investments result from the economic performance and is dependent on the obtained profit.

While in the year 2000 the economic operators from the national economy had losses amounting to -638.8 million lei (Table 6), subsequently the profit ranged from 5456.9 million lei in 2010 to 1,084.6 million lei in 2012.

Farmers' losses ranged from MDL 204.9 million in 2000 to MDL 35.5 million in 2012.

The profit obtained in the processing industry sharply increased from MDL 70.7 million in 2000 to MDL 939.3 million in 2005, to decline afterwards up to MDL 9.8 million in 2012.

Table 6. Profit (+), losses (-) before tax of the economic operators by main types of activities (MDL million)

	2000	2005	2010	2011	2012	2013
Total, <i>out of which:</i>	-638.3	3,795.5	5,456.9	5,180.2	1,084.6	2,008.5
- agriculture, hunting and forestry	-204.9	28.9	863.4	951.4	-35.5	389.7
- processing industry	70.7	939.3	720.9	503.7	9.8	316.6
- wholesale and retail trade	71.7	802.2	1954.4	1751.6	695.4	620.2

Source: authors' calculations based on the Statistical Yearbooks of the Republic of Moldova [3]

It is only in trading that no losses occurred. Except for the year 2005, the profit obtained before tax in the wholesale and retail trade prevailed, reaching 35.8% of total in the year 2010.

It is worth mentioning that the investment

possibilities of agricultural enterprises are significantly different. The number of agricultural holdings range from 873 in 2000 (Table 7) to 1,580 in the year 2010. After 2010, this number decreased to 1,489 in 2012 or by about 6%.

Table 7. Indicators of the activity of agricultural enterprises

	1995	2000	2005	2010	2011	2012
Number of holdings at the end of the year	1037	873	1524	1580	1536	1489
Average yearly volume of fixed production assets with agricultural destination (MDL million)	5233	3764	4262	6462	7180	11716
Per holding (MDL million)	5.05	4.31	2.79	4.09	4.67	7.87
Number of unprofitable holdings	291	488	739	431	426	794
Share of non-profitable holdings in total agricultural holdings (%)	28	56	48	27	28	53

Source: authors' calculations based on the Statistical Yearbooks of the Republic of Moldova [3]

The number of non-profitable agricultural holdings was up from 291 (28% of total) in 1995 to 739 (48% of total) in 2005, to decline

afterwards to 431 (27% of total) in 2010 and it increased afterwards to 794 (53% of total) in the year 2012.

Table 8. Level of profitability (losses) of production sold by agricultural enterprises (%)

Item	1992	1995	2000	2005	2010	2011	2012
Crop production, <i>out of which:</i>	86.7	8.8	22.8	17.1	43.2	45.3	16.5
- cereals	240.3	59.4	36.3	10.9	29.2	39.9	10.0
- sugar beet	100.1	11.0	-4.1	16.3	27.9	10.8	-7.0
- field vegetables	28.4	-34.2	-17.9	6.7	15.8	15.9	2.2
- fruit and shrubs	51.1	-11.7	-4.7	1.6	25.9	32.3	1.3
- grapes	79.7	0.5	47.2	31.0	8.6	36.5	37.0
Animal production, <i>out of which:</i>	4.0	-33.0	-6.7	25.0	20.7	14.6	16.7
- livestock and poultry	12.7	-33.1	-37.3	1.8	19.9	11.4	20.4
- milk	-4.9	-40.7	-1.1	9.9	13.7	26.3	13.5

Source: authors' calculations based on the Statistical Yearbooks of the Republic of Moldova [3]

The profit obtained in agriculture is influenced by the structure of branches and agricultural products whose profitability (losses) level on agricultural holdings significantly differs. Thus, the crop production profitability on agricultural enterprises was down from 86.7% in 1992 (Table 8) to 8.8% in 1995, then it ranged from 45.3% in 2011 to 16.5% and to 8.8% in 2012. Livestock production profitability was down from 4% in 1992 to -33.1% in 1995 and to -

6.7% in 2000; then it oscillated within the limits of positive values from 14.6 to 25.0%. The profit obtained in the agri-food sector contributed to a very low extent to the investments from own resources, and in the year 2012 more than half of the agricultural holdings were non-profitable, thus having no investment possibilities. In such situations, the investments are funded from loans (credits), in the first place, from specialized financial institutions.

The balance of credits in the national economy increased from MDL 486.8 million in 1995 (Table 9) to MDL 41,273 million in 2014, i.e. 27.7 times. It has to be mentioned that the credit balance in the period 1995-

2000 increased 2.13 times; in the period 2000-2005 it increased 3.15 times, in 2005-2010 it increased 2.69 times, while in the period 2010-2014 it increased 1.53 times.

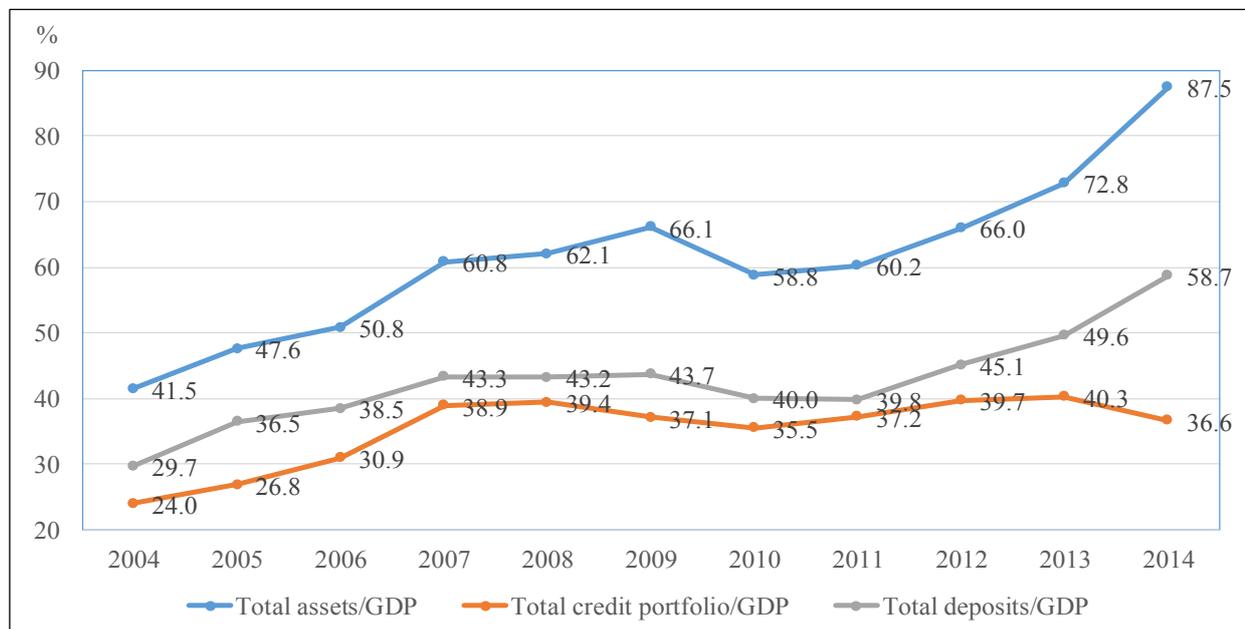
Table 9. Balance of domestic credits in the national economy (MDL million)

Item	1995	2000	2005	2010	2011	2012	2013	2014
Credit balance in the economy, total	1,486.8	3,170.9	9,990.5	26,915.5	30,962.9	35,948.3	42,632.7	41,273.0
- on short term	1,368.4	2,555.1	2,442.3	3,929.8	3,833.9	4,291.9	5,267.7	3,409.4
- on long term	118.4	615.8	7,548.2	22,985.7	27,129.0	31,656.4	37,375.0	37,863.6
Balance of cash deposits of natural persons, total, <i>out of which:</i>	-	936.4	6999.9	18,464.9	21,277.1	25,257.3	31,433.3	34,444.4
- in national currency	-	477.0	3,595.2	9,000.5	11,451.3	14,166.2	18,221.3	17,438.9
- in foreign currency	-	459.4	3,404.7	9,464.4	9,825.8	11,069.1	13,211.8	17,005.5

Source: authors' calculations based on the Statistical Yearbooks of the Republic of Moldova [3]

The balance of credits on short term exceeded the balance on the long term by 11.55 times in 1995 and by 4.15 times in 2000; in the year 2005, the balance of credits on long term began to prevail, 3.09 times as

high compared to the balance on short term. The respective situation was maintained until 2014, when the balance of credits on long term was 11.1 times as high compared to short time credits.[4]



Source: Yearly Report of the National Bank of Moldova, 2014 [4]

Fig. 1. Dynamics of assets, credits and deposits as share of GDP (%)

The share of credit portfolio in our country's GDP increased from 29.7% in 2004 (Fig. 1) to 58.7% in 2014. In the year 2004 the share of assets exceeded the share of credits by 11.8 %, while in 2014 by 28.8 %. The diminution of the credit portfolio exceeded the share of deposits in GDP by 5.7 % and by 22.1% respectively.

According to the World Bank's estimates in the year 1995 the share of domestic credits in our country's GDP was 23.72% (Table 10), second to the Russian Federation. Even though it increased up to 39% in 2014, this percentage was lower than in the neighbor countries and the Baltic countries.

Table 10. Domestic credit (% of GDP)

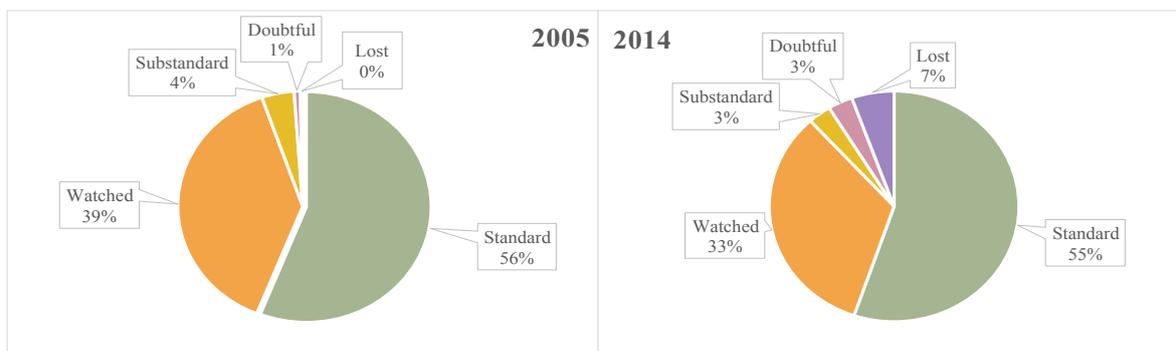
Country	1995	2000	2005	2010	2011	2012	2013	2014
Estonia	11.19	34.50	68.00	96.53	83.80	76.59	71.82	72.00
Latvia	11.74	18.47	67.46	128.88	79.63	62.94	59.02	52.92
Lithuania	-	-	42.81	63.83	57.02	52.00	50.92	45.63
Romania	23.56	13.88	20.71	53.84	54.12	54.27	51.97	48.24
Rep. of Moldova	23.72	25.21	31.52	36.34	39.05	43.46	45.83	39.00
Ukraine	15.51	23.82	33.24	93.89	87.27	87.86	95.02	96.55
Russian Federation	25.46	24.93	20.81	37.72	39.59	42.75	48.70	52.37

Source: authors' calculations on the basis of information from <http://data.worldbank.org/indicator>[6]

We mention that the information presented by the National Bank of Moldova is different from that presented by the World Bank, which can be explained by the fact that in the first case the information on is presented for the end of the year, while in the World Bank's case the yearly average is presented.

In the portfolio structure (Fig. 2), the standard

credits and financial leasing prevail, with 56% in 2005 and 55.2% in 2014, being followed by the supervised credits and financial leasing with 38.7% and 33.1% respectively. It has to be mentioned that the share of dubious credits and financial leasing increased from 0.8% in 2005 to 3.2% in 2014.



Source: Yearly Report of the National Bank of Moldova, 2014 [4]

Fig. 2. Structure of credit portfolio and of financial leasing in the Republic of Moldova – end of year (%)

The total credits and loans to agriculture increased from MDL 219.7 million in 2001 (Table 11) to MDL 1,808.5 million in 2013 or 8.23 times, while the credits to the processing industry increased from MDL 1,319.2 million in 2001 to MDL 3,744.0 million in 2013 or 2.83 times; the credits provided to the wholesale and retail trade increased from MDL 2,613.2 million to MDL 17,901.4 million, i.e. 6.85 times.

In the year 2001, the credits provided to agriculture accounted for 4.37%, to the processing industry 26.22%, to the wholesale and retail trade 51.94%; in the year 2005, these represented 4.93%, 27.78% and 48.33% respectively; in 2010, these shares amounted to 6.52%, 14.76% and 45.97%, while in the year 2013 these represented 5.57%, 11.54% and 55.16%.

Thus, even though the share of credits addressed to agriculture increased from 4.37%

in 2001 to 5.57% in 2013 it was still insufficient for increasing the efficiency of this extremely important segment of national economy.

On December 31, 2014, the credits provided to trade prevailed with 32.9% (Fig. 3). The credits to agriculture accounted for only 6.9% in total domestic credits and the credits to the processing industry accounted for 7.4% of total domestic credits.

Crediting in national economy is influenced by the bank spread. For the operations in national currency, the bank spread ranged from 2.87% in 2008 (Fig. 4) to 8.69% in 2010.

The bank spread for the operations in foreign currency ranged from 2.38% in 2008 to 7.72% in 2003. The banking margin for the operations in foreign currency prevailed only until 2005.

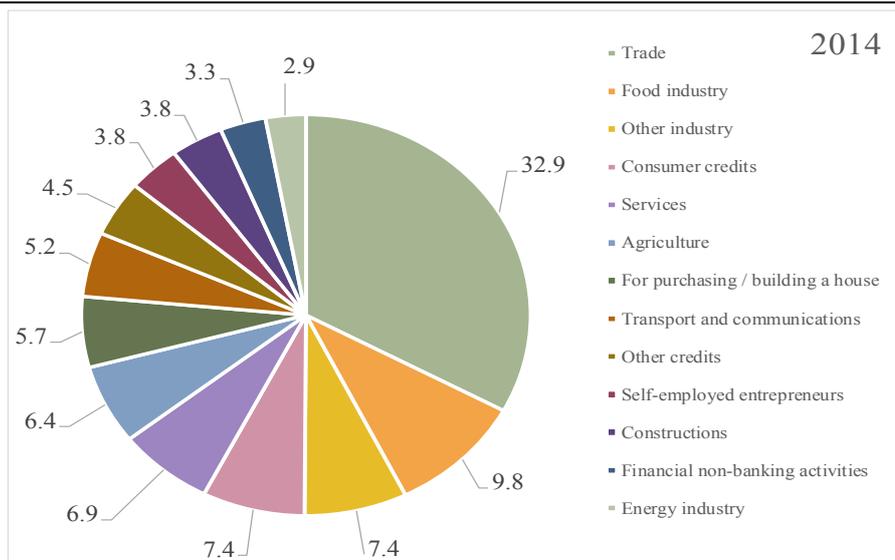


Fig. 3. Distribution of domestic credits by economic sectors on 31.12.2014  
 Source: Yearly Report of the National Bank of Moldova, 2014 [4]



Fig. 4. Bank spread dynamics (%)  
 Source: Yearly Report of the National Bank of Moldova, 2014 [4]

We can notice that the banking credit for investments does not cover our country's agri-food sector needs and foreign investors are needed.

Practically, the programs of all governments specify the need to attract foreign

investments. Even though the foreign investors' contribution increased from USD 25.9 million in 1995 (Table 11) to USD 353.1 million in 2014, i.e. 13.6 times, it remains much too modest and does not cover the existing demand.

Table 11. Foreign direct investments (USD million)

	1995	2000	2005	2010	2011	2012	2013	2014
Estonia	201	387	3,127	2,053	511	1,592	884	1597
Latvia	180	412	812	433	1,502	1,076	990	782
Lithuania	73	379	1,189	865	1,538	576	708	375
Romania	419	1037	6,866	3,204	2,557	2,629	4,108	-
R. Moldova	25.9	127.5	190.7	212.0	301.4	204.9	249.0	353.1
Ukraine	267	595	7,808	6,451	7,207	8,175	4,509	847
Russian Federation	20,650	27,142	15,08	43,168	55,084	50,588	69,219	20,958

Source: authors' calculations on the basis of information from <http://data.worldbank.org/indicator> [6]

It is worth mentioning that in the year 2014 the foreign direct investments in our country increased 13.6 times as compared to 1995, in Estonia 7.9 times, in Latvia 4.3 times, in Lithuania 5.1 times, in Romania 9.8 times and in Ukraine 3.2 times. Even though the foreign direct investments in Moldova increased at a faster rate, in the year 2014 these were 4.52 times lower than in Estonia, 2.2 times lower than in Latvia, 2.4 times lower than in Ukraine and 11.6 times lower than in Romania.

## CONCLUSIONS

The investments in the agri-food sector in the Republic of Moldova are far too insufficient. Our country's agri-food sector, practically, does not have its own investment resources. At the same time, all domestic credits and various loans granted to the sector come with an interest rate far too high. Therefore, we consider that some urgent measures are needed in order to improve the present situation:

- encouraging investments from own resources through instruments such as fiscal facilities;
- changing the structure of the agricultural production by adjusting it to the demand of the European market, while taking into account the profitability of the products;
- revise the national legislation in such a way to provide attractive conditions for foreign investors;
- encourage cross border cooperation to develop regionalized products.

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## CONSUMER PREFERENCES REGARDING SOURCES OF INFORMATION AND USE OF TECHNOLOGY FOR WINE SELECTION – A SURVEY OF MILLENNIALS AND GENERATION X SAMPLE IN ROMANIA

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### Abstract

*The study explores the types and sources of information considered by consumers and investigates the difficulties they encounter in wine selection, as well as the opportunity of using technology as a helping tool. The data obtained from consumers were analysed based on their frequency of consumption and the results showed differences between Core, Marginal and Occasional wine drinkers for the average price paid for a bottle of wine depending on occasion, for the source of information considered and variety seeking behaviour. It was found that for all categories of consumers the recommendations of their peers and the use of technology plays a significant role in their decision making habits.*

**Key words:** generational marketing, marketing, millennials, purchasing behaviour, wine app

### INTRODUCTION

There are Millennials who avoid wine because they consider it too pretentious or because they don't understand it (Thach and Olsen, 2006) [16] and there are consumers of all ages who find wine confusing and have difficulties in selecting wine (Drummond and Rule, 2005; Constellation Wines US, 2014) [6, 19].

Further exploration is needed in regard to the type of information useful for consumers and the sources of information considered, along with investigation of the opportunity of using technology as a helping tool in wine selection, in order to reduce consumer confusion.

Researchers previously investigated the issue of technology in wine marketing (Thach, 2009; Bouquet 2012) [3,17] and found that, although adoption of web 2.0 is slower than in other domains, in the last years more and more wineries adopted Facebook as a communication channel with their potential customers. The use of technology has a positive impact on consumer perception of the brand and on user engagement (Bellman et al,

2011; Nowak and Newton, 2008) [2, 13].

One study investigated the use of wine applications for mobile and found that these are more likely to be used by wine enthusiasts (consumers with interest in wine) (Higging et al, 2014) [8]. The authors further evidentiate that the adoption of wine apps by the common consumer is determined by their perception of them as useful, easy to use and capable to satisfy an unmet need (Higging et. al., 2014) [8]., and more should be done in these areas, their argument being based on the Technology Acceptance Model (Davis, 1989; Chuttur, 2009) [4, 7].

Various studies consider generational segmentation and analyse the consumer behaviour in regard to wine in specific countries, showing similarities across distinct age ranges (De Magistris *et al.*, 2011, Qenani-Petrela *et al.*, 2007; Wolf *et al.*, 2005; Olsen et. al, 2007) [5, 14, 15, 18]. Other studies focus on behavioural segmentation, the most widely used being the one based on the frequency of

consumption, which considers 3 categories of consumers of alcoholic beverages: Core wine

drinkers (consume wine once or a few times per week), Marginal wine drinkers (consume once or twice per month), and Non-adopters, alcoholic beverages consumer who do not drink wine (Wine Market Council, 2009) [20]. The present study considers both, analysing the difference between two generations – Millennials and Generation X – and seeks further insight into different categories of consumers based on their frequency of consumption.

## MATERIALS AND METHODS

The sample population is comprised of 91 alcoholic beverage consumers from Romania in the age range 18-50 years, Internet literate, presumed to be in majority from urban areas.

The survey was available online and distributed via Facebook, the snowball sampling method being employed (Baltar and Brunet, 2012) [1] and the data being then analysed in Excel.

The study is based on a survey of 23 questions out of which 11 are related to types and sources of information about wine, technology use and other aspects of the consuming behaviour in general.

For some of the questions a Likert scale was used; respondents could indicate their level of agreement or disagreement on a symmetric agree-disagree scale for a set of predefined affirmations, rated from low to high (Krosnick and Fabrigar, 1997) [11]. Verbal anchors were used, with a middle neutral don't know option (Lietz, 2008) [12].

The study examines the behaviour of younger generations of consumers, Millennials and Generation X, considering wine consumption segmentation.

The consumers were categorised in 3 groups by the frequency of their wine consumption: Core drinkers – consuming once or a few times per week, Marginal drinkers – those who consume once or twice per month and Occasional drinkers – who consume wine rarely, a few times per year (once a few months).

The segmentation was adapted from Wine Council with small modifications. Wine Council proposes the following categories in

accordance to consuming frequency: Core drinkers, Marginal drinkers and Non-Adapters (Wine Council, 2003).

These categories of consumers (Fig. 1) were compared in regards to different aspects of their behaviour: choosing wine, sourcing of information about wine, difficulties encountered, while also considering the impact of technology in their lives.

The goal of the analysis was to highlight the differences and patterns of young consumers with different wine consumption frequency, in order to create a more accurate profile of consumer, useful in wine marketing.

## RESULTS AND DISCUSSIONS

The sample is composed of 41% Core wine drinkers, 27% Marginal wine drinkers and 32% Occasional wine drinkers, as shown in Fig. 1, segments which will be further investigated throughout the paper.

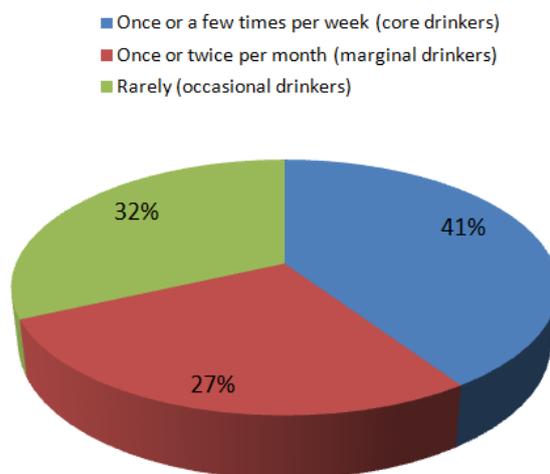


Fig. 1. Percentage of consumers by frequency of wine consumption

The demographic characteristics based on wine consumption segmentation are presented in Table 1, with Millennials (cohort aged 18-35 years) being split into 2 subgroups, 18-24 and 25-35 years old.

The most well represented age group among respondents is that of 25-35 years (59%), which includes 63% of the core drinkers, 59% of the marginal drinkers and 53% of the occasional drinkers. Most of the respondents were single (51%) and the majority have a

Bachelor's degree (59%).

Table 1. Demographic characteristics of the sample, based on wine consumption segmentation

	Core drinkers	Marginal drinkers	Occasional drinkers	Total
<b>Age groups:</b>				
18 - 24	8%	12%	21%	13%
25 - 35	68%	72%	59%	66%
36 - 50	24%	16%	21%	21%
<b>Gender:</b>				
Female	54%	44%	72%	57%
Male	46%	56%	28%	43%
<b>Social status:</b>				
Single	43%	68%	41%	49%
Married with children	32%	16%	38%	30%
Married without children	22%	12%	17%	18%
Divorced	0%	4%	3%	2%
Widow	3%	0%	0%	1%
<b>Education:</b>				
High School	19%	8%	14%	14%
Bachelor degree	57%	64%	59%	59%
Postgraduate degree	24%	28%	28%	26%
<b>Personal income (per month):</b>				
< 1200 RON (below 266 Euro)	11%	0%	14%	9%
1200-1999 RON (266-444 Euro)	16%	20%	24%	20%
2000-4500 RON (445-999Euro)	38%	44%	21%	34%
4501-8000 RON (1000-1776 Euro)	22%	28%	31%	26%
> 8000 RON (over 1776 Euro)	14%	8%	10%	11%

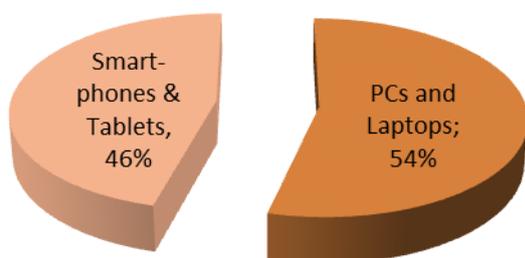


Fig. 2. Distribution of the devices used for completing the survey

Figure 2 illustrates the devices used for completing the survey, emphasizing that a large segments of consumers are using mobile devices on a regular basis (46%).

When asked about the main factor that influences their decision of buying a particular drink (alcoholic beverage in general), the majority of respondents (63%) have chosen *quality*, followed by *friends' recommendation* (18%) and *brand* (15%).

In Figure 3 are illustrated the most important factors in alcoholic beverage selection by consumers frequency in the wine usage category.

There are some differences between the types of wine drinkers by frequency. First, core wine drinkers show a stronger interest for friends' recommendation than their counterparts – namely 24%, compared with 12% of the marginal drinkers and 14% of occasional drinkers.

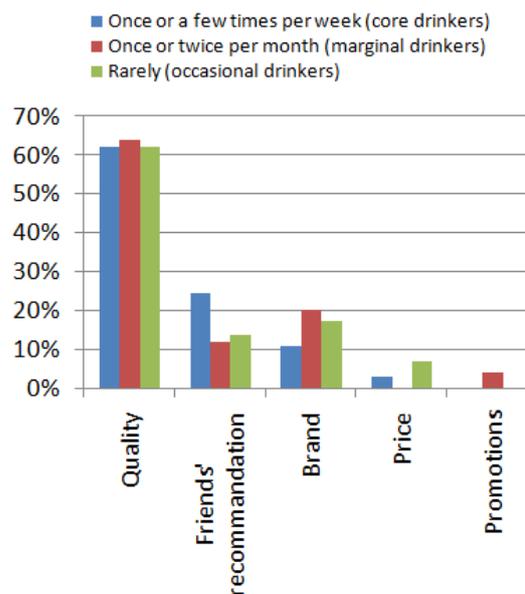


Fig 3. The most important factor that influences buying an alcoholic beverage (percentage from the total category) – by wine usage rate segmentation

Second, core wine drinkers show a lower interest for brand in comparison with the other categories of consumers – 11% compared with 20% for marginal drinkers and 21% for occasional drinkers.

Considering that the respondents were asked about the most important factor that influences their buying decision of alcoholic beverages, and they were able to select only one, the recurrence of friends' recommendation in 26% of the Core wine drinkers could be considered rather high.

When analysed per generation some differences can be seen between Millennials and Generation X, as shown in Fig 4. People in the 18-35 age range display a higher interest in quality than their counterparts, and those in the 35-50 age range are considerably more interested in brand than the youngest.

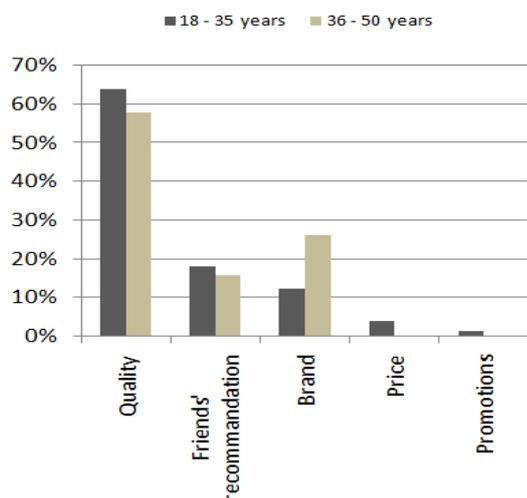


Fig 4. The most important factor that influences buying an alcoholic beverage (percentage from the total category) – by age groups (generations)

Respondents were asked to state the price they will normally pay for a bottle of wine in 3 different contexts: for an ordinary meal at home or at a barbeque, wine at restaurant with no special occasion and wine for a special occasion or for a gift. The price averages in Euro, for each category of consumers, are presented in Fig. 5.

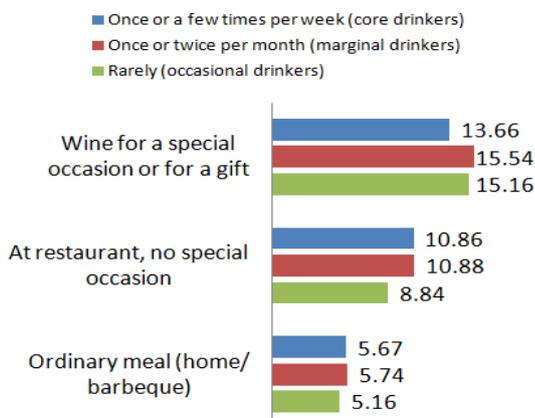


Fig. 5. The average price for different occasions, for consumer categories by frequency (Euro)

The prices were converted from RON, using the NBR (National Bank of Romania) average exchange rate for December 2015.

Core drinkers and Marginal drinkers pay in average more than Occasional drinkers for wine at restaurant with no special occasion, but Core drinkers pay less than their counterparts for wine for a special occasion or for a gift, which could suggest their higher interest in wine as part of their everyday life and less to make an impression on others.

Regarding the information the respondents consider useful when choosing wine, each type of information was to be rated from 1 – Never to 7 – Always (4 – Sometimes) and the averages are shown in Fig. 6.

Results show that the wine type by sugar content is considered to be the most useful by all the consumers, closely followed by wine quality classification and brand/ producer.

Core drinkers show a stronger interest than the other consumers for brand or producer, for place of origin and for year.

Both Core and Marginal drinkers consider wine quality classification and the information regarding grape variety useful in a greater extent than their counterparts. Those who consume wine rarely, the Occasional drinkers, have rated the majority of the information considerably less useful than did their counterparts, with the exception of wine and food pairing recommendation.

Legend: 1 – Never; 2 – Almost never; 3 – Rarely; 4 – Sometimes; 5 – Often; 6 – Very often; 7 – Always

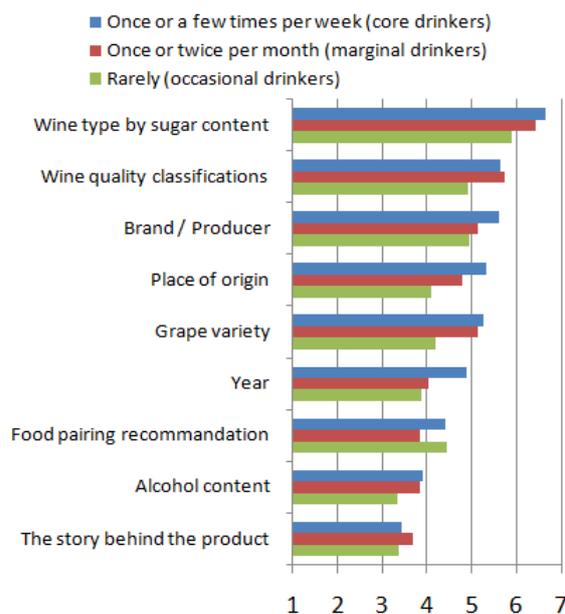


Fig. 6. The most useful information when choosing wine (Average; 1– Never to 7 – Always)

To evaluate the efficiency of the information about wine (Fig. 7) and the consumers' methods of choosing wine at the place of sale (Fig. 8), respondents were given a set of affirmations which they could agree or disagree with (5 points Likert scale, with a neutral middle option).

Results show that Core drinkers are the only consumers considering the information about wine very useful and easy to understand, by moderately agreeing with the respective statements (Fig. 7) and they tend to pay attention to the information available on the wine label in a greater extent than the other consumers (Fig. 8).

Occasional drinkers on the other hand are rather inclined to consider that there is too much information, which overwhelms them, which is why they would rather not read it (Fig. 7) and this affects their variety seeking behaviour, as they most often choose a wine they know (Fig. 8).

Furthermore, the respondents were asked about the different types of difficulties met when choosing wine, by rating them by their occurrence, from 1 – Never to 5 – Always (3 – Sometimes).

Figure 9 illustrates the averages for each of these types of difficulties, as assessed by the 3 categories of consumers (based on wine usage).

The most difficulties encountered by all consumers are related to choice overload, due to the large assortment on offer and the low product differentiation perceived, and their insufficient experience with wine, both averages being close to "Sometimes" – 3.

On the other hand, the Occasional drinkers encounter the most difficulties in choosing wine, due to their lack of experience and difficulty in understanding some specific terms relating to quality classification and grape varieties.

When considering the sources of information regarding wine, most of the consumers rely heavily on recommendations of friends and peers (Fig. 10), which is in agreement with previous findings (Higgins et. al, 2015) [9].

Legend: -2 – No, not at all; -1 – No, not quite; 0 – Don't know; +1 – Yes, kind of; +2 – Yes, always

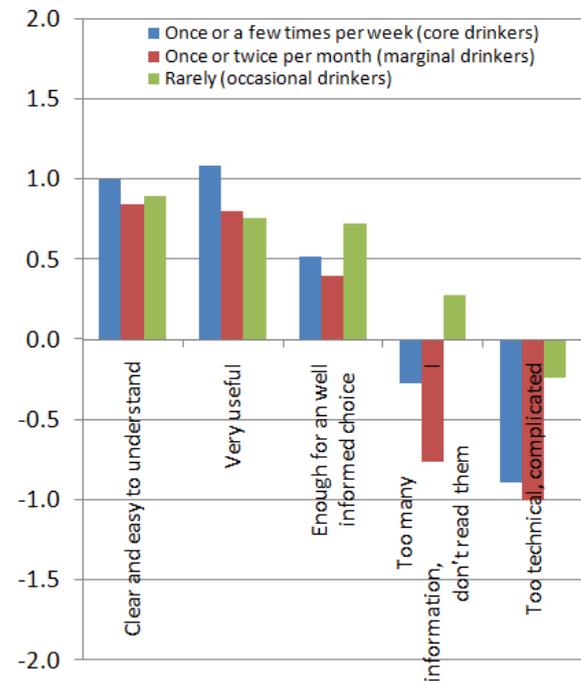


Fig. 7. Consumers' personal evaluation of information about wine (Average; ranging from -2 strongly disagree to +2 strongly agree)

Legend: -2 – No, not at all; -1 – No, not quite; 0 – Don't know; +1 – Yes, kind of; +2 – Yes, always

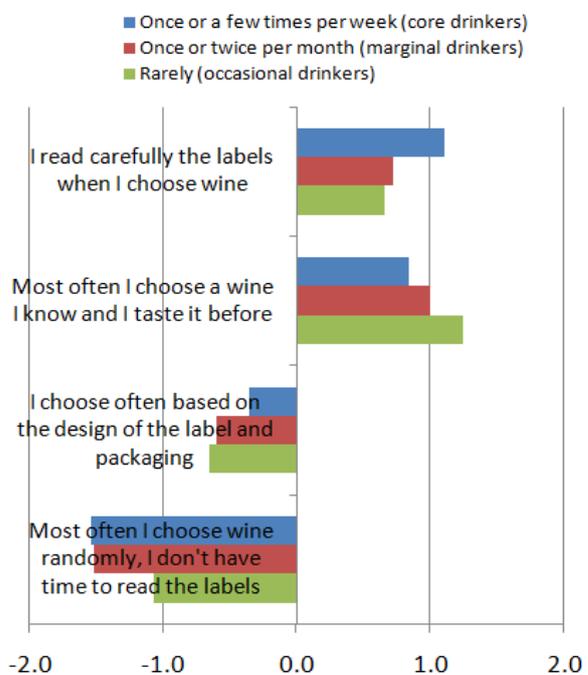


Fig. 8. Consumers' evaluation of their methods of choosing wine (Average; ranging from -2 strongly disagree to +2 strongly agree)

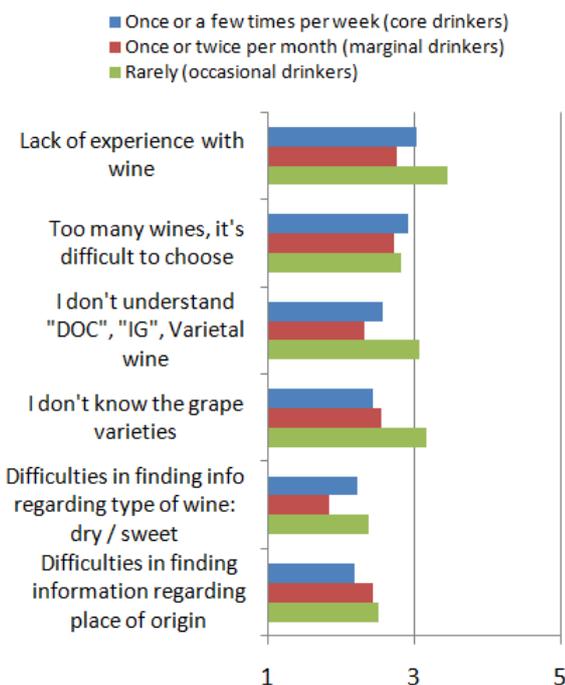


Fig. 9. The frequency of difficulties encountered when choosing wine, for consumer categories based on wine consumption segmentation (Average; ranging from 1 – Never to 5 – Always; 3 – Sometimes)

Marginal drinkers show the strongest interest in friends and peers recommendations (96%), followed by Core drinkers (59%) and Occasional drinkers (55%).

Core drinkers rely more strongly than the others on Medals on the labels and both Core and Marginal drinkers consider wine blogs as sources of information.

Specialized personnel in shops and restaurants are considered as a reliable source of information to a greater extent by Occasional drinkers than the other two categories of more frequent users.

Technology plays an important role in the consumers' lives, 70% of the respondents stating that they use their mobile while shopping, 25% of them searching online for information regarding products and 28% of them calling someone to help them decide which product to choose.

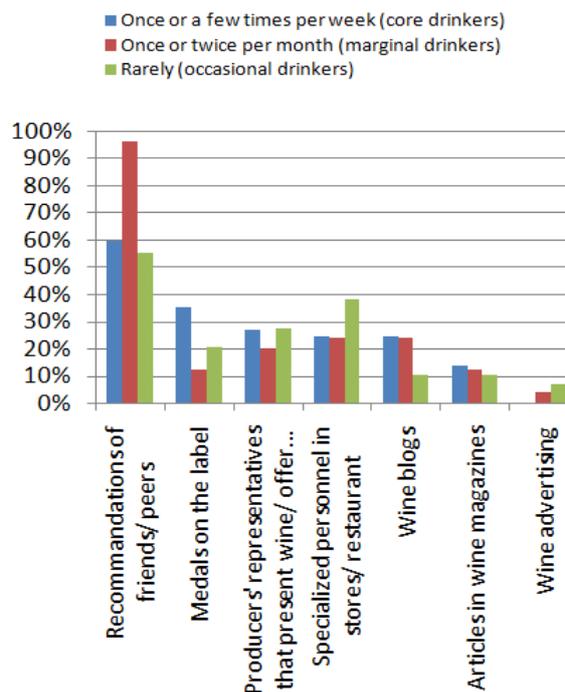


Fig. 10. Preferred sources of information for the consumer categories based on wine consumption segmentation (Percentage from total category; multiple answer questions)

Figures 11a and 11b show the usage of mobile while shopping for each generations, the results indicating that a larger segment of Millennials are using the mobile while shopping (79%), in comparison with Generation X (only 37%).

Respondents were asked about the usefulness of a wine app in helping them choosing wine, with answers ranging from *Yes, very useful* (+2), *Yes, kind of useful* (+1), *I don't know* (0), to *No, not quite* (-1) and *No, not at all* (-2). The results show an average of 0.82 for age group 18-35, corresponding to "*Yes, kind of useful*" (approximately) and an average of -0.11 for age group 36-50, corresponding of *not knowing*.

When analysed by different category of wine consumers by frequency moderate differences between the groups can be noticed (Fig. 12).

Core drinkers show the most interest for a wine app, with an average of 0.7, followed by Marginal drinkers with an average of 0.6 and Occasional drinkers with an average of 0.55, situated in between of *kind of useful* and *not knowing*.

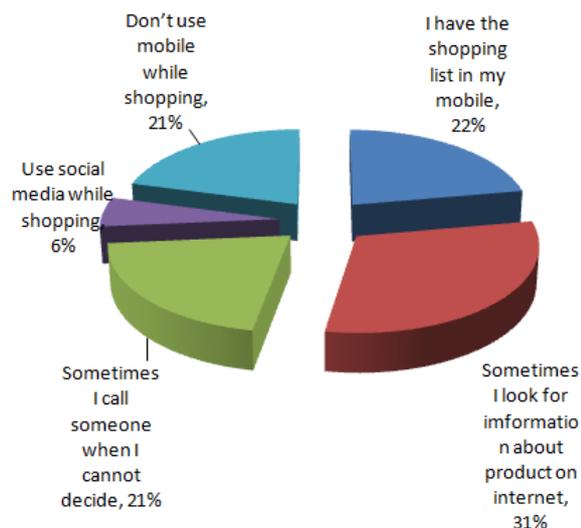


Fig. 11a. Millennials' usage of mobile while shopping (Percentage from total category)

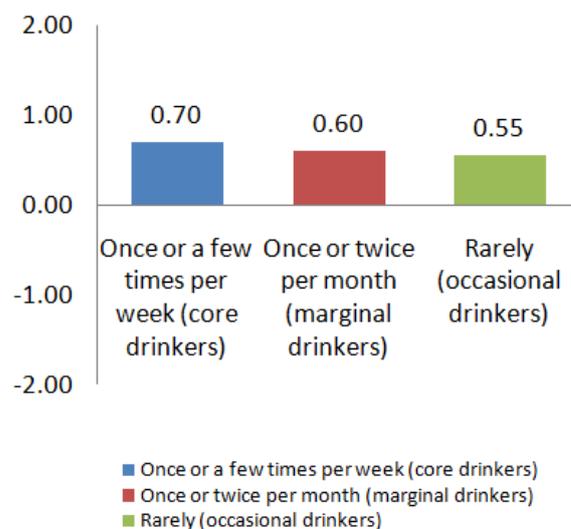


Fig. 12. Consumers evaluation of app utility in wine choosing (Average; min -2, max +2)

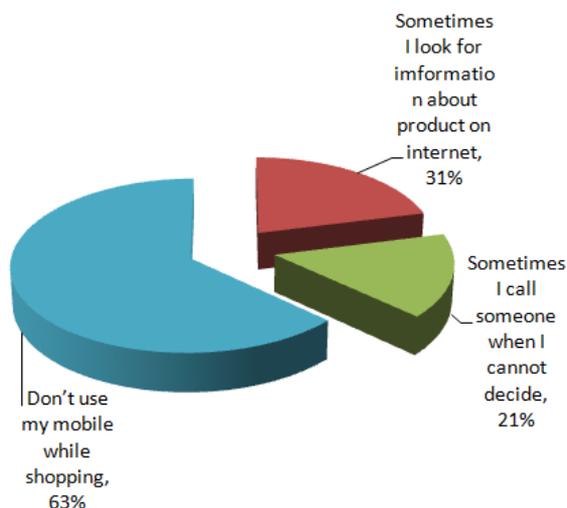


Fig. 11b. Generation X's usage of mobile while shopping (Percentage from total category)

As previous studies showed (Higgins *et al*, 2014) [8], 20% of consumers regularly use wine applications for mobile, and app use is consistent with the frequency of consumption. Furthermore, the investigation aimed to find the areas where wine mobile applications could be useful for consumers, helping them with their choice (Fig. 13 and Fig. 14). The findings showed a greater interest for an app that could recommend wines considering the profile of the user, based on the preferences of other users with similar tastes, and secondly, for apps with wine and food pairing suggestions.

Consumers also rated high apps with features relating to sorting and narrowing the available wine offer based on their preferences, which is in agreement with their difficulties regarding the existence of too many choices in wine category.

Millennials show a much higher interest than Generation X in almost all app features and manifest a greater interest for a multiple function mobile application, probably as an effect of their higher usage of technology (mobiles) in their lives as shoppers.

They are also much more interested than Generation X in an app that could help them remember and rate wines they liked (wine journal) and learn about their friends' preferences about wines (Fig. 14).

Results show important differences between the 3 categories of consumers by wine usage (Fig. 13).

Core drinkers displayed the highest interest in apps features relating to remembering the preferred wines through a wine journal with ratings and finding about the story of the products in an interactive manner.

Marginal drinkers show a greater interest than their counterparts for wine mobile application with recommendations based on users profiles and for app features relating to sorting and narrowing the available wine offer based on their criteria.

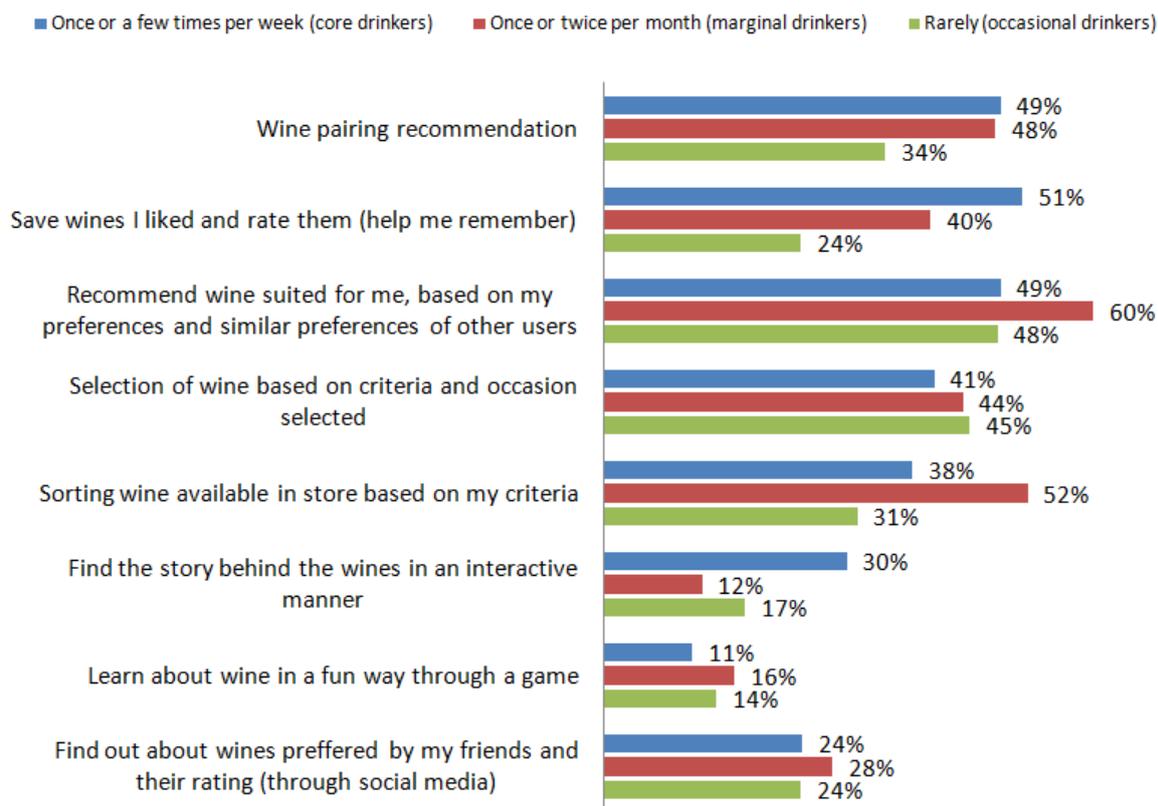


Fig. 13. Desired features for an app useful in wine category – consumer categories by consumption frequency

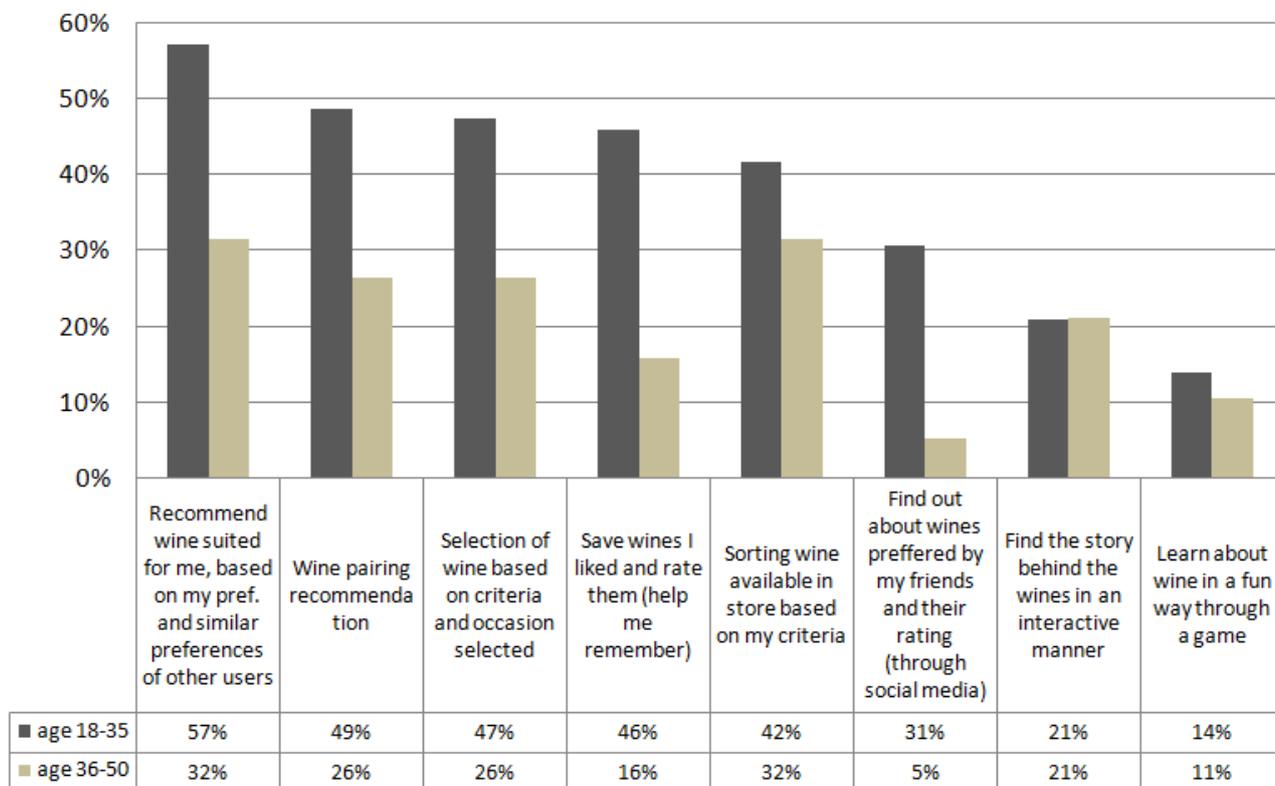


Fig. 14. Desired features for an app in wine category – by generation  
 Millennials – aged 18-35; Generation X- aged 36-5

Both Core and Marginal drinkers show great interest in an app that would display food pairing recommendations.

## CONCLUSIONS

The present research attempted to provide further insight into different categories of Millennials and Generation X consumers, based on their frequency of consumption, allowing a much more focused targeted approach for marketers.

It was found that Core, Marginal and Occasional wine drinkers show differences in the price they are willing to pay depending on occasion, as well as in the source of information and variety seeking behaviour in relation with wine. For all categories of consumers, the preferences of their peers and the use of technology play a significant role in their life.

All consumers tend to favor and rely on friends and peers as preferred sources of information regarding wine, and this is consistent throughout the research, in other aspects of their shopping behaviour, as respondents choose alcoholic beverages in general based on friends recommendation and, when in doubt about which product to choose (any product, in general), they call someone they know to help them with their choice.

Marginal drinkers rely more strongly on their friends and peers recommendation regarding wine choices than the other consumers and Core drinkers show a greater interest for the medals on the label, compared to the other categories.

Occasional drinkers consider specialized personnel in stores and restaurants reliable sources of information, to a greater extent than the more frequent drinkers.

On the other hand, Occasional drinkers pay less attention on the information on the label and they show a lower variety-seeking behaviour, preferring wines they have previously tried.

Core drinkers and Marginal drinkers pay more than the other category of consumers for wine at restaurant in everyday situations (no special occasions) and Core drinkers pay less than their counterparts for wine for a special

occasion or gift.

More than half of the respondents are using their mobile while shopping, Millennials to a greater extent than member of Generation X. Consumers use their mobiles mostly to find information about products online or to seek advice from their friends when they cannot decide what to buy.

Marginal drinkers show the most interest for wine apps, being interested in features relating to recommendations based on user's profiles, food pairing and selection of wines based on occasion and users' criteria.

Core drinkers would prefer wine apps that show wine and food pairing, those which would help them remember wines via a wine journal and allows ratings, and those which would tailor wine recommendation using users wine profiles.

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## UNDERSTANDING CONSUMER PREFERENCES FOR WINE: A COMPARISON BETWEEN MILLENNIALS AND GENERATION X

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### Abstract

*The present research explores particularities of consumer behaviour of Millennials and Generation X, aiming to a better understanding in order to increase the engagement of younger generations with wine. The study is based on a survey of 91 respondents aged 18 to 50 years, concerning their preferences, motivations and occasion of consumption in regards to wine and other alcoholic beverages. Results show that for Millennials alcoholic beverage consumption occurs most often outside their home, some contexts being identified where wine was not available but they would have liked it to be. They associate drinking with socialising, the strongest motivation of consumption being the enjoyment of the drink with friends and family, but they also consume wine mainly on special occasions, considering it a sophisticated drink or preferring a lower alcohol beverage for more frequent use.*

**Key words:** consumer behaviour, Millennials, generational marketing, wine marketing

### INTRODUCTION

In the US, the young generation is considered to be the driving force behind the increase in wine consumption (Kennedy and Mancini, 2008; Jones, 2013) [5, 6], while in traditional wine markets such as France, Italy, Spain, Portugal, the same age group shows a low interest in wine, opting for other types of alcoholic beverages and having limited (occasional) contact (encounter) with wine (Holter, 2009; Conibear, 2010; Lorey and Poutet, 2011) [2, 3, 7].

As studies reveal, some of the young consumers are not enticed by wine because they perceive it as obsolete, snobby and they don't find themselves in the associated symbolism and in the conventional wine image promoted (Thach and Olsen, 2006; Holter, 2009; Lorey and Poutet, 2011) [3, 7, 15], while others are deferred by the complexity of wine information (Thach and Olsen, 2006; Constellation Wines US, 2014) [15, 17].

In a highly competitive environment, one could benefit from a better focus on the potential of market segments left out of reach

and a better understanding of young consumers could have positive implication in wine industry.

Millennials (also known as *Generation Y* or *Echo Boomers*) are young adults aged 18-35 years<sup>1</sup>, while the so-called Generation X is represented by those in the age range of 36-50. Both are considered to have common characteristics as a generation (as an expression of shared experience of key historic events) in regard to beliefs, motivations and lifestyle, which impact their consumer behaviour. They represent two of the cohorts defined by Strauss and Howe (1991; Howe and Strauss, 2009) [4,13], whose theory about generations set the basis for generational marketing.

From the wine marketing perspective, Millennials are an important segment, due to their dimension and potential, as they are already consumers of alcoholic beverages, due to their power of influence in their families and in their groups (Neuborne, 1999) [10].

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<sup>1</sup> In generational marketing the defined year interval varies, depending on the source: starting with 1982 according to Strauss and Howe (1997), 1977-1994 according to Parment (2013), starting with 1981 according to Pew Research Center (2014)

Engaging the young consumers with wine could also have a positive impact on wine consumption over time, as studies suggests that consumption patterns formed now will last throughout their lifetime and creating a positive connection (relation) with them now will benefit the wine industry on the long term.

In Romania there are 4.84 millions of Millennials (National Institute of Statistics, 2014), representing approximately 24% of the total population. The present study explores their consumer behaviour in comparison with the previous generation, Generation X, which in Romania consists of 4.36 millions (National Institute of Statistics, 2014) [9].

This study contribute to a better understanding of the particularities of young consumers' needs and preferences, which could help marketing professionals and managers to improve their marketing strategies in order to deliver better adapted products, capable of attracting a higher segment of young consumers on the wine side.

## MATERIALS AND METHODS

The study is based on a survey methodology, using a questionnaire designed by the authors, aiming to find the differences between generations regarding their preferences for wine and alcoholic beverages in general.

The initially proposed questionnaire was pre-tested with respondents in different age groups and simplified by rephrasing or by changing the form of some of the answers.

The survey included both single answer and multiple answer questions, some being half-open, meaning that the respondents were allowed to include their own answer, if the already provided answers for selection did not describe their particular opinion/situation. For the questions which included an open answer, each answer was then reviewed and categorized using thematic coding.

The sample population consisted of people from Romania in the age range 18-50 years, all Internet literate, being safe to assume that they are mostly from urban areas. The survey was made available online and for its

spreading the snowball sampling method was used, via Facebook (Baltar and Brunet, 2012) [1].

A total of 91 responses were collected and the data was analysed in Excel, frequencies and averages being calculated and compared for the two age groups of interest: Millennials, aged 18-35, and Generation X, aged 36-50.

For the present marketing analysis the sample was divided into two age groups, according to segmentation based on generation cohorts (Strauss and Howe, 1991; Williams and Page, 2010) [13, 16]. The responses were analysed, interpreted and compared with findings from other countries.

## RESULTS AND DISCUSSIONS

The socio-demographic description of the sample is shown in Table 1. The most common respondent to our questionnaire was female (57% of the participants), aged 25-35 (66%), and single (49%), with a Bachelor's degree (59%).

Table 1. Demographic Characteristics of the Sample (n=91)

Gender	Female	57%
	Male	43%
Age category	18-24	13%
	25-35	66%
	36-50	21%
Social status	Single	49%
	Married with children	30%
	Married without children	18%
	Divorced	2%
	Widow	1%
Highest level of education completed	High School	14%
	Bachelor degree	59%
	Postgraduate degree	26%

Fig. 1 illustrates the frequency of wine consumption for the present sample, divided in 3 categories of consumers, adapted from Wine Market Council (2009), as follows: Core drinkers (once or a few times per week), Marginal drinkers (once or twice per month) and Occasional drinkers (rarely, once or a few times a year).

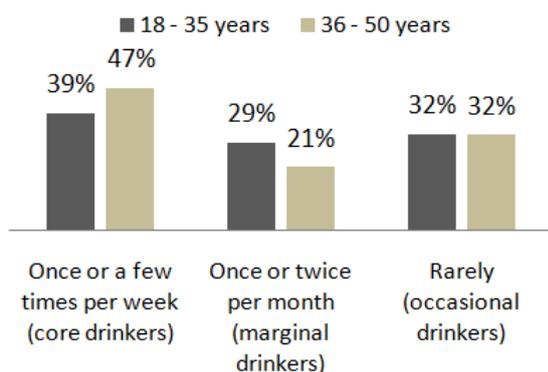


Fig. 1. Percentage of type of wine drinkers in the sample, Millennials (age 18-35) and Generation X (age 36-50)

As seen in Fig. 1, 39% of the Millennials (18-35 years old) in the sample are core drinkers, 29% are marginal drinkers and 32% rarely consume wine.

The participants were asked about their preference for the type of wine, taking into consideration the colour and the sugar content, in 2 different situations, when wine is consumed without food or with food, results being shown in Fig. 2 and Fig. 3, respectively. Results reveal that all respondents enjoy sweet and medium sweet wines to a great extent, 20% of Millennials and 22% of Generation X, followed by dry reds, preferred by 17% of each generation.

Millennials show a higher preference for cocktails with wine (11%) and sparkling wine (9%), more often than their older counterparts.

On the other hand, rose wines and medium dry red wines show higher prevalence in Generation X preferences (each preferred by 22% of the respondents). Cocktails with wine, which included wine spritzer, are preferred by 9% of the Millennials and by only 6% of the previous generation.

When consumed with food, a larger percentage of the consumers in the age range of 36-50 years prefer dry reds (32%, compared with 10% of Millennials) and medium dry whites (32%, compared with 19% of Millennials).

For Millennials, the top preferences are sweet and medium sweet wines (27%) and medium dry whites and reds (19%, respectively 17%). For a more complex understanding of the

consumer and to identify the potential areas of market penetration by attracting non-users (areas where wine is not as present, but other alcoholic beverages are widely consumed) the beginning of the survey focused on consumer behaviour in regards to alcoholic beverages in general.

Fig. 2 shows the preferred occasions of consumption for alcoholic beverages, for both generations analysed. The results shows that the most preferred context of consumption for Millennials is in clubs and bars (65%), in contrast with Generation X members who prefer to consume alcoholic beverages at home with the partner or family (68%).

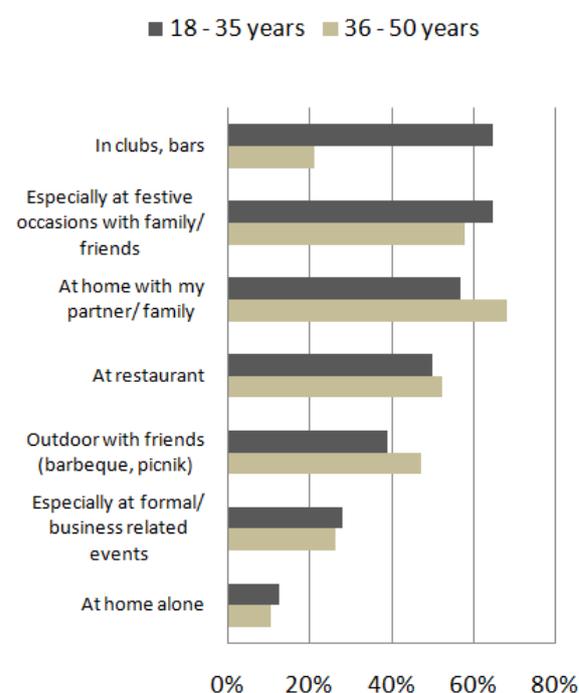


Fig. 2. Preferred consumption occasions for alcoholic beverages (% of age group; multiple answer question)

These aspects could be explained by the lifestyle differences related to age (life stage), but a better understanding of the young consumer could lead to a better targeted product and message, generating a better engagement of the Millennials.

Furthermore, different occasions of consumption for wine were investigated, as participants could give points, from 1 – never to 5 – very often (3 – sometimes), in accordance to their frequency of drinking wine in that context.

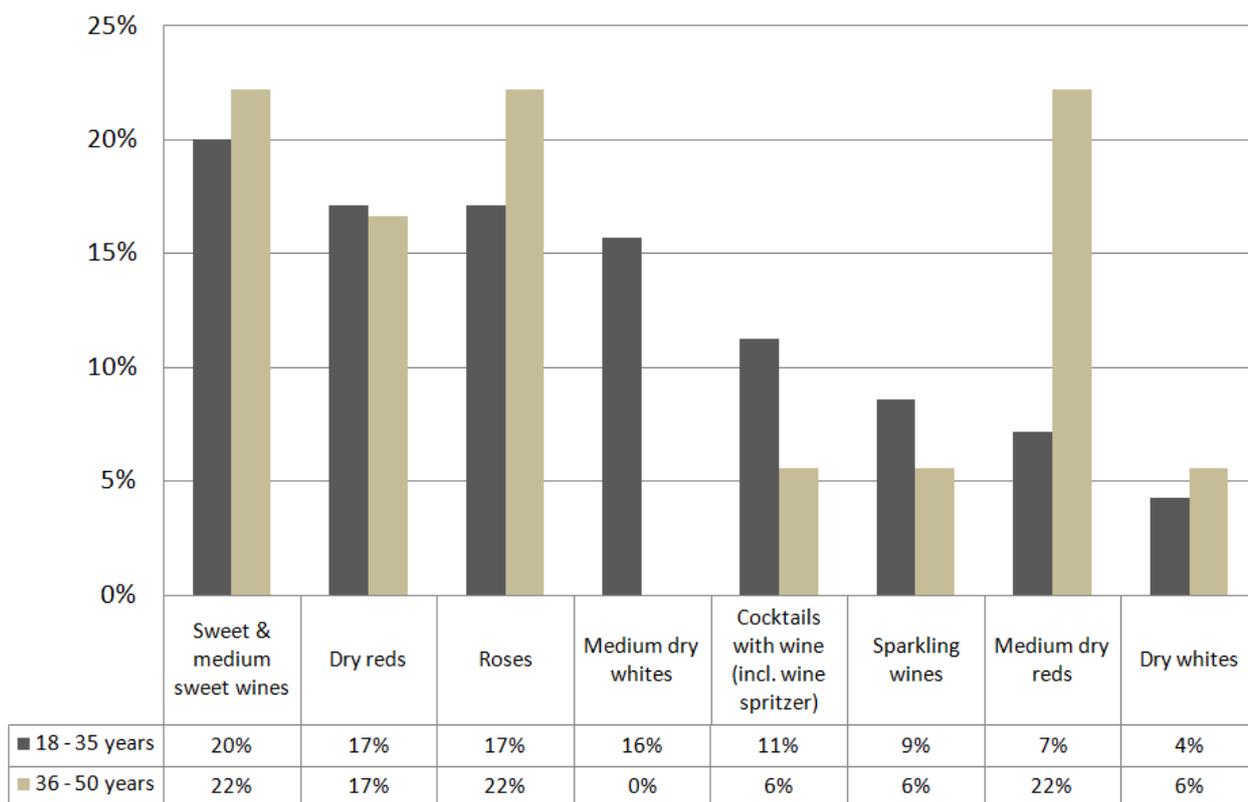


Fig. 3. Preferred types of wine, when not consumed with food, comparative Millennials (age 18-35) and Generation X (age 36-50)

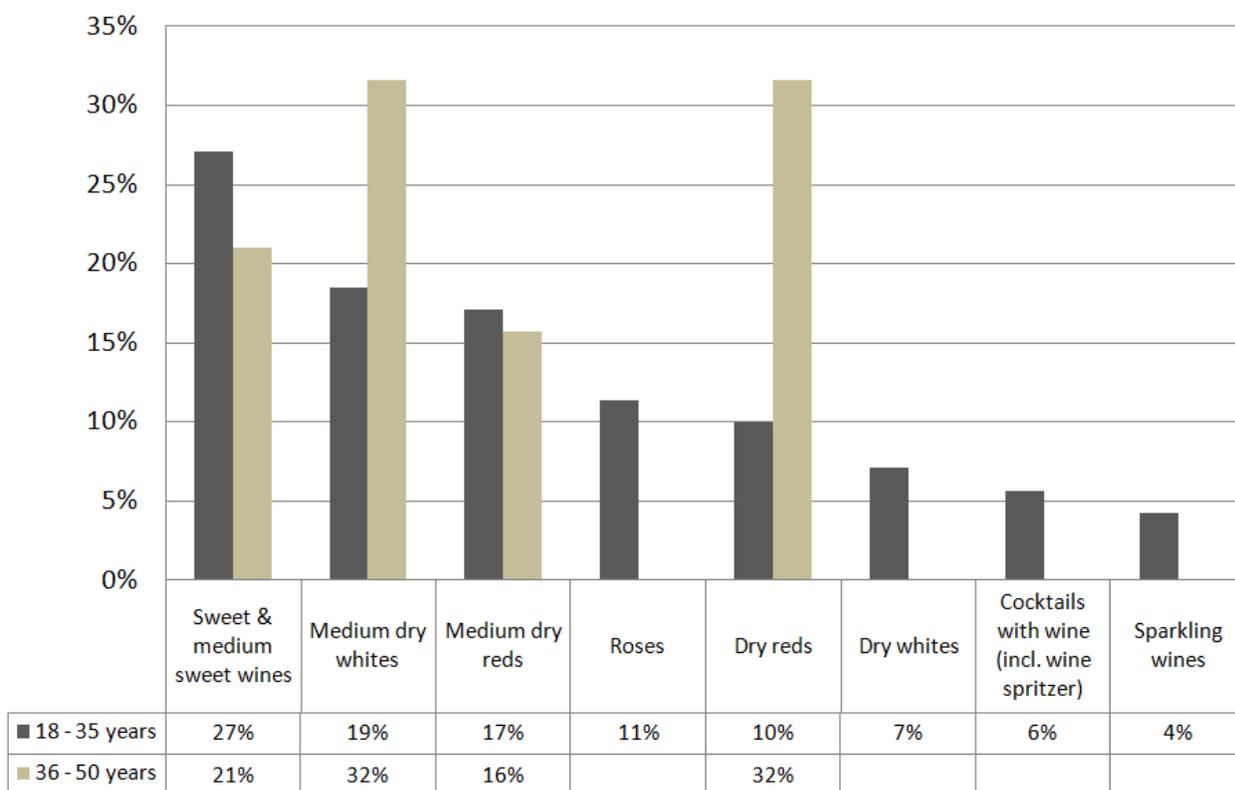


Fig. 4. Preferred types of wine with food/ meal, comparative Millennials (age 18-35) and Generation X (age 36-50)

The frequencies of consumption in the respective contexts are shown as averages, based on the number of points received, and can be seen in Fig. 5 for drinking without food occasions and in Fig. 6 for drink with meal occasions.

The results show that the highest ranking occasions for wine consumption (non-meal) for both age categories is *Special occasion*, with an average of 3.58 for Millennials and 3.32 for Generation X.

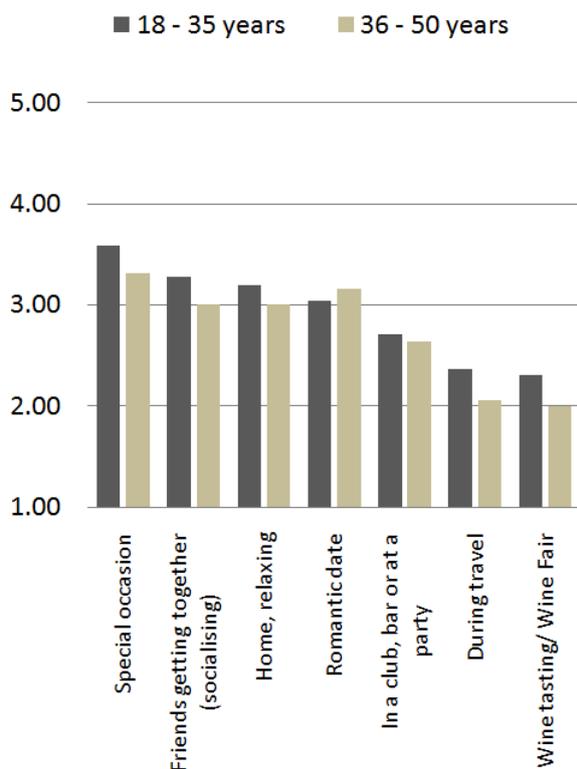


Fig. 5. Non-meal occasions of wine consumption (Average; 1 – Never to 5 – Very often) for Millennials (age 18-35) and Generation X (age 36-50)

This is followed with a high ranking for the younger generation for *Friends get together* with an average of 3.28, Generation X's second ranked frequency of consumption being *Romantic date* with an average of 3.16. When consumed with food (Fig. 6), the most frequent occasion of wine consumption was *special occasion dinner at home* (Millennials – 3.57; Generation X – 3.37), followed by *dinner at friends* for Millennials (3.17) and by *restaurant* for Generation X (2.95).

Analysing the results, a higher correlation can be noticed between drinking and socialising

for Millennials, wine consumption during *friends getting together* and *dinner at friends* ranking higher than for Generation X, as well as a higher interest for consuming alcoholic beverages outside their home, in clubs, bars or at restaurant, in comparison with their counterparts.

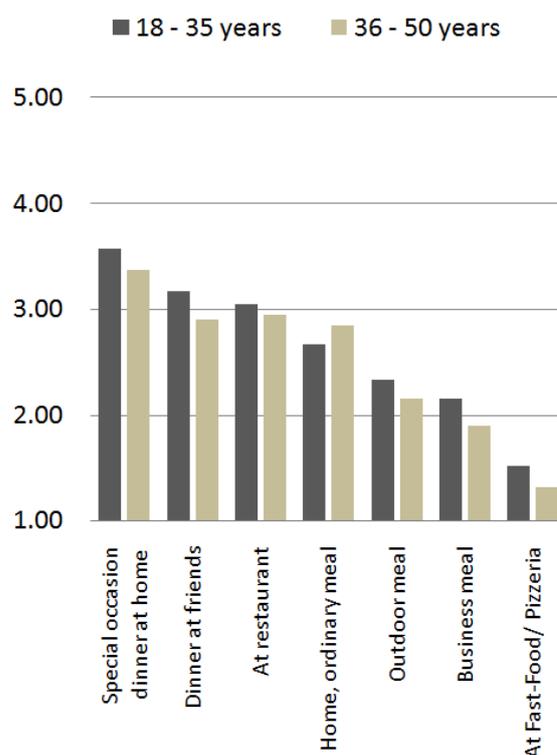


Fig. 6. Meal occasions of wine consumption (Average; 1 – Never to 5 – Very often) for Millennials (age 18-35) and Generation X (age 36-50)

The relationship between drinking and socialising for the young generation is recurrent in other previous studies (Marinelli *et. al.*, 2014) [8], but the good news here is that wine is considered by the young a drink well suited for socialising.

Generation X shows a higher interest in consuming beverages at home with partner or family (Fig. 4) and has a stronger preference for wine with a (ordinary) meal at home (Fig. 6) or for a romantic date (Fig. 5).

For both generations, wine is most frequently consumed in special occasions.

The questionnaire allowed an open answer regarding the contexts where respondents wanted to drink wine, but they could not.

A percent of 19% of respondents identified

contexts where they would have consumed wine but wine was not available – in clubs or pubs, at concerts, in team-building, at work, at the movie, in train – or they were not satisfied with the selection available in a place they were.

This can indicate some potential gaps in the market and therefore lost opportunities for wine, which can be further investigated and exploited.

The results on the motivation for consuming alcoholic beverages in general are shown in Fig. 7, the question allowed only one answer, as the strongest motivation.

Thus, for Millennials the top reasons to consume alcoholic beverages were *enjoying the drink with friends or family* (32%), for *relaxation* (27%) and for *being a good accompaniment to food* (20%); and Generation X members drink alcoholic beverage mainly for *relaxation* (33%), for the *drink taste* and for *enjoying it with friends or family* (each 28%).

Furthermore, the respondents were asked about the reasons they prefer wine to other alcoholic beverages – Table 2 – or why they prefer other alcoholic beverages to wine – Table 3. The respondents could choose to answer to one question, the most appropriate to their situation, or to both; both questions allowed multiple answers.

The results show that wine is preferred by both generations due to, in order: its taste, its health benefits and being seen as well suited for socializing. Also, 17% of the Millennials are being interested in wine as the perfect drink for romantic occasions.

The main reason for preferring other alcoholic drinks to wine is due to its alcoholic content, 21% of Millennials and 37% of Generation X stating they prefer a lower alcoholic drink. For 17% of the Millennials wine is perceived as a sophisticated drink and considered not suited for their usual context of drinking and 7% of them consider it difficult to choose, avoiding it.

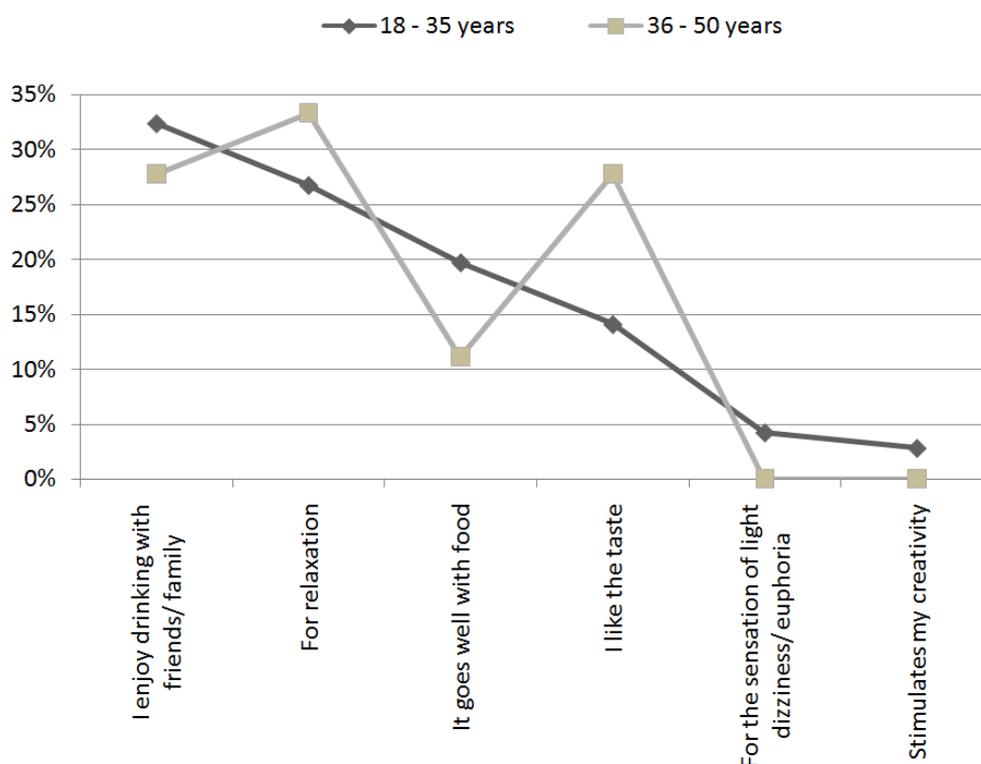


Fig.7. The motivation for consuming alcoholic beverages for Millennials (age 18-35) and Generation X (age 36-50)

Table 2. Reasons Millennials and Generation X prefer wine to other alcoholic beverages (n=91; multiple answer question)

Reasons	age 18 - 35 years	age 36 - 50 years
I like the taste	43%	32%
It is healthy	32%	37%
It's suitable for socializing	19%	21%
It's suitable for romantic occasions	17%	5%
I like the effect it has on me/ the sensation it gives me	17%	0%
It's suited to my lifestyle	17%	11%
Passion for wine	13%	5%

Table 3. Reasons Millennials (age 18-35) and Generation X (age 36-50) prefer other alcoholic beverages to wine (n=91; multiple answer question)

Reasons	age 18 - 35 years	age 36 - 50 years
Too strong – prefer a lower alcoholic drink	21%	37%
Doesn't fit the context where I consume, I consider wine a sophisticated drink for special occasions	17%	11%
It is difficult to choose	7%	5%
I don't trust the quality of the products	7%	16%
Is not for me, I feel that is not intended for me	6%	0%
Price – prefer more affordable drinks	4%	0%
Don't like the taste	3%	16%
Packaging - prefer drinks in smaller formats	3%	0%

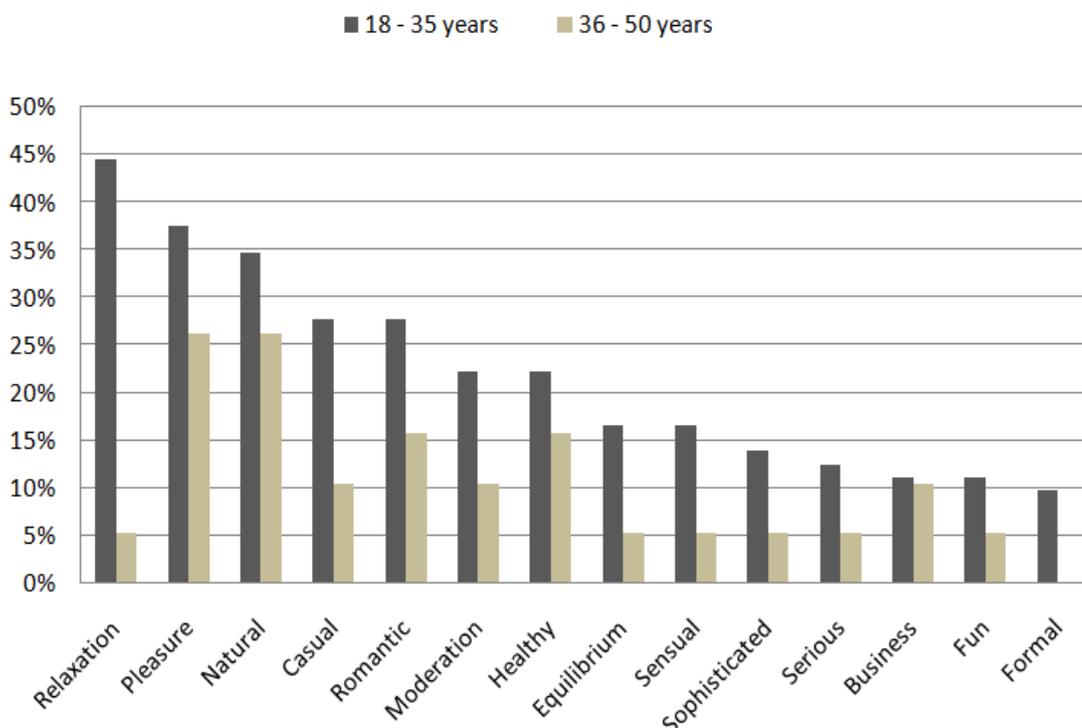


Fig 8. Words associated with wine by Millennials (age 18-35) and Generation X (age 36-50) (% of respondents; multiple answer question)

For Generation X, 16% don't like the taste and 11% don't consider wine suited for their usual context of drinking. Both generations

show quality related concerns, with a higher prevalence in Generation X, 16% compared with 7% of Millennials, saying they don't

trust the quality of the products.

When asked to choose the best descriptors that characterize their experience with wine, Millennials mostly associated their experience with hedonic and emotional-intimate attributes – *Relaxation, Pleasure, Romantic, Sensual* – and with *Casual*, most frequently than their older counterparts. This difference is maintained also in the recurrence of descriptors such as *Equilibrium* and *Moderation* and *Sophisticated* and *Serious*. The descriptors are shown by the frequency in Fig 8. Results also illustrate that both age categories perceive wine as a natural and healthy drink, with a rather higher occurrence among Millennials.

Consumers were also asked about what improvement they consider necessary in wine presentation, the results being illustrated in Fig. 9. The findings show that Millennials would be interested in more easily to understand information (43%) and communicated in a fun manner (28%), in a larger proportion than Generation X (21% and, respectively, 11%).

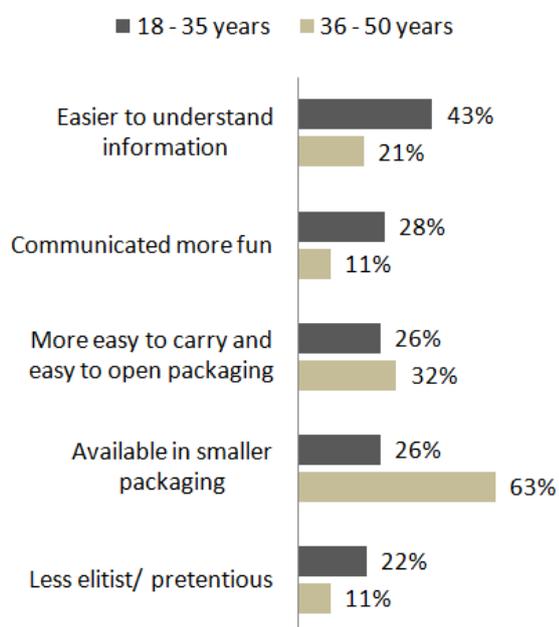


Fig. 9. Suggestions regarding improvements in wine presentation from Millennials and Generation X (% of age group; multiple answer question)

On the other hand, Generation X is much more interested in wine available in smaller packaging, 63% comparative with 26% of the

Millennials, but both age groups would want more easy to carry and easy to open packaging (26% of Millennials and 32% of Generation X).

## CONCLUSIONS

The preset study intended to improve the understanding of the young consumer's behaviour in relation with wine and alcoholic beverages in general, in order to create better targeted products, which would generate a better engagement of the Millennials with wine.

The findings show that Millennials consume alcoholic beverages most often outside their home, preferred locations being the clubs and bars, and they also identified contexts outside home where they would have liked to drink wine and it was not available: in clubs or pubs, at concerts, at movies, in team-building or at work (after working hours).

The preferences of these young consumers show a stronger correlation between drinking and socialising, the strongest motivation of consumption being related to enjoying the drink with friends and family. They prefer wine to other beverages because they like the taste, they consider it healthy, find it suitable for socialising and for romantic occasions.

However, they drink it mainly on special occasions, considering wine a sophisticated drink or too strong, preferring lower alcohol beverages.

Generation X would rather consume alcoholic beverages at home with the partner or family, and show a higher preference for consuming wine at home with meal with no special occasion or at a romantic date.

Millennials would prefer wine to be communicated in an easier to understand, less pretentious and more fun manner, and would be interested in easier to carry and easier to open packaging.

Even though the sophisticated allure of the wine is appealing for the passionate/enthusiast consumer, the conventional style of communicating in the wine category could eventually have a boomerang effect for Millennials. These consumers cannot identify themselves with the typical/ usual image of

wine, which is obsolete for them.

If wine it is to be present more into the young consumers' lives, a better understanding of this segment is needed, in order to create some new category of products that could better communicate to and engage with them.

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## THE ANALYSIS OF THE HUMAN RESOURCES INVOLVED IN THE RURAL TOURISM IN ROMANIA

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### **Abstract**

*Rural tourism is one of the most important types of tourism in Romania and have the highest growing potential. For those who live in the rural areas, developing the tourism means improving their social, cultural and economical situation. This research aimed to analyse the evolution of human resources that are involved in the rural tourism activities. The main purpose was to identify and review the main trends and challenges related to human resources involved in rural tourism and agro-tourism. The main source of statistical information used is the INSSE databases related to occupied population in general and rural areas, total employees in hospitality services in rural areas, total tourists accommodation establishments in rural areas and their capacity. The research methods used in this research are documented study, empirical analysis and logical synthesis of information. The last couple of years were the proof that the exploitation of cultural and natural habitats is the best solution to boost the economy, to create new jobs and to help promote Romania abroad, all at the same time. Rural tourism is an alternative to the well known traditional tourism. By spending time in the rural area, people can engage in different sorts of activities such as: hunting, fishing, walking, bird watching and many other enjoyable activities. The main findings revealed an increase of all the statistics indicators that are related to agro-tourism pensions and the human resources involved in the rural tourism. The total number of agro-tourism guesthouses increased by 39% and the number of accommodation places almost doubled. Also, the quality standards of agro-tourism pensions increased significantly. This growth has generated a 65.8% increase of the number of employees involved in hospitality field in rural areas.*

**Key words:** agro-tourism, development strategy, employment, human resources, rural tourism, sustainability

### **INTRODUCTION**

In Romania, the rural tourism is one of the most important type of tourism and has the highest growing potential. For those who live in the rural areas, developing the local tourism means improving their social, cultural and economical situation [14, 17].

From tourism perspective, the rural areas can fulfil a large mixture of interests and ways to spend the time off: leisure and relaxation, cultural

activities, hiking, climbing and other sports, exploring, hunting and fishing [9]. Rural tourism represents an alternative for the classic and traditional tourism that takes place in noisy cities and crowded resorts [7].

The agro-tourism represents the main element of the rural tourism. In the last 30-40 years, agro-tourism has growing rapidly in European

countries, where there is an estimated market of over 370 million tourists [4].

As a general definition the agro-tourism represents a concept that includes tourism activity organized and led by rural population, and is based on a close connection with the natural and human environment. Agro-tourism is directly related to agricultural activities, supported by small farmers, their own household activity remaining the main source of income [13].

Agro-tourism is a form of rural tourism where accommodation and other hospitality services take place in tourists boarding houses that are integrated in the local farms. The tourists are benefiting from an unpolluted environment, quality food, beautiful natural landscape, natural and cultural-historical values, traditions and customs of the rural areas, and other various tourist attractions [12].

The statistics revealed that touristic exploitation of natural and cultural rural environment represents an important chance for economic recovery and a solution that generates new working places in rural area therefore, prospects for a sustainable development. Also the rural tourism represents an important opportunity to promote Romania at international level.

In this context, the paper aimed to analyse the dynamics of human resources involved in the rural tourism and agro-tourism activities in order to identify the main trends and challenges in this area. The empirical data collected from National Institute of Statistics regarding occupied population in general and in rural areas, total employees in hospitality services in rural areas, total tourists accommodation establishments in rural areas and their capacity were dynamically studied and interpreted.

## MATERIALS AND METHODS

According to the National Institute of Statistics, the indicators used in this paper can be defined as following:

- employment comprises all persons aged 15 and over who carried out an economic or social activity producing goods or services for at least one hour during the reference period (one week) in order to get income in the form of wages, payment in kind or other benefits. In the rural areas, the indicator for employed people implies that the minimum length used in the production of agricultural products for own consumption is a minimum of 20 hours per week. [9]

- agro-tourism guesthouses are establishments of tourist accommodation with a capacity of up to 8 rooms, operating in the homes of citizens or in independent buildings, which provide tourist accommodation and conditions of preparation and catering, as well as the possibility of participating in household activities or handicraft, in special places.[9]

- the existing tourist accommodation capacity (installed) represents the number of tourist beds for use included in the final act of reception, approval, classification of tourist accommodation unit, excluding extra beds

that can be installed if necessary.[9]

Rural areas can be defined by considering the following criteria: morphological criterion (number of inhabitants, density, type of environment), structural and functional criterion (type of activities and relationships).

In this definition of the rural areas, the main characteristics highlighted are the following ones: [11]

- the low population density in the rural areas;
- villages are the human establishment forms characterized by individuality and discontinuity of the built space;
- the productive activity includes predominantly agriculture and forestry but this does not exclude rural tourism and the processing industry and trade areas;
- the relations between people rely primarily on mutual recognition from all points of views;
- the environment is much less polluted than in urban areas.

The methods used in this research were the following ones: the documented study, the descriptive statistic analysis and logical synthesis of information.

This type of documentation aimed to identify and review the main trends and challenges related with human resources involved in rural tourism.

Defining the rural environment, the human resources, and the accommodation capacity were analyzed using a set of synthetic indicators relevant to resources and results as follows:

- occupied population in rural areas
- employment in rural areas
- agro-tourism boarding houses as reception facilities
- accommodation capacity
- the total number of tourists arrivals and overnight stays (total and foreign tourists).

The present study attempts to synthesize the situation of human resources involved in tourism in rural areas, starting from statistical databases published by the NIS in the period 2007-2014 concerning: the total employed population, employment in rural areas, total employees nationwide, employees in rural areas, reception and accommodation facilities, accommodation capacity in agro-hostels.

Index method was used to point out the differences from a year to another, taking into account that the figures registered in 2007 were considered a fixed basis.

The index with fixed basis,  $I_{FB}$ , was calculated according to the formula:

$$I_{FB} = (X_n/X_0)*100 \quad (1)$$

where,  $X_n$  is the value of the indicator in the  $n$  year of the chronological series and  $X_0$  is the value of the indicator in the year 2007.

The share of a sub indicator in the total value

of the indicator was calculated according to the formula:

$$S\% = (X_n / \sum_{i=1}^n X) * 100 \quad (2)$$

## RESULTS AND DISCUSSIONS

Romania's future is strongly related with the rural development because rural areas account for 87% of the total area of the country and 45% of total population. [11]

Table 1. The evolution and structure of occupied population at national level and in rural areas

	2007	2008	2009	2010	2011	2012	2013	2014
A.Total occupied population at national level (Thousand persons)	9,352.5	9,259.0	8,952.4	8,712.8	8,528.1	8,605.1	8,549.1	8,613.7
Evolution(%) 2007=100	100	99.0	95.7	93.2	91.2	92.0	91.4	92.1
B.Occupied population in the rural areas (Thousand persons)	4,341.5	4,376.4	4,235.7	4,108.2	3,905.0	3,987.3	3,962.0	3,945.0
Evolution(%) 2007=100	100	100.8	97.6	94.6	89.9	91.8	91.3	90.9
Share of occupied population in the rural areas (%) (B/A%)	46.4	47.3	47.3	47.2	45.8	46.3	46.3	45.8
C.Total occupied population in hospitality services at national level (Thousand persons)	133.6	145.5	151.2	161.9	169.2	172.1	175.0	180.6
Evolution(%) 2007=100	100	109.0	113.2	121.2	126.6	128.8	131.0	135.2
D.Occupied population in hospitality services in the rural areas (Thousand persons)	25.3	28.2	34.7	33.9	35.9	38.4	41.1	41.7
Evolution(%) 2007=100	100	111.2	136.8	133.9	141.7	151.4	162.2	164.4
Share of occupied population in the rural areas (%) (D/C%)	19.0	19.4	22.9	21.0	21.2	22.3	23.5	23.1

Source: Own calculation based on NIS Database, 2007-2014 [9].

Rural population is not evenly distributed across the country. Thus, the rural population has a high level in the following regions: South Muntenia - 58.6%, North East - and South-West Oltenia 56.8% - 51.9%, [9] while in the Western part of the country, rural areas are less populated. These disparities are

reflected in the socio-economic development of the areas and quality of life in rural areas. During the analyzed period, rural population experienced a demographic decline caused by social mobility, low birth rate and aging. Between 2007 and 2014, rural population decreased by 3%, respectively, by 230,442

people. According to the demographic forecasts, the decline will continue in the period 2016-2050 [3].

The main factors of population decline are low birth rates and migration. Through its cumulative effects, migration contributed to

increased regional and community disparities. The total population decline is also reflected in the evolution of occupied population at a national level and in rural areas as presented in Table 1.

Table 2. The evolution and structure of employed population at national level and in rural areas

	2007	2008	2009	2010	2011	2012	2013	2014
A.Total employees at national level (Thousand persons)	6,145.0	6,149.8	5,940.9	5,648.6	5,697.2	5,734.5	5,743.5	5,850.3
Evolution(%) 2007=100	100	100.1	96.7	91.9	92.7	93.3	93.5	95.2
B.Employees in the rural areas (Thousand persons)	1,545.3	1,670.3	1,630.7	1,473.5	1,470.6	1,506.7	1,531.0	1,554.4
Evolution(%) 2007=100	100	108.1	105.5	95.4	95.2	97.5	99.1	100.6
Share of employed population in the rural areas (%) (B/A%)	25.1	27.2	27.4	26.1	25.8	26.3	26.7	26.6
C.Total employees in hospitality services at national level (Thousand persons)	126.0	136.9	145.2	155.4	162.3	163.3	165.4	170.9
Evolution(%) 2007=100	100	108.6	115.2	123.3	128.8	129.6	131.3	135.7
D.Employees in hospitality services in the rural areas (Thousand persons)	23.7	26.8	34.3	32.6	34.4	37.5	38.7	39.3
Evolution(%) 2007=100	100	113.0	144.9	137.6	145.0	158.1	163.3	165.8
Share of employed population in the rural areas (%) (D/C%)	18.8	19.6	23.7	21.0	21.2	23.0	23.4	23.0

Source: Own calculation based on NIS Database, 2007-2014 [9].

The analysis of national occupied population in the period under review shows a reduction by approximately 8% on the total period under review. The largest decrease took place in 2008-2009, and has been influenced by the exodus of labour force to the developed countries from Western Europe.

The occupied population in rural areas accounted for about 45-46% of total national occupied population and throughout the review period, the indicator was reduced by around 9 %.

At national level, population occupied with hospitality services increased by 35 %. The population occupied in hospitality services in rural areas rose to 64.4% over the period under review and this led to an increase in the

share of total employment in hospitality, from 19% in 2007 to 23.1% 2014.

The evolution and structure of employees at national level and in rural areas is presented in Table 2.

The analysis of the indicators referring to employees reflects the following: the total number of employees nationwide experienced a period of decline (2008-2010), when during the economic crisis, the number of employees was reduced by 8.2%.

After the economic crisis, between 2011 and 2014, the total number of employees increased slightly. In 2014, the total number of employees was 4.8% lower than the base year, 2007.

Employment in rural areas increased by 8.1%

in the first two years of the analysis. After that, because of the economic crisis, the number of employees was reduced by 4.8%. In the period 2011 and 2014, the number of employees started to increase, therefore in the last year of the analysed period the number of employees was by 0.6% higher compared to

the reference year.

The share of rural areas employees in the total number of employees varied between 25.1%, the lowest level recorded in 2007 and 27.4% of all employees, the highest level registered in 2009.

Table 3. The evolution and structure of touristic accommodation units and their capacity at national level and in rural areas

	2007	2008	2009	2010	2011	2012	2013	2014
A. Touristic accommodation units	4,694	4,840	5,095	5,222	5,003	5,821	6,009	6,130
Evolution(%) 2007=100	100	103	109	111	107	124	128	131
Accommodation capacity-Places	283,701	294,210	303,486	311,698	278,503	301,109	305,707	311,288
Evolution(%) 2007=100	100	104	107	110	98	106	108	110
B. Agro-tourism guesthouses	1,292	1,348	1,412	1,354	1,210	1,569	1,598	1,665
Evolution(%) 2007=100	100	104	109	105	94	121	124	129
Share of Agro-tourism guesthouses in the total touristic accommodation units (%) (B/A%)	28	28	28	26	24	27	27	27
Accommodation capacity-Places in agro-tourism pensions	15,448	16,906	19,783	20,208	20,683	27,453	28,775	30,480
Evolution(%) 2007=100	100	109	128	131	134	178	186	197

Source: Own calculation based on NIS Database, 2007-2014 [9].

At national level, the total number of employees in hospitality industry grew by 35.7% compared to 2007, while the number of employees in the rural areas increased by 65.8% in 2014 compared with year 2007.

The reduced share of the population employed in agriculture is an opportunity for human resources to work in non-agricultural sectors like rural and agro-tourism. This involves a proper and permanent information and training of the human resources [1].

The proportion of employees working in hospitality in the rural areas in the total number of employees in hospitality services increased from 18.8% in 2007 to 23% in 2014.

The increase of number of employees in hospitality services is related to the increase of the number of reception facilities and their accommodation capacity.

Although tourism in Romania has a small share in GDP, around 1.5%, well below the global media of 5 %, [5] in the analysed period, Romanian's businessmen made important investments in the development of tourism facilities and accommodation capacities.

An important element of the development process was based on the absorption of European funds [8]. A significant share of these funds targeted investments in reception facilities in rural areas.

The situation for reception facilities and accommodation capacity is shown in Table 3. The analysis shows that between 2007 and 2014 the total number of accommodation units in Romania increased by 31%, and the accommodation capacity rose by 10%. The difference between the 31% increase of touristic accommodation units and the 10%

increase of total capacity is caused by the fact that most of the boarding houses built in the analyzed period have small or medium accommodation capacity.

The number of agro-tourism pensions increased by 39 % from 1,292 in 2007 to 1,665 in 2014. The tourist pensions have continuously increased their share from 15.7 % in 2007 to 22.4 % in 2015, occupying the 2nd position after agro-tourist pensions [10].

The agro-tourist pensions accommodation capacity almost doubled, increasing from 15,448 places in 2007 to 30,480 places in 2014. The share of rural reception facilities in the total units accounted for about 27%.

Fig. 1. presents the evolution of the total accommodation capacity in Romania compared to the evolution of agro-tourism pensions accommodation capacity, taking 2007 as a reference year. The representation reveals the high increase of the number of accommodation places in agro-tourism boarding houses. Even if the agro-tourism pensions accommodation capacity almost doubled, its share in total accommodation capacity is still small, of slightly under 10%.

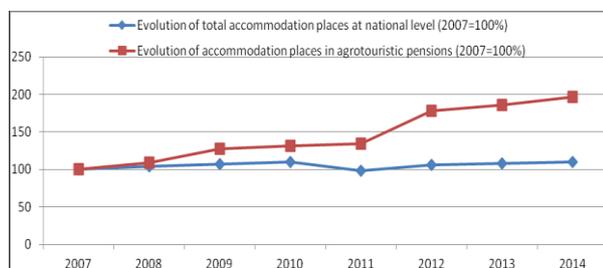


Fig. 1. Evolution of total accommodation capacity and the agro-tourism pensions capacity in terms of beds/places, considering 2007 as a reference year

Source: Own calculation based on NIS Database, 2007-2014 [9].

In Table 4 it is presented the evolution of arrivals in reception facilities at national level and in agro-tourism pensions, and the share of foreign tourists accommodated in the touristic facilities.

The total number of tourists arrivals in touristic boarding houses increased by 21.4% in the analysed period. In year 2009, due to economic crisis, the number of total arrivals decreased by 11,9% compared to 2007. The tourists arrivals continued to decrease in 2010,

representing only 87.1% compared to the reference year. Since 2011, the number of tourists arrivals started to increase and the trend remained the same for the rest of the analysed period [16].

The foreign tourists arrivals increased by 23.4% in the analysed period. They represents around 22% from total number of tourists arrivals. The number of foreign tourists arrived in agro-tourism pensions doubled during the analysed period and their share in total tourists arrivals in agro-tourism pensions represented 7% in average.

In Table 5, it is presented the evolution of overnight stays in touristic accommodation units at national level and in agro-touristic pensions, and the share of foreign tourists that stayed overnight in the touristic units.

The results have a similar trend with the evolution of arrivals. Compared to the year 2007, the total number of overnight stays decreased by 22.1% in 2010. After 2010, the number of overnight stays started to increase but in contrast with the number of arrivals, the overnight stays did not even reach back the value of the reference year. In 2014, the total number of overnight stays was by 1.5% smaller compared with year 2007.

During the analysed period, the proportion of tourists accommodated in agro-tourism pensions was small, but its trend was a positive one. The proportion increased from 2.9 % in 2007 to 5.3 % in 2014.

This could be explained by the low prices per night and the consumer preference for traditional food prepared from organic local products produced in the agro-touristic farm. Urban population uses to visit the agro-tourism pensions because of the healthy food which can be found there [2].

Foreign tourists overnight stays increased by only 5.1% in the analysed period. They represented around 18% from total number of tourists overnight stays. The number of foreign tourists who slept in agro-tourism pensions increased by 56.2% during the analysed period and their share in total overnight stays in agro-tourism pensions represented 8% in average.

The evolution of agro-tourism pensions regarding the level of comfort is shown in Fig.2.

Table 4. The evolution of arrivals in reception facilities at national level and in agro-tourism pensions in total and on foreign tourists

	2007	2008	2009	2010	2011	2012	2013	2014
A. Total number of arrivals	6,971,925	7,125,307	6,141,135	6,072,757	7,031,606	7,686,489	7,943,153	8,465,909
Evolution(%) 2007=100	100	102.2	88.1	87.1	100.9	110.2	113.9	121.4
B. Foreign tourists' arrivals	1,550,957	1,465,891	1,275,590	1,346,343	1,516,699	1,656,436	1,717,355	1,914,570
Evolution(%) 2007=100	100	94.5	82.2	86.8	97.8	106.8	110.7	123.4
Share of foreign tourists' arrivals (%) (B/A)*100	22.2	20.6	20.8	22.2	21.6	21.5	21.6	22.6
C. Arrivals in agro-tourism pensions	288,508	357,617	325,686	289,923	360,696	447,113	501,746	549,302
Evolution(%) 2007=100	100	124.0	112.9	100.5	125.0	155.0	173.9	190.4
Proportion from total arrivals (%) (C/A)*100	4.1	5.0	5.3	4.8	5.1	5.8	6.3	6.5
D. Foreign tourist arrivals in agro-tourism pensions	20,443	19,856	19,282	19,677	24,691	30,174	38,183	41,434
Evolution(%) 2007=100	100	97.1	94.3	96.3	120.8	147.6	186.8	202.7
Foreign tourists' proportion (%) (D/C)*100	7.1	5.6	5.9	6.8	6.8	6.7	7.6	7.5

Source: Own calculation based on NIS Database, 2007-2014 [9].

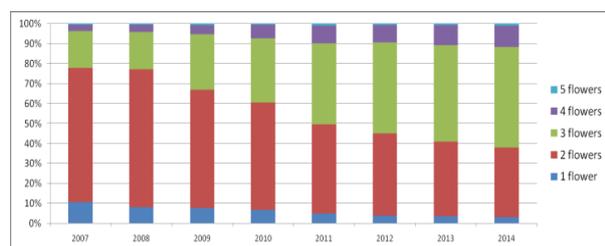


Fig. 2. The evolution and proportion of the comfort level in agro-tourism pensions

Source: Own calculation based on INSS statistics [9].

In 2007, the agro-tourism pensions from category '2 flowers' had the largest share, 67%, but in 2014, it was reduced to 35%.

The agro-tourism pensions from category '3 flowers' increased their share from 18% in 2007 to 50% in 2014.

The share of agro-tourism pensions with a high degree of comfort, classified at the category '4 flowers' and at the category '5 flowers' tripled from 4% in 2007 to 12% in 2014.

Therefore, the agro and rural tourist pensions managers are more and more focused to increase the comfort level according to the quality standards and to increase clients' satisfaction degree [6].

The repartition of agro-tourist pensions in developing regions is shown in Fig.3.

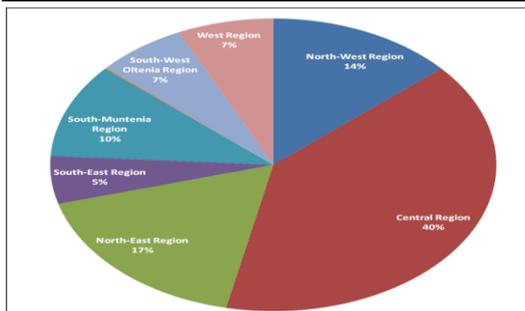


Fig. 3. Distribution of agro-tourism pensions by development regions

Source: Own calculation based on NIS Database, 2014, [9].

In 2014, the highest share of agro-tourism pensions was located in the Central region, 40%, followed by the North-East and North-West regions with 17% and 14% of the total agro-tourism pensions.

South-Muntenia accounts for 10% and other regions have a share below 10% each.

Some regions from Romania have a high potential for agro-tourism. As an example, the Danube Delta region is highly appreciated and gained worldwide recognition. [15]

Table 5. The evolution of overnight stays in reception facilities at national level and in agro-tourism pensions in total and on foreign tourists

	2007	2008	2009	2010	2011	2012	2013	2014
A.Total overnight stays	20,593,349	20,725,981	17,325,410	16,051,135	17,979,439	19,166,122	19,362,671	20,280,041
Evolution(%) 2007=100	100	100.6	84.1	77.9	87.3	93.1	94.0	98.5
B.Foreign tourists' overnight stays	3,596,439	3,359,244	2,667,666	2,766,581	3,066,882	3,297,433	3,477,854	3,768,104
Evolution (%) 2007=100	100	93.7	74.4	77.1	85.5	91.9	97.0	105.1
Share of foreign tourists' overnight stays (%) (B/A)*100	17.4	16.2	15.4	17.2	17.1	17.2	18.0	18.6
C.Overnight stays in agro-tourism pensions	592,327	743,444	673,188	604,606	741,350	906,504	996,475	1,081,521
Evolution(%) 2007=100	100	125.5	113.7	102.1	125.2	153.0	168.2	182.6
Proportion of overnight stays in agro-tourism pensions (%) (C/A)*100	2.9	3.6	3.9	3.8	4.1	4.7	5.1	5.3
D.Foreign overnight stays in agro-tourism pensions	58,467	53,721	55,421	56,592	61,149	77,963	86,342	91,342
Evolution(%) 2007=100	100	91.9	94.8	96.8	104.6	133.3	147.3	156.2
Foreign tourists' proportion (%) (D/C)*100	9.9	7.2	8.2	9.4	8.2	8.6	8.7	8.4

Source: Own calculation based on NIS Database, 2007-2014 [9].

## CONCLUSIONS

As a result of the technological progress achieved in the Romanian agriculture in the period under review, the share of population employed in agriculture reduced, this resulting in availability of human resources

for non-agricultural sectors of rural entrepreneurship, such as rural tourism.

In conclusion, the rural labour force must be redirected towards other activities, particularly towards services like agro-tourism, through proper and permanent information and training of human resources.

Human resources strategies in rural areas can include measures focused on: upgrading rural population education and training systems; promoting occupational mobility of human resources in rural areas in order to move towards non-agricultural occupational areas; promoting entrepreneurship in rural areas and providing support services in agro-tourism.

The total number of agro-tourism pensions increased by 39% and the number of places almost doubled. This growth has generated a 65.8% growth of the number of employees involved in hospitality field in rural areas.

One of the key element explaining the positive evolution of agro-tourism in Romania is related to the development of hosting services and tourists reception with high quality standards. Regarding quality standards, the trend of the agro-tourism pensions comfort level, in the analysed periods showed that the share of agro-tourism pensions with one and two flowers decreased from 78% in 2007 to 38% in 2014. The difference up to 100% in represented by agro-tourism pensions with 3 flowers (50%) and pensions with 4 flowers representing 11%.

Another growing trend with a positive influence on the agro-tourism development is related to the consumer increasing demand for the organic products. Urban population uses to visit the agro-tourism pensions because of the healthy food which can be found there.

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## EDUCATION IN FINLAND AND ROMANIA. A COMPARATIVE PERSPECTIVE

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### **Abstract**

*This paper focuses on education, training, teachers and students starting from a general perspective in order to discuss two specific case studies. The article aimed to define education and the role of the teacher and of the learner, moving on to the greater than ever need for e-learning (virtual modules, electronic resources, online learning and teaching) and ending with the case studies of Finland and Romania. Based on my personal experience as student and teacher in Romania and the chance to experience Finnish educational services as an Erasmus teacher, this paper analyzed both theoretical and practical aspects related to: education, teaching, learning, e-learning, developing and maintaining a sustainable platform and adapting to new teaching and learning models. Additionally using theoretical sources, the current research considered the similarities and the differences between the two education systems and emphasized the importance of incorporating other countries' experience into Romania's brighter future.*

**Key words:** education, e-learning, Finland, Romania, teaching

### **INTRODUCTION**

“Education”, “teaching”, “learning”, “teachers”, and “students” are the words that inspired this paper which aims to compare the education systems of two countries, Romania and Finland, with a particular focus on the role of e-learning in the future of education. My own background as a student and teacher, and my personal experiences with the latest trends in technology are used to demonstrate the rationale behind this paper. The article proposes a general-to-specific structure, starting from theories regarding education and the role of the teacher and of the learner, moving on to the greater than ever need for e-learning (virtual modules, electronic resources, online learning and teaching) and ending with the case studies of Finland and Romania. Experiencing the Finnish higher education system as an Erasmus teacher and having been teaching in the Romanian university system for thirteen years enabled my research at both theoretical and practical level.

According to *Encyclopaedia Britannica*, “education is a discipline that is concerned

with methods of teaching and learning in schools or school-like environments as opposed to various nonformal and informal means of socialization” [11]. It is the method used by societies to share their accumulated values and knowledge enabling their citizens to gain “greater understanding and control over oneself and one’s world” [9]. In addition, it is a lifelong and comprehensive process, involving body and mind, being characterized by continuous development and change.

Ryan and Cooper make an important distinction between education and schooling, a distinction which, as teachers, we are all aware of. Education is “much more open-ended and all-inclusive”, knowing “few bounds” [9] compared to the formal system of education which implies schools, students, teachers and textbooks. “[T]he whole universe of informal learning” [9] does not necessarily require a standard classroom; instead books, movies, the parents’ example, our friends’ and colleagues’ gestures and actions can all influence our development and personality, as “[p]eople are engaged in education from the cradle to the grave” [9].

In my capacity as teacher, I do not

underestimate the power of any of the two forms of teaching and learning. I truly believe in the vocation of a good instructor, in the role model and inspiration they can offer to their students, in the desire that one has “to aid in the renewal of society”, in the “nobility of the teacher’s work” [9]. The power that this profession can offer should be used wisely, and considering the topic of this article, the act of good teaching can be highly influenced by the methods, the tools and the resources the trainer uses in their teaching activities. In the 21<sup>st</sup> century, the widespread use of virtual modules, electronic devices, and online resources requires even more innovative working methods and a complex educational design in addition to an adapted content design. This new challenge has to be considered thoroughly in order to be included in the teaching and learning methods characteristic to a modern system of education.

## MATERIALS AND METHODS

I would like to begin this part with a quote, expressing the starting point of my research. “As many other people in my generation, my lifetime has spanned so far over two drastically different political regimes and the ending of the 20<sup>th</sup> century and the beginning of the 21<sup>st</sup>. But more than anything, what we have all witnessed and has profoundly affected our societies and ways of thinking is the electronic revolution” [4]. Under these circumstances, it would be fair to remark that I first became aware of a Virtual Learning Environment in 2009 at the *University of Birmingham*, United Kingdom, in the capacity of Visiting Research Associate. Doing research for my Ph.D. thesis I had access to the WebCT environment of the University, I joined discussion boards, had access to the syllabuses of the courses of the Department of American and Canadian Studies, or submitted short assignments. Coming from a very traditional system of education, it was a challenging step towards the virtual world that I was not very familiar with.

The second major contact with e-learning,

actually e-teaching, was my encounter with the Finnish system of higher education as part of an Erasmus Staff Mobility – Teaching Assignment in 2012. The last day at *Kemi-Tornio University of Applied Sciences* surprised me the most when I was invited to give a lecture in front of the microphone of a computer for remote students, while some others were watching and listening to me from the class, including my hosts and fellow teachers.

Thirdly, the topic of e-learning and virtual methods for teaching has been one of my academic interests for the past three years which resulted in two articles that will also be referred here.

Conceptually speaking, two Romanian authors, Ghilic-Micu and Stoica start their analysis from the very basic assumption that the rapid development of ICT gave birth to a new type of economy, i.e. the digital economy. As information is tightly connected to education, the access and transmission of knowledge has been changing over the years. This can be seen in the system of education as well. Considering the previous shift in education from the former classical emphasis on teaching and the teacher to the focus on learning and the student, what changes drastically in the virtual world is “the role of the educational institutions in the transfer of knowledge, skills and values [7, *my translation*] that ICT-based virtual environments require.

The next issue I would like to focus on refers to some of the technicalities of e-learning and the specific tools used in the process. I would like to begin by briefly defining e-learning. The specialists Clark and Mayer define e-learning as “instruction delivered on a digital device such as a computer or mobile device that is intended to support learning” [3]. Two main aspects characterize e-learning according to Ghilic-Micu and Stoica: firstly, the online access to information that facilitates distance learning, without the physical presence of the students in the class, secondly, the access to knowledge by means of tools that the modern classroom provides [7]. Moreover, a few requirements should be met: the possibility to store and/or transmit

lessons on CD-ROM, servers, Internet, etc., learning-focused content based on the stated objectives, instructional methods based on exemplifications, practical activities, feedback, and the use of media elements, such as “text, graphics, or sounds used to convey lesson content” [3]. Moreover, its most important aspects are facilitating the assimilation of “new knowledge and skills linked to individual learning goals” [3] and the fact that it can ensure an enhanced level of the organization’s performance.

All these aspects facilitated by the new technologies and the easy access to information are to be found in the instruments that have been employed in e-learning, such as: CAL (computer assisted learning), ICT (information communication and technology), (VLE) Virtual Learning Environment, Moodle (Modular Object-Oriented Dynamic Learning Environment), WebCT (Course Tools) or Blackboard Learning System, iLinc, Media Wiki, WordPress, Mahara, OpenMeetings, etc.

One should also differentiate between the two types of e-learning: “synchronous e-learning” and “asynchronous e-learning”. When the learning process is led by an instructor, “available to geographically dispersed learners at the same time” and delivered by means of specialized softwares, this is called synchronous e-learning, Virtual Classroom or Webinar [3]. Asynchronous e-learning implies individual study, and the learners, at their own pace, can access the “instructional resources intended for self-study” “any time and any place” [3].

Besides these structural distinctions, the content of online courses differs structurally from that of traditional ones. The courses are created in web page format, which besides plain text, include images, sounds, films, and links to further sources or activities. The conclusion of each chapter should include multiple-choice activities which facilitate a better understanding of the lessons, as well as the possibility to re-read the chapter facilitated by the HTML pages that each student has access to whenever they need [7].

An important aspect that Ghilic-Miccu and Stoica draw our attention upon concerns the

four requirements that the transfer from the classical format to the virtual format have to meet. The first one concerns “clearly defining the policies and strategies regarding ICT by the educational establishments”. Secondly, the two authors mention “developing an adequate infrastructure for the usage of the new ICT”. Thirdly, “redefining the role of the teaching staff” should be considered and the last but not the least priority is: “ensuring the Internet access of the institutions involved” [7, *my translation*].

Inquiring even further, one should analyse objectively, both the strengths and weaknesses of e-learning. Clark and Mayer consider that the greatest advantage of e-learning is “tailoring content and instructional methods based on the work roles and learning needs of individuals (particularly their prior knowledge)” [3]. As mentioned above, the students’ constant “engagement in learning” [3] is an essential feature. The third point that Clark and Mayer emphasise is the “use [of] a combination of text and audio, as well as still and motion visuals to communicate your content” [3], which can be challenging if we think of the way these tools should be balanced. Clark and Mayer’s fourth advantage refers to the scenarios and computer simulations that can be used in various domains and which can “immerse learners in job-realistic environments requiring them to solve infrequent problems or complete tasks in a matter of minutes that could take hours or days to complete in the real world” [3].

On the other hand, the two authors analyse as well the “pitfalls of e-learning” and the traps that teachers and learners might fall into when employing e-learning. Facing numerous electronic instruments and attempting to do more, teachers might sometimes have the tendency to abuse the multimedia, instead of following a simple guideline for the process of instruction, where “less is almost always more” [3]. Not only that more is not good, but also less can be harmful and boring if the students are faced with screen after screen of words or interactivity is omitted. Furthermore, “highly exploratory learning environments” do not help the users as “discovery learning rarely works” [Mayer 2004 qtd. in 3] and both

young students and adult trainees need structured, tailor-made e-learning lessons which to provide the required guidance.

## RESULTS AND DISCUSSIONS

Moving on to the next part of my article, I would like to refer to **Finland**, a pioneer in distance learning (since 1986) and e-learning (web-based education since 1998), that can be a good example of best practice, a brief outlook on the Finnish education system offering valuable insights.

Lying in the north of the European continent, Finland covers 390,903 sq. km., a surface populated by only 5,426,674 inhabitants. Education is an important issue on the Finnish governmental agenda, its source going back to the 1860s, the Lutheran Church playing an important role in literacy, similar to the one of the Orthodox or the Catholic Church in other European countries.

Probably one of the most expert opinions is Pasi Sahlberg's book entitled *Finnish Lessons: What Can the World Learn from Educational Change in Finland?*. However, in order to understand "what the world can learn from Finland", I would like to refer to a certain aspect of the Finnish personality, so that we can further understand Sahlberg's vision of the education system. In her book about the Finns, Tarja Moles narrates the following tall story:

"A Frenchman, a German and a Finn were in Africa and came across an elephant. The Frenchman looked at the creature and straightaway started thinking about the variety of culinary delights he could cook from it. The German pondered the animal's potential as a vehicle on the savannah and how its performance compared to that of his Jeep. The Finn's immediate thought was: 'I wonder what the elephant thinks of me?'" [8].

Reflecting on the joke in retrospect, Sahlberg's title might surprise us: a Finn bragging about something? Even if Sahlberg's modesty impedes him from telling us that Finland has the best education system in the world, he does impart valuable knowledge that could improve Romania's education system.

Firstly, I consider that one of the most important words in Finland is "equity", education serving as an "equalizing instrument for society" [10], as stated before in another article [4]. According to The Finnish National Board of Education [12], equity implies free education for all the children and teenagers between 7 and 16 years old, the right to educational support, the encouragement of a mixed system, where students with special needs become part of mainstream education and are helped by teachers and students at the same time. Moreover, Finland supports their minorities' mother tongues, thus diversity [13]. Secondly, Sahlberg points out the fact that more than 80% of the Finns belong to the Evangelical Lutheran Church of Finland, the Lutheran beliefs encouraging equality of opportunity and hard-work ethics, as demonstrated by the educational system, too. Thirdly, the Finnish system of education is based on "trust and responsibility", the State and the local authorities sharing the liability for funding, autonomy and quality assurance. Focusing on lifelong learning, Finnish education encourages and financially supports both students' and teachers' development, providing for their individual needs [4]. As regards the students, the most surprising aspect worth mentioning is the lack of school inspections, standardised curricula, or national testing systems, the Finns building their quality assurance on "steering instead of controlling" [13]. When we refer to the teaching staff's training, starting with the late 1970s, all the teachers were required to obtain a master's degree at the expense of the state, a regulation still in force nowadays. Being considered a "prestigious profession", "those who are lucky enough to become teachers normally are teachers for life" as the system demonstrates they have chosen an autonomous profession where relevant professional development is required and encouraged [10].

Furthermore, the educational system proves highly competitive, as Finland has consistently come at the top of the test devised by OECD (The Organisation for Economic Co-operation and Development)

entitled Program for International Student Assessment (PISA). The findings of 2012 demonstrated that Finland recorded results above the average for all the three tests assigned to 15-year-old teenagers, i.e. reading, mathematics, and science. Finland scored 524 for reading literacy, compared to the average of 496 points, for mathematics they scored 519, the mean score of OECD countries being of 494 points, and for science the difference was between 545 and 501 also in favour of Finland [14] (See below the comparison with Romania).

In this context, I would personally add that e-learning is an important factor in the increasing quality of the Finnish system of education. All the academic or applied sciences universities or vocational schools advertise their online component, attempting to attract people to their study programmes, irrespective of their place of origin, financial status, physical ability, age or employment. "E-learning increases accessibility of education (in terms of time and space), efficiency (in terms of costs, and not only) and motivation, especially for those mentioned above, sometimes faced with the risk of exclusion" [4].

Based on my experience and the information that the eLearning Centre kindly provided, at *Kemi-Tornio University of Applied Sciences*, the first Finnish university I visited in 2012, all study programmes employ online tools, "from a mere support environment for classroom courses to full-time e-learning, covering almost 100% of the people involved in the process of education. Interestingly, even full-time students benefit from online education, allowing teachers a better time management of the most important activities to be performed in class, leaving aside the ones which can be solved at home, individually by each student in front of their laptop" [4]. In addition, the necessity for e-learning has become even higher in the northern part of the country, a colder region with remotely populated areas, where, pressured by diverse factors, the functions of universities based in three different towns: Kemi, Tornio and Rovaniemi merged on January 1, 2014 to form *Lapland University of*

*Applied Sciences*.

In order to speak with objectivity about my own country, **Romania**, I consider appropriate to start with a brief description of the Romanians' personality, connecting (or not), the two chosen countries mentioned in the title. Although some of the features mentioned by the historian Lucian Boia in his controversial book *Why is Romania Different?* might lead to similarities between the Romanians and the Finns, the facts and figures might be contradictory. According to the historian, Romanians suffer from "the inferiority complex", "the 'insignificance' of a small nation lying at the others' mercy" [2, *my translation*], furthermore emphasised by perceiving the relations with foreigners as ranging between "admiration and hostility ... sometimes with combined attitudes" [2, *my translation*]. So far, the two nations seem to have in common the vicissitudes of history, the constant oppression of the more powerful neighbours and the resulting preoccupation with identity, nationality or independence which sometimes leads to the self-critical obsession with *nave gazing* [8]. Unfortunately, unlike the Finns, at a certain moment in time, the Romanians seemed to fall prey to reflection, motionlessness and disappointment which can still be observed at all levels of the society.

In statistical terms, Romania is a South-eastern European country, its population reaching 19,942,642 (according to the latest census), the total surface of the country being of 238,391 km<sup>2</sup>. In terms of its population, Romania ranks 7 among the European Union countries, although we do not take pride in the decreasing demography.

The need for modern education is both a national and a European priority for the member states, our country following the Community laws. For example, Romanian students did not obtain such great results as the Finnish students at the PISA test, unfortunately not even the average. Comparing the results with an international average of 500 points for all the three tests, Romania obtained 428 points for reading literacy, 426 points for mathematics and 441 points for science [6], which are disappointing

scores. And if we were to quote the headlines, then education would be metaphorically associated with “a boring and not a bit promising Cinderella” [6, *my translation*] and the most common attributes describing the system of education would be: “inefficient, irrelevant, inequitable” [6, *my translation*] even in the words of politicians, the quoted author being one.

These are some factual details about the Romanian system of education, a system I have known as a student and a teacher for 29 years (without including kindergarten). Going back to the question what can Romania learn from Finland or Europe in general, as a matter of fact, I will have a look at the measures in force nowadays. Compulsory education in Romania starts at the age of 6 and ends at the age of 16, the system offering both public and private institutions at all the levels. Unfortunately, the primary and secondary education in Romania are extremely standardised by means of national curricula, national testing systems and various other factors which create significant differences between schools and even classes. Another particular aspect is the politicization of the system in spite of all the efforts made by the teachers and of the European regulations, an aspect which again imbalances the society, instead of being an equalizing instrument.

For the modernization of its system of education, Romania passed a new National Education Law in January 2011 (with its subsequent amendments) strengthening the legal and institutional framework, creating a coherent and transparent national framework, open to the recognition of its stakeholders.

As regards the ICT (Information and Communication Technology), although the internet network is considered more modern than in other European countries, due to its more recent installation, in May 2013 the e-learning portal of Romania was still lobbying for the access to internet for educational purposes, particularly broadband internet in schools [15]. Interestingly, the results of the European Schoolnet Survey (2012) showed that Romania was behind the European average if we take into account the number of computers, 13 students using one computer,

compared to 5 in Europe (and Finland as well), while the connectivity rate of the schools in Romania and the broadband internet usage were almost similar to the European average [15]. According to the 2011-2011 country profile [16] for the Digital Agenda for Europe, the percentages of teachers using ICT equipment in 25% of their lessons were slightly lower or equal to the European average, for grade 8, Romania's percentage being higher than the European average (35% vs. 32%). Students at grade 8 and 11 also took part in the survey, their usage of various items of ICT equipment in class for learning, be it the school computer/laptop, their own laptop or their mobile phone, being above the EU mean, particularly the 11 graders and their use of school computers.

The greatest novelty of 2014 in terms of schoolbooks for primary schools is the digital component which is introduced, saved on a CD and available on the platform of the Ministry of National Education and Scientific Research. Starting September 15, 2014 (unfortunately, there were some delays), first and second graders have presumably had access to the various types of educational resources offered by these new materials: text, photo, audio, video, and interactive, for an enhanced learning environment for two subject matters: Romanian Language Communication and Maths and the Exploration of the Environment.

At higher education level, I would like to refer to the case of the Business English seminars for University students. Given the necessary technology, we use online quizzes during the seminar, as a form of practice or review, or even as a form of assessment. However, the types of activities used online: single answer, multiple choice, matching or fill-in [17] have been part of the students' paper-based evaluation for the Business English seminar for quite a long time. Probably the most commonly used methods for the study of a foreign language are the genuine audio-video materials, even if the ones we use are not provided by an e-learning platform. The main aim is to expose students to varieties of English and natural

spoken language and in most of the cases the task is to listen for specific information. A wide range of sources can be used in this context, offering the students the chance to listen to various speakers of English: courses of English accompanied by CD, British Council examination samples, online sources (from music to conferences), videos created for academic purposes, and mobile applications for learning languages. As demonstrated previously in a 2015 article, some of the sources that I use could be: the Royal Society for the Encouragement of Arts, Manufactures and Commerce, TED Conferences, <http://www.bbc.co.uk/learningenglish>, <http://www.britishcouncil.org/learning-learn-english.htm>, Duolingo, etc. [5].

My students also benefit from the characteristics of the social networks, my professional Facebook account providing for them articles on various topics, famous quotes, descriptions of historical events, book or film recommendations, encouraging them to be in contact with English all day long, to develop their own interests, and to improve their language skills in their own terms.

Combining classical teaching methods with simulations, case studies, role plays, images, animations and photos, represents a step further to a virtual environment, so that the transition is made smoothly.

## CONCLUSIONS

Allow me to conclude by emphasizing the importance of teaching and learning in all the possible forms. The European context favours the development of all its member states, and the fact that countries can collaborate for the purpose of education, research and development is extremely encouraging for newer EU members like Romania. It is a great advantage that we can benefit from the expertise of partners and things are changing for the modernization of teaching and learning methods in Romania. If the Romanian results are not always as good as the Finnish examples, and the use of technology is still insufficient, then, it means that much more efforts should be made. However, with a

younger generation whose “habits of mind [are] associated with these technologies” [1] due to their early exposure, with a younger generation able to obtain the wanted information in seconds and ready to assimilate it fast, the success is almost guaranteed. As an adult and a teacher, I should confess it is challenging but for sure not impossible to imagine a virtual learning and teaching environment. And as sentimental and common as it might seem, the future is ours and we should be prepared for it!

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## ASPECTS CONCERNING THE DEMANDS OF THE WINTER WHEAT CULTURE IN COMPARISON WITH THE CLIMATIC CONDITIONS IN THE CARACAL PLAIN. CASE STUDY: THE AGRICULTURAL YEAR 2006 – 2007

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### Abstract

*The crops are vulnerable to variations in the annual climate, therefore, reducing losses and increasing the agricultural production are necessary, both economically and socially. The purpose of this paper is to analyze the thermic and hydric resources and to indentify the agro-climatic parameters and critical thresholds on the intervals of period September 2006 – August 2007, with direct consequences for the winter wheat crops in the Caracal Plain. In the first decade of the 21st century, the crop year 2006–2007, was characterized, in general, by a higher air temperature than normal, with soil humidity deficit, which determined the depreciation of the vegetation state of the winter wheat crop and consequently, a low production per hectare. By knowing the climatic conditions, for a period of time, it provides the ability of implementing effective measures in order to prevent and combat effects on agricultural production.*

**Key words:** thermic resources, hydric resources, winter wheat, the Caracal Plain.

### INTRODUCTION

The winter wheat is the most important culture in Romania, both by the cultivated area and its economic and social value. Due to its ecological plasticity, the winter wheat can adapt to various climatic conditions [2]. The rational use of the climatic conditions in agriculture requires to know how the cultivated plants react to the permanent changes in their evolution, as a part of the biotope [1].

The main climatic factors limiting the winter wheat, as a cultivated plant, are: the temperature, precipitations and the light [11]. In Romania, the winter wheat proved to be more productive than the spring wheat, that is why the former occupies 99 % of the total

area sown with this plant, while the spring wheat is cultivated on small areas in the Transylvania Depression [3]. The vegetation season of the winter wheat depends on the climatic and soil conditions and on the cultivated variety, therefore this is, generally, between 230 and 250 days. In the southern part of Romania, where the Caracal Plain is situated, the winter wheat is sown after September 25<sup>th</sup> and harvested in early July. [12].

The variability of the agro-meteorological parameters in each crop year, provides favorable or restrictive conditions for each phenological phase and productivity of the cultivated wheat. [5].

The characterization of a crop year consists of an agro-meteorological analyzis of the period

from September to August, which corresponds to the vegetation season for the field crops. In this paper, there will be analyzed the climate of the crop year: September 1<sup>st</sup>, 2006 – August 31<sup>st</sup>, 2007, in terms of the thermic and hydric resources from the air and from the soil surface, for the winter wheat in the Caracal Plain area.

Arguments for the choice of the agricultural year 2006 – 2007 as year of study is not based on the consideration available data, but on highlighting the climatological characteristics of this year, in relation to series of records of the first 15 years of this century, as an essential factor in analysis of the influence of climatic factors on crop yields and, consequently, in identifying the type of agricultural management suitable for such specific situations – all this in a context where it is known that all crops are exposed in each agricultural year at risk occurrence of extreme weather events – drought, heat, floods etc. The climatic analysis will be done for the crop year 2006 – 2007, because:

- in the first decade of the XXI century, in the five years to agricultural drought (2000 – 2001; 2001 – 2002; 2002 – 2003; 2008 – 2009) the crop year 2006 – 2007 was an extremely dry year, like the crop year 1945 – 1946;

- its summer is comparable to that of the year 1946, but with a higher number of hot days ( $T_{max} \geq 35.0 \text{ }^{\circ}\text{C}$ ) and with a excessive drought which, by its duration and intensity of water deficit, was above the crop year 1945 – 1946, which was considered the driest year in the last five decades of the 20<sup>th</sup> century [12];

- the absolute maximum monthly temperature of air in Romania for July was 44.3 °C on July 24<sup>th</sup>, 2007 at Calafat – Danube Valley in Oltenia Plain (close to absolute maximum temperature in Romania, 44.5 °C, recorded at August 10<sup>th</sup>, 1951 in the Ion Sion locality, near Braila town);

- for the period 1961 – 2013, the year 2007 is the warmest year in Romania, registering an average annual temperature in the country of 10.6 °C, with a positive drift of 1.8 °C compared to the average annual multi followed in descending order the years 1994, 2009, 2000, 2008, 2002 and 2013;

- in the first nine months of agricultural year 2006 – 2007 were recorded particularly low values of rainfall for the entire agricultural area of the country, highlighting such an extremely dry year for almost all crops;

- in the second decade of the XXI century, so far, the dry crop year is considered the year 2011 – 2012, but without touching the seriousness of the agricultural year 2006 – 2007.

The Caracal Plain is located in the southern Romania, being a part of the Romanian Plain composed of the terraces of the Olt and the Danube river [7]; [8]. It is located in the west of the Olt Valley, with altitudes between 180 – 190 m in the north and 45 – 50 m in the south, and a homogeneous landscape (Figure 1B) [4].

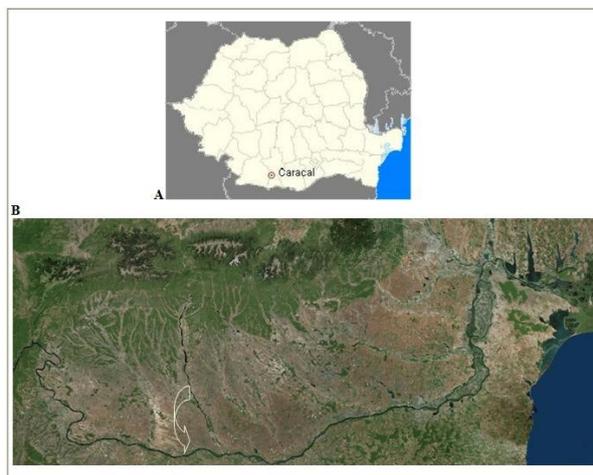


Fig. 1. The geographical location of the Caracal meteorological station (A) and of the Caracal Plain (B) in Romania

Source: Own processing from [www.google.ro](http://www.google.ro)

## MATERIALS AND METHODS

The climatic analysis of the crop year 2006 – 2007 and the impact on the vegetation season and production of the winter wheat obtained for the Caracal Plain have used: the meteorological data from the Caracal meteorological station (situated at 112 m altitude) (Figure 1A), the agro-meteorological information elaborated by the National Administration of Meteorology [15], the production data from the Olt Directorate for Agriculture [14], statistic methods, graphics and maps.

The climatic analysis is completed by

calculating the Lang precipitation index and the hidro-thermic index. At these climatic indices, there are added indices which set precipitation values for certain periods of which the annual amount is characteristic [6].

## RESULTS AND DISCUSSIONS

Although the winter wheat can adapt to different climates in order to achieve profitable crops, the climatic factors such as: air temperature, soil surface temperature, precipitation, air humidity etc. have a great importance.

**The air temperature** affects the physiological processes of the winter wheat, thus, for each stage of development, there are upper and lower temperature limits, besides which the thermic stress also occurs, and also temperature limits at which the vital functions cease.

For the crop year 2006 – 2007, in the Caracal Plain, the annual average temperature was 13.8 °C, which is higher than normal. In the Oltenia region, which includes the studied area, farming for the period 1961 – 1990, the annual average air temperature was 10.6 °C, and for the period 2001 – 2008 of 11.4 °C [12], the positive deviations are 3.2 °C and 2.4 °C, respectively.

Analyzing the annual air temperature regime at the Caracal meteorological station, there was recorded an air temperature of 19.5 °C in May, and 23.8 °C in June (Figure 2).

The interval from May to June is the critical period for the winter wheat (earring - flowering - formation and grain filling), the thermic optimum being between 16 °C – 20 °C for May and 16 °C – 22 °C for June [1].

The values recorded are at the limit and beyond, but do not exceed the maximum temperature, between 30 °C and 35 °C. July was very hot, with values of 27.2 °C, forcing the physiological processes, and reducing the vegetation period.

The winter months register positive values between 2.2 °C in December and 4.2 °C in February (Figure 2). At 0 °C and below, the biological activity is stopped and the winter wheat falls during winter. The pronounced winter thermic instability, with relative warm

periods alternating with cold and frosty winter periods, produces injuries to the winter wheat crop.

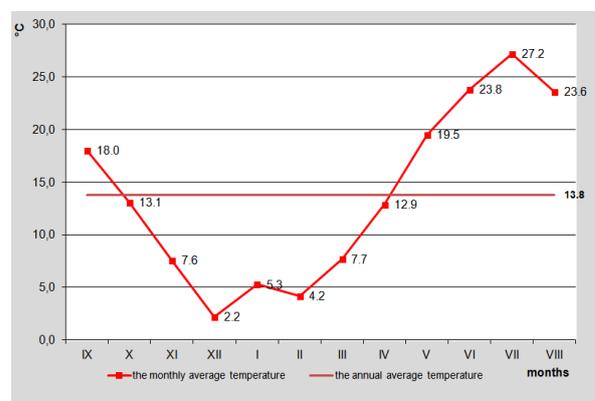


Fig. 2. The annual air temperature regime (°C) at the Caracal meteorological station, in the agricultural year 2006 – 2007

Source: Processed data after ANM

In the periods of maximum demands in comparison with the specific climatic conditions of the winter wheat vegetation processes, the quality and level of production may be affected because of the heat phenomenon.

In the crop year 2006 – 2007, at Caracal, there has been recorded a total of 78.0 tropical days, representing 22 % of the total year. The monthly maximum was in July, of 28.0 days, meaning 90.3 % of the month, the maximum temperature being  $\geq 30$  °C (Tabel 1).

In the same month – July, there has been recorded the highest maximum temperature, of 41.9 °C, while the monthly average of the daily maximum was 35.2 °C (Tabel 1).

During May 1<sup>st</sup> – July 31<sup>st</sup>, 2007, the heat appeared and accelerated, the maximum intensity being between July 15<sup>th</sup> and July 24<sup>th</sup>, 2007.

This phenomenon represents the quantification of the heat (thermic) stress in the critical period of the culture, which through intensity ( $\Sigma t_{\max} \geq 32$  °C/units of heat) and lasting (number of days with heat). In this monthly interval, at Caracal, there were recorder the values: 135.6 units with heat; a total of 37 days with heat (40.2 % of the monthly interval) and 3 intervals with 9 consecutive heat days from June 19<sup>th</sup> to 27<sup>th</sup>; 5 days from July 1<sup>st</sup> to July 5<sup>th</sup> and 17 days between July 15<sup>th</sup> to July 31<sup>st</sup> [12].

Table 1. The distribution of the agro-climatic parameters, at the Caracal meteorological station, in the agricultural year 2006 – 2007

Month	Minimum temperature (°C)	Maximum temperature (°C)	No. of tropical days (t <sub>max</sub> ≥ 30 °C)	No. of days with frost (t <sub>min</sub> ≤ 0 °C)
IX	9.3	30.7	3.0	0.0
X	-1.0	30.6	2.0	1.0
XI	-4.7	20.7	0.0	6.0
XII	-7.5	15.6	0.0	16.0
I	-3.4	18.2	0.0	11.0
II	-8.5	18.2	0.0	15.0
III	-1.3	20.9	0.0	1.0
IV	-1.0	27.4	0.0	1.0
V	2.9	32.0	6.0	0.0
VI	12.2	39.7	18.0	0.0
VII	11.9	41.9	28.0	0.0
VIII	13.7	37.2	21.0	0.0

Source: Processed data after ANM

The high air temperature values during the elongation of the straw emphasize its growth, causing a slight drop resistance, while during the filling of the grain, these temperatures impede a good pollination and fertilization, increasing the phenomenon of fading wheat.

In the crop year 2006 – 2007, the lowest minimum temperature was -8.5 °C in February, when it was also registered the lowest monthly average of the minimum temperatures, of -0.8 °C (Tabel no. 1). The total number of days with frost, when the minimum temperature is ≤ 0 °C, was 51 days, meaning 13.9 % of the year. The highest number of days per month was 16 days in December, meaning 51.6 % of the month. Days with frost were recorded monthly, between November 2006 and April 2007, but for November, March and April, there was registered 1 day/month. (Tabel no. 1). During winter, the wheat can withstand temperatures of -12 °C to -15 °C, for 2 – 3 days, if the hardening phase went well, and by its end, the frost resistance gradually decreases.

**The surface soil temperature** mainly affects the winter wheat germination, emergence and twinning. If the soil temperature values in these phenological stages are higher, the faster the seeds are growing, also depending on an optimal humidity. Also, the soil temperature determines the absorbtion of nutrients and the root system development etc. [10].

At the Cacaral meteorological station, the annual average temperature, at soil surface, for the crop year 2006 – 2007 was of 15.4 °C. In the annual regime, all the months register

positive values, the lowest value being in December: 2.7 °C, while the highest temperature value was in July, 32.9 °C (Figure 3).

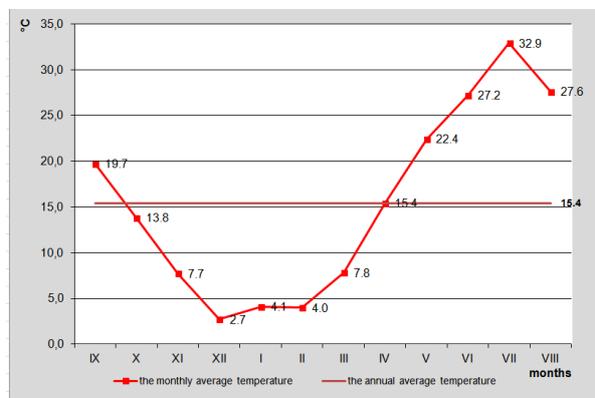


Fig. 3. The annual regime of the surface soil temperature (°C) at the Caracal meteorological station, in the agricultural year 2006 – 2007

Source: Processed data after ANM

In September and October, there were recorded values of 19.7 °C and 13.8 °C, falling to the thermic optimum of 10 °C – 20 °C for the phenological phases of sowing, germination and emergence. In November, when it begins the twinning, the optimum heat is 8 °C – 12 °C, while the recorded value is 7.7 °C. The minimum temperatures for the twinning phase are between 4 °C – 6 °C. Changes in the soil temperature determine the humidity regime and, therefore, modify the conditions of wheat.

**The precipitations** are the natural source of water supply for the soil. The "silent" rainfalls are the most useful to plants, because they are well retained by the soil and its fertility through nitrogen can increase, this nitrogen being brought as nitrates and ammonia salts from the atmosphere [13].

At Caracal, for the crop year 2006 – 2007, there have been recorded annual precipitations of 460.4 mm, these being in a negative deviation, comparing to, both the annual quantity, for the period 1961 – 1990, in the agricultural region of Oltenia of 189.9 mm, and also, for the period 2001 – 2008, with 249.1 mm. In Romania, in the crop year 2006 – 2007, there was recorded an amount of 479.2 mm [12]. As a result, the crop year 2006 – 2007, in terms of the annual precipitations, registered a deficit, comparing to the demands for the optimal growth and

development of the winter wheat crop (600 mm), being a moderate dry year (450 – 600 mm).

In the annual regime, the monthly precipitations recorded between 0.0 mm in April and 129.0 mm, in August (Figure 4).

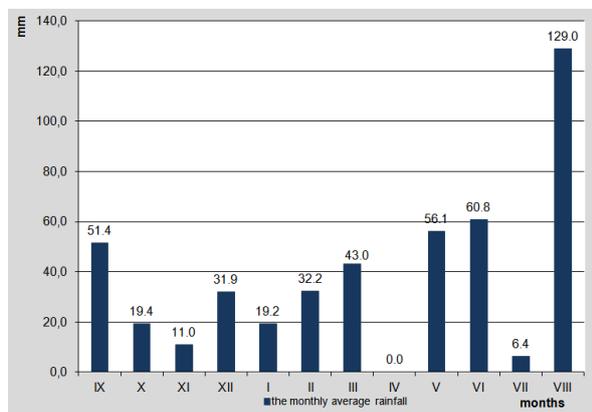


Fig. 4. The annual precipitation regime (mm) at the Caracal meteorological station, in the agricultural year 2006 – 2007

Source: Processed data after ANM

With reference to the monthly amounts of precipitations, there has not been reached the optimum level of precipitations for November (60.0 mm), April (50.0 mm), June (80.0 mm) and July (50.0 mm) [12], the monthly values recorded at the Caracal meteorological station, being less below the optimal limits mentioned before (Figure 4). The greatest demand of water, for the winter wheat crop is during earing period and during early graining of the wheat, meaning from April to June. The precipitations for this monthly interval ( $\Sigma P_{IV-VI}$ ) registered a value of 116.9 mm, being assigned as a mildly dry regime. April was considered excessively dry.

During the period of water accumulation in soil ( $\Sigma P_{XI-III}$ ), the precipitation regime corresponded to a dry one, being of 137.3 mm, thus maintaining the soil water deficit for the winter wheat growing, for the profile 0 – 100 cm. The optimum of precipitation for this period is 200 mm.

During the active vegetation season of the winter wheat crop ( $\Sigma P_{IV-X}$ ), the precipitation regime was dry (251 – 350 mm) being 323.1 mm for the Caracal Plain area.

For the crop year 2006 – 2007, at the Caracal meteorological station, there has been

recorded a total of 63 days with precipitation  $\geq 1.0$  mm, representing 17.2 % of the year. The monthly number of days with precipitations  $\geq 1.0$  mm varied from 0 days in April to 9 days in May.

**The relative air humidity** prevents transpiration, pollination, flowering and fructification at higher values, and at low levels, the transpiration increases and also the water consumption [5]. For the crop year 2006 – 2007, at Caracal, the annual average is 64.8 %. In May, June and July, when there are the phenological stages of flowering and maturity, the relative air humidity values are 58 %, 55 % and 35 % respectively. The optimal values of the relative air humidity to conduct the vegetative activity within this monthly interval, are 60 – 90 %. Values  $\leq 50\%$  of the relative air humidity show a large deficit of moisture in the air. For the same month, the minimum relative humidity was 14 %, 17 % and 11 % respectively (Table 2).

Table 2. The average and monthly minimum relative air humidity (%), at the Caracal meteorological station, in the agricultural year 2006 – 2007

Month	Relative humidity	Minimum humidity
IX	68	26
X	76	30
XI	74	30
XII	87	53
I	72	27
II	73	29
III	68	29
IV	48	18
V	58	14
VI	55	17
VII	35	11
VIII	63	19
an	64.8	25.3

Source: Processed data after ANM

In order to determine the humidity content of the active vegetation season for the winter wheat, in the Caracal Plain, in the crop year 2006 – 2007, there were calculated the Lang precipitation index and the hydro-thermic index.

**The Lang precipitation index or the rainfall factor** (mm/°C) indicates the atmospheric humidity degree. This index is calculated using the formula:  $I_{Lang} = P/T$ , where P represents the annual precipitation quantity, while T is the annual average temperature [9]. At Caracal station, for the period of study, the Lang precipitation index was 33.4. Values

below 70 indicate a mildly dry regime.

**The hydro-thermic index** (units) is calculated after the formula:  $I_h = (P \cdot T) / 1000$ , where P is the annual precipitation quantity, while T is the annual average temperature [9]. At the Caracal meteorological station, the value of this index is 6.3, indicating a moderate drought, same as the Lang precipitation index.

## CONCLUSIONS

The synergy of the agro-climatic parameters is reflected in the reactions of the winter wheat crop, during the successive vegetation periods.

Purpose of an agro-meteorological analysis for an agricultural year is to evaluate vulnerabilities and adaptation measures of agro-ecosystems to climate changes.

In the agro-meteorological terminology, agricultural year 2006 – 2007 it was an extremely dry year and belongs to a series of dry years of the XXI century, so the climatological analysis establishes the importance of the winter wheat variety for the design of new genotypes with raised resistance to extreme temperatures and deficiency of rainfall.

Also, on the basis of such analyzes, it highlights the certainty of change sowing the date for the winter wheat, from September 25<sup>th</sup> to October 20<sup>th</sup>, at present, to October 20<sup>th</sup> to November 10<sup>th</sup>, during future of the climate in south and southeast of the country.

Analyzing the thermic and hydric resources for the Caracal Plain, from September 1<sup>st</sup>, 2006 to August 31<sup>st</sup>, 2007, it has been recorded an air temperature regime more pronounced than normally in winter, spring and summer, which determines a phenology advance of 3 – 4 weeks in the evolution of the winter wheat crop [12].

Along with the air and soil surface temperature regime, the water stress intensified, being caused by the soil drought. All these affected the winter wheat crop which was in the period of flowering, formation and grain filling, milk-wax maturity, causing the intensification of ripening and even compromising by over 50 % the crops.

Taking into account the agro-climatic favourability index of the agricultural land in relation with the bio-climatic demands of the winter wheat, the Caracal Plain belongs to the 1<sup>st</sup> area of favourability, subzone no. 3 [11]. Despite it belongs to the most favourable area, the Caracal Plain is situated in the area with the most frequent droughts, that is why irrigations are needed during the periods with maximum demands of water.

The thermic and hydric oscillations cause large variations for harvests from year to year. The crop year 2006 – 2007 is a reference year for the first decade of 21<sup>st</sup> century, in terms of drought in Romania, being related to the compromised crops on large arable land.

The direct consequence of the climate, in the agricultural year 2006 – 2007, is the production of winter wheat obtained in the Caracal Plain area. The winter wheat productions are presented for several administrative units of the studied area in the Table 3.

Table 3. The cultivated area and the winter wheat production, in the Caracal Plain, for the agricultural year 2006 – 2007

Locality	Surface (ha)	Production (tone)
Caracal	1,415	1,157
Corabia	3,995	2,596
Babiciu	1,440	764
Brastavățu	4,025	2,688
Cilieni	1,874	1,180
Deveselu	1,305	1,089
Dobrosloveni	1,763	2,478
Fălcoiu	850	417
Izbiceni	1,228	388
Rusănești	2,154	1,954
Stoenești	901	564
Studina	1,521	915
Tia Mare	1,635	1,387
Vișina	1,514	1,248
Vlădila	1,194	964

Source: Processed data after DADR Olt

In conclusion, there was obtained an average of 1.4 tons of winter wheat per hectare, representing a low production in comparison with the bio-climatic potential of the area.

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## THE EVOLUTION AND IMPACT OF FOREIGN DIRECT INVESTMENTS IN ROMANIA

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### **Abstract**

*This study approaches the topic of foreign direct investments in Romania and their role in the sustainable development of the economy. The aim of the paper was to emphasise the role of foreign direct investments on the sustainable development of Romania's economy and their impact on economic growth and business environment development. The research was based on statistical indicators related to foreign direct investments, published by the National Bank of Romania. The indicators for which we performed a dynamic analysis of the data series were: the FDI per economic activities and the FDI per development regions. The data covered the interval between 2003 and 2014. The results indicated an upward trend in the case of foreign direct investments in Romania. Foreign direct investments had a direct and highly significant correlation with the gross domestic product.*

**Key words:** foreign direct investment, Romania

### **INTRODUCTION**

Investments are a need in the establishment of a competitive economy, in narrowing gaps between the level of the economy in Romania and the one in the developed countries.

Investments represent the economic factor in the form of material, financial and labour resources, whose purpose is to replace obsolete means of production, improve already existing means of production or create new means of production, in order to obtain economic effects in time and whose total is higher than the initial expenditures. [5]

The investments that are obtained must be channelled towards those economic sectors which contribute to sustainable economic growth – agriculture, tourism, the processing industry – and not towards speculative sectors, such as the real estate or retail sectors.[4][2]

According to the UNCTAD definition, the foreign direct investment (FDI) represents a long-term relationship which reflects the investor's lasting interest and his actual possibility to control the entity located in the foreign country where the investment is made. The foreign direct investment is the long-term

investment relationship between a resident and a non-resident entity; it usually involves a significant degree of influence exerted by the investor on the management of the direct investment enterprise in which he has invested. Direct investments include the paid-up capital and the reserves related to a non-resident investor holding at least 10 % of the subscribed share capital of an enterprise, the loans between the investor and the enterprise he invested in, as well as the profit he reinvested. [8]

Foreign direct investments trigger positive effects both at macroeconomic and at microeconomic level, indicated by economic growth, the creation of new jobs, of new production facilities and also by the increase in contributions to the state budget, as a result of taxes paid by the new tax-payers.

Foreign direct investments also have a positive effect on national manufacturers who will invest in their turn, as they want to streamline their activity, as well as to have the possibility to become suppliers of the foreign business partner. [7]

Increased attention paid to the domain of foreign direct investment is justified by the fact that they are a booster for economic

growth and they do not generate external debt, as they are complementary to domestic investment. [4]

Foreign direct investments are considered a unique solution with high opportunity for success in narrowing competitiveness gaps which separate the economies of developed countries from the economies of emerging countries. [3]

Foreign direct investments are generally attracted by countries with political and economic stability. Practice has shown that developed countries, in capacity as main receivers of FDI, obtain significantly higher benefits than emerging countries. Their main positive impacts are: economic growth, stimulating domestic investments, supporting reorganisation and privatisation, supporting the increase in state budget revenues. Nevertheless, it is also possible they will have a negative impact, both at macroeconomic and at sectorial level. These negative effects are generally visible on a short term, their occurrence being closely related to implementing and streamlining the investment. [1]

In terms of sustainable development, foreign direct investments trigger the improvement in life quality for those who take the new jobs. As a result of the increase in the supply of goods and services, there is a decrease in prices. But foreign direct investments can also trigger negative effects in the context in which foreign companies have monopoly.

The aim of the paper was to emphasise the role of foreign direct investments on the sustainable development of Romania's economy and their impact on economic growth and business environment development.

## **MATERIALS AND METHODS**

The research was performed based on the statistical data obtained from the Tempo-on line database and the Reports of the National Bank of Romania on foreign direct investments. We considered an interval of 12 years, respectively 2003-2014. The analysis methods employed in data processing were: the comparison method, the indices method,

the correlation method and the regression method.

Using the comparison method, events are compared in time and space.

Considering that the indices present the evolution of a phenomenon schematically, but also emphasise the annual growth rhythms [6], in the case of foreign direct investments we used the FDI per economic activities and the FDI per development regions.

The correlations and regressions were calculated using the statistical tool in Excel, useful in analysing, simulating and interpreting the results.

## **RESULTS AND DISCUSSIONS**

Foreign direct investments are an important element in the economic development of any country and in its operation, considering the market economy principles. Foreign direct investments have been a very important solution to sustainable economic growth in Romania, taking into account the fact that the economy can be modernised by importing advanced technologies, highly effective machinery and equipment, as well as by implementing new quality standards.

If we analyse the dynamics of the foreign direct investment balance in Romania, we notice an upward trend. Thus, the FDI balance increased by 523% in 2014, as compared to 2003 (fig.1). The increase may be explained by the fact that foreign investors saw the possibility to obtain relatively high profits from the Romanian economy, in the form of greenfield investments, merger-buyouts or purchases.

We notice that, starting with 2008, when the economic-financial crisis also affected Romania's economy, the foreign direct investment balance cumulated very slow growth rhythms.

The situation may be explained by the significant decrease in or even discontinuance of investments out of the net profits obtained by foreign investors, taking into account that there were investors who suffered great losses.

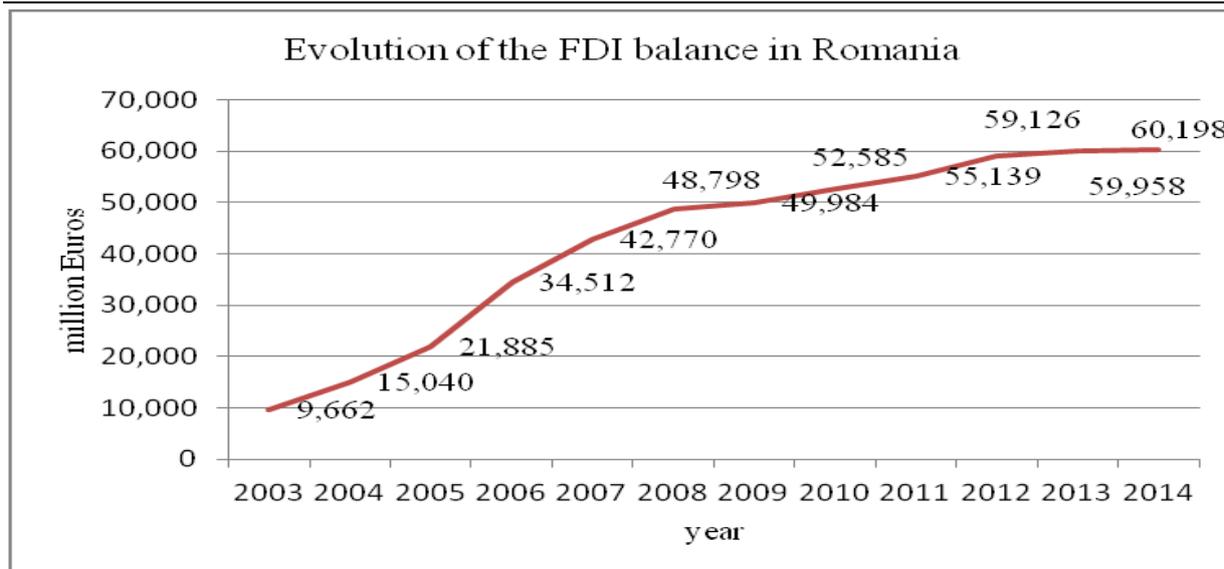


Fig.1 Evolution of the FDI balance in Romania in the interval 2003-2014  
 Source: NBR Reports- foreign direct investment in Romania 2004-2015

At the end of 2014, the foreign direct investment balance amounted to EUR 60,198 billion, namely 23.4% higher than in 2008 and only 0.4% higher than in 2012.

In terms of the foreign investors' interest in economic sectors, we may notice that industry fills the first position, with a ratio of 51% in 2003 and 48.7% in 2014.

We may notice that, during the analysed

interval, foreign investors were also interested in financial brokerage and insurance, which include the banking activity, non-banking and financial institutions and insurance ones, the highest ratio in this sector being 23% in 2007. (fig.2)

Another activity that attracted important FDI is commerce.

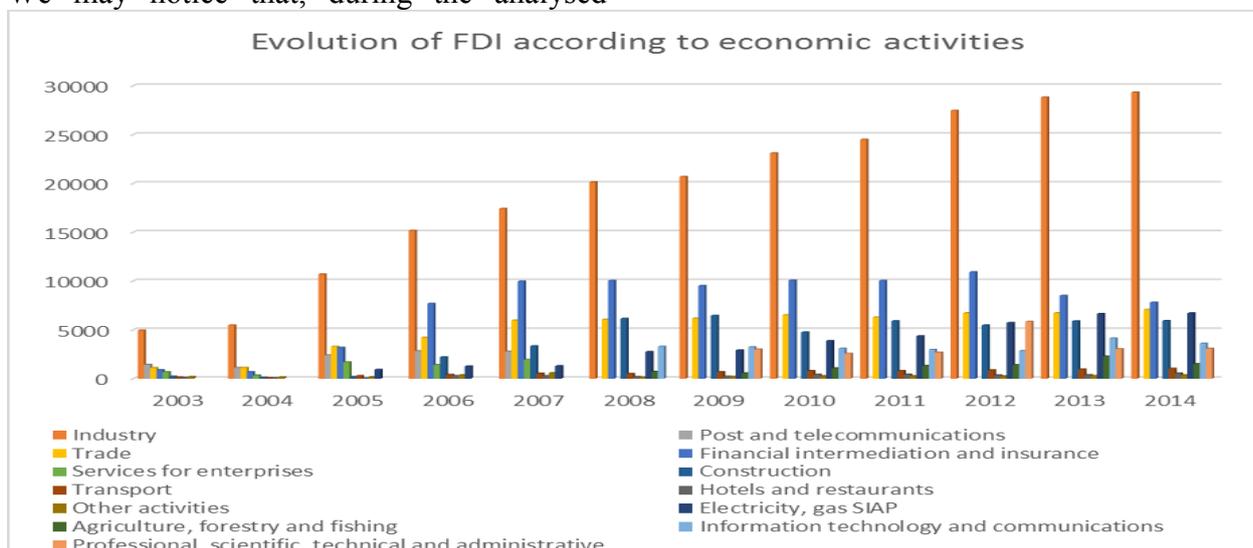


Fig. 2. Evolution of FDI according to economic activities in Romania in the interval 2003-2014  
 Source: NBR Reports- foreign direct investment in Romania 2004-2015

We noticed a low ratio, compared to the potential, in the case of domains such as transport, hotels and restaurants, with ratios of approximately 2%.

Since 2008, foreign investments have been attracted in domains such as agriculture,

forestry and fisheries, as well as the information technology and communications. But, the ratios in agriculture, forestry and fisheries are not significant, ranging from 1.1% to 3.8%. The need to increase investments in agriculture is given by the

advanced wear and tear of the assets, which triggered negative effects on labour productivity and production costs.

In the domain of information technology and communications, the ratio of foreign direct investments range from 4.8% to 6.7%.

In terms of regions, foreign direct investments are mainly oriented to the Bucharest-Ilfov region, with a ratio exceeding 50%. During the analysed interval, FDI recorded an increase of 581% in 2014 as compared to 2003.

The next regions that benefited from FDI during the analysed interval are: the Centre region, where the FDI increased in 2014 as compared to 2003 by 823%, the South-Muntenia region, and the South-East region,

but the ratio of foreign direct investments in this region out of the total FDI does not exceed 10%.

The North-East region is the least attractive to foreign investors and this is where the lowest ratio is recorded for FDI out of the total foreign direct investment, of approximately 2%.(fig3) Nevertheless, we notice that the volume of foreign direct investments increased by 669% in 2014 as compared to 2003. This region is avoided by foreign investors due to the faulty transport infrastructure, as well as long distance from the western part of Europe. But foreign investors should consider the labour cost in this region, which is very low.

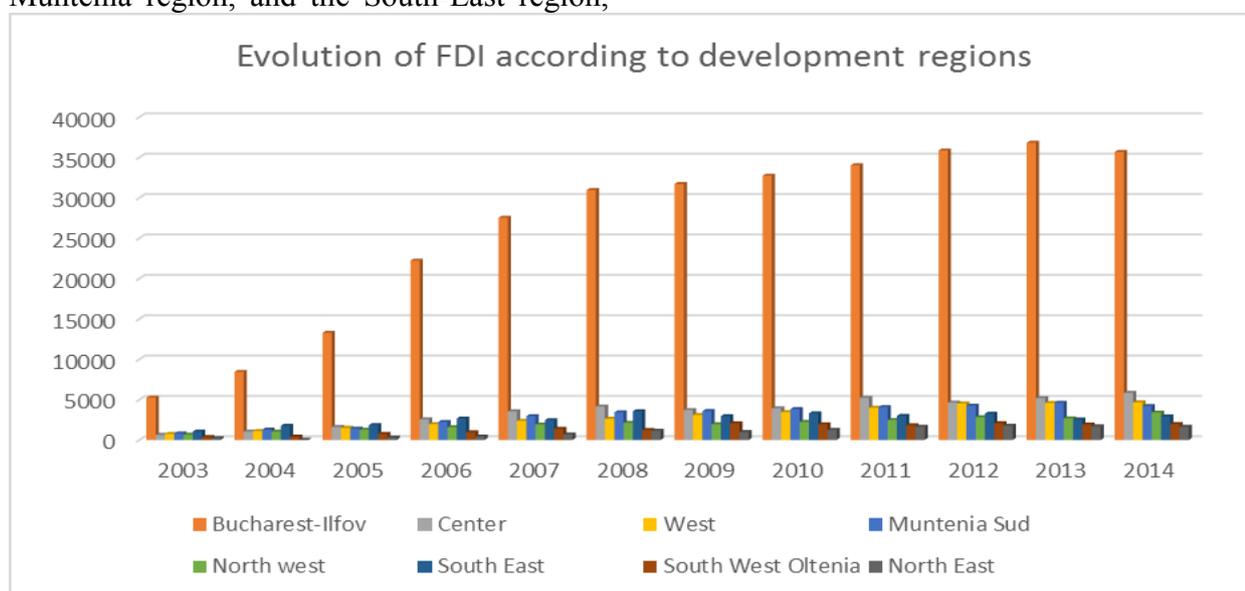


Fig. 3. Evolution of FDI according to development regions in the interval 2003-2014  
 Source: NBR Reports- foreign direct investment in Romania 2004-2015

We must mention that, in the territorial dispersion analysis of FDI, we must also consider the fact that the statistical research located the FDI in the territory according to the headquarters of the direct investment companies, which does not always correspond to the place where the economic activity is performed. (the NBR report)

To analyse the impact of foreign direct

investments on economic growth in Romania in the interval 2003-2014, we used the econometric modelling method, by means of the Excel software, the Data Analysis module. In order to emphasise the influence of the foreign direct investment balance on economic growth (GDP) in the interval 2003-2014, we used the econometric modelling method (Table 1).

Table 1. Economic indicators used in the econometric study (Billion EUR)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
FDI balance	9.6	15	21.9	34.5	47.7	48.7	49.9	52.5	55.1	59.1	59.6	60.1
GDP	52.6	60.8	79.5	97.7	123.7	139.7	118.2	124.4	131.3	132.	140.6	202

Source: NBR Reports- foreign direct investment in Romania 2004-2015

Thus, we will analyse the relationship between the foreign direct investment balance, which is the independent variable, and the gross domestic product, considered the dependent variable.  $Y = a + bx + c$ , where:  
 $Y$  = Dependent variable, the GDP;

$X$  = Independent variable, the foreign direct investment balance;  
 $a$  = free term;  
 $b$  = independent variable parameter;  
 $c$  = equation error term

Table 2. Regression function results

<i>Regression Statistics</i>	
Multiple R	0.856694
R Square	0.73392461
Adjusted R Square	0.70436068
Standard Error	19.9076481
Observations	11

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	9838.506	9838.506	24.825	0.000757
Residual	9	3566.83	396.3145		
Total	10	13405.34			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	30.7504037	19.4097	1.58428	0.147591	-13.15739	74.6582	-13.1574	74.6582
	9.6	2.02572198	4.982469	0.000757	1.105997	2.94545	1.105997	2.94545

Source: own calculations

Based on the data in Table 2, the regression function is the following for the foreign direct investment balance:

$$Y = 30.750403 + 2.025721x$$

The value of the correlation coefficient between the foreign direct investment balance and the gross domestic product is 0.856694, and, as it is close to the value of 1, it indicates that there is a close correlation between the two variables, therefore the increase in the foreign direct investment balance triggers the increase in GDP. Foreign direct investment caused a direct and highly significant correlation on the gross domestic product.

The determination coefficient  $R^2$  recorded the value of 0.73392, which indicates that 73.3% of the gross domestic product variation was caused by the variation of the foreign direct investment balance.

As the Fisher test value was 24.825 and the probability was 0.000757, we accept that,

overall, the simple linear regression model is valid.

As there is a direct and very close connection between the two indicators, we can estimate that an increase by EUR 1 billion in the foreign direct investment balance will trigger an increase in the gross domestic product of EUR 2.0257 billion.

The results obtained using the econometric model emphasise the contribution made by the foreign direct investments to the sustainable development of Romania's economy.

**CONCLUSIONS**

The foreign direct investment balance in Romania took a positive trend in in the interval 2003-2014, as a result of the fact that investors saw the possibility to make a profit from greenfield investments, merger-buyouts or purchases.

In terms of the foreign investors' interest in

economic sectors, we may notice that industry fills the first position, but important FDI ratios are also found in the domains of financial brokerage and insurance, as well as commerce.

The agricultural sector, a very important sector in Romania's economy, recorded low ratio values in terms of the amount of foreign direct investments. The need to increase investments in agriculture is given by the advanced wear and tear of the assets, which triggered negative effects on labour productivity and production costs.

In terms of regions, foreign direct investments are mainly oriented to the Bucharest-Ilfov region, with a ratio exceeding 50%, whereas the North-East region is the least attractive to foreign investors and it records the lowest ratio of FDI out of the foreign direct investment, of approximately 2%

The impact of foreign direct investments on the gross domestic product emphasised a positive relationship between these two macroeconomic indicators, which had a positive impact on economic growth. Based on the research results, we noticed that the connection between the amount of foreign direct investments and the gross domestic product was of high intensity, the correlation coefficient value being 0.856694, and the determination was 73.3%. Therefore, this positive impact triggered streamlining the use of resources in the economy.

It is necessary to perform activities to attract a number of foreign investors as large as possible, who will contribute to the development of investment activities that will lead to an increase in the number of jobs, population incomes, to a decrease in poverty, as well as to recording superior macroeconomic results.

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## THE IMPACT OF CORPORATE SOCIAL RESPONSIBILITY ON THE COMMUNITY. CASE STUDY.

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### Abstract

*In the paper, starting from the more common examples of companies supporting social activities of the communities, we proposed a study of the impact of these activities on the main categories of beneficiaries. As a research method, the quantitative study was used by means of the questionnaire, applied face to face by the interviewers, on a sample of 301 persons, in the period October - December 2015, in the South Muntenia Development Region, from Romania. The responsibility to the society can be a very powerful differentiate element for the companies, as the consumers begin to be more receptive to the messages of those who aim the sustainable development of society than of those who are passive on this aspect and are perceived as having the profit as the sole aim. In Romania, researches were not made on the consumers' attitude towards the social responsibility of the companies, interviewed persons, they had to be explained the concept in order to participate in the enquiry. Among the responses of the interviewed persons, 82 percent, consider that the companies assume a series of social responsibilities, to the extent that the effects are beneficial for their profit. In conclusion, we can say that the investigated population perceives the organizations as being in the early stage of implementing social responsibility initiatives.*

**Key words:** community, economic profile, education option, perception, social responsibility

### INTRODUCTION

In the context of globalization process accelerating, the companies are forced to develop new strategies to remain competitive on long term. Increasing the quality of goods and services provided and maximizing short-term profit are not enough. Adopting a socially responsible behaviour, the companies gain many advantages, differentiate from the competitors and contribute to the sustainable development [6]. Different audience categories put higher pressure for developing economic activities in a responsible way.

These trends manifest increasingly stronger in Romania too, especially after joining the European Union. Beyond the social responsibility that organizations have to the communities they belong to, such programs become marketing tools that bring undeniable benefits of image, exceeding the status of mere producers of goods and services, by programs that generate not only long term results, but also attitude [2]. Bowen (1953) mentions that the owner, the businessmen

and, the managers must “assume consciously the responsibility for the common well and to stop their own interest and authority when exercising them harms them and harms the individual freedom” [1].

What is the perception of the beneficiaries of the evidence of social responsibility? Who are they, what are they, how they think, how they act and especially react to the company intentions and actions? This study proposed to answer these questions.

### MATERIALS AND METHODS

In order to obtain valid information on the impact of social responsibility actions made by the companies in Romania for employees, customers and other economic and social categories, a study based on survey was designed, during October - December 2015 and involved the following steps: (1) formulating the research hypotheses, (2) designing the questionnaire (3) selection of the investigated population, (4) selection of the respondents sample (5) information

collecting and processing. As a research method, the quantitative study was used by means of the questionnaire, applied face to face by the interviewers, on a sample of 301 persons in the urban area, in the South Muntenia Development Region.

The questionnaire comprises 13 questions and was divided into two parts. Part I, the contained filter questions on age, education of the interviewed persons, field of activity, the position they have in the place of work. Part II contains 9 questions and it serves directly the purpose of the research, aiming to track the specific aspects on knowledge of the notion and initiatives of social responsibility, personal involvement in such initiatives, the main reasons why the companies in Romania practice social responsibility, the modalities for the companies involvement, causes that should be supported by the companies in the context of this concept, other aspects.

## RESULTS AND DISCUSSIONS

Many researches made during the last decade underline the importance of the responsible and sustainable corporatist behaviour. ("M. Hopkins (2006) puts the findings in the context and measures their meaning for the near future") [5].

A healthy society needs healthy companies and vice versa. No social program can rival the business sector when it is about creating jobs and improving the living standard. Moreover, the feeling of involvement of the employees of a company must not be underestimated, who following such an action feel they are part of an important and impact action [4].

Those who support the social responsibility actions use four arguments to sustain the case: moral obligation, maintaining on the market, reputation and operation license. The greatest weakness of the social responsibility programs results from the fact that they are not interconnected with the business [3]. Consequently, the companies must identify, prioritize the actions which have the greatest impact on the consumers' group they address to.

Regarding the level of studies of the interviewed persons, the predominant level is high school – 52 percent, followed by faculty level - percent, secondary and vocational studies -19 percent, and 5 percent, post university studies. The respondents' age, is contained between 18 and 70 years old. The share, on age categories, is represented by the segment 35- 59 years old, with a percent of 54. Persons with different positions and studies were interviewed, just to give an image closer to the reality of the conceptions on the perception on the concept of social responsibility. At the question "Do you know the concept of social responsibility", 49 percent of the respondents answered YES and a percent of 51, NO. At the question "In you opinion, the social responsibility must be practiced rather by": a) companies; b) NGOs; c) state institutions, a percent of 34 of the respondents associate the concept of social responsibility as being specific to the public institutions, 21 percent, of NGOs and 45 percent, of companies (Fig. 1).

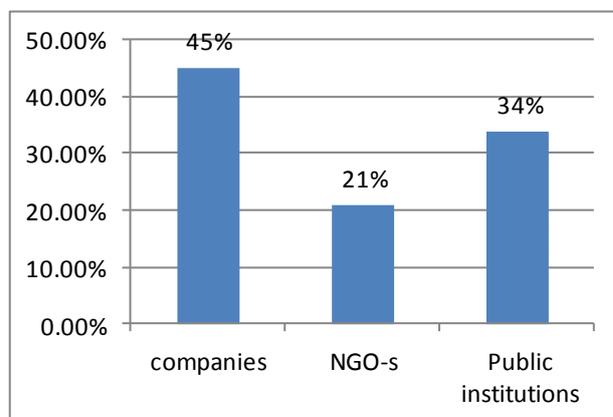


Fig. 1. The structure of the answers regarding the social responsibility practicing

At the question "Were you involved in initiatives of social responsibility", 31 percent, answered YES and 69 percent, answered NO. It is remarked the fact that, those who were involved in such actions, are most of them from the age segment 35- 59 years old, have studies – faculty level and management positions.

Among the responses of the interviewed persons, 82 percent, consider that the companies assume a series of social

responsibilities, to the extent that the effects are beneficial for their profit.

At the request: "Evaluate the following initiatives, according to a scale from 1 to 5 (1= the least important initiative, 5= the most important initiative) depending on the importance you give to it", 43 percent, of the respondents, consider as being priority those who aim their own employees, 12 percent, support the talents, 19 percent, those which support contests and other actions in the educational sector, 11 percent, those which support actions in the health sector, 8 percent, those which support the persons found in poverty situations and social exclusion ( Fig. 2, Table 1 ).

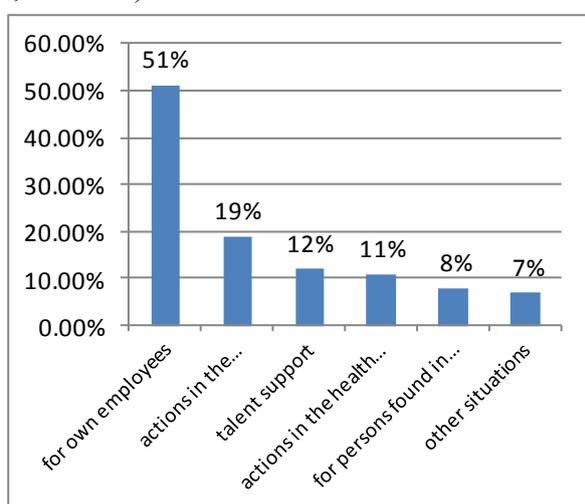


Fig. 2. Prioritization of actions of social responsibility

Table 1. Affirmation evaluation

Nr crt	Affirmations	Evaluation				
		1	2	3	4	5
1	Environment protection	40%	26%	12%	12%	10%
2	Talents support	14%	14%	20%	20%	32%
3	Contests and other actions in the educational sector	6%	2%	4%	42%	46%
4	Actions for their own employees	0%	0%	1%	25%	74%
5	Actions in the health sector	12%	6%	16%	30%	36%
6	Persons found in poverty situations and social exclusion.	50%	9%	9%	16%	16%

Among the respondents, 91 percent, would like to work for those companies that they perceive as socially responsible and they can even be committed and proud to work for such companies.

At the request: "Make a hierarchy of the

below factors, which could encourage the actions of social responsibility (1= the least important factor, 5= the most important factor) depending on the importance you give to it", 87 percent, consider that the favorable fiscal legislation would be the main argument. At the question "The actions of social responsibility serve to the interest of": a) the employees; b) community; c) organization, a percent of 22 answered they serve to the community interest and a percent of 71 answered they serve the organization interest, to make known and to increase the sales. A percent of 7 answered that the actions sever to the employees interest, which become proud of the organization they work with (Fig. 3). As regards the respondents' involvement level in such activities, 56 percent, answered favorable.

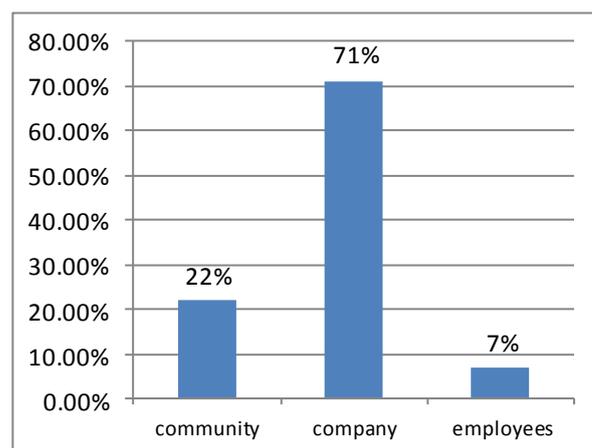


Fig. 3. Whom do the actions of social responsibility serve to?

At the question "In case, the organisation you are part of, would initiate actions of social responsibility, would you prefer to be": a) passive observer; b) participant; c) coordinator, a percent of 58 answered that they would participate, a percent of 26 answered that they would like to be coordinators of the actions and a percent of 16 answered that they would not like to involve, but to remain only observers (Fig. 4).

At the question if and how much they would be willing to pay for a product if they had the certainty the a part of its value would be directed to actions for the community, 52 percent, answered that they would not pay

extra, but they would buy more products, because it is the company obligation to be responsible to those who use the services or buy the products.

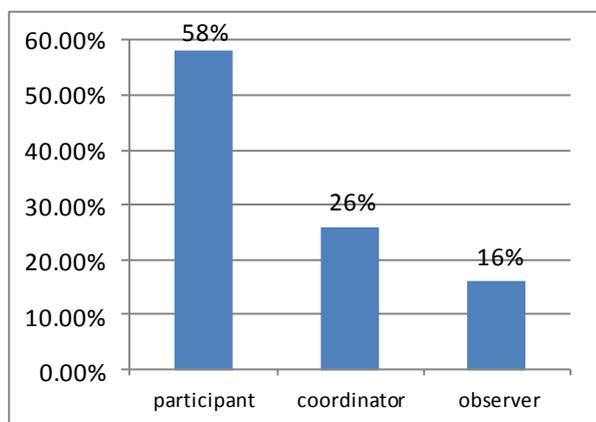


Fig. 4. Modality of involving in actions of social responsibility

So, the consumers know more and more their rights and learnt to ask for responsibility from the companies.

## CONCLUSIONS

As a main conclusion of this study, the social responsibility must become an integral part of company strategy. Thus, it has the guarantee that the company assumes responsibility to the society, by programs that generate not only long-term results, but also attitude.

At the microeconomic level, the activities of social responsibility can generate a series of positive aspects: creating an environment of trust and pride for the company employees, it generates developing some strategies to avoid or minimize the risks and benefits at financial level. The positive contributions to the social development must be considered by the companies as long-term investments in strengthening a safer, better educated and more responsible community life [7].

There is a positive correlation between the age of the interviewed persons and the frequency they indicated that they implemented social responsibility actions, correlation that remains also for the positions held in the companies and the number of social responsibility initiatives that they developed. Thus, the age category 35- 59, the majority of respondents have higher education and hold management

positions, most active in this respect, compared to other socio-professional categories and age.

One of the questions that management had to respond over time, was whether the activities they undertake to be others than those aimed at maximizing profit. It appears, however, that corporate social responsibility is a marketing tool that can bring profit. The first community for which a company has to be responsible is made by its very employees. The other community on which the responsible spirit of the companies spread is the public.

In conclusion, we can say that the investigated population perceives the organizations as being in the early stage of implementing social responsibility initiatives.

There is a significant positive correlation between the extent to which such initiative are implemented and their managerial performance, given that 71% of the respondents perceive these initiatives as being in the favor of the organizations, that advertise, keep loyal customers and increase their profit.

The companies perceived as being socially responsible can benefit by wider and more satisfied customers, the present study regarding the community's perception on the social responsibility of the company, demonstrates this very aspect.

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## THE STUDY OF THE ROMANIAN LEASING MARKET DYNAMICS DEPENDING ON THE EVOLUTION OF THE DOMESTIC CREDIT

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### *Abstract*

*The domestic credit is one of the essential indicators of a national economy. In this context, the paper aimed to analyze the credit influence on the national economy and its effects on the economic development. Also, an important part of the domestic credit is represented by the market of leasing credits, alongside the investment credits or the mortgages. Their evolution is presented in detail in this paper. As a conclusion, the increase of the domestic credit helped at the formation of a stability at a macro-economic level, contributing to maintaining an economic growth and an economic recovery after a difficult period.*

**Key words:** credit, economy, leasing

### INTRODUCTION

The credits are an important way of mobilizing the capital and transporting it from the fund holders to the people or holdings which want to invest. This process is contributing at the development of the national economy, by funding the investments and acquisitions of all types [3, 4].

The credits come in a variety of types, these types containing leasing credits, which help an individual or a legal entity to buy a specific type of capital.

The simplest definition of leasing credits mentions that these credits are a modality to obtain funds for the acquisition of vehicles, equipment or estate.

The transactions are made through leasing societies [1, 6].

The leasing market is formed from societies which have to meet at least two requirements: it must prove in papers that its activity object is 'leasing' and it must have the sum of minimum 50.000 lei as joint stock.

These societies can register at the Romanian National Bank (BNR) and they can also register within The Romanian Leasing Societies Association (ASLR), The Romanian Operational Leasing Societies Association (ASLO) or The Romanian Financial Societies

Association (ALB).

These societies generate annual statistics related to leasing credits in Romania and provide valuable information regarding the leasing market evolution.

From the acquisition point of view, the leasing can be classified into several categories. We are focusing in this paper on the financial and the operational one. While the financial leasing refers to the fact that, at the end of leasing period, the bought asset can be considered in the buyer propriety and he takes the risks and the benefits related to this propriety right starting from the moment when the contract is signed, the operational leasing is focused on the usage of the asset, the user returning the asset at the end of leasing period [5, 8].

The leasing credit is an important part of the domestic credit, which includes several types of credits, such as mortgage or investment credit [2, 6].

The mortgage refers to the acquisition of estate and the investment one has as principal object the funding of public or private investment.

From the creditor point of view, the domestic credit is classified in governmental credit and loans for the private sector.

## MATERIALS AND METHODS

This study is based on the data taken from the databases of leasing societies associations (ALB [6] and ASLO [7]), from the publications of BNR [5] and from the publications of The National Institute of Statistics [8]. These data are then analyzed, observing the phenomenon and the evolution from the leasing market within the monetary and capital market. At the end, we will try to describe a trend line for the future.

## RESULTS AND DISCUSSIONS

The Romanian leasing market is in a permanent change and depends on the multitude of factors, being influenced by the interdependency between markets. Thus, a decrease of leasing market results from the decrease of the number of bought vehicles and the investments made within a national economy and an economic growth leads to a better development of the leasing market.

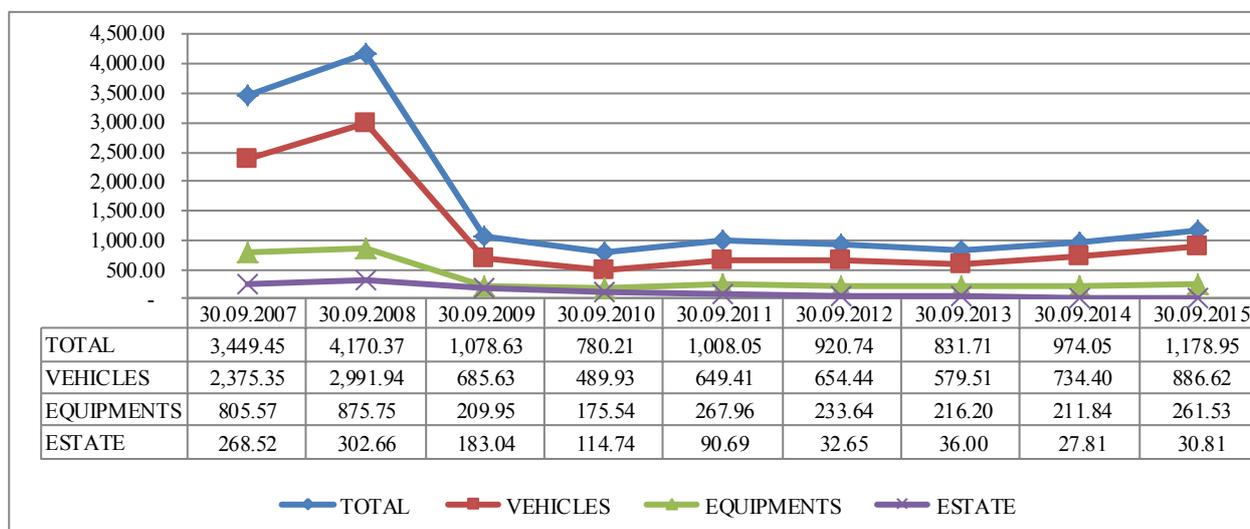


Fig. 1. The evolution of financial leasing (quarterly growth)  
 Source: Own determination based on the data provided by ALB and ASLO

Next, we will present the evolution of the recorded an increase of over 50% faced to the same year of 2010, with some oscillations in 2012 and 2013, inherent to a recovery period within this phase of the economic cycle. leasing market for the two important types of leasing: financial and operational. Figure 1 presents the evolution of the financial leasing and Figure 2 the evolution of the operational leasing.

As we can observe in Figure 1, the evolution of the total numbers on the financial leasing market is an oscillating one.

Although in 2009 this market had known an extremely large fall (from over 4 billion euro in 2008 to 780 million euro in 2010), because of the effect of economic crisis, which led to a littler or bigger general decrease of all the economic sectors. This decrease of approximately 81% represented a minimum

point of the leasing market in the period 2007-2015, from this point of view the market recording a slight recovery. Thus, the estimation in 2015 had recorded an increase of over 50% faced to the same year of 2010, with some oscillations in 2012 and 2013, inherent to a recovery period within this phase of the economic cycle.

The numbers which show the leasing market evolution for vehicles are similar to the total ones, the evolution of the operations on this market fitting to the model of the evolution of total numbers, maybe due to the fact that the vehicles represent a major part of the sales and acquisitions on the leasing market.

The evolution of the equipment market has not recorded such a sudden fall, because the equipment market is secondary on that market. As in the case of vehicle leasing, a growth trend can be seen, even if between

2011 and 2013 a slight decrease can be observed in the number of sales.

The leasing in estates has been the less influenced by the moment of economic crisis. Though, it recorded a decrease of approximately 40%.

A fall trend can be observed in this sub-market, probably because the less number of investments in this area after this unquiet period of economic bereavement and oscillations harmful to national economies.

A prolonged effect of this moment can be observed, because of the high risks of investments in buildings destined to businesses.

Figure 2 presents the evolution of the operational leasing from 2007 to 2015 (estimation in this year).

Unlike the financial leasing, the operational one had an approximate constant increase, given by the nature of this leasing.

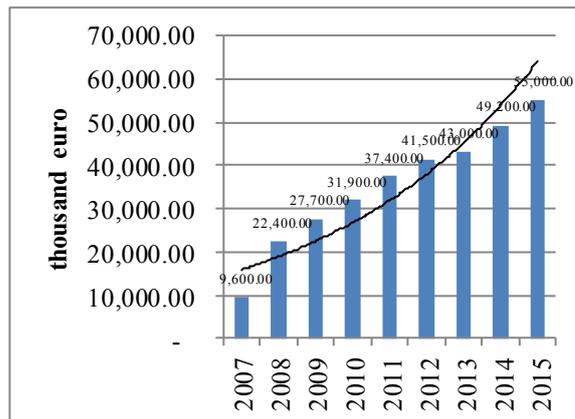


Fig. 2. The evolution of financial leasing quarterly growth)  
 Source: Own determination.

Besides a less increase in 2013 than in the other years and a sudden increase in 2008 from 2007, the operational leasing market has no surprises to offer in the domain of sales evolution.

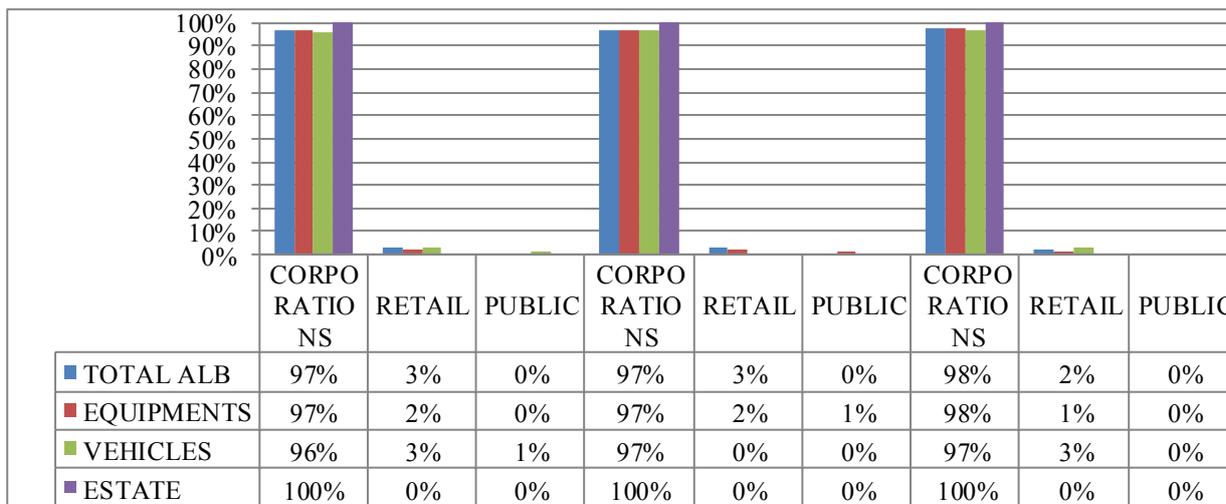


Fig. 3. The Romanian financial leasing market by the user category (30.09.2013-30.09.2015)  
 Source: Own determination based on the data provided by ALB and ASLO

Now, we will study the leasing market from the point of view of categories of leasing credit users, presented in Figure 3.

As it can be seen, the majority of clients of leasing credits are the corporations in the case of all the three categories of sub-markets of leasing market and we can talk about a monopoly of this type of clients on the market. The category which contains the retail-type clients represents a very little part

of this market and the public clients are almost non-existent on this market.

The leasing market is an integrant part of the Romanian credits market, implicitly existing a strong interdependence between these two markets. Thus, even if the leasing credit had a decreasing trend, the domestic credit grew in 2007-2012, as Figure 4 shows.

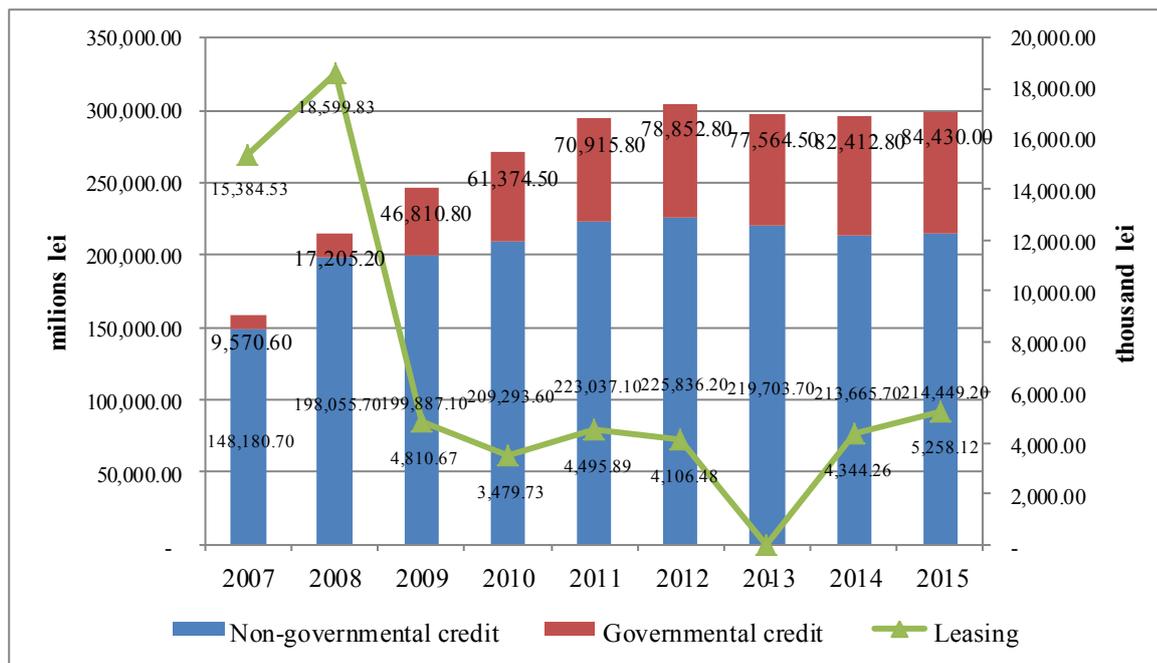


Fig. 4. The compared evolution of the domestic credit and leasing credits  
 Source: Own determination based on the data provided by BNR.

In the figure above, it can be observed that the moment of the economic crisis had not influenced very much the domestic credit. The two components of the domestic credit,

governmental and private, had a slightly similar evolution, the both values growing up in 2007-2012.

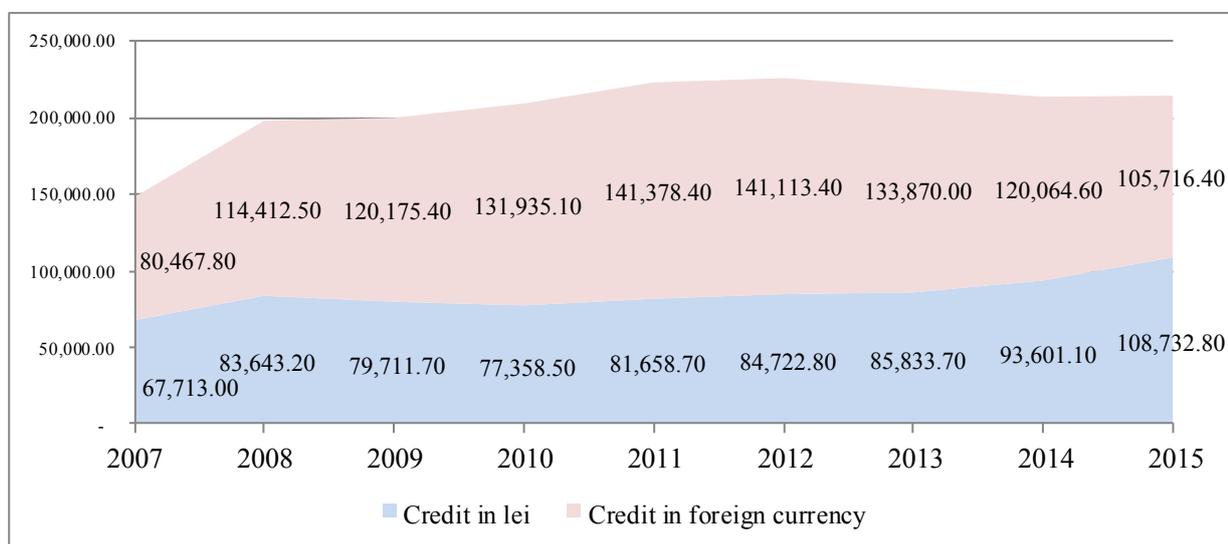


Fig. 5. The compared evolution of the domestic credit and leasing credits  
 Source: Own determination based on the data provided by BNR.

Starting from this point, the value of the domestic gross started to have an oscillating period, having quite an unpredictable behavior.

The value of the credits given to the private sector had a smaller increase in 2008-2010, in Figure 4 being observed the dynamics of the

private credit for its two categories: in lei and in other currencies.

A bigger preference for credits in other currencies can be observed in 2007-2012, given to the relatively low stability of the ratio leu/euro. Due to this fact, the credits in lei had a decrease in 2007-2013. Although, a trust

given to this types of credits by the customers can be observed and, implicitly, a recovery of the credit values in the national currency.

The credits in foreign currencies have a decreasing trend starting from 2013, confirming the decreasing tendency of the value of credits given to the private sector. This thing is owed to the stabile rate of the currency of leu in front of the foreign currencies, stabilizing itself after a difficult period of the national economy.

Thus, the behavior of the value of the non-governmental (private) credits can be seen in Figure 5.

## CONCLUSIONS

The increase of the domestic credit helped at the formation of a stability at a macro-economic level, contributing to maintaining an economic growth and an economic recovery after a difficult period from this point of view.

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## RURAL ENTREPRENEURSHIP IN ROMANIA: IMPORTANCE, PREMISES AND LIMITATIONS

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### Abstract

*Both in Europe and Romania, small and medium enterprises (SMEs) are predominant in both the total number of enterprises and in terms of number of employees. According to European Commission, in Romania, SMEs account for 99.9% of total number of enterprises, provide employment of 67.2% of total employment in the private sector and generate 49.6% of gross value added. Therefore SMEs directly affect employment and economic growth in the area. It is widely recognized that the role of SMEs in the national and regional economy is very important because they contributes in a large proportion to the achievement of the country's gross domestic product (GDP) and provide jobs for a large number of people. Therefore the economic recovery largely depends on the improvement of SMEs' performance. In Romanian rural areas, entrepreneurship still encounters a large number of vulnerabilities and there is an important need to create the means for the rural entrepreneurs to have access to finance, professional advices and support and to benefit from a better and modernized infrastructure. In this research, our main purpose was to investigate and analyse the role played by the rural SMEs as an important factor that can generate and increase the development of the Romanian rural areas. On this path, we are going to analyse the premises and challenges of the entrepreneurship in rural areas and the importance of this manifestation for local and national economy.*

**Key words:** entrepreneurship, rural development, SMEs

### INTRODUCTION

Given the fact that complex development policies are promoted for rural areas where agriculture remains the mainstay, it is required the creation and development of other activities that meet the transposition of the concept recalled. The main focus in the rural communities development is to diversify rural economic and demographic opportunities. Rural tourism, agro-tourism, small and medium sized enterprises will be able to offer such sustained participation of the working population by absorbing workforce surplus [3].

In order to approach and reach the level of developed countries it is necessary the micro-enterprises extension in rural areas, demand driven by the need to support small agricultural producers still deprived of the advantages of scientific and technical progress. It is widely recognized that the role

of small and medium enterprises (SMEs) in the national and regional economy is very important because they contributes in a large proportion to the achievement of the country's gross domestic product (GDP) and provides jobs for a large number of people. Therefore, the economic recovery largely depends on the improvement of SMEs' performance [10].

Both in Europe and in Romania, SMEs are predominant in both the total number of enterprises and in terms of number of employees. Nevertheless, SMEs directly affect employment and economic growth (European Commission, 2016).

Within this paper we want to underline the important role to be paid by the SMEs companies in the rural areas as one of the most important factor that can determine and sustain the development and the diversity of the Romanian rural areas.

The problem of entrepreneurship has, at least, two meanings in the present paper: the

premises and challenges of the free manifestation of private initiative in rural areas and the importance of this manifestation for local and national economy. Analyzing these two subjects, we will be able to answer to the paper's objective.

## MATERIALS AND METHODS

We have conducted our research based on theoretical elements combined by using various *sources of information*, both quantitative and qualitative, such as: national and international statistical data and other relevant scientific and academic sources, reports and analysis by the Romanian National Institute of Statistics, county Department of Agriculture and Rural Development, Ministry of Agriculture and Rural Development, Regional Development Agencies, along with recent publications presenting the investigated topic. In the same time, we tried to underline the premises for rural entrepreneurship, the limitations faced by the rural SMEs and to make some strategic ways to follow for stimulating rural entrepreneurial spirit in Romania.

## RESULTS AND DISCUSSIONS

### Analysis of the SMEs sector in Romania

Delimitation of SMEs in the economic landscape has been, over time, a difficult and controversial topic. According to Definition of European Commission Recommendation

no. 361/2003/CE: micro, small and medium enterprises category (SME) is formed up by enterprises that employ less than 250 persons and have a net annual turnover up to 50 million euros and /or have total assets up to 43 million euros.

The main SMEs features as high dynamism, flexibility, adaptability and capacity for innovation, places them in a position to benefit from the profound changes taking place in the socio-economic environment. Specifically, developments such as increasing the level of education of the population, globalization, computerization, etc. using outsourcing services that encourage and accelerate the transition to the new economy, are more as opportunities than threats for most SMEs [9].

Small and medium sized enterprises play an important role in the development of economy by creating jobs, supporting competitiveness and innovation, emphasizing dynamism and market atomicity [1]. Both in Europe and in Romania, SMEs are predominant in the total number of enterprises and in terms of number of employees (Table 1). Therefore SMEs directly affect employment and economic growth.

In Romania, SMEs account for 99.9% of total number of enterprises, provide employment of 67.2% of total employment in the private sector and generate 49.6% of gross value added (Table 1).

Table 1. EU and Romanian enterprises distribution

	Number of enterprises			Number of employees			Value added		
	Romania		UE28	Romania		UE28	Romania		UE28
	Number	Proportion	Proportion	Number	Proportion	Proportion	Billion Euros	Proportion	Proportion
Micro	392,377.00	87.1%	92.7%	884,895	22.2%	29.2%	7	13.5%	21.1%
Small	48,024.00	10.7%	6.1%	928,801	23.3%	20.4%	9	16.1%	18.2%
Medium-Sized	8,643.00	1.9%	1.0%	866,563	21.7%	17.3%	11	20.0%	18.5%
<b>SMEs</b>	<b>449,044.00</b>	<b>99.7%</b>	<b>99.8%</b>	<b>2,680,259</b>	<b>67.2%</b>	<b>66.9%</b>	<b>27</b>	<b>49.6%</b>	<b>57.8%</b>
Large	1,637.00	0.3%	0.2%	1,309,863	32.8%	33.1%	28	50.4%	42.2%
<b>TOTAL</b>	<b>450,681.00</b>	<b>100.0%</b>	<b>100.0%</b>	<b>3,990,122</b>	<b>100.0%</b>	<b>100.0%</b>	<b>55</b>	<b>100.0%</b>	<b>100.0%</b>

(Source: 2015 SBA Fact Sheet ROMANIA - Enterprise and Industry [4])

### Opportunities for SMEs development in rural areas.

Rural area in Romania is almost equal from the point of view of the population, to the

urban area. Throughout its modern history, Romania was a country with a predominantly rural population. Rural area have substantial growth potential and a vital social role. This surface sums up 207,522 km<sup>2</sup>, respectively

87.1% of the country surface. The population of this area, although it recorded a slight decrease in 2013-2015 period, is currently about 9.2 million people (46% of the population) (National Institute of Statistics, 2014). [12]

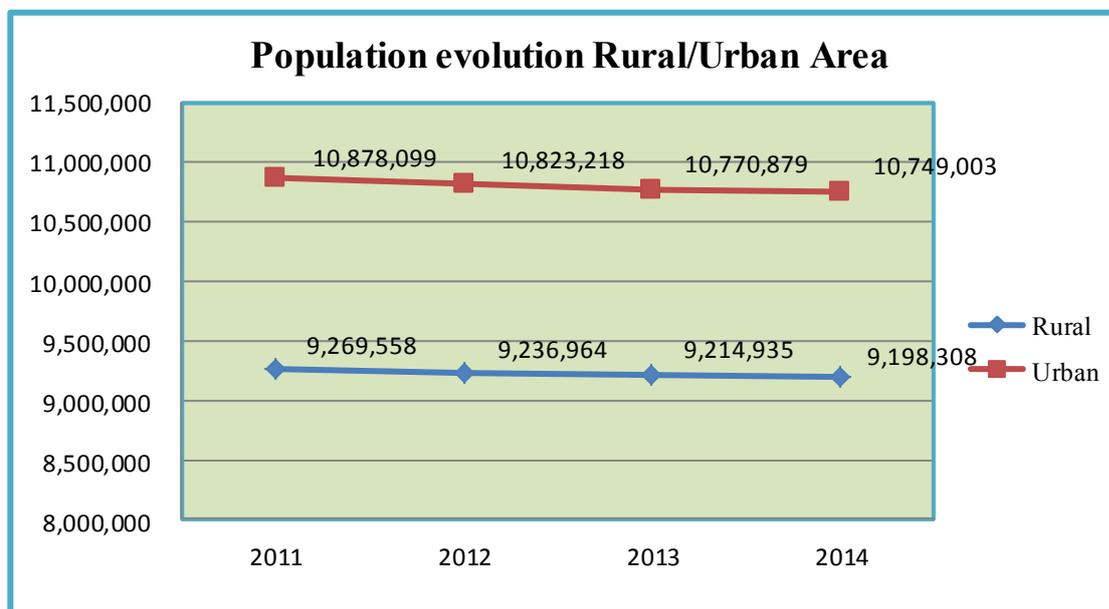


Fig. 1. Dynamics of Romanian population distribution, by rural/urban areas (Source: Data processed by the author based on NIS databases, 2015)

The structure of Romanian rural economy is clearly dominated by agriculture, but should also be noted that there are many differences between regions of the country in which the place of agriculture in the rural economy may not be the same [7].

According to data released by the National Institute for Statistics, although the labour

force involved in agriculture has recorded a negative trend in recent years, still has a considerable amount. Thereby, for the 2015 year, the total of agriculture labour force consisted of 1326 thousand annual work units of which 213 thousand employees and the rest of 1113 thousand unemployed (Figure 2).

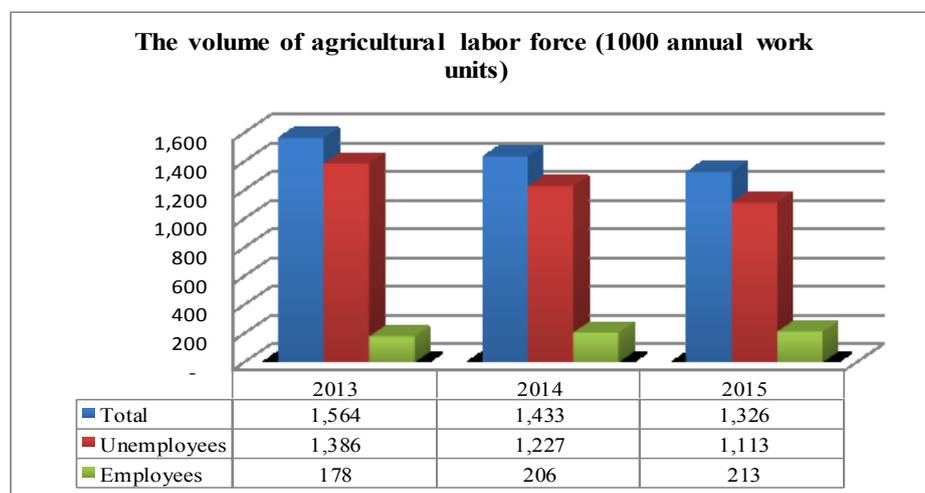


Fig.2. The dynamics of volume of agricultural labor force in Romania (2013-2015) (Source: Data processed by author based on NIS databases, 2015)

Burca (2015) has reported that agriculture is still providing in Romania a large number of workers that are usually earning modest and insufficient venues. Moreover, workers should be relocated to other sectors, such as agribusiness, where they can be hired by the entrepreneurs in SMEs companies; by this way it is diversifying the number of opportunities for the rural employees [2].

The share of agriculture in GDP remains substantial compared to the EU average; it has experienced some growth during transition period, but recorded positive variations do not reflect, even remotely, increasing economic efficiency of the sector, but rather his lack of efficiency [3].

Taking into consideration the above mentioned aspects and the importance of the agriculture for the national economy, it is easily to recognize the importance of the rural economy as a generator of development.

This way to conceive and materialize rural economy is an alternative to the policies promoted by economically advanced countries, potentially leading thus to reduce the share of employment in agriculture by increasing technical endowment, generating significant productivity gains and thus an "explosion" of agricultural production.

In this context, SMEs can be the economic engine of these areas; the performance and strategic perspectives of these businesses are major elements in the development of their work and the areas where they operate and they need to be supported and benefit consultancy in order to develop. Using them can contribute, among other things, to increase the employment of labor existing in rural areas, to avoid depopulation of some areas thereof, the enhancement of the various resources the nature of agricultural and non-agricultural, and increased income of members of various rural communities.

#### **Rural Entrepreneurship Limitations**

In terms of the future development of the rural areas through entrepreneurship, we cannot overlook the major challenges that entrepreneurs have to face. In a previous study [6] it is highlighted that having just 4 SMEs at 1,000 inhabitants and more than 50% of than activating in services and not in

production, the challenges of the Romanian rural entrepreneurship are many and incommensurable. Their impact upon Romanian rural economy may be seen every day, due to its lack of performance and huge problems that rural entrepreneurs confront to.

In order to analyse the challenges faced by rural enterprises is necessary to mention the weaknesses of Romanian rural area.

Among these are found: deficient rural infrastructure, dependence on agriculture, subsistence agriculture, low level of education and qualification of the rural population, low income, poor productivity and quality of agricultural products, unfavourable age structure, lack of an organized market network, rural youth migration and reduced installation rate of SMEs [3].

In Romania, rural entrepreneurship is facing a lot of challenges that prevent it to develop and to catch magnitude. In our opinion, those limits and restrictions, therefore the challenges of the Romanian rural entrepreneurship are given by several aspects:

➤ First and an important aspect is a poor quality of life in rural areas. Rural population is facing with bad living conditions and precarious existence of roads, water and sanitation, communication, education infrastructure. This lead to a strong effort against these living conditions (urban migration, accession university education and settlement in urban centers) and a lower interest in entrepreneurship.

➤ As a result of a weak manifestation as rural business in the past, in rural areas, there is a traditional approach of profession that almost excludes the entrepreneurial expression. The fear of risk taking, the resistance to financial investment whatever the financial resources, the lack of entrepreneurial education and competences take away any persons who would like to have a market approach.

➤ The absence of a family tradition in entrepreneurship in rural areas, and not only. The population is less willing to take as the entrepreneur risks the family's treasure and financial stability and this is equivalent of family's image and community's acceptance, especially in rural areas.

➤ Lack of entrepreneurial education in the field of rural activities. The market orientation is not part of the rural offer and few entrepreneurs accurately know marketing and how to reach consumers.

➤ The huge number of the small and semi-subsistence farms which cannot be competitive in market terms, as they confront many problems and they struggle in a vicious circle.

➤ Deficiency in the small and semi-subsistence farms' management and marketing, given by the absence of specialized trainings.

➤ The low number of special financial products offered by banks or guaranteed by public authorities, through which to support the rural economy development. The high cost, the restrictive conditions for newly established SMEs and especially the reduced capacity of companies to provide the guarantees required by the Bank make it very difficult for rural SMEs to access loans.

➤ The bureaucracy of accessing and managing European structural funds for rural development. The future policies should rearrange these conditions, according to the rural inhabitant profile.

Taking into consideration the aspects mentioned above, the weak manifestation of the rural economy and in the same time, having in mind the still important contribution of agriculture, as main rural activity, public policy should overcome all these challenges and help rural inhabitants to become more entrepreneurial.

To support SMEs, to increase employment, efforts should be made both at European and national level. Therefore, policies supporting SMEs should be combined with employment and economic growth policies. [1]

The strategies to encourage rural entrepreneurship initiative must respond to three major challenges [11]:

➤ aspects of economic structure - low employment opportunities in the primary sectors (especially agriculture) as a result of structural changes in the economy (focusing on agricultural land use, migration flows, financial crises, etc.), increased by legislative changes far too fast to could be assimilated by

the rural population. It highlights thus the need to address the stimulation of economic activity in line with employment potential in rural areas;

➤ the characteristics of rural business environment - the difficulty of maintaining a critical mass of facilities in rural areas (infrastructure, market, tax incentives, etc..) to support economic development;

➤ the characteristics of rural population - accelerated aging of the population associated with extra-rural exodus of young people and (re)turning to rural areas, especially of persons at retirement age, are social processes that negatively affect the chances of potential rural entrepreneurs occurrence [5].

Mansi and Achla (2013) sustain that in order to overcome the challenges faced and promote rural entrepreneurship, support roles are required, such as: Infrastructural development by the government to increase the possibility for business service provider and industrial sector to enhance the entrepreneurship of women, Micro-finance assistance by government to rural women in larger scale, Marketing assistance by marketing the products, Conduction of trade fairs specifically to advertise the work of rural women entrepreneurs [8].

## CONCLUSIONS

Rural entrepreneurship still encounters a large number of vulnerabilities. There is a need to create the means for the rural entrepreneurs to have access to finance, professional advices and support and to benefit from a better and modernized infrastructure. Moreover, we consider that should be ensured the support for network development in the rural areas to facilitate a dynamic economic environment for all the implicated parties.

Our opinion is that rural SMEs are the solution to generate an economic dynamic, flexible and diversified environment. The development of a viable network of private small and medium enterprises (agricultural food, industrial, of local products processing, crafts, services etc.) within the rural areas has, in addition to the important economic function, an outstanding social component too,

in the meaning of stabilizing the rural population, eliminating commuting and of using, by complementarity, the rural workforce. To facilitate the innovation process for the rural SMEs we should ensure a transparent and facile knowledge transfer, provide the necessary means for the access to research and development for the companies acting in those regions, and to education and professional development and training for the labor force and for the entrepreneurs.

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## ASSESSMENT OF AWARENESS LEVELS ON GOAT MILK AND PRODUCTS: THE CASE OF ÇANAKKALE

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### *Abstract*

*Cheese production from goat milk has a core place in Çanakkale's economy. The present study was conducted to determine the consumption trends in goat milk and products and to determine the factors effective in preference of these products. Data were gathered from the household through questionnaires.*

*Key words:* goat milk, goat cheese, goat milk and cheese demand

### INTRODUCTION

Goats are quiet adapted to agricultural and economic structures especially of poor and developing countries. The main reason of this adaptation is because goats are highly resistant to harsh car-feeding conditions compared to other farm animals and they can well-benefit from the natural resources. Goats can meet their feed from the nature by themselves even under the most unfavorable conditions and they can withstand thirst and hunger for longer periods than the other animals. Goat raising has an ever-increasing significance in various parts of the world because not only of their easy care and feeding, but also of high nutritional values of goat milk [10].

According to United Nations Food and Agriculture Organization (FAO), there are 996,120,851 goats in the world and number of milking goat is 197.463.071 heads. The annual goat milk production worldwide is 17,846,118 tons. Considering the developments in world goat inventory, China is the leading country and it is followed respectively by India and Pakistan. Goat raising is commonly practiced especially in less developed or developing countries. Turkey has the 27th place in world goat inventory. In goat milk production, India,

Bangladesh and the Sudan are the leading countries and Turkey has 17th place in world goat milk production [4].

World goat milk consumption can be assessed under three groups. The first one is the domestic (inner family) use of goat milk and products in less developed or developing countries. The second one is processing and consumption of goat milk as industrial drinking milk, yoghurt and etc. in developed countries like Spain and France. The third one is consumption by the people with digestive system disorders and allergy to cow milk [18]. Despite significant consumption and thus production levels throughout the world, especially in EU countries, production of goat milk and products is still at insufficient levels. The share of goat milk in total milk production of Turkey is only 2%. There are scientific researches carried out to determine goat milk consumption trends in various countries of the world such as the United States of America, Sweden and Japan. However, such studies about consumption trends of these products are quite limited in Turkey [14].

Generally extensive sheep and goat raising is practiced in Turkey. Resultant livestock products are mostly constitute the basic food stuff of low-income agricultural enterprises. Such activities provide contributions to family

income and some employment opportunities[6].

Because of natural and agricultural structure, extensive goat raising practices are common in Çanakkale province of Turkey. However, number of enterprises with intensive goat raising activities is increasing recently [11].

Considering the goat inventory and goat milk production of Çanakkale province, it was observed that goat milk production of the province increased from 26,354 tons in 2008 to 29,349 tons in 2013. The province constitutes about 7.05% of total goat milk production of Turkey.

The present study was conducted to determine the consumption trends in goat milk and products and to determine the factors effective in preference of these products. Therefore, the study was performed in Çanakkale province with intensive goat raising activities.

## MATERIALS AND METHODS

Goat milk and product preferences of the households living in central town of Çanakkale province and the factors affecting their preferences were investigated in this study. Data were gathered from the household through questionnaires. Household approach was used in previous studies to determine dairy product consumption trends in Turkey [9, 15, 3, 5, 17, 2, 7]

According to TUIK (Turkish Statistics Institute) 2013 data, total population of Çanakkale central town is 149,881 people. Of this population, 116, 078 are living in town center, 33,803 are living in districts and villages. Total number of household in central town is 41,456 and average household size is 2.8 people. Instead of including entire households, a sampling was performed to decide about the household coverage of the study. For this purpose, rational sampling method was used [13, 12] and 99% probability and 10% error margin was used and finally sample volume was calculated as 166.

Regression analyses were used to put forth the socio-economic effecting goat milk and product consumption of households. Initially, various functions such as linear, logarithmic,

square, exponential and etc. were tried to decide about model structure and linear model was considered to have the best fit. In this model, the consumption status of goat milk and products (non-consuming and consuming ones) were considered as dependent variable and gender, age, number of people in household, existence of under 14 child in household, education level, monthly average income, monthly average food expense, monthly average dairy expenses were considered as independent variables for consumer groups. The existence of multiple collinearity among the independent variables throughout estimation process of the model was tested with variance inflation factor (VIF) and condition index (K) values.

In logistic model, independent variable mean is calculated as a probability as follows:

Let the probability of desired incident as P, and probability of undesired incident as 1-P.

$\beta_0$  : Equation constant (intercept)

$\beta_1, \beta_2, \dots, \beta_p$  : Regression coefficients for independent variables (Slopes)

$X_i$  : the value for  $i^{\text{th}}$  independent variable (for instance: discrete variate, for  $i=1, X_1=1$  or  $X_1=0$ ) and

$p$  : Number of variables ( $i=1,2,3, \dots, p$ )

Probability of desired incident ( $Y=1$ );

$$P(Y = 1 | X_1, X_2, \dots, X_p) = \frac{e^{\beta_0 + \beta_1 X_1 + \dots + \beta_p X_p}}{1 + e^{\beta_0 + \beta_1 X_1 + \dots + \beta_p X_p}} \text{ or}$$

$$P(Y = 1 | X_1, X_2, \dots, X_p) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \dots + \beta_p X_p)}};$$

Probability of undesired incidence ( $Y=0$ )

$$P(Y = 0 | X_1, X_2, \dots, X_p) = 1 - P(Y = 1 | X_1, X_2, \dots, X_p)$$

$$= 1 - \frac{e^{\beta_0 + \beta_1 X_1 + \dots + \beta_p X_p}}{1 + e^{\beta_0 + \beta_1 X_1 + \dots + \beta_p X_p}} = \frac{1}{1 + e^{\beta_0 + \beta_1 X_1 + \dots + \beta_p X_p}}$$

The ratio of these two probabilities to each other is called as "odds ratio.

Odds ( $Y=1|X_1, X_2, \dots, X_p$ ) ratio 0:

$$\frac{P}{1 - P} = e^{\beta_0 + \beta_1 X_1 + \dots + \beta_p X_p}$$

$$\text{Or } \frac{P}{1 - P} = e^{\beta_0} e^{\beta_1 X_1} \dots e^{\beta_p X_p}.$$

When the natural logarithm (Ln) of both sides of the equation was taken, the logistic regression equation, in which the relationship between dependent and independent variable

turns into a linear form, can be written as follows:

$$\text{Logit (P)} = \log \left[ \frac{P}{1-P} \right] = \beta_0 + \beta_1 X_1 + \dots + \beta_p X_p \quad [1; 8].$$

## RESULTS AND DISCUSSIONS

Of the survey participants, 47.6% were male and 52.4% were female consumers. Considering the possible effects of educational levels on consumptive trends and decision making, educational levels of consumers were also assessed. The university or vocational collage graduate consumers constituted the greatest portion (59%) of the participant consumers and they were followed by secondary or primary school graduates (22.9%) and high school graduates (18.1%). Average consumer age was identified as 37.13 years, monthly average income as 3,019 TL, monthly average food expenses as 578.3 TL, monthly average dairy expenses as 115.9 TL and average household size as 3.04 people (Table 1). Monthly average household milk (cow, sheep and goat) consumption was 13.6 lt/month and monthly average cheese (cow, sheep and goat) consumption was 3.92 kg/month.

Of the participant consumers, 19.9 were consuming goat milk, 36.1% were consuming goat cheese and 3% were consuming goat yoghurt.

The households buying one of these 3

products were considered as consuming goat milk and products and they were taken as dependent variable.

The household consuming (43.4%) and non-consuming (56.6%) goat milk and products were assessed in comparison with the independent variables provided in Table 1.

Likelihood ratio test was used to measure the significance of an independent variable in logistic regression model. Following the assessment of general statistics of the model, (model degree of freedom was 2,  $\chi^2$  value was 20.009 ( $p < 0.001$ ) and class verification ratio was 61.4%), parameter estimations ( $\beta$ ), standard error, Wald statistics-dependent significance level, degrees of freedom and likelihood ratios are provided in Table 2.

Model fit was tested through backward elimination method with iterations and the best model was obtained in 7 iterations (Table 2).

According to best model, it was observed that except for household size and monthly average food expenses, remaining characteristics did not have any significant effects on goat milk and product consumption of household ( $p > 0.10$ ). A 1 TL increase in household food expenses decreased goat milk and product consumption probability by 1.57% (1/0.634). Similarly, a person increase in household size decreased goat milk and product consumption probability by 1% (1/0.999).

Table 1. Socio-economic factors effecting consumption of goat milk and products

Variables	Groups	Categories	Number	%
Gender	Gender (1)	Consumer gender		
	Gender (2)	Female	87	52.4
		Male*	79	47.6
Age	Continuous data	-	-	-
Education	Education (1)	Consumer education		
	Education (2)	Primary and secondary school	38	22.9
	Education (3)	High school	30	18.1
		Vocational Collage/University *	98	59
Monthly income	Continuous data	-	-	-
Monthly food expense	Continuous data	-	-	-
Montly dairy expense	Continuous data	-	-	-
Household size	Continuous data	-	-	-
Number of children under 14 years		<14 years old		
		Exist	112	66.5
		No-exist*	54	32.5

\*Assessed as reference category in logistic regression analysis.

Table 2. Results of logistic regression analysis for the effects of consumer socio-economic characteristics on goat milk and product consumption

STEP	Independent Variables	B	SE	Wald	df**	Sig.	Exp (B)
Step 1	Age	-0.013	0.019	0.504	1	0.478	0.987
	Gender (1)	-0.162	0.186	0.763	1	0.382	0.850
	Gender (2)	0.000 <sup>*</sup>			0		
	Education (1)	-0.189	0.338	0.312	1	0.576	0.828
	Education (2)	-0.075	0.313	0.057	1	0.811	0.928
	Education (3)	0.000 <sup>*</sup>			0		
	Household monthly income	0.001	0.001	0.385	1	0.529	1.000
	Household food expense	-0.001	0.001	2.126	1	0.145	0.999
	Household dairy expense	-0.003	0.002	1.148	1	0.284	0.997
	Household size	-0.352	0.171	4.242	1	0.039	0.703
	Under 14 years in household (1)	0.098	0.194	0.257	1	0.612	1.103
	Under 14 years in household (2)	0.000 <sup>*</sup>			0		
Constant	2.888	1.020	8.020	1	0.005	17.951	
Step 2	Age	-0.022	0.016	1.882	1	0.170	0.978
	Gender (1)	-0.170	0.177	0.916	1	0.339	0.844
	Gender (2)	0.000 <sup>*</sup>			0		
	Household monthly income	0.001	0.001	0.248	1	0.618	1.000
	Household food expense	-0.001	0.001	1.686	1	0.194	0.999
	Household dairy expense	-0.003	0.002	1.496	1	0.221	0.997
	Household size	-0.386	0.167	5.358	1	0.021	0.680
	Under 14 years in household (1)	0.109	0.193	0.318	1	0.573	1.115
	Under 14 years in household (2)	0.000 <sup>*</sup>			0		
	Constant	3.272	0.913	12.848	1	0.001	26.358
Step 3	Age	-0.020	0.016	1.696	1	0.193	0.980
	Gender (1)	-0.178	0.176	1.019	1	0.313	0.837
	Gender (2)	0.000 <sup>*</sup>			0		
	Household food expense	-0.001	0.001	2.891	1	0.089	0.999
	Household dairy expense	-0.003	0.002	1.527	1	0.217	0.997
	Household size	-0.394	0.166	5.619	1	0.018	0.675
	Under 14 years in household (1)	0.101	0.192	0.278	1	0.598	1.106
	Under 14 years in household (2)	0.000 <sup>*</sup>			0		
Constant	3.109	0.846	13.502	1	0.001	22.392	
Step 4	Age	-0.020	0.016	1.641	1	0.200	0.980
	Gender (1)	-0.175	0.176	0.989	1	0.320	0.839
	Gender (2)	0.000 <sup>*</sup>			0		
	Household food expense	-0.001	0.001	2.950	1	0.086	0.999
	Household dairy expense	-0.003	0.002	1.417	1	0.234	0.997
	Household size	-0.423	0.157	7.295	1	0.007	0.655
Constant	3.209	0.824	15.173	1	0.001	24.672	
Step 5	Age	-0.019	0.016	1.523	1	0.217	0.981
	Household food expense	-0.418	0.001	2.639	1	0.104	0.999
	Household dairy expense	-0.001	0.002	1.395	1	0.238	0.997
	Household size	-0.418	0.156	7.174	1	0.007	0.658
	Constant	3.108	0.811	14.667	1	0.001	22.367
Step 6	Age	-0.017	0.015	1.181	1	0.277	0.983
	Household food expense	-0.001	0.01	5.643	1	0.018	0.999
	Household size	-0.429	0.156	7.556	1	0.006	0.651
	Constant	2.919	0.787	13.744	1	0.001	18.529
Step 7	Household food expense	-0.001	0.001	5.391	1	0.020 <sup>+</sup>	0.634
	Household size	-0.455	0.153	8.820	1	0.003 <sup>+</sup>	0.999
	Constant	2.339	0.559	17.485	1	0.001 <sup>++</sup>	10.369

\*This parameter is set to zero because it is redundant (The standard error cannot be calculated for this, of course, since the parameter is set to zero).

\*\*Degrees of Freedom, +p<0.01, ++p<0.001 SE: Standard Error

## CONCLUSIONS

Current findings arouse a suspicion that goat milk and products had the characteristics of Veblen goods. In economics, Veblen goods are types of material commodities for which the demand is proportional to its high price, making the goods desirable as symbols of the buyer's high social status. According to current data, although it is not possible to

assess goat milk and products as a status scale, it can be asserted based on insignificant effects of consumer income, educational level and age that consumption of these types of products could not be correlated with socio-economic characteristics and their consumptions realized independent of consumer incomes and product prices. It was seen in this study that consumers did not much prefer goat milk and products.

Being unaccustomed to, unpleasant smell and lack of knowledge were considered as the reasons for such low consumption levels. Demo groups should be created and advertisements should be made to introduce goat milk and products, to overcome such negative issues and ultimately to increase consumption levels.

High prices and less appearance in markets were also considered as the reasons for such low consumption levels. Current dairy operations should tend to goat milk and market such products through easily-accessible marketing channels and price ranges should be brought to reasonable levels. In goat milk processing, cheese, especially Ezine cheese has a special priority. Beside this, production of drinking milk should also be increased since goat milk is healthier than the other milks. Relevant informative and awareness works should be carried out about the benefits of goat milk and products.

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## THE RESOURCE DECOUPLING IMPORTANCE FOR SUSTAINABLE PRODUCTION IN ROMANIA

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### *Abstract*

*In this paper we aim to emphasize and to analyse the importance of resource decoupling for securing a sustainable production and economic growth in Romania. Increasing the resource-efficiency is a strategic objective which should be seen in the context of the European Sustainable Development Strategy and global efforts to achieve a transition towards a resource-efficient, circular and green economy, by decoupling growth from resource use. Some theoretical and methodological background issues are introduced for a deeper understanding of the most important concepts which underpin the current objectives and trends of sustainable economic growth: resource efficiency, resource productivity, resource decoupling. We outline the role of the resource productivity indicator in assessing progress towards the most important objectives of relevant strategic documents for sustainable and resource-efficient economic development in the European Union and Romania. In the tables and graphs presented in the paper, we shall try to compare the level and evolution of key statistical indicators, in Romania and in EU-27, to check the main trends in resource decoupling, the impact of the economic crisis as well as whether these trends may be consistent with the principles of a sustainable consumption and production. The conclusions and recommendations are based on the finding that, in the analysed period 2002-2013, the decoupling of economic growth from the resource use was achieved in Romania due to the economic crisis time (2008-2010).*

**Key words:** *decoupling, green economy, resource-efficient, resource productivity, sustainable economic growth*

### INTRODUCTION

Sustainability has become an over-arching global social, environmental and economic imperative among governments, international organizations, and the private sector.

The political leaders have increasingly understood that making progress towards a more sustainable economy requires an absolute reduction in resource use at a global level, while human well-being demands that economic activities should expand and environmental impacts diminish [9].

In this respect, the main objective of the paper is a theoretical and methodological grounding and analysis of some concepts, trends and issues required for the implementation of the SDS (Sustainable Development Strategy) in the EU and Romania, as well as for the transition to a resource efficient and greener economy.

We explain in more detail the meaning and relationships featuring sustainable economic

growth, focusing on the concept of resource efficiency, with the lead indicator “resource productivity”, as it provides a way to measure progress towards the goals of a green economy, as the outcome of sustainable economic development.

This way, we emphasize the main principles and features of decoupling the sustainable production from resource use. This is also a necessary condition for the path of green economic growth.

In this context, the paper presents an analysis of the evolution of the resource decoupling in Romania, in order to put into evidence the fact that it was possible only due to the economic crisis of 2008-2010. The rate of growth of the resource productivity (RP) is compared to the economic growth rate (of the GDP) to highlight the main recent issues and trends in Romania and in the EU.

## MATERIALS AND METHODS

The methodology used below is based on:

- Clarification and definition of the main methodological and operational concepts;
- Description of economic correlations in the decoupling mechanisms by increasing resource productivity;
- Analysis and synthesis of the characteristics and mechanisms for decoupling economic growth from resource use, both for the aggregate indicators as well as those per capita;
- Analysis and synthesis of the strategic objectives for a sustainable and resource-efficient production and economic development in Romania;
- Adjacent calculations, with tables and graphics, for a dynamic comparative analysis of the trends of main indicators.

## RESULTS AND DISCUSSIONS

### Theoretical and methodological background

As we have pointed out in a previous paper, all stages of the resources' life cycle – extracting natural resources, transforming them into goods, and subsequent processes of recycling and disposal – put pressure on the environment. Yet this systemic relationship is the very essence of the continuous economic process of production and consumption [6].

Consequently, the new paradigms of production and consumption call more and more for a higher resource-efficiency, a concept that underpins all the valuable ideal concepts of economy and development: sustainable development, the green economy and the circular economy, as well as the strategies dedicated to their objectives [7].

Deeper studies and easily understandable indicators have become necessary to provide signals and measure progress in improving resource efficiency and show how society is doing in decoupling economic development from the use of natural resources.

At present, the issue of resource efficiency expressed by the resource productivity (RP) indicator has a clear environmental dimension, so it is considered an appropriate lead indicator of sustainable development.

Resource productivity describes the relation between economic outputs in monetary terms ( $Y$  – numerator) and a physical indicator ( $M$  or  $R$  – denominator) for the material or the resource input.

A particular resource efficiency aspect that we have raised in research is linked to the critical importance and role of the efficiency in the water production and use for a sustainable economic development.

It has been thus demonstrated that for the agriculture [5] as well as for all the industries and ultimately for our survival, water is one of the most important and scarce environmental resources, with some particular characteristics that raise serious challenges for a sustainable management and development [4].

There are numerous and sensitive socio-economic problems of sustainable water management, such as the issues on the role of efficient water pricing for sustainable water management. Our research showed that from the viewpoint of ecological sustainability, an efficient pricing of water supply and sanitation services can contribute to ecological efficiency if used in order to [3]:

- manage demand so as to encourage a more reasonable and efficient use of the resource;
- recover the costs of the damages borne by the environment (i.e. the negative impacts on ecosystems, including pollution).

But water is not the only priceless natural resource that we rely on for a sustainable socio-economic development. In the sustainable development framework, the total resource consumption (material flows, energy and land) is an appropriate description of the long-term environmental disturbance potentials and its reduction turns out to lead reliably to a de-escalation of most environmental problems, although not proportionally. Thus, the total natural resource consumption can be understood as an indicator for the environmental dimension of sustainable economic development.

By modelling sustainable development, the postulate shows that economic growth can only be environmentally sustainable if it is accompanied by resource productivity increases at a higher rate than the growth rate [8]. This relative limit to growth would lead to

an absolute reduction in resource use and thus in environmental pressures. Hence, there may be de-link between material use and economic growth called the decoupling effect.

The decoupling is actually a dematerialization of economic development, defined as the relative or absolute reduction in the quantity of materials required to serve economic growth [10]. The concept of resource decoupling has therefore become more and more important since by significance of raising resource productivity, it seeks to alleviate the problem of scarcity and respond to the sustainability challenge of intergenerational equity by reducing the rate of resource depletion and production costs.

Besides that, the decoupling may be expected to simultaneously reduce the environmental impacts of certain resources [6]. The impact decoupling requires increasing economic output while reducing negative environmental impacts. Those impacts arise from the extraction of required resources (such as groundwater pollution due to mining or agriculture), from production (such as land degradation, wastes and emissions). Methodologically, the impacts can be estimated by life cycle analysis (LCA) in combination with various input-output techniques.

For highlighting the effect of resource decoupling, when analysing trends in resource productivity, the focus is put on the relationship between the trends in GDP and material consumption. These are called 'decoupling' indicators because they show the strength of the link between the economic and the environmental variable.

Consequently, in relation to sustainable development, the aim is to achieve 'decoupling' of these two variables, so that continued economic growth does not lead to a further increase in environmental degradation. A recent study assumes that an improved evaluation of decoupling could be performed once the aggregate production (GDP) is transformed to the "per capita" level (per capita GDP) and compared to the material consumption per capita (DMC per capita) [11]. The per capita GDP is used as valid indicator for comparing and ranking national

and regional economies, while environmental indicators based on the per capita GDP have prevailed in studies of the so-called Environmental Kuznets Curves [13].

Assuming this point, we shall further employ, in our own analysis of the trends in resource productivity and decoupling resource use from economic growth in Romania besides the aggregated indicators of RP and GDP also some per capita indicators such as: the Domestic Material Consumption per capita (DMC/capita) and the Gross Domestic Product/capita (GDP/capita), to check whether this approach may lead to different insights and conclusions.

An actual decoupling and dematerialization of economic growth should occur when the rate of economic growth (GDP/capita) exceeds the rate of material consumption per capita (DMC/capita).

#### **Objectives and issues of resource decoupling for sustainable production and consumption**

In Europe, an important step in the efforts of decoupling resource use and its environmental impacts from economic growth was the adoption of the EU's Thematic Strategy on the Sustainable Use of Natural Resources under the 6th Environmental Action Program. This strategy has the objective of achieving a more sustainable use of natural resources by reducing the negative environmental impacts generated by the use of natural resources while ensuring economic growth. The Strategy recognizes decoupling of both resource use and its impacts from economic growth. The Renewed European Union Sustainable Development Strategy [2] and the National Sustainable Development Strategy (NSDS) of Romania [14] have set the objective of promoting sustainable consumption and production patterns.

European economic policies put increasing focus on the goal of 'dematerialising' economic output, i.e. reducing the quantity of resources used by the economy [1]. In this respect, decoupling growth from resource use, increasing the resource-efficiency and unlocking new sources of growth are objectives which need integration in the policies shaping economy and lifestyles.

In the National Sustainable Development Strategy of Romania (NSDS) 2013-2020-2030 it was stated as an important horizon 2013 national objective: to achieve eco-efficient management of resource consumption and to maximize resource productivity by promoting a pattern of consumption and production that: makes sustainable economic growth possible; brings Romania gradually closer to the average performance of the other EU countries.

The importance of this national sustainable development objective is emphasized by knowing that, as previously pointed by [12] the Romanian economy's resource productivity was at the lowest level in EU-27 in the period 2000-2007, far below the EU-27 average.

This was due to the fact that in Romania, the business focus was not resource efficiency or sustainability concerns, but the relatively low level of labour productivity and benefiting from the predominance of labour-intensive industrial sectors, with competitive advantages based on the second lowest labour costs in EU-27.

By applying the specific theoretical-methodological relations with own computations of the main indicators (GDP, Resource productivity-further here referred to as RP), we may analyse whether in the last years (2000-2012) the sustainable economic growth and resource-efficiency criteria have been met in economic development.

As we highlighted in previous papers, the average level of resource productivity (RP expressed in PPS/kg) in the EU-27 has grown quite significantly (60%) in 2013 as compared with 2000.

On the contrary, in Romania, the RP expressed in PPS/kg in 2013 was 4.6% lower than in 2000, and this was quite a recovery after the drop of 28% in the RP level of 2008.

So the gap towards the EU-27 average level of resource productivity has widened in recent years, since in 2000 RP in Romania was of 52.4% of the average RP in EU-27 while in 2013 it represented only 31.1% of the average RP in EU-27, in PPS/kg.

As evident from Table 1 and Figure 1, in Romania, the Domestic Material

Consumption per capita (a proxy for the resource use/capita) has increased with more than 160% in the period 2000-2012, on a significant upward trend.

Table 1. Evolution and trends of the GDP/capita rate (%) and DMC/capita (t/capita) in Romania 2000-2012

	2000	2001	2002	2003	2004	2005	2006
DMC/capita (t/capita)	7.6	12.2	12,0	13,1	14,1	15,4	16.7
GDP/capita rate (%)	2.5	5.7	8.7	6.0	9.0	4.8	8.7
	2007	2008	2009	2010	2011	2012	2013
DMC/capita (t/capita)	19.9	25.6	20.1	18.6	21.0	20.5	n/a
GDP/capita rate (%)	8.5	10.3	6.3	0.2	1.6	1.1	3.8*

Source: Own computation based on data from NIS, System of SDI, OP4\_2 Domestic Material Consumption per Capita

The trend of poor resource efficiency, no decoupling and unsustainable economic growth in Romania is also confirmed by our analysis based on data from the National System of Sustainable Development Indicators of the Romanian National Institute of Statistics (in table 1, figures 1 and 2).

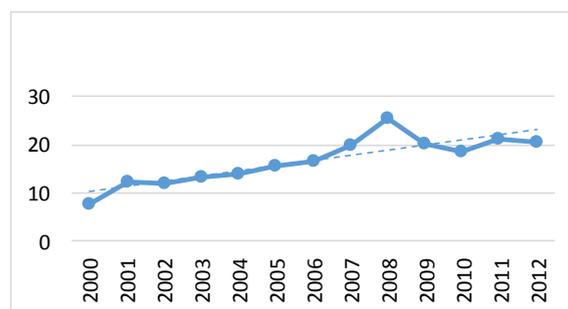


Fig. 1. Domestic Material Consumption per Capita evolution and trend in Romania, 2000-2012 (t/capita)

Source: Own computation

This trend is not that of a sustainable and resource-efficient production and consumption in Romania since there was practically no significant decoupling of economic growth from resource use, for more than a decade.

The only years when the GDP/capita rate exceeded that of DMC/capita are 2002 and then 2009 and 2010, during and due to the economic recession.

To highlight this statement, considering the methodological insight of a per capita approach in sustainable development, resource productivity and decoupling analysis

(as cited in section 1) we have represented in Figure 2 that for the same period 2000-2012, the fact that GDP/capita rate (as a proxy for the rate of economic growth in Romania) has the similar trend with the DMC/capita rate (a proxy for the rate of resource use).

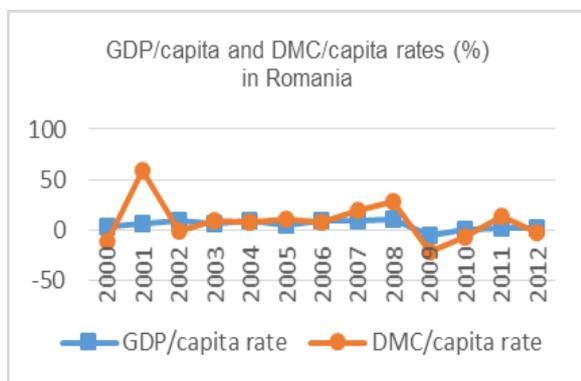


Fig. 2. GDP/capita and DMC/capita rates (%) in Romania, 2000-2012 Source: Own computation

Nevertheless, we would also like to check for decoupling and sustainability by applying the first theoretical-methodological criterion as presented in section 1, namely the environment-economy interlinkage in the sustainable economic development approach [8], and see whether we come to similar outcomes and conclusions.

Indeed, as observable in Figures 3a and 3b, (according to our calculations based on data available from Eurostat) by applying the criterion of sustainability in the model of the absolute decoupling of economic growth from the resource use, this was not achieved along the entire analysed period 2000-2013, not only in Romania, but neither in the EU-27. Hence the GDP rate in Romania was in most years of the period higher than the RP rate (mainly negative or 0).

We noted however something more here, when considering the period 2008-2012: in Romania (Figure 3 a), the sustainable growth condition  $d(GDP) < d(RP)$  has not been indeed fulfilled except for the year 2002 and for during the economic crisis of 2008-2010 (outcomes consistent with those of the per capita dynamics analysed previously, in figure 2). The trend means that in this period of economic recession, the production of energy-intensive and material-intensive sectors has mostly decreased, and a more sustainable

production structure and path was possible. The same trend is more striking and more significant actually, across the EU-27 (Figure 3 b) where the sustainable growth condition  $d(GDP) < d(RP)$  has been indeed fulfilled during the economic crisis of 2008-2010 up to 2012 as well.

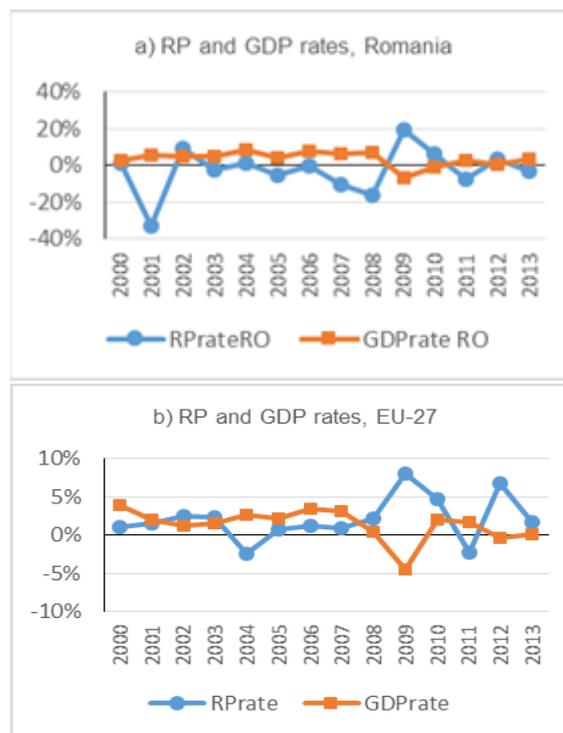


Fig. 3. RP and GDP rates in Romania (a) and in the EU (b) Source: Own computation

In our view, this result means that there was also a positive effect of the economic crisis, in the rehabilitation of economic structure or a smart recovery which may, if maintained and exploited in the future, promote a model sustainable development through an absolute decoupling of economic growth from resource consumption in the European Union.

## CONCLUSIONS

The concept of resource decoupling, associated with the objectives of increasing resource productivity, is most important in the current EU efforts for increasing resource-efficiency and the dematerialization of economic development.

Resource decoupling means reducing the rate of use of (primary) resources per unit of economic activity, so it leads to an increase in the efficiency with which resources are used.

Such enhanced resource efficiency (productivity) can be expressed for a national economy, an economic sector or a certain economic process or production chain, by dividing added value by resource use (e.g. GDP/ Domestic Material Consumption). If this quotient increases with time, resource productivity (RP) is rising.

The main conclusion in a previous study [7] was that, in Romania, the situation of the resource productivity indicator is complicated since here we must reverse the 2000-2012 downward trend of the RP. A continuation of this trend in Romania may threaten the sustainability of economic growth in the long term, due to excessive and irrational resource consumption, with negative consequences for the state of our natural capital.

As stated in [1], to assess the sustainability of European systems of production and consumption, it is necessary to move beyond measuring whether production is increasing faster than resource use. Rather, there is a need to assess whether there is evidence of 'absolute decoupling', with production increasing while resource use declines. Therefore, as a contribution of the paper to this assessment, by applying the graphic method on two different sets of indicators (of resource decoupling) for a comparative analysis in data dynamics, we get to similar outcomes leading to a sole final conclusion: the absolute decoupling of economic growth from the resource use was not achieved in the analysed period 2000-2013 in Romania except for the period starting with the economic crisis of 2008-2010, which may mean that in this period the production of energy-intensive and material-intensive sectors has mostly decreased, allowing the resource decoupling. To enable some prospects and policy recommendations, future research will analyse more deeply the evolution and the factors resource decoupling in Romania.

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## SOCIAL CAPITAL FORMATION IN ROMANIAN AGRICULTURE

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### Abstract

*Social capital is crucial for farmers' financial viability and market integration. However, stocks of structural social capital have been historically low in Romania. This paper explores the recently-initiated process of social capital formation in Romanian agriculture, in an attempt to identify factors favouring it. Three key elements were found to facilitate structural social capital formation: clarity of common interests, the success of collective actions and local farmers as leaders of associational structures.*

**Key words:** cooperatives, livestock farmers' associations, Romania, social capital

### INTRODUCTION

Social capital was defined by French sociologist Bourdieu as an individual's aggregate resources linked to the possession of a durable network ... of relationships of mutual acquaintance and recognition [3]. Robert Putnam redefines the concept as features of social organization such as networks, norms and trust that facilitate coordination and cooperation for mutual benefit [9]. Edwards and Foley criticizes Putnam's definition, arguing that capital is a social-relational rather than a socio-psychological concept [6], but they are contradicted by Uphoff and Wijayaratna, who argue that there are two forms of capital, the structural one (roles, rules, procedures and social networks) and the cognitive one (norms, values, attitudes and beliefs –social-psychological connotation) [11].

Ostrom and Ahn insist that social capital is an attribute of individuals, which improves their ability to solve collective action problems through one of its products, trust. They also underline the decisive influence the state has on the formation of social capital [8]. Narayan and Cassidy argue that a determinant of structural social capital is the presence of strong leaders [7].

The debate regarding trust as input, form or result of capital has not yet been resolved.

Romanian literature on this topic focuses on

cognitive social capital in urban areas, concluding that it is, along with trust and participation in formal associations, very weak, just like in the other ex-communist countries [5]. Badescu et al find that Romania's democratic institutions are weak and unresponsive, complicating civil society's task to articulate its interests and strategies [1].

Regarding rural areas, some research has been conducted in 2006 on values related to cognitive social capital, stating that generalized trust is low, similarly to urban areas [2], which also implies limited participation in local governance [4]. Sandu notes, however, that between 2002 and 2005 the number of community development optimists increased [10].

This paper describes the formation of structural social capital in Romanian rural areas, by analyzing two agricultural cooperatives, in the counties of Giurgiu and Ilfov, two independent associations of livestock farmers in the counties of Gorj and Neamt, and two NGO-sponsored livestock farmers' associations in Vaslui county.

### MATERIALS AND METHODS

The paper takes a comparative approach in order to study social capital formation, and analyse differences between groups that have successfully built social capital (structures

that still function, and complete their activities), and groups that have failed to do so (structures that do not function anymore, or do not complete activities as planned). The group that was successful in social capital formation includes the livestock farmers' associations from Buda-Oșești (Vaslui) and Borca (Neamț) and the Vlașca cooperative (Giurgiu); the unsuccessful group includes the Negrești-Căzănești (Vaslui) and Tismana (Gorj) associations as well as the AgriSud cooperative (Ilfov).

The research method is based on semi-structured interviews, enabling farmers to express freely their thoughts about the social structures they belong to. Thus, important elements in building social capital, so far ignored by quantitative studies conducted in Romania, can emerge.

## RESULTS AND DISCUSSIONS

The group of functional associative structures and the group of dysfunctional ones were compared on the basis of three aspects identified as relevant to social capital: clarity of common interests, success of the first collective actions and whether or not the leaders of the associations are successful farmers.

### 1. Clarity of common interests

The clarity of common interests transcribed in the NGO's objectives is the first element that differentiates successful associational structures from unsuccessful ones. For agricultural associations, clarity of objectives is a result of several factors, such as: the number of members and their level of acquaintance with each other, the admission procedure, geographical position, members' homogeneity, frequency of meetings, internal communication channels, joint resource management, members' reliability and the relationship with local authorities and the national regulatory environment.

The associations' initial number of members was not pre-defined, all those willing to join being accepted. In the case of the AgriSud cooperative, the president advertised the structure among farmers of the area; thus the number of founding members was high. The

same happened in the case of the Borca and Tismana associations. In the Vlașca cooperative and the two associations from Vaslui county, the number of founding members was much lower. It is therefore not surprising that in the case of the Ilfov cooperative and the Tismana association conflicts of interest arose. A large number of members is equivalent to a large number of individual interests and greater potential for divergence among them.

With 120 members originally, the AgriSud cooperative proved too large to be managed correctly and to foster frequent interaction among members. Among its members there were also people who, although not fully understanding the functioning of a cooperative, joined out of curiosity, later hindering activities. Admission criteria were vague, cooperative leaders believing that a large number of members will ensure success, as it would provide greater representativeness. However, this led to a low level of acquaintance among members, and the inability to identify which farmers were reliable and which were not. Although the negative impact of this policy was seen subsequently, and some farmers were expelled while others withdrew voluntarily, the cooperative was already weakened.

The Vlașca cooperative had a relatively limited number of members in the beginning (24). It continued to expand - it is now twice its initial size - but with caution. Before admitting a new member, references were taken from neighbour farmers about the applicants' reliability. Thanks to cooperative's reasonable size, internal interactions allowed older members to test novices' reliability and pressure them to respect their commitments. Thus, there has been only one case where a farmer hasn't paid all his dues to input suppliers. The Buda-Oșești association has developed in a similar manner, with a small number of founding members; subsequently membership was extended, but newcomers had to submit to the original group's priorities.

The Tismana association encountered difficulties regarding the large number of members. Following the accession of 40

novices, the activities started unfolding with difficulty and reaching consensus on priority objectives became a challenge. Leaders tried to solve problems by sanctioning those who were blocking progress, but the violent conflicts that followed destabilized the internal climate even further. The Borca association, despite the large number of members, did not encounter operational difficulties, probably due to social cohesion in the area, which ensured convergence of interests. Surprisingly, despite the small number of members, the association of Negrești-Căzănești encountered great difficulties in its development process. However, these difficulties were not related to the number of members but to other aspects.

Clarity of common interests is also determined by geographical factors, the most important ones being proximity to an urban centre and the distances between farms. In areas further away from urban centres agriculture plays an important economic role and is seen as the main source of income, while proximity to a city opens up other perspectives, the members of the associations no longer focusing solely on their farms. For some AgriSud members agriculture is not the only business, and thus they do not face the same types of constraints as their peers. By associating themselves, farmers obtain better purchase and sale conditions, which are important for future investments, especially given that obtaining credit is difficult in this economic sector. However there are farmers who can easily obtain credit thanks to their additional sources of income, which significantly lowers their interest in the cooperative's efforts. Within the Vlașca cooperative there are no such cases because, although they are situated relatively close to the city, Giurgiu does not provide development opportunities as diverse as the city of Bucharest.

These differences are also observed between the two associations of livestock farmers in Vaslui county. Farmers in the Oșești village work mainly in agriculture, as they are relatively far from the urban area. They are very eager to process their milk and market cheese in urban areas. In Negrești, some

farmers have other activities in addition to farming; their area being declared urban, they disregard somewhat farm work, aspiring to 'urban' occupations. Borca is further away from an urban centre than Oșești, thus livestock breeding is a very important activity in the area. The town of Tismana, although not offering major economic opportunities, is near the city of Târgu-Jiu, determining a relatively low interest in agricultural activities, especially in young people.

Regarding geographical proximity of farms, it is an element of differentiation only among cooperatives. Farmers from the Vlașca cooperative are relatively close to each other, within a radius of 25 km around the city of Giurgiu, while in the AgriSud cooperative farmers are dispersed, as the Ilfov county forms a ring around Bucharest. Although geographical proximity leads to strong competition on agricultural land, which may strain relations between members, its main effect is closer collaboration between neighbours (who assist each other with materials and equipment). The Vlașca cooperative has therefore another advantage over the AgriSud cooperative, where farmers keep in touch mostly by phone and can only count on the help of close neighbours.

Common objectives can be defined with greater ease in homogeneous groups, heterogeneity hindering social capital creation.

Heterogeneity in education generates different capacities to understand the functioning of associations and to get involved. In livestock farmers' associations, few members are able to understand and engage in managing common resources, not having the ability to analyse legislation. Members who are dissatisfied with associations' actions, but do not have the capacity to make constructive comments, resort to gossip, thus inhibiting the involvement of capable and well-intentioned peers. In Tismana, due to rumours that members in charge of organizing auctions for infrastructure works receive money from competing firms, the committee had to be renewed each time, former members not wanting to participate again in order to avoid peers' comments. In the Oșești and Negrești

associations the impact of gossip is not felt, as members who chose to adhere to these structures have a similar level of education. In the Borca association, the work performed relies on the traditional approach to animal husbandry, well-known to all members; thus differences in education levels brought no conflicts within the structure.

In cooperatives, discrepancies in education manifest either as shyness of those with less formal training to get involved in discussions or through an attempt to impose themselves by force, becoming a disturbing factor in the association. These discrepancies are felt more strongly in the AgriSud cooperative, although they are present in the Vlaşca cooperative as well.

Another potential difficulty in the way of clarifying common objectives is the difference in interests between old and young members, as well as the different ways of perceiving the role of associative structures in the two age groups. In the Tismana area, the lack of intergenerational confidence has affected the construction of structural capital. It is customary that successions takes place only upon parents' death, as they fear that young people will not take proper care of them in old age if wealth transfer occurs during their lifetime. A consequence is that, without ownership of family farms, young people behave irresponsibly in society, as well as in the association.

In Borca, the initiative to create the association came from younger farmers, who knew how to harmonize their interests with those of the elderly. This was facilitated by the flexibility of national legislation concerning associations, which conciliated elderly's' subsistence concerns, with the young generation's development orientation. In the Vaslui area, tensions between generations were mitigated by the existence of two associative structures, one dealing with the management of the EU's Single Area Payment Scheme funds and another one, supported by the NGO, oriented towards marketing of products and drafting project proposals; young people eager to develop their holdings got involved in the second one.

In agricultural cooperatives, age differences

determine even larger disparities between farmers. The older ones possess, in general, larger areas of land than younger cooperative members, which make it easier for them to face market requirements by themselves, and therefore they tend to cooperate less. In the Vlaşca cooperative, for example, one of the farmers who cultivate larger land areas chose not to sale his production through the cooperative. In Ilfov county, many farmers choose not to sell through the cooperative, and thus this activity could not take place. Those who wanted joint sales chose to leave the cooperative and create smaller groups of producers, with greater financial bonuses from the Ministry of Agriculture and simpler accounting.

Issues related to farmers' heterogeneity can be mitigated by frequent meetings and choosing a suitable internal consultation method. In the Giurgiu county, proposals for joint investments with the money collected by the cooperative existed for several years but were not materialized. However, since market pressure on farmers increased, so did their desire to build common infrastructure that will help them face it; thus it was decided to hold a General Assembly meeting every month, in order to discuss the objectives that need to crystallize. In AgriSud, General Assemblies were held, from the outset, less frequently than those in Vlaşca, which made it difficult to find a common direction. In livestock farmer's associations, although meetings weren't frequent, geographical proximity allowed continuous communication between members.

New activity proposals arouse fear among farmers, and they need time to debate them and get used to the new ideas in order to gain confidence. Misunderstandings and suspicion about new proposals existed in the Vlaşca cooperative, but were sporadic and short-lived, thanks to transparent consultations carried out at the central level. In the Ilfov County disagreements persisted, as consultations were not always held at group level; the cooperative leaders' approach has been to negotiate new ideas with farmers individually, before discussing them in the plenary, somewhat reducing transparency.

Regarding livestock farmers' associations, consultations were always held in the General Assembly, and were transparent.

Resource management and choices about the type of investments made are a key element in terms of building social capital, fears of financial nature dividing, most often, the members of the associations in several camps. In livestock farmers' associations, when investments are not made in the commons or in inalienable goods (ex: infrastructure on pastures), they are a double-edged sword, which can lead to the construction as well as the destruction of capital. They have a positive impact in areas with high social cohesion and negative impacts in the other areas. Thus, buying a car for guarding pastures has become a matter of contention in Tismana, while the purchase of cars for transporting construction material to alpine meadows in Borca did not create animosity. The purchase of automatic milking machines was appreciated in both associations in the county of Vaslui, but when they broke in Negrești, farmers began to accuse each other of damaging them and refused to contribute for repairs. The Vlașca cooperative leaders refused to purchase common agricultural equipment, in order to avoid conflicts.

Reliability of cooperative members contributes to the maintenance of common objectives. By conforming to the rules and decisions of the group, farmers contribute to achieving common interests, preventing the emergence of divergent individual interests which can destabilize the structure. In Giurgiu, the first reason the president cited for the strength of relations between farmers was their reliability: "all paid subscription; everyone was serious and transparent ". This is another difference between the Vlașca cooperative and AgriSud. In Ilfov county, from the very first attempt to purchase inputs through the cooperatives, one of the farmers refused to take and pay his order, creating a precedent, after which each farmer felt free to buy inputs separately from their peers, becoming unreliable.

A similarly unpleasant episode occurred in the Vlașca cooperative: farmers once signed a common contract to sell sunflower, but some

farmers refused to honour it, as the price at harvest was better than the one determined by the contract. Farmers who have not provided the products were executed in court, having to pay penalties. However, previous positive experiences with the sale through the cooperative prevented this negative experience from becoming a reason not to trust other cooperative members on following occasions. In addition, since all farmers pay suppliers on time, more companies are present each time at the auctions organized by the cooperative, thus ensuring the competition necessary to obtain better prices on inputs. Conversely, since AgriSud cooperative farmers withdraw their input orders after auctions, companies who participated in auctions retracted, preferring to negotiate with individual farmers, like their competitors.

Members' reliability is the main issue of the Negrești-Căzănești livestock farmers' association. Members prefer to work with few external commitments, as this allows them to avoid paying taxes, even though their income diminishes consequently. For example, for a long time they did not want to declare the number of animals they had, in order not to renew ear tags annually. Regarding joint marketing, it would require permanent control of milk quality. As farmers do not comply with hygiene rules imposed by law, not seeing their usefulness, they prefer to sell their products individually, in the informal sector. In these circumstances, trust and collaboration cannot evolve in the association.

Associations' relationship with local authorities is not always smooth, political interventions being a factor that opposes the process of common objectives clarification. Although political influence is exerted on cooperatives, their financial viability and the fact that they do not depend on funding from the state, makes them less vulnerable to this risk than livestock associations.

Political intervention is the main cause for the Tismana association's dysfunction, as her work was hampered by the mayor through various strategies, culminating with the commissioning of grasslands to another association, controlled by his relatives. Vulnerable people are easy to manipulate

(even by means of small gifts), and if the local government is captured by interests that compete with those of associations, the fragile balance created within them can be easily destroyed. In the Tismana association, when conflicts with the local administration escalated, a minority of people tried to impose by force their opinion (even through physical violence). The holding of General Assemblies and the decision-making process were destabilized, undermining trust among members.

The Borca and Vaslui associations enjoyed the appreciation and support of local authorities. In Borca the mayor supported directly one of the presidents of the association to go to Bucharest and discuss with national authorities the mismatch between proposed legislation (transforming not-for-profit associations in for-profit cooperatives) with the work done by his association locally. The Buda-Oșești association's president participated in local management meetings chaired by the Oșești mayor, thus being able to harmonize the goals of the association with village development plan. As a result they received financial support from the mayor to purchase a cooling tank for a milk processing centre the association was building with the assistance obtained from an NGO.

Clarity of common interests, a result of many factors' interplay, is thus a major determinant of success in social capital formation.

## **2.Success of joint actions**

Success of joint actions, especially of the first ones, plays an important role in consolidating social capital. Both associations and cooperatives are created for a precise economic purpose. As long as they are progressing towards meeting that goal, members are motivated to make efforts in strengthening relationships with others and their affiliation to the associative structure. But if no progress is noted, or if most actions fail, trust in the associative structure and its usefulness will decrease, alongside with individuals' efforts to consolidate it.

Success of joint actions depends on the effort put in their preparation, but also on chance; therefore it is important to organize less risky

activities, at least initially, and to plan them carefully, so as to avoid obstacles. In its attempt to obtain better input prices, the Vlașca cooperative opted for organizing auctions, followed by the signing of individual contracts between farmers and suppliers. The responsibility to respect the contract lied with each individual and involved no risk for their peers in case one of them broke the agreement. All farmers honoured contractual clauses, in order to avoid problems with suppliers, thus making transactions successful every year; both farmers and companies consolidated their confidence in the cooperative's auctions.

AgriSud opted, first year, for a centralized purchase of inputs through the cooperative, each farmer subsequently taking the products he ordered from the headquarters and repaying the cooperative. Those accountable for compliance with contract clauses were the cooperative leaders and not the farmers. With no compulsion to meet the commitments made to suppliers, one of the farmers chose to no longer take his rapeseed command, as it was announced that a dry autumn will follow, with unfavourable conditions for this crop. The non-observance of this farmer had a destabilizing impact on the whole cooperative, as it generated a negative example, which was followed by other farmers in the coming years. It occurred due to misfortune (drought year), but also due to leaders' unwise approach of granting for a large number of individuals, whose reliability had not yet been proven.

A similar comparison can also be made between the two livestock farmers' associations of Vaslui. Both have submitted projects to finance milk cooling tanks. The Buda-Oșești association projected to use the tank to collect milk and process it into cheese. Their project has failed to obtain financing through European funds. Nevertheless, the association had shared their plan with the mayor; since the project was going to benefit the entire village, the mayor extended his material support and the cooling tank was purchased. The Negrești-Căzănești association planned to use the cooling tank to collect milk locally and sell it to a company in

Piatra Neamț, which would process and market it. The project failed because the intermediary company, although initially promised a good price per litre, then decreased it by 60%, and the members of the association decided to abandon the partnership as well as the purchase of the tank. Thus, besides the chance of some to be supported by the mayor and the misfortune of others to be deceived by a potential partner, the approach taken by the two associations played an important role in the outcome, as the one who was more ambitious and able to better calibrate its target was successful, while the other, lacking enthusiasm and strategic thinking, failed.

Counselling plays an important role in the success of associations' collective actions. The Tismana association lacked legal advice on its rights and responsibilities, leading to the accumulation of mistakes that undermined certain members' confidence in the president. The president, due to lack of clear information in this respect, did not mention at the outset that the association will not grant dividends to members. Some members, looking at another association present in the village, Obșteștea Moșnenilor, which granted dividends, thought it would be the same for the livestock farmers' group. Later on, the president clarified that legal dispositions did not allow the association to grant dividends, but this created discontent among members. Another issue was that, in the first year maintenance of common grassland was carried out by all members (who were paid); the following year the president found out that this was a risky procedure from the legal point of view, and stopped it (hiring only five members to do the work). This led to the accumulation of additional complaints. The association's misfortune was that, despite the achievements of its first years, the mayor's interference in internal conflicts led to the total halt of activities.

Misunderstandings in the application of legislation happened also in the case of the Borca association. However, disputes caused by lack of information did not take place between the presidents and members of the association, but between one of the presidents

and people from another village, who wanted to receive part of the association's meadows. Thus, although the conflict was serious, it had no impact on the association and activities were carried out successfully.

### **3. Successful farmers as leaders**

Traditionally, Romanian peasants accepted more easily to implement innovations in agriculture when these were recommended by successful peers. This recommendation meant that people, who were successful in their farming activities in the specific conditions of the local environment, found out that these innovations can work locally. Even if they did not have the opportunity to test them, their discernment was enough to determine whether they were profitable or not. The strategy of copying the successful farmer is still adopted in Romanian villages today. Thus, associative structures are more likely to succeed if they are led by such people, who constitute an example for the rest.

In Vlașca, although the initiative of funding the cooperative came from younger farmers and not from the current president, the fact that he is a successful farmer with considerable work experience enabled him to strengthen the associative structure. Some members complain about his cautiousness, yet they all admire him for his technical knowledge and ability to draft crop plans. This allowed him to impose a rule requiring members to use an identical crop technique on 70% of the area they cultivate, a provision which facilitated common auctions and obtaining considerable price reduction for agricultural inputs. Despite her experience in crop protection, the AgriSud cooperative's president, an agricultural engineer, did not enjoy the same kind of trust from farmers. They requested her advice when they dealt with pests or diseases, but never accepted to follow the crop plans she suggested to them.

The president of the Vlașca cooperative, having the same aversion for risk as the rest of the farmers, imposed a slower pace of growth in complexity of cooperative projects, wanting to test first the reliability of members, and cautiously observe market developments. AgriSud leaders, due to their training and network, proposed, ever since the

establishment of the cooperative, development plans that were too complex and ambitious in relation to the level of confidence farmers had in their peers, leading often to failure.

The president of the Negrești association encountered the same difficulties. Although she possesses a farm, her main occupation is teaching. She tried to make her colleagues identify with her, by stressing the fact that she lived in the same environment as them, and that her farm was as small as theirs. However, she was not considered 'one of them' by the rest of the farmers, and they did not follow her advice. The Tismana association president was more successful in his relation to farmers, although he was a professor as well. However, not all villagers accepted him as a leader, and some of them preferred to ally with the mayor.

The president of the Borca association, a farmer who lived in the farms on alpine meadows in his childhood, was able to design necessary improvements in animals' and shepherds' living conditions. Thus he was accepted as a leader not only by members of the association in his village, but also by the other presidents of the Borca association, who were quick to adopt the same model of development for the areas under their responsibility. The president of the Buda-Oșești association was designated as leader by the other members after they noticed her degree of involvement in the activities proposed by the partner NGO. Thanks to her management skill she earned the respect and confidence of peer farmers.

The general development direction of the association is defined by the president, many members lacking the capacity to propose solutions to complex problems. Yet there are always suspicions against the president (in both cooperatives and associations), because of his capacity to propose solutions that others cannot foresee; some members believe that the president has hidden interests when he comes with development suggestions. This is why trust in and acceptance of the president as leader by the rest of the members is crucial. This is more easily achievable by farmers than by leaders coming from the external environment. Strong leaders make a great

contribution to the clarification of common goals and the success of collective actions, being cornerstones on which social capital is built.

## CONCLUSIONS

This study aimed to constitute an analysis of the process of social capital formation in Romanian agriculture, in order to identify factors favouring it. A first finding is that the sources of inspiration in creating Romanian associative structures were predominantly foreign, confirming the lack of local models and the assumption that the level of domestic social capital is low. Only one exception was identified, the Borca association. It is thus important to facilitate exchanges with successful associations from other areas to encourage the formation of associative structures.

The reasons that pushed farmers in recent years to adopt the associative solution were mainly financial: lower production costs and increased selling prices for cooperatives, and gaining access to European funds for livestock farmers' associations. Encouraging associative structures financially is therefore a useful tool in social capital formation.

The main elements that differentiated successful associations from those who failed were clear common interests, success of collective actions and having successful farmers as leaders (having strong leaders is not sufficient, it is also necessary that members identify with their leader). It is important to note that the development of associative structures is difficult in a corrupt environment in which political interventions create a non-transparent climate and do not encourage public consultations. In this case an institutional disjunction [7] occurs between associations and the local administration, engendering suspicion and destroying the regime of cooperation and consultation.

This study seems to indicate that trust is a necessary input, but also a result of social capital. Thus, it is initially necessary to grant at least a little trust to colleagues, in order to start collective activities. It is not only the ability to generate trust that is a component of

social capital, but also the one to grant trust to others. For example, among farmers in the Tismana association, those who did not place any confidence in others, criticizing all action taken, having a suspicious attitude towards the association's president and refusing to get involved in activities, have not acquired subsequently any trust in their peers, nor in the associative structure, despite its achievements. Those who were more involved in activities from the beginning (investing trust, time and effort), are those who were more satisfied in the end, gaining more confidence in the president and their colleagues.

However, trust, when obtained through repeated interactions, cements social capital, becoming a determinant and not only a result of it. Thus, for example, the trust built between farmers in Giurgiu through collective, smaller-scale successes, led to the start of negotiations to build more complex common goals, evidence of increased trust and strengthened social capital. This preparation of a collective action, will, if successful, increase trust even further, therefore strengthening social capital. Conversely, the lack of confidence led, in AgriSud, to a standstill and even withdrawal from certain activities which, in turn, reduced trust in the associative structure and rendered it fragile: it could no longer develop and protect common goals against individual ones. Thus came the destruction of social capital and gradual disintegration of the cooperative.

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## COMPLIANCE ANALYSIS OF INTEGRATED PEST MANAGEMENT IN CHERRY CULTIVATION

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### Abstract

*Integrated pest management came to Turkey with international projects in 1980s and it has been implemented by Food, Agriculture and Livestock Ministry in various product groups. The present research aims to determine the socio-economic factors affecting the level of integrated pest management methods' implementation of enterprises involved in cherry growing that stands out in the region. In this context, Izmir, Manisa, Konya, Isparta, Afyon and Denizli were taken into the scope of research where intensive growing of cherry in Turkey takes place. Research findings indicate that awareness of integrated pest management concept is at low level. However, the integrated pest management methods have been implemented more since cherry started to be exported. Producers' implementation level of the integrated pest management methods is affected by production scale, spraying schedule, the consultant ownership, compliance with Food, Agriculture and Livestock Ministry provincial / district offices' spraying schedule proposal for brown rot (*Monilinia laxa*), cherry fruit fly (*Rhagoletis cerasi* L.), (*Dip.:Tephritidae*).*

**Key words:** cherry production, IPM, Ordered Probit model, Turkey

### INTRODUCTION

The increase in consumers' request regarding safe food necessitates use of harmless inputs, development and implementation of production techniques in food production and agricultural production. Additionally, Turkey's accession process to EU requires more informed and effective agricultural production. In EU, EUREPGAP Protocol (The Euro Retailer Producer Group Good Agricultural Practices) was prepared in 1997 in order for registration and control of all kinds of fresh fruit and vegetables from production to consumption. The principles of Good Agricultural Practices (ITU-GAP) are found in EUREGAP Protocol. Good Agricultural Practices includes the practices that are required to make agricultural production system socially sustainable,

economically profitable and productive and to protect human health and environment. As a reflection, Agriculture and Rural Affairs Ministry prepared and implemented a regulation regarding Good Agricultural Practices in Turkey in 2004.

Given reasons and evaluations emphasize the importance and necessity of integrated pest management (IPM) implemented in cherry growing which is one of the main products providing high added value considering fresh fruit production in Turkey. Within this scope, the starting point of the project is the fact that implementation level of the IPM in cherry growing, which executives and implementers got to know thanks to an international project in 1980s, has not been known. Besides the given problem, farmers' spraying management approaches, factors influencing the implementation level of the IPM and

questions regarding the change requests considering the existing system and developing technology and knowledge level were attempted to be answered.

The research focuses on presenting farmers' agricultural management structure, determination and betterment of the level of farmers' accordance with the IPM program. In this context, demographic, economic and sociological profiles of the farmers applying and not applying the IPM program and how effective these factors are on the adaptation level of the IPM program were determined.

## MATERIALS AND METHODS

In this context, Denizli, Isparta, Izmir, Konya and Manisa were taken into the scope of research where intensive cultivation of cherry (41.9 percent of the cherry growing, 52.3 percent of planted areas, 38.5 percent of the number of trees) in Turkey takes place. The primary data constituting the main material of the research were obtained through questionnaire method from the cherry producers found in the given cities. The secondary data related to the research were obtained from institutions and organizations including Provincial and District Food, Agriculture and Livestock Directorates. Additionally, benefitted from the relevant researches conducted at national and international level.

The primary data constituting the main material of the research were obtained through questionnaire method from the cherry producers found in the given cities.

In the model used to determine how effective farmers' socio-economic features are on adaptation level of the integrated pest management, the answers are divided into three categories regarding the dependent variable, which is the implementation level of the integrated pest management, as 0=1-39 percent, 1=40-69 percent and 2=70-100 percent. As the dependent variable gets three discrete values which naturally increase, "ordered probit model" is the optimal model to be used. Age, education level, experience, income, non-agricultural income level, family size and similar characteristics of

demographic and socio-economic features were considered as the independent variables in the model.

Four criteria given below were used in the determination of the implementation level of the IPM in cherry cultivation. These are;

(i)The level of compliance to the IPM(the point taken according to the Likert scale) (25 points),

(ii)Farmers' implementation level of alternative methods to chemical fight like biological fight, cultural measures, biotechnological methods, physical and mechanical methods (the point taken according to the Likert scale) (25 points),

(iii)Enterprises' technical applications (pruning method, irrigation, fertilization dose, dilution condition, consultant status, participation in educational activities, chemical drug dosing knowledge, fertilizer application in accordance with soil analysis results, use of suitable plant nutrients) (25 points),

(iv) Proper use of drug in accordance with the integrated pest management, the recognition level of pest and disease (the point taken according to the Likert scale) (25 points),

In the study, Chi-square test was used in order to determine whether there was dependence among the agricultural pest management system used by the farmers, farmers' features and features of the region where growing is done.

The implementation level of the IPM and demographic, economic and sociological profiles of the farmers were determined through the given criteria and how effective these variables were on the adaptation level of the IPM program were determined.

The dependent variable is qualitative in the ordered Probit model. This qualitative dependent variable has a categorical structure as it has a specific order and sequence reflecting the size of data or variables having continuous feature [15]. Ordered response models are presented as the optimum econometric model in the presence of this type of dependent variable [10].

In the ordered probit model, it is presumed that error term is normally distributed and latent dependent variable is a continuous

variable [16]; [18].

It is assumed in ordered probit model that there is an unobservable latent variable behind the observable, intermittent and sequential categories. The unobservable latent dependent variable is explained with explanatory variable vector and error term as shown below [8].

$$y^* = \beta x + \varepsilon \quad \varepsilon \sim N [0,1]$$

In this equation, symbols indicate their counterparts;

$y^*$ ; unobservable dependent variable,  
 $x$ ; explanatory variable vector,  
 $\beta$ ; parameter vector to be estimated and  
 $\varepsilon$ ; error term (normally distributed).

In the below equations, the relationship between dependent variable ( $y$ ) and unobservable dependent variable ( $y^*$ ) is indicated.

$$\begin{aligned} \text{if } y = 0, & \quad y^* \leq 0, \\ \text{if } y = 1, & \quad 0 < y^* \leq \mu_1, \\ \text{if } y = 2, & \quad \mu_1 < y^* \leq \mu_2, \\ & \quad \cdot \\ \text{if } y = j, & \quad \mu_{j-1} \leq y^* \end{aligned}$$

Here,  $y$  is observed equivalent of  $y^*$ .  $\mu_j$  is the threshold value determining upper and lower limits of the values that are estimated with  $\beta$  and are taken by  $y$ . In this study, five different implementation options of the integrated pest management system in growing were taken into consideration. The sequential categories of the dependent variables to be used in the study are as follows;

If  $Y=0$ , use of IPM method at 1-39 percent level,  
 If  $Y=1$ , use of IPM method at 40-69 percent level,  
 If  $Y=2$ , use of IPM method at 70-100 percent level.

In ordered probit model, likelihood of farmers' preferring different alternatives (observed  $y$  values) is indicated in equations as follows;

$$\begin{aligned} P(y=0) &= \Phi(-\beta'x) \\ P(y=1) &= \Phi(\mu_1 - \beta'x) - \Phi(-\beta'x) \\ P(y=2) &= 1 - \Phi(\mu_1 - \beta'x) \end{aligned}$$

In order for all likelihoods to be positive,  $\mu$  values should be like  $0 < \mu_1 < \mu_2 < \dots < \mu_j - 1$ .  $\Phi(\cdot)$  Indicates the cumulative normal distribution function.

The likelihood function of the model is formed from the given likelihoods as given below.

$$L = \Pi_{y=0} P(y=0) \Pi_{y=1} P(y=1) \Pi_{y=2} P(y=2)$$

If the likelihood equations put into their places in the model,

$$L = \Pi_{y=0} \Phi(-\beta'x) \Pi_{y=1} [\Phi(\mu_1 - \beta'x) - \Phi(-\beta'x)] \Pi_{y=2} [1 - \Phi(\mu_1 - \beta'x)]$$

Logarithmically indicated like

$$\log L = \sum_{y=0} \log \Phi(-\beta'x) + \sum_{y=1} \log [\Phi(\mu_1 - \beta'x) - \Phi(-\beta'x)] + \sum_{y=2} \log [1 - \Phi(\mu_1 - \beta'x)]$$

The estimate of the model is found with maximum likelihood method. Derivatives taken according to the explanatory variables of the likelihood equation provide the marginal effects of explanatory variables on these likelihoods [18]. Effects of explanatory variables on the likelihoods are not same with the coefficient estimates and they are dependent on the explanatory variables. Marginal effects of the variables are calculated for each likelihood as given below [8].

$$\begin{aligned} \frac{\partial P(y=0)}{\partial x} &= -\phi(\beta'x)\beta \\ \frac{\partial P(y=1)}{\partial x} &= [\phi(-\beta'x) - \phi(\mu_1 - \beta'x)]\beta \\ \frac{\partial P(y=2)}{\partial x} &= \phi(\mu_1 - \beta'x)\beta \end{aligned}$$

Likelihood Ratio (LR) hypothesis test is used to test the ordered probit model's acceptability of general meaningfulness statistically and explanatory of the obtained equation [20]. This test is done by comparing LR values found with the below given equations by using constrained and unconstrained log-likelihood values obtained with the model to  $\chi^2$  (sd) value.

$LR = -2[(\text{Log}L_{\text{constrained}}) - (\text{Log}L_{\text{unconstrained}})]$   
 If LR value is bigger than  $\chi^2$  (sd), it is interpreted as the general meaningfulness of the model is statistically acceptable and supports the explanatory of the equation [19].

**RESULTS AND DISCUSSIONS**

Logit, ordered logit, probit, ordered probit, tobit or poisson have been widely used in the empirical studies on compliance with the IPM method [14]; [7]; [5]; [6]; [12]; [13]; [1]; [17]; [9]).

Before the analysis, the optimum variables, which explain farmers' behaviours regarding the compliance with the IPM method in the best way, should be determined. Socio-demographic, economic, behavioural variables influence farmers' compliance with the IPM method.

The explanatory variables for compliance with farmers' IPM method are given at Table 1. A significant portion of the variables are as bivalent variable. Farmers' features like education level and age are included in the model.

In the study, likelihood Ratio (LR) hypothesis test is used to test the ordered probit model's acceptability of general meaningfulness statistically and explanatory of the obtained equation. According to this hypothesis test;  $LR = -2[(\text{LogLikelihood constrained}) - (\text{LogLikelihood unconstrained})]$   
 $LR = -2[(-249.41148) - (-186.31925)]$   
 $LR = 126.18$

Considering the constrained and unconstrained log-likelihood values, LR value obtained in the model is bigger than 27.59 which equals  $\chi^2$  (17) critical value at 5 percent level (126.18). In the study, likelihood Ratio (LR) hypothesis test result indicates the ordered probit model's acceptability of general meaningfulness statistically and supports explanatory of the obtained equation.

In the modals containing qualitative dependent variable, the estimated coefficients should be interpreted carefully. If the symbol of the parameter taken as explanatory variable in the model is positive (+), it means that a high value in the explanatory variable can increase the possibility of higher value dependent variable. If the symbol of the parameter taken as explanatory variable in the model is negative (-), it means that a high value in the explanatory variable decreases the possibility of higher value for dependent [2].

Estimated model is;

$$EMYUD = f (\text{ILKOD}, \text{EGTM}, \text{YAS}, \text{Krzparca}, \text{Krzuretda}, \text{S33}, \text{S30}, \text{S42}, \text{S40}, \text{S48}, \text{S76}, \text{S75}, \text{MAK\_DA}, \text{ISG\_DA}, \text{NKAR}, \text{MLYT}, \text{GRUP}).$$

According to the results of analysis, Pseudo  $R^2$  of the model's shadow certainty coefficients was estimated as 0.2530. The estimated model was found meaningful statistically as a whole ( $\text{Prob} > \chi^2$ ).

Table 1. Variables used in the model

Variables	Definition of variables
<b>Dependent variable</b>	
EMYU	Compliance with IPM method: Y=0, implemented at low level; Y=1, implemented at middle level; Y=2, implemented at high level.
<b>Independent variable</b>	
ILKOD	Cities within the research scope: Izmir=1, Manisa=2, Konya=3, Isparta=4, Afyonkarahisar=5, Denizli=6
EGTM	If enterprise manager's education is over primary school level 1, if not 0 (dummy)
YAS	If enterprise manager is below age 50 1, if not 0 (dummy)
Krzparca	Number of cherry lands of enterprise (continuous)
Krzuretda	Cherry yields of enterprise per decares (continuous)
S33	Marketing channel of cherry: (categorical) 1= Exporter merchant, 2= Middleman, 3= Merchant, 4= Other
S30	Special consultant status regarding the cherry orchard care: (categorical) 1= Yes, 2= No
S42	Good agriculture certificate ownership status in cherry cultivation: (categorical) 1= Yes, 2= No
S40	Compliance with Food, Agriculture and Livestock Ministry provincial / district offices' spraying schedule proposal for brown rot and cherry fruit fly in cherry cultivation: (categorical) 1= None, 2= Little, 3= Middle, 4= Much, 5= Very much
S48	Spraying schedule ownership status in cherry cultivation: (categorical) 1= Yes, 2= No
S76	Satisfaction from cherry cultivation: (categorical) 1= None, 2= Little, 3= Middle, 4= Much, 5= Very much
S75	Insurance status in cherry cultivation: (categorical) 1= Yes, 2= No
MAK_DA	Use of machine power in growing (hour/minute) (continuous)
ISG_DA	Labour use in growing (hour/minute) (continuous)
NKAR	Relative profit in growing (continuous)
MLYT	Cost in growing (TL/kg) (continuous)
GROUP	Classification of enterprises' cherry orchard sizes: (categorical), decares 1-6.99 =1, 7-14.99 =2, 15-29.99 =3, 30 and over =4

Source: Own calculation.

According to the analysis results, education level, age, number of plots, marketing channel, ownership status of good agriculture practice certificate, insurance status, satisfaction from cherry cultivation, use of machine power, labour use, relative profit and cost variables found in the model were found statistically meaningless. Even if socio-economic factors including being under age 50, having an education level over primary school affect compatibility with integrated pest management, variables' being statistically different make interpretation of this level challenging (Table 2).

The group variables including compliance with Food, Agriculture and Livestock

Ministry provincial / district offices' spraying schedule proposal for brown rot (*Monilinia laxa*), cherry fruit fly (*Rhagoletis cerasi* L.), (Dip.:Tephritidae), in cherry cultivation, ownership of spraying schedule, size classification of cherry orchards were found statistically meaningful (Table 2).

Table 2. Results of ordered probit model

Variables	Coefficient	Coefficient standard error	Z-value	P-value
İLKOD*	-0.096	0.056	-1.730	0.083
EGTM	0.175	0.180	0.970	0.332
YAS	0.054	0.178	0.300	0.763
Krzparca	-0.004	0.042	-0.110	0.916
Krzuretda*	-0.001	0.001	-1.840	0.066
S33	-0.060	0.084	-0.720	0.472
S30***	-0.601	0.198	-3.030	0.002
S42	-0.128	0.205	-0.620	0.533
S40***	0.381	0.058	6.540	0.000
S48***	1.287	0.178	7.222	0.000
S76	0.060	0.077	0.780	0.437
S75	0.117	0.212	0.550	0.580
MAK_DA	0.004	0.104	0.040	0.967
ISG_DA	0.004	0.005	0.740	0.459
NKAR	0.084	0.132	0.640	0.523
MLYT	-0.233	0.361	-0.650	0.518
GROUP	0.205	0.100	2.052	0.041
/CUT1	-0.534	1.217		
/CUT2	1.109	1.222		

Source: Own calculation.

The coefficient of city group was found meaningful at 10 per cent significance level with negative symbol. For instance, it can be expressed that farmer's being in Izmir and Manisa cities increase the likelihood of compliance with IPM by 0.096 (Table 2).

Another variable found in the model is cherry yield level. The coefficient of this variable was found meaningful at 10 per cent significance level with negative symbol. As the cherry yield increases, the IPM adoption level decreases by 0.001 (Table 2). The coefficient regarding the compliance with Food, Agriculture and Livestock Ministry provincial / district offices' spraying schedule proposal for brown rot (*Monilinia laxa*), cherry fruit fly (*Rhagoletis cerasi* L.), (Dip.:Tephritidae), in growing was found meaningful at 1 per cent significance level with positive symbol. Farmer's compliance with Food, Agriculture and Livestock Ministry provincial offices' spraying schedule proposal for brown rot (*Monilinia laxa*), cherry fruit fly (*Rhagoletis cerasi* L.), (Dip.:Tephritidae), in growing increases the

likelihood of compliance with the IPM by 0.381 (Table 2).

The coefficient of farmers' ownership of special consultant in the care of cherry orchards is with negative symbol. It was found statistically meaningful at 1 per cent significance level. The coefficient of farmers' ownership of private consultant in the care of cherry orchards is with negative symbol.

The coefficient of farmers' ownership of spraying schedule in growing is with negative symbol. It was found statistically meaningful at 1 per cent significance level. Farmers' ownership of spraying schedule in growing increases the likelihood of compliance with the IPM by 1.29 (Table 2).

According to group variable regarding the size classification of cherry orchards, the likelihood of compliance with the IPM increases by 0.21 for the enterprises owning bigger orchards. This variable was found meaningful at 5 per cent significance level (Table 2). However, Bonabana-Wabbi et al. [3] found out that the influence of size of orchards on compliance with the IPM was not statistically significant.

Mauceri et al [11] studied adaptation to IPM techniques in potato cultivation in Carchi, Equator. They used ordered probit model in the analysis of data. They listed the factors influencing IPM adaptation as access to Farmer Field School's data, field day, brochures and willingness to participate in farmer field school. According to the findings of the study, increase in the size of household decreases the compliance with IPM. According to the writers, farmer field schools, field days and brochures are effective mechanisms providing IPM knowledge and its adaptation.

According to the study of Singh et al [17], studies about the IPM through applied programs have favourable effects in the long run. Extension services were statistically not significant in the adaptation of integrated pest management. Different relationships were observed between the size of enterprise and adaptation of integrated pest management. It was found out that as the size of enterprises increased in cotton cultivation and decreased in rice plant cultivation, the likelihood of IPM

adaptation increased.

According to the results of study by Li et al. [9], it is more likely in the bigger enterprises cultivating various plants and employing more full-time workers to adapt IPM method. As green housing and arboriculture activities face with diseases more, it is harder to adapt IPM method. Moreover, the biological control agents (i.e., predator and parasite) constrain IPM in green housing and arboriculture enterprises. At the same time, this study emphasizes the difference between measures of IPM and farmers' knowledge.

In the study by Carlberg et al [4], the peanut production level of farmers who apply IPM method and participate in farmer field schools were found statistically to be meaningful and higher in Ghana.

## CONCLUSIONS

In the study, suggestions for development and betterment of IPM method in the fight against disease-pests regarding compliance level in cherry growing were studied in Izmir, Manisa, Konya, Isparta, Afyonkarahisar and Denizli samples.

Regarding the influence of farmers' socio-economic characteristics on compliance with IPM, variables found in the model were found to be significant. However, the variables found in the model including education level, age, number of plot, marketing channel, ownership status of good agriculture practice certificate, insurance status, satisfaction from cherry growing, use of machine power, labour use, relative profit and cost variables found in the model were found statistically meaningless. However, the group variables including compliance with Food, Agriculture and Livestock Ministry provincial / district offices' spraying schedule proposal for brown rot (*Monilinia laxa*), cherry fruit fly (*Rhagoletis cerasi* L.), (Dip.:Tephritidae), in cherry growing, ownership of spraying schedule, level of satisfaction from cherry growing, the frequency of internet use, taking measures in chemical spraying in cherry cultivation, size classification of cherry orchards were found statistically significant (Table 2).

Besides this study, the studies carried out in the national and international arena indicate that integrated pest management can be adapted through effective communication. The majority of the enterprises request more knowledge and awareness in this subject.

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## ECONOMIC ANALYSIS OF INTEGRATED PEST MANAGEMENT IN CHERRY CULTIVATION

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### Abstract

*The present study aims to develop new suggestions by determining the implementation level of integrated pest management, awareness level regarding the integrated pest management, shortcomings in implementation and efficiency of implementation in cherry cultivation in the region that stands out in Turkey. In this context, Izmir, Manisa, Konya, Isparta, Afyon and Denizli were taken into the scope of research where intensive cultivation of cherry in Turkey takes place. According to the results of the study integrated pest management awareness is low. However, the integrated pest management methods have been implemented more since cherry started to be exported. 37.3% of farmers highly implement integrated pest management and 22.5% implements at low level. The lack of awareness at enterprise level regarding integrated pest management and warning system is the area need to be focused. At the top of the suggestions about increasing the efficiency of the system comes popularizing the training activities in the region. Overall, providing sustainability of the system, development of production and consumption culture are important areas both in public and private sectors.*

**Key words:** cherry production, IPM, Turkey

### INTRODUCTION

Pesticide use plays an important role in the increase of production. A remarkable increase was observed in 1940-1950s in the pesticide use especially in the developed countries. However, the unfavourable effects of intense input use in agricultural production on natural resources and human health have been discussed at the present time. The unfavourable effects have been observed on environment and human health in many countries since intense pesticide use. Pesticides have acute and chronic effects on human health and cause unfavourable effects on non-target organisms by contaminating the ground and surface water [17] [26]. This situation has caused the emergence of alternative spraying methods. The best known

of these methods is Integrated Pest Management (IPM). IPM is described as Integrated Pest Control and defined as the management system of pests. Within the scope of this definition, IPM is the efforts for the use of all techniques and methods in harmony in order to keep pest populations under economic damage levels by taking all factors taking part in pests' population change into consideration by their environments.

Objectives of IPM are; (a) Increasing agricultural production, obtaining qualified chemical products which do not leave chemical residues, (b) protection and encouragement of natural enemies, (c) controlling field, orchard and vineyards and (d) farmers' becoming experts of their fields, orchards and vineyards [38].

The research focuses on presenting farmers'

agricultural management structure, determination and betterment of the level of farmers' accordance with the IPM program. In this context, farmers' compliance level with the IPM program existing in the region was determined and economic analysis was conducted. Additionally, cherry producers' judgment, attitude, existing knowledge and awareness levels regarding the IPM were determined.

## MATERIALS AND METHODS

In this context, Denizli, Isparta, Izmir, Konya and Manisa were taken into the scope of research where intensive cultivation of cherry (41.9 percent of the cherry cultivation, 52.3 percent of planted areas, 38.5 percent of the number of trees) in Turkey takes place. The primary data constituting the main material of the research were obtained through questionnaire method from the cherry producers found in the given cities. The secondary data related to the research were obtained from institutions and organizations including Provincial and District Food, Agriculture and Livestock Directorates. Additionally, the relevant researches conducted at national and international level has been benefitted.

The sample volume was calculated as 236 farms with 95 percent confidence interval and 5 percent margin of error by applying stratified random sampling to the population obtained from Farmer Registration System of six cities. The sample farms were allocated into strata with "Neyman Method".

Four criteria were used in the determination of the implementation level of the IPM in cherry cultivation. These are; (i) the level of compliance to the IPM (the point taken according to the Likert scale) (25 points), (ii) farmers' implementation level of alternative methods to chemical fight like biological fight, cultural measures, bio-technological methods, physical and mechanical methods (the point taken according to the Likert scale) (25 points), (iii) farms' technical applications (pruning method, irrigation, fertilization dose, thinning condition, consultant status, participation in educational activities,

pesticide using knowledge, fertilizer application in accordance with soil analysis results, use of suitable plant nutrients) (25 points), (iv) proper use of chemical in accordance with the integrated pest management, the recognition level of pest and disease (the point taken according to the Likert scale) (25 points),

In the study, farmers' choice of pest management system and judgment, attitude and existing knowledge level about IPM were studied. Within this scope, Likert scale was used to evaluate farmers' attitude regarding the use of agricultural pest management system in cherry cultivation. The expressions situated in attitude scale were evaluated according to 5-point scale in Likert scale. The answers; I definitely agree - I agree - I am neutral - I disagree - I definitely disagree, are found next to each question. The severity of attitude increases or decreases toward the end [6]. In the scale, farmers' answers to each attitude question were determined and how positive they are in terms of use of determined system or their attitude regarding the use of IPM were found out. The variable expense items in cherry cultivation contain temporary labour, fertilizer, drug, water expenses, fuel-repair-maintenance, rent of machinery, marketing, other changing items and working capital interest. In the farms studied in the region, fixed costs contain paid family labour, permanent foreign - family labour cost, rent-sharecropping share, depreciation period, interest period, depreciations and total debt interest. The total of equity interest, fixed cost and variable cost constitutes production costs. Profitability rates were found out in the evaluation of compliance with IPM in cherry cultivation and success rates. In the calculation of cherry's relative, gross and absolute (net) profits;  $\text{Gross Profit} = \text{Gross Value of Output} - \text{Variable costs}$ ,  $\text{Relative Cost} = \frac{\text{Gross Value of Output} - \text{Production Costs}}{\text{Gross Value of Output}}$  [1] [19] [35].

## RESULTS AND DISCUSSIONS

80.5 percent of the farmers apply foliar fertilizer. Considering the size groups of farms, foliar fertilizer is applied at the lowest

level in group I, at the highest level at group IV. Regarding the number of foliar fertilizer applied to cherry orchards, it was found out that foliar fertilizer was applied 2.2 times at farmers' general average. There is a directly related statistical ( $P < 0.05$ ) relationship between size groups of farms and number of foliar fertilizer application.

In vegetable and fruit growing, application of farm manure is important besides chemical fertilization. 52.2 percent of farmers in the region apply farm manure in their cherry orchards. The application time of farm manure changes among farms. The farms generally apply farm manure in autumn and winter months (October, November and December).

Considering the farms' status of conducting soil analysis in the research area, it was found out that 57.2 percent of farms conducted soil analysis. There is a directly related statistical ( $P < 0.05$ ) relationship between size groups of farms and conducting soil analysis.

Considering farms' application of fertilizer in accordance with analysis results in cherry cultivation, 88.9 percent of the farms conducting soil analysis applied fertilizer in accordance with analysis results.

According to the study by Hasdemir and Taluğ [15], the most important source of information regarding the fertilization decision was the farmers' own knowledge with 39.71 percent for farms not conducting GAP (Good Agricultural Practices) and it was the soil analysis results with 32.35 percent for farms conducting GAP.

Pruning is a very important issue in cherry cultivation. The cultivation system differs according to the vigour of cherry's rootstocks and variety. The pruning methods in cherry orchards can be divided into three categories. These are; (i) Shape pruning is done in order to give shape to the young trees. (ii) Pruning of trees in yield era are conducted every year regularly for apple, pear and peach trees but not for cherry. Fruit trees are pruned in order to provide pre-built canopy remove diseased or damaged branches, remove branches that compact the crown and affect light exposure unfavourably, remove aged branches and voracious shoots and encourage the formation

of new shoots to ensure the continuity of physiological balance. (iii) Rejuvenation pruning of the elderly trees are conducted with hard cuts in order to encourage the formation of new branches. While most of the pruning activities aim to give the tree shape, some pruning activities like Sweet Hearth are compulsory to conduct each year regularly in productive fruit-bearing trees in order to prevent the quality loss of fruits caused by increased fruit weight on branches.

In that way, new branches can form on the tree and high-quality fruits are obtained thanks to the balanced fruit weight. According to the study results, 94.5 percent of the farms conduct pruning regularly. The ratio changes between 92 percent and 100 percent in size groups of farms.

In stone fruits, such diseases-pests as brown rot (*Monilinia laxa*), Cherry fruit fly (*Rhagoletis cerasi* L.), (*Dip.:Tephritidae*), Shot hole disease (*Wilsonomyces carpophilus*) are found as significant diseases-pests in cherry research area [2].

Relevant departments of Ministry of Food, Agriculture and Livestock have taken apple scab (*Venturia inaequalis*) and powdery mildew (*Uncinulanegator*) into the estimate and warning system. Some technical instructions and standard chemical application methods for pest control have been prepared based on the studies carried out within Plant Protection Central Research Institute.

Brown rot (*Monilinia laxa*) emerges on every diseased part of conidiophores containing asexual generation structures. Conidiophores stacks can be observed by naked eye in the form of pustules on diseased branches in early autumn and spring. Cherry fruit fly (*Rhagoletis cerasi* L.) (*Dip.:Tephritidae*), whose mature forms are 4-5 mm long, have a yellow triangular shape at the neb of thorax. On cherry trees, Shot hole disease (*Wilsonomyces carpophilus*) fungus lives in the form of micelle on fruit-bud and branches in winter. The primary infections take place with conidiophores and diseased fruit-bud and cancers are the sources of infection. The front wings of rose tortrix (*Archips rosanus*) butterflies have a skewed rectangles shape and its colour changes between light olive and

brown. There are descriptive spots and bands providing details in terms of shape and colour on wings [2].

In the studied region, cherry IPM project is found in the programs of Crop Production and Plant Health branches of the Ministry of Food, Agriculture and Livestock Provincial and District Directorates. The Ministry removed cherry integrated technical ordinance and determined the definitions of cherry diseases and pests, fight methods and their periods to be harmful in 2011.

It was found out that 25.8 percent of the studied farms worked with consultant(s) in the care of cherry orchards.

Considering whether farms worked with a private consultant in the disease and pest management in cherry cultivation and care of cherry orchards; 10.2 percent worked with free consultant, 20.3 percent worked with paid consultant and 69.9 percent did not work with any consultant in the disease and pest management and care of orchards.

Considering the worldwide pesticide use; a remarkable increase was observed in 1940-1950s in the pesticide use especially in the developed countries. However, the intense use had unfavourable effects on natural resources and human health. This situation has caused the emergence of alternative spraying methods. The best known of these methods is Integrate Pest Management (IPM). IPM entered the world literature at the end of 1950s and it has been still improved. Similar programs with different names have been supported and run in many countries [13].

The production methods containing intense use of input in agricultural activities in order to increase productivity have caused an increase in environmental problems. The unfavourable effects of intense input use have been discussed especially in developed countries in the recent years. There have been a demand in these countries for healthy, clean products which are produced without chemical inputs and do not damage the environment or human. This situation has provided the emergence of production techniques including integrated pest management, organic agriculture and Good Agricultural Practices. The implementation of

these techniques presents a great significance for EU market which is the most important market for cherry export from Turkey. The consumers are willing to pay higher premium prices for the cherries produced with good agricultural practices [28].

Within this scope, the questions about the knowledge level of farms regarding the IPM were initially asked.

According to the findings, farms had a low level of knowledge. It was found out that 79.2 percent of the farms did not have information regarding the IPM (Table 1). Gül et al. [13], found out that 68.2 percent of the farmers did not have information regarding the IPM in their study on apple producers. Beddow [5] analysed the existing studies on environmental and economic techniques about IPM in USA and measured how IPM protocol was evaluated in the sample case of implementations on sweet corn in Pennsylvania and Massachusetts. It was found out that personal perceptions were not a measure in order to evaluate the adaptation of integrated pest management. It was because farmers had different ideas about the integrated pest management.

According to the data obtained in the research area, farmers' knowledge about good agricultural practices was studied. It was found out that average 44.5 percent of the farms had knowledge about the good agricultural practices while 55.5 percent did not have information. 78.0 percent of the studied farms had information about the organic agricultural practices. Considering farmers' knowledge about biologic agricultural practices, 30.9 percent had knowledge while 69.1 percent did not have knowledge. 58.1 percent of the studied farms had information about the official warning and practices regarding diseases and pests in cherry cultivation. Considering farms' ownership of good agricultural practices certificate; 22.9 percent of the farms had good agricultural practices certificate and 77.1 percent did not have good agricultural practices certificate.

17.1 percent of the studied farms implemented chemical control against weeds and 42.1 percent implemented mechanical control. 43.2

percent of the studied farms implemented chemical control consciously, 5.5 percent implemented unconsciously and 13.1 percent implemented with increased conscious. Farms' compliance with spraying schedule of Ministry of Food, Agriculture and Livestock for brown rot (*Monilinia laxa*), and cherry fruit fly (*Rhagoletis cerasi* L.), (*Dip.:Tephritidae*) was studied. Accordingly, 22.2 percent of the farms had never complied with the spraying schedule and 41.5 percent had complied very carefully. Considering the farms' compliance with the proposed dosage; the majority (84.3 percent) complied with the proposed dosage. Additionally, the majority of the farms (90.7) had sufficient knowledge regarding the time that must elapse between harvesting and spraying.

The majority of the farms (86.4 percent) took measures during chemical spray preparation in cherry cultivation. However, this ratio is low, especially in the III. group farms.

The participation of farms to the IPM trainings was also low (18.6 percent). This was also caused by the fact that farms did not have a conceptual understanding of IPM (74.2 percent did not know). Farms' compliance with spraying schedule of Ministry of Food, Agriculture and Livestock for brown rot (*Monilinia laxa*), and cherry fruit fly (*Rhagoletiscerasi* L.), (*Dip.:Tephritidae*) was studied as those complying at high level and those complying at low level. Accordingly, 24.6 percent complied at low level with Ministry's warning system regarding brown rot (*Monilinia laxa*) and Cherry fruit fly (*Rhagoletiscerasi* L.), (*Dip.:Tephritidae*) 75.4 percent complied at high level.

Considering the farms' implementation level of IPM against pests, diseases and weeds; 59.3 percent implemented at low level and 40.7 percent implemented at high level.

Unconscious and excessive use of agricultural pesticides causes toxic materials to accumulate in the soil and environment to be contaminated. Farmers, who did not know the chemical pesticide, used pesticides without considering the economic harm threshold sometimes early and sometimes late with the proposal of those who were not experts in the field and used pesticides sometimes even

when there was no need [16].

Pesticides used in cherry cultivation were classified as fungicides, insecticides and acaricide. The pesticides are generally used against fungal diseases in December-April months and used against pests in April-August months. It was found out that the proposals of Ministry of Food, Agriculture and Livestock Provincial/District Directorates' technical staff got 4.3 points, proposals of TARGEL consultants got 4.1 points and spraying periodically without considering whether trees had diseases or pests got 3.9 points.

Demircan and Aktaş [9] studied decision-making process of farmers regarding pesticide use against diseases and pests in cherry cultivation. In their study, they found out that, 14.13 percent of the farmers considered actual seeing of diseases and pests in their orchards, 4.35 percent considered seeing of diseases and pests in neighbour orchards, 41.31 percent considered proposals of Agriculture Provincial/District Directorates' technical staff and 34.78 percent considered seeing of diseases and pests in their orchards and proposals of Agriculture Provincial/District Directorates' technical staff. The findings of the study are similar to the present study.

Based on the Technical Guideline of Ministry published in 2011[2], farmers' approaches and proposals regarding the cultural, bio-technical, mechanical and biological management in cherry cultivation were entered to the questionnaire and asked to the studied farms. Considering farmers' cultural, biological, bio-technical implementation behaviours in pest and disease management; mechanical management got 3.1 points, cultural management took 3.0 points, bio-technical management took 1.5 points and biological management took 1.2 points.

Laborta and Swinton [21] found out that Nicaraguan bean farmers' IPM trainings resulted in increase of beneficial insect populations. Considering the sources of information regarding how to choose the insecticides, fungicides and herbicides; the farmers' own knowledge and experience got 4.4 points, technical staff of Ministry of Food, Agriculture and Livestock Provincial/District

Directorates got 4.2 points. Therefore, farmers' own experiences and Ministry's technical staff are important criteria on pesticide choice. Unlike the study of Gül et al. [13] on apple producers, the customers are also important in cherry cultivation.

The farms were studied in 3 groups according to their implementation level of the IPM by considering information obtained from farmers through questionnaire and technical staff's evaluation based on farmers' practices (Figure 1).

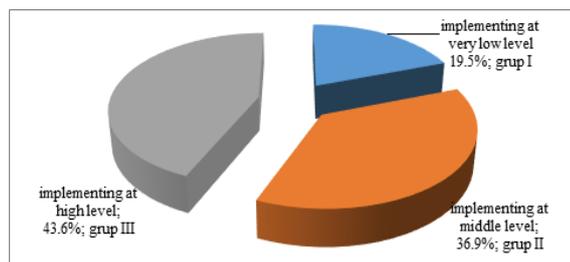


Fig. 1. Farms' compliance with the integrated pest management

Source: Own calculation.

At this point, IPM was targeted (obtaining good quality products not containing chemical residues, protection of beneficial organisms, and farmers' control of their orchards at regular intervals, bringing to the level of self-decision-making, minimizing the unfavourable effects of pesticides on environment). Additionally, scoring was made according to four criteria. These are; (i) the level of compliance to the IPM (the point taken according to the Likert scale) (25 points), (ii) farmers' implementation level of alternative methods to chemical fight like biological fight, cultural measures, biotechnological methods, physical and mechanical methods (the point taken according to the Likert scale) (25 points), (iii) farms' technical applications (pruning method, irrigation, fertilization dose, dilution condition, consultant status, participation in educational activities, chemical drug dosing knowledge, fertilizer application in accordance with soil analysis results, use of suitable plant nutrients) (25 points), (iv) proper use of drug in accordance with the integrated pest management, the recognition level of pest and disease (the point taken

according to the Likert scale) (25 points). The farms were divided into three categories according to the implementation level of integrated pest management; implementing at low level (1st group; 1-39 points), implementing at middle level (2nd group; 40-69 points) and implementing at high level (3rd group; 70-100 points). The farms' compliance level with the IPM is given at Figure 1. According to the table, 43.6 percent of the farms implemented at high level, 36.92 percent implemented at middle level and 19.5 percent implemented at low level.

Considering the analysis of socio-economic variables; there is no statistical relationship between the compliance with IPM and farmers' age. As the implementation level of IPM increases, farmers' education level increases. In other words, there is a relationship between implementation level and farmers' education level. Moreover, there is no relationship between the size of household and compliance level with the integrated pest management. There is no relationship between cherry field, number of cherry parcels and implementation level of IPM (Table 1).

According to the cherry cultivation variables, there is no relationship between, cherry production (kg), cherry production (kg/ha), number of cherry trees (piece), number of cherry trees (piece/ha), number of non-cherry-bearing trees and compliance level with IPM (Table 1).

Considering the technical implementation variables; there is no relationship between the quantity of nitrogen (kg/ha), phosphor (kg/ha), potassium (kg/ha) implemented to the cherry orchards and compliance level with integrated pest management, even if they follow a parallel declining trend with IPM (Table 1).

Compliance level with IPM and herbicide (g/ha), fungicide (g/ha), insecticide (g/ha), and acaricide (g/ha) implementation to the unit area changes and can follow an increasing trend. However, there is no relationship between IPM and these variables. Maupin and Norton [25] indicated in their study that pesticide use increased in USA from 1992 to 2000, but the most poisonous

pesticide use decreased at the same period. USDA presumes that this change was caused by the adaptation of integrated pest management. GAO (General Accounting Office) expresses that there is no sufficient data to prove this claim. In their study, they attempted to estimate the relationship between pesticide use between 1996 and 2005 and adapted IPM method. In the conclusion of the study, they found out that the pesticide use decreased dramatically with the average adaptation of integrated pest management.

There is a similarity and there is no statistical difference between farms' total labour use (hour/ha), total machinery use (hour/ha) and compliance with IPM (Table 1).

According to the findings, there is statistical relationship between farms' compliance level with IPM and soil cultivation, pruning and weeding. Accordingly, as farms' compliance level with IPM increases, the ratio of farms conducting soil cultivation, pruning and weeding every year increases (Table 1).

The obtained data indicates that as compliance with IPM increases, the ratio of working with consultant in orchard care and the ratio (percent) of farms marketing the product to the exporting merchant increase. Furthermore, there is a statistical difference among compliance level with integrated pest management, the ratio of working with consultant in orchard care and the ratio of farms marketing the product to the exporting merchant (Table 1).

According to the data, as the compliance level with the IPM increases, the ratio (percent) of farms conducting soil analysis regularly, the ratio (percent) of those conducting foliar fertilizer, the ratio (percent) of those having special consultant for disease and pests increase.

It was found out that there was a statistical relationship between the indicators of the ratio of farms conducting soil analysis regularly, the ratio of those conducting foliar fertilizer, the ratio of those having special consultant for disease and pests and compliance level with the IPM (Table 1).

As the compliance level with the IPM increases, the ratio (percent) of knowing the good agricultural practice concept, the ratio

(percent) of knowing biological control concept, the ratio of (percent) conducting mechanical control against weeds and the ratio (percent) of owning spraying schedule increases. Furthermore, there are statistical differences among the compliance level with the integrated pest management, the ratio of knowing the good agricultural practice concept, the ratio of knowing biological control concept, the ratio of conducting mechanical control against weeds and the ratio of owning spraying schedule increases (Table 1).

Table 1. The evaluation of IPM in farms in terms of socio-economic criteria-I

Variables	Adoption level of IPM			Total
	I	II	III	
<b>SOCIO-DEMOGRAPHIC VARIABLES</b>				
Age (year)	49.3	48.9	50.8	49.7
Education (year)	7.2	7.2	7.5	7.3
Size of household (person)	3.4	3.8	3.4	3.6
<b>CULTIVATING VARIABLES</b>				
Cherry field (ha)	2.79	2.45	3.14	2.79
Number of cherry parcels (piece)	3.2	2.9	3.0	3.0
Cherry Production (kg)	26,119	22,730	29,130	25,887
Cherry Production (kg/ha)	9,362.9	9,260.7	9,268.7	9,285.0
Number of cherry trees (piece)	1,091.3	880.1	1,054.1	990.2
Number of cherry trees (piece/ha)	391.2	358.2	335.2	354.9
Number of non-cherry-bearing trees (piece)	259.0	158.2	212.1	199.5
<b>TECHNICAL IMPLEMENTATION VARIABLES</b>				
Nitrogen (kg/ha)	193.6	195.6	172.9	185.3
Phosphor (kg/ha)	169.7	157.8	138.6	151.9
Potassium (kg/ha)	63.2	57.9	60.7	60.2
Fungicide (g/ha)	5,937.6	7,294.8	6,126.0	6,510.6
Insecticide (g/ha)	1,077.9	819.4	778.4	854.2
Acaricide (g/ha)	441.2	431.0	357.0	400.9
Herbicide (g/ha)	423.7	561.2	223.5	386.4
Total labour use (h/ha)	984.8	1,036.6	969.7	997.0
Total machine power usage (h/ha)	18.6	22.6	19.9	20.6
The ratio of farms cultivating soil every year regularly (%)*	66.7	85.6	96.7	86.0
The ratio of farms pruning every year regularly (%)*	89.6	93.8	97.8	94.5
The ratio of farms weeding every year regularly (%)*	79.2	77.3	92.3	83.5
The ratio of having private consultant for the care of orchard (%)*	0.0	27.8	37.4	25.8
The ratio of drip irrigation (%)	50.0	41.2	35.2	40.7
The ratio of marketing the product directly to the exporter merchant (%)*	52.1	50.5	58.2	53.8
The ratio of conducting soil analysis regularly (%)*	29.2	58.8	70.3	57.2
The ratio of conducting foliar fertilizer regularly (%)*	68.8	74.2	93.4	80.5
The ratio of having private consultant for diseases and pests (%)*	8.3	21.6	24.2	19.9
The ratio of knowing good agricultural practice concept (%)*	25.0	38.1	61.5	44.5
The ratio of knowing biological control concept (%)*	6.3	22.7	52.7	30.9
The ratio of owning good agricultural practice certificate (%)	18.8	20.6	27.5	22.9
The ratio of owning spraying schedule (%)*	16.7	53.6	74.7	54.2
The ratio of conducting mechanical control for weed (%)*	18.8	25.8	45.1	31.8
The ratio of those having knowledge about the time that must elapse between harvesting and spraying (%)*	77.1	90.7	97.8	90.7
The ratio of those taking measures during spraying (%)*	52.1	89.7	97.8	85.2
The ratio of those taking measures during pesticide preparation (%)*	60.4	90.7	95.6	86.4
The ratio of having agricultural insurance for orchards (%)*	4.2	12.4	22.0	14.4
The ratio of those participating to the IPM training program (%)*	4.2	5.2	40.7	18.6
The compliance level with monilinia and Rhaoglotisccerasi L. spraying schedule of Ministry of Food, Agriculture and Livestock Provincial/District Directorate in cherry cultivation (5-point Likert) *	2.3	3.6	4.2	3.6

Source: Own calculation.

As the compliance level with the IPM increases, the ratio of those conducting mechanical control (percent), the ratio of those having knowledge about the time that must elapse between harvesting and spraying

(percent), the ratio of those taking measures during spraying (percent) and ratio of those taking measures during pesticide preparation (percent) follow an increasing trend. There are statistical differences among the compliance level with the integrated pest management, the ratio of those conducting mechanical control, the ratio of those having knowledge about the time that must elapse between harvesting and spraying, the ratio of those taking measures during spraying and ratio of those taking measures during pesticide preparation. Mauceri et al. [22] pointed out that the potato farmers in Equator who took training about IPM techniques and therefore implemented IPM more took more measures before and during pesticide use.

The ownership of good agricultural practice certificate increased together with the compliance with the integrated pest management. However, there is no statistical relationship between the ownership of good agricultural practice certificate and compliance level with the IPM (Table 2).

As the compliance level with the IPM increases, the ratio of farms having agricultural insurance for cherry orchards increases. It was found out that there was a statistical relationship between the ratio of farms having agricultural insurance for cherry orchards and compliance level with the IPM (Table 2).

Furthermore, it was found out that as the compliance level with IPM increased, the ratio of participating into the IPM trainings increased. It was found out that there was a statistical relationship between the ratio of farms participating into IPM trainings and compliance level with the IPM (Table 2). Bayraktar [4] expresses that greenhouse tomato producers who participated into IPM program had favourable effects on product selling price, quantity of the product, number of spraying and care expenses.

As the compliance level with the IPM increases, compliance with brown rot (*Monilinia laxa*) and cherry fruit fly (*Rhagoletis cerasi* L.), (*Dip.:Tephritidae*). Spraying schedule of Ministry of Food, Agriculture and Livestock Provincial/District Directorate increases. There are statistical

differences between the compliance level with the IPM and compliance with brown rot (*Monilinia laxa*) and cherry fruit fly (*Rhagoletis cerasi* L.), (*Dip.:Tephritidae*) spraying schedule of Ministry of Food, Agriculture and Livestock Provincial/District Directorate. In cherry cultivation, the compliance with brown rot (*Monilinia laxa*) and cherry fruit fly (*Rhagoletis cerasi* L.), (*Dip.:Tephritidae*) spraying schedule of Ministry of Food, Agriculture and Livestock Provincial/District Directorate changes between 2.3-4.2 points (Table 2).

In the studied farms involved in cherry cultivation, in the efficiency of information sources (5-point Likert); as compliance level with IPM increases "Merchant, Commission agent", "Ministry of Food, Agriculture and Livestock Provincial/District Directorate staff", "Pesticide dealer", "Consultant (Paid)" and "Descriptions on the package" points increase. Furthermore, it was found out that there was a statistical relationship between these variables and compliance level with the IPM (Table 3). According to the data obtained in the research area, farmers' satisfaction from the cherry cultivation increases with the compliance with IPM groups. However, there is no significant difference between farms' compliance level with IPM and satisfaction level from the cherry cultivation (Table 2).

There is statistical difference between factors effective on spraying time (5-point Likert); "proposals of Ministry of Food, Agriculture and Livestock Provincial/District Directorate staff", "Consultant (paid)" and compliance level with IPM groups (Table 2). The economic variables of cherry cultivation activity of the farms; fixed cost of the unit area, variable cost, production cost, unit cost and spraying cost decreases in parallel with the compliance level with integrated pest management. Similarly, GPV for unit area, gross profit, absolute profit, relative profit values and selling price values follow increasing trend. However, it was found out that there was not a significant statistical difference among these economic variables and compliance with IPM groups (Table 2).

Table 2. The evaluation of IPM in farms in terms of socio-economic criteria-2

Variables	Compliance level with IPM			Total
	I	II	III	
<b>Factors influencing the decision about when to spray in cherry cultivation (5-point Likert)</b>				
Compliance with the proposals of Food, Agriculture and Livestock provincial/district offices technical staff (avg)*	3.5	4.3	4.7	4.3
Compliance with the proposals of pesticide dealers (avg)	3.1	3.7	4.2	3.8
Compliance with proposals of consultant (paid) (avg)*	2.5	2.8	3.1	2.9
Compliance with the proposals of consultant (Agricultural Engineers) (avg)	3.4	4.1	4.4	4.1
Spraying in accordance with the proposals of Ministry (avg)	3.4	3.8	4.4	3.9
Spraying in accordance with their own spraying schedule (avg)	3.4	3.2	3.7	3.4
Spraying in accordance with spraying schedule prepared by family-relatives (avg)	2.4	2.4	2.5	2.4
<b>Significance level of information sources related to agricultural management (5-point Likert)</b>				
Merchant, Commission agent (avg)*	2.6	3.6	3.7	3.4
Food, Agriculture and Livestock provincial/district offices staff (avg)*	3.1	4.5	4.6	4.2
Pesticide dealer (avg)*	3.0	4.4	3.9	3.9
Consultant (paid) (avg)*	2.3	3.1	3.0	2.9
Producers' organization (Coop or Union) (avg)	2.9	4.0	4.0	3.8
Descriptions on the package (avg)*	3.0	4.4	3.9	3.9
Satisfaction level in cherry cultivation (5-point Likert)	3.1	3.2	3.7	3.4
<b>ECONOMIC VARIABLES OF CHERRY CULTIVATION</b>				
Gross profit (TL/ha)	24,825	25,028	26,348	25,475
Absolute profit (TL/ha)	20,902	20,694	22,459	21,399
Pesticide cost (TL/ha)	1,906	1,935	1,751	1,860
Variable costs (TL/ha)	9,571	9,353	9,245	9,361
Share of pesticide spraying cost in variable cost (%)	19.9	20.7	18.9	19.9
Share of pesticide spraying cost in production cost (%)	14.1	14.1	13.3	13.8
Relative profit	2.6	2.6	2.8	2.7
Selling price (TL/kg)	3.8	3.9	3.9	3.9
Unit cost (kg/TL)	1.6	1.6	1.5	1.6

Source: Own calculation.

Williams [37] found out that the tart cherry producers in USA, who adapted IPM at middle level, saved \$449.08 per acre (4.047 m<sup>2</sup>) in comparison with the conventional production. 7,790 acres were managed with IPM at middle level in Northern Lower Michigan in 1999. It was found out that \$350,000 was saved in comparison with the conventional production. Williams [37] calculated that \$708,000 was saved by farmers implementing IPM at middle level in tart cherry cultivation in all Michigan. According to the writer, the farmers who implemented IPM at low level saved most after those implementing at middle level. Colette et al. [8] pointed out that IPM was implemented especially in sweet corn, cotton, sorghum and wheat cultivation in USA's Texas plains and this management/implementation saved expense and employee cost besides decreasing the quantity and number of implemented chemicals. According to the writers, IPM implementations decrease annual production costs more than 173 million dollars and decrease environmental costs more than 19 million dollars. 272 million dollars was saved annually from economic and environmental costs by the adaptation of IPM for basic products in Texas plains. Hamilton [14] compared the profitability of traditional and IPM method in lettuce

cultivation in test parcels in USA. He found out that production with IPM provided more profit between \$0.02 and \$0.08 per case and he claimed that the system could work without any productivity and quality loss.

Demircan et al. [10] stated in their studies in Isparta that relative profit was 2.54 in cherry cultivation. The findings of the study are similar to the present study. This ratio is 2.7 for the studied farms. In other words, farmers obtained 2.7 TL GPV in return for 1 TL production cost and therefore obtained 1.7 TL profit. As the farms' compliance with IPM increased, the relative profit increased.

Birari et al. [7] disclosed in their study of integrated pest management's influence on cotton production in West Maharashtra that education level of cotton farmers, size and income of farms had a substantial influence on the adaptation of integrated pest management. Furthermore, they pointed out that cotton farmers adapting IPM increased productivity by 11.0 percent and absolute (net) income by 39.0 percent. Additionally, they stated that IPM was cost-cutting and had the economic potential to replace commonly implemented chemical pest control.

Napit et al. [27] found out that the farms implementing IPM techniques obtained higher incomes in various agricultural products in 8 different states of USA.

Fernandez-Cornejo [11] explained the tomato producers' compliance level with IPM with two probit models including pest and disease management in 8 states of USA. According to his probit model, such variables as product price, having consultant, family labour use (all were statistically significant) were the factors that increased farmers' likelihood of compliance with IPM. However, risk-averse farms factor (was statistically significant) decreased the likelihood of compliance with IPM. The education level was not statistically meaningful and had a negative symbol. Besides this model, Seemingly Unrelated Regression Model (demand models of insecticide and fungicide) was developed. According to the results of this model, there was a negative statistically significant relationship between insecticide use and compliance with IPM. Similar results were

found regarding the relationship between fungicide use and compliance level with IPM. In other words, there was a statistically important and avoidant relationship. It was calculated that 10 percent increase at compliance with IPM decreased number of insecticide implementation by 4 percent and number of fungicide implementation by 1 percent. It was found out that a similar compliance with IPM would decrease number of fungicide implementation by 25 percent according to Pohronezny et al. [31] and by 15-45 percent according to Toscano et al. [36]. However, Fernandez-Cornejo [11] and Toscano et al. [36] found out that even if there was a positive relationship between compliance with IPM and productivity, this relationship was not statistically important.

Fernandez-Cornejo [11] found a positive relationship between compliance level with IPM and profitability in the Seemingly Unrelated Profitability Regression model. According to Fernandez-Cornejo [11], 10 percent increase at compliance with IPM in insecticide implementation increases profitability by 0.1 percent in tomato cultivation and 10 percent increase at compliance with IPM in fungicide implementation increases profitability by 2.7 percent.

Resosundarmo [32] informs that overdose implementation of chemical pesticide caused serious environmental problems in Indonesia in 1980s. In order to handle the problems, Indonesian government has actively employed strategies to ensure the adaptation of IPM since 1989. The IPM system decreased farmers' pesticide use by 56 percent and increased productivity by 10 percent in the years started to be implemented [29]. Resosundarmo [32] expresses that poisoning from chemical substances decreased with the increasing adaptation of IPM. He informs that the increase in the adaptation of IPM increased efficiency in agricultural production, but this increase slightly affected the incomes of both producers and consumers. Similarly, he states that the increase in IPM implementation favourably affects national GDP. Accordingly, the increase at compliance with IPM increases the agricultural and

general GDP. He found out that the decrease in IPM investment or IPM's getting more expensive causes a decrease in country's growth rate. He proposes that the levies on chemicals, which would finance IPM, would decrease the number of chemical pesticide use and contribute to the economic growth rate.

Baicu et al. [3] expresses that IPM provided apple varieties to be more resistant to apple scab (*Venturia inaequalis*) and powdery mildew diseases and decreased the number of pesticide used trees from 15.8 to 8 in Romania. It was found out that this situation decreased spraying cost by 44.3 percent.

Williams [37] pointed out in his study comparing 4 IPM implementation level; ((i) conventional, (ii) basic implementation level of IPM (iii) middle implementation level, (iv) high implementation level) on tart cherry cultivation in Lower Michigan that middle level adaptation of IPM served best to the highest profitability, human health and environment.

According to Orr et al. [30] determined in their economic evaluation project of IPM for spineless pests in lettuce cultivation that the adaptation of IPM economically contributed to lettuce industry and lettuce farmers. The cost-benefit ratio of lettuce studies was calculated as 2.

Song and Swinton [34] predicted economic benefit of implementing IPM for soya bean aphid and calculated that IPM provided 1.3 billion dollars net profit since 2003 and project's internal rate of return was 140 percent.

Even if profitability indicators increased in parallel with the compliance with integrated pest management, this increase did not have statistical difference.

Kutlar and Ceylan [20] provided socio-economic characteristics of the farmers who participated and did not participate in Implementation and Training Project and their opinions regarding IPM in their IPM Study in Antalya. The writers pointed out that IPM was not commonly known by the farmers. Furthermore, the producers, who participated and did not participate in the project, expressed that there was not a significant difference from the methods they employed.

Singh et al. [33] studied basic socio-economic and institutional factors influencing the adaptation of IPM in cotton cultivation in Punjabi and rice plant cultivation in Haryana. IPM increased when the size of farms increased in cotton cultivation and decreased in rice plant cultivation.

The gross value of production did not increase with the implementation of integrated pest management.

Hurd [18] expressed that the uncertainty in cotton production prevents the adaptation of such methods as IPM containing less pesticide use. According to his findings, the variability in cotton productivity and pesticide use were not statistically affected from the implementation of other input methods and integrated pest management.

However, there was a statistical difference between farmers' frequency of meeting with consultant and productivity variable.

Fernandez-Cornejo et al. [12] analysed factors influencing the adaptation of IPM in vegetable cultivation from the data obtained from producers in Florida, Michigan and Texas.

According to their logit model, such variables as size of farms (for farms in Florida and Texas), family labour use, varieties of cultivated vegetables (was statistically significant) were the factors that increased farmers' likelihood of compliance with IPM. However, farms' being in the business of livestock (was statistically significant) decreased the likelihood of compliance with IPM.

When cherry farmers were asked open-ended questions regarding the steps to be taken in order to develop/popularize the integrated pest management; 37.3% of the farmers uttered the "organizing trainings for farmers" proposal. 17.8% gave the answer that "Ministry of Food, Agriculture and Livestock District Directorates should organize seminar courses" (Table 3).

12.7% of the farms expressed that "agricultural engineers should be in the field more." Furthermore, 8.9% supported the proposal that "supervisions should be popularized" (Table 3).

Table 3. Farmers' opinions regarding how to develop/popularize IPM in cherry cultivation

Proposals	Total	
	N	%
Farmer training courses should be arranged.	88	37.3
Ministry should organize courses, seminars	42	17.8
Agricultural engineers should be in the field more	30	12.7
Supervisions should be popularized	21	8.9
Management methods should be taught	16	6.8
Use of technology should be increased	15	6.4
The number of agricultural engineers should be increased	15	6.4
Compliance with the spraying schedule of Ministry should be ensured in the region	13	5.5
Land consolidation should be done	8	3.4
Consultant should be used	8	3.4
Organizing trips to sample farms	6	2.5
<b>No idea</b>	<b>54</b>	<b>22.9</b>

Source: Own calculation.

Maumbe and Swinton [23] pointed out in their study regarding the influence of farmer training and health risks on the adaptation of IPM in Zimbabwe that adaptation of this management was directly connected to awareness of the farmers. However, health risks of chemical spraying were not related. Maumbe and Swinton [23]; Maumbe and Swinton [24] emphasized the fact that Zimbabwe government could increase the awareness of IPM through farmer field schools and expanding their approach to producers and therefore could contribute to the adaptation of IPM by more farmers. Singh et al. [33] studied basic socio-economic and institutional factors influencing the adaptation of IPM in cotton cultivation in Punjabi and in rice plant cultivation in Haryana. They found out that product-specific IPM trainings were highly effective in terms of increasing technological awareness.

## CONCLUSIONS

In the present study, İzmir, Manisa, Konya, Isparta, Afyonkarahisar and Denizli sample was studied in order to develop proposals regarding cherry producers' pest management, compliance level with IPM and betterment of compliance.

According to the results of the study, the awareness regarding IPM concept is at low

level. However, the awareness of GAP is at high level. Cherry's being a significant export product is effective on this awareness. Accordingly, it was found out that cherry producers behaved more consciously in disease-pest management.

The findings of studies conducted at national and international arena besides the present study indicate that compliance with IPM can be ensured through effective communication. The majority of the farms request more information and awareness in this subject.

The most important thing in the disease-pest management is determining the best time for spraying. If the spraying time is predicted earlier, the likelihood of becoming successful increases as the preparations is done on time. Predicting spore flying, pest concentration, having information regarding the biology of pest and phonological periods of the plant contribute to fight against disease and pests remarkably and natural balance and environmental health will be protected at a high rate with the timely and correct implementations.

Cultivation method employed in the orchards play an important role in the effective implementation of integrated pest management. Use of the relatively squat clonal rootstock, which enables the formation of homogeneous trees, should be increased and replaced with the widely used of "wild cherry" seedlings which do not form uniform trees. Furthermore, keeping size of corolla under control by pruning-giving shape can help a more effective fight against diseases and pests and decrease costs. Giving shape (cultivation system) and "orchard management" implementations should be conducted for both "0900 Ziraat" variety widely used in Turkey and other new varieties or pollinator varieties.

Within this scope, farmers should implement agricultural measures, avoid excessive nitrogenous fertilization, adapt natural enemies method against pests and take part in trainings regarding environment-friendly chemical pesticides in order for more efficient implementation of IPM in cherry cultivation in the region.

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## VALUE OF A FARM ANIMAL WELFARE PROGRAM IN BURSA-TURKEY

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### **Abstract**

*The paper aimed to present the value of a farm animal welfare (FAW) program that is not compulsory in South Marmara Region of Turkey. It is based on the face-to-face survey results administered in rural areas of Bursa City. The study measures the willingness to accept of producers for changing FAW levels in regards to sheep and goat husbandry. Contingent valuation technique is employed in the statistical analysis. Three different FAW levels were identified for valuation as "base" level, "better" level, and the "best" level. The best level was the most stringent FAW program. The current study suggests a protocol with WTA(P) nomenclature to resolve complexity issues in FAW studies by investigating producers rather than consumers. FAW programs' value were calculated as 130.3 million United States Dollars (USD) for base scenario. The figures were 166.2 million USD/Year and 175 million USD/Year for "better" and "best" FAW conditions, respectively. The results show that FAW programs have strong public opinion and non-market value.*

**Key words:** contingent valuation, farm animal welfare, non-market valuation

### **INTRODUCTION**

Farm animal welfare (FAW) is an important phenomenon in Turkey in the way of membership of the European Union (EU). In 1997, it was agreed that animal welfare considerations become annexed to the Treaty of Rome through a Protocol on Animal Welfare. A year later, EU Council Directive 98/58 was enacted for the protection of animals for farming purposes, and set minimum common standards. From that date, weak FAW sensitivity in the Europe has begun to rise. In 2003, an EU Regulation established a principle that "*farmers who do not comply with certain requirements in the areas of public, animal and plant health, environment and animal welfare are subject to reductions of or exclusion from direct support. This cross compliance system forms an integral part of Community support under direct payments*". This legislation concerned both of farmers and processors at the food industry as well as consumers. The farmers who think that the industry can be damaged by strict legislations while the processors and distributors on the other side are worried

about economic loss. In 2009, a regulation concluded the debates on FAW by suggesting that the Member States should be allowed to use up to 10 % of their national ceilings for the single payment scheme for granting specific support in clearly defined cases. Such support should allow Member States to address environmental and animal welfare issues.

Turkey is not a member state, but it tries to follow EU regulations. Consequently, it is not compulsory to provide FAW in Turkey. In this study, an approach of producers to prospective FAW programs by using non-market valuation method was employed. Results are candidate to support FAW programs in Turkey although some critiques were possible.

### **MATERIALS AND METHODS**

The negative externality issue occurs in poor animal welfare conditions as well, and they must be internalized appropriately (Gürlük and Rehber, 2008) [6]. Several surveys support this phenomenon. In fact, there has been increasing demand for higher animal

welfare standards beyond the minimum standards set by regulations such as the EU's (Barcellos et al. 2013; Bennett and Blaney, 2003) [1, 3].

The research area is the Bursa province of Turkey. Even though the Bursa Province has a 11.4 percent share of the sheep and goat numbers in Turkey. Regional statistics were used in order to determine development levels, and then 294 farmers were interviewed by using the face-to-face survey method. The face-to-face survey format has an advantage in developing countries where such work is not widespread. Yet, valuable researches are more and more increasing (Soltani, et al. 2012) [8]. The survey for this study consists of three sections. Socio-economic questions in the first section put forward the demographic structure of respondents. Farm structure and knowledge of FAW programs were investigated in the second section. In the last section, respondents answered the willingness to accept question according to changing FAW levels. EU criteria and scientific criteria for ovine animal welfare were simultaneously considered in the FAW scenarios. (Bartussek et al., 2000; Sorensen et al., 2001) [2, 9]. Three different FAW levels were identified for valuation: "Base" level, "better" level and the "best" level. The base level indicates current farm level in terms of animal welfare conditions. Better and best scenarios were created by making more stringent the FAW levels. Respondents were asked to state their WTA payments for shifting FAW levels.

The current paper contributes to existing literature by combining environmental attitudes/behaviors and FAW level preferences through certain components of the New Ecological Paradigm (NEP) scale. The NEP scale consists of several items previously developed by Dunlap and Van Liere (1978) [5]. Liu et al. (2010) [7] measured the environmental attitudes of stakeholders on protected areas in China while Bonaiuto et al. (2002) [4] emphasized the importance of 'values' within the NEP scale. In the NEP scale, the question format is a typical five-level Likert scale starting from *Strongly disagree* to *Strongly agree* answers.

## RESULTS AND DISCUSSIONS

Statistical model was tested using various test methods, and the results are as following table 1. The likelihood ratio chi-squared of -1219.86 with a *p-value* of 0.000 indicates that the model as a whole is statistically significant. *Hosmer-Lemeshow (H-M)* is a statistical test for goodness of fit for logistic regression models. *H-M value of current Research* is 19.15, and lower than critique  $\chi^2$  value. *Kendall's Tau coefficient ( $\tau$ )* is a statistic, which have values between -1 and +1, used to measure the association between two measured quantities.  $\tau$ -value of current research is 0.30 indicates that there is a relationship between dependent and explanatory variables. *Goodman and Kruskal's gamma coefficient ( $\gamma$ )*, which have values between -1 and +1, is a measure of rank correlation, but it measures the strength of association of the cross tabulated data when both variables are measured at the ordinal level.  $\gamma$ -value of current research is 0.60 indicates existence of association.

To find out the effects of statistically significant model parameters on the FAW levels, the median value of other variables was multiplied by their coefficients and then a constant was added to total value. The reason for using median value is to reduce the impact of greater and lower values above central tendency. Related model's expected value was calculated in this fashion, and presented as following Table 2. Thus, 1,204.5 USD/year, 1,142 USD/Year and 894.5 USD/Year was estimated for FAW-I, FAWII and FAW-III, respectively. The number of goats and sheep in the survey area, Bursa, was calculated to be an average of 132 head per farm. If this number is associated with FAW values it is calculated per head as 9TL/Year, 8.6 USD/year, and 6.7 USD/Year.

The values lead us to remarkable results. It is known that the number of sheep and goats is 38.5 million head in Turkey. If half of this figure is assumed to be in bad animal welfare conditions, which is worse than the base level investigated in the current paper, non-use benefits of bringing them to at least the base level would be approximately 130.3 million

USD/Year with a possible FAW program that can be implemented. Figures would be 166.2 million USD/Year and 175 million USD/Year for “better” and the “best” FAW conditions, respectively.

Table 1. Statistical model results

Variable	Parameter estimate	Standard error	Pr>chi
Intercept	0.4340	1.7178	0.8026
Bid <sup>1</sup>	-4.4e-5	4.7e-6	0.0000
Income <sup>2</sup>	-0.6e-5	2.1e-6	0.0004
Age <sup>3</sup>	0.0034	9.12e-4	0.0000
Coop_member <sup>4</sup>	0.0335	0.30549	0.2758
Hholder_gender <sup>5</sup>	-0.1408	0.0269	0.0000
Sacrifice <sup>6</sup>	-0.0389	7.75e-3	0.0000
Education <sup>7</sup>	0.0510	2.11e-2	0.0160
Development <sup>8</sup>	-0.0270	0.191	0.1586
NEP_scale <sup>9</sup>	-0.0014	3.29e-2	0.8886
FAW-II <sup>10</sup>	-0.0060	1.793e-3	0.0000
FAW-III	-0.0130	1.797e-3	0.0000

Log-Likelihood= -1219.86

Hosmer-Lemeshow=19.15

Kendall's Tau= 0.30

Goodman-Kruskal Gamma= 0.60

<sup>1</sup> Bid is the presented bid amount through payment card

<sup>2</sup> Income is the monetary income of producer. It is expected to be more sensitive for high FAW levels.

<sup>3</sup> Age is the respondent's age and expected to be positive. Older producers' WTA(P) for shifting FAW levels may higher than that of younger producers.

<sup>4</sup> Coop\_member is membership situation to a cooperative apart from existence membership to Union of Cattle and Sheep Husbandry of Bursa. 1: yes 0: No

<sup>5</sup> Hholder\_gender is gender of householder 1:Male 0:Female

<sup>6</sup> Sacrifice is a question that it investigates if respondent is ready to endure any sacrifice so that farm animals experience better welfare circumstances 1: Yes 0: No

<sup>7</sup> Education is the levels which are primary school graduation:1 secondary graduation:2 and higher:3

<sup>8</sup> Development is development level of location that survey administered. 1: Developed region 0: Less developed region

<sup>9</sup> Nep\_scale is a scale measuring environmental sensitivity of related individual. The expected sign is puzzle because it was not tested in former farm animal welfare valuation studies.

<sup>10</sup> FAW is farm animal welfare program introduced to respondent. Of three FAW levels, FAW-I is the most stringent level

Table 2. FAW program's non-use benefits in Turkey

FAW levels	Percentage of total number of goats and sheep which are under worse conditions than base level investigated in current study	
	50%	80%
Base level	130.3*	208.5
Better level	166.2	266
The best level	175.0	280

\*Aggregate WTA(P) in million USD /Year

If 80 percent of goat and sheep numbers in Turkey is assumed to be in bad conditions, that accounts for 30.8 million heads.

If so, the non-use benefits of bringing them to at least the base level would be approximately 208.5 million USD/Year while it would be 266 million USD/Year and 280 million USD/Year for “better” level and the “best”

level, respectively (Table 2).

## CONCLUSIONS

FAW programs are not considered to be luxury issues for developing countries such as Turkey. However, it is also one of great complexity, and if changes in the regulations

governing animal production methods are to be made, those changes should take full account of the implications for producers, consumers, and society in general. The farming industry should not interpret the interest in animal welfare as a threat to its livelihood. The appropriate animal welfare policy for society will be identified only when all the interested parties become fully aware of the consequences of their actions. In the near future, foreign trade will be depending on good animal welfare conditions in the world. Hence firms have some advantages in advance if they provide good animal welfare conditions. The analysis tests ‘panel estimators’ in stated preference data in a FAW pricing study by using the payment card question format. Probit panels are employed to measure individual effects on FAW levels by considering producers’ willingness to accept a scenario FAW program during a year. The results supply important insights to policy makers. For instance, farm revenue is a significant parameter. The farms that approach medium-sized enterprises and have the advantage of economies of scale result in differences among FAW levels. However, the FAW concept is able to be treated as a valuable input for larger enterprises who want to create their own brands. In addition, the phenomenon of experienced farmers who spend many years in their profession are more sensitive on FAW issues points out that agricultural extension programs should be for younger farmers.

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## WATER ECONOMICS IN AGRICULTURE AND OTHER SECTORS: RECOMMENDATIONS FOR WATER MANAGEMENT

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### **Abstract**

*Water is a vital for humans and should be used efficiently. Yet, drought issues in some regions of the world have negative impacts for humans. Consequently, in economic system the awareness about excessive water-consuming sectors provides advantages to related community. The economic benefits of the water in the agriculture sector and general economy are computed by the logic of opportunity cost. Food security objectives are essential for many countries in the world. Economic benefits are computed by savings in foreign exchange firstly. It protects domestic producers and consumers from the fluctuations of world markets. The poverty alleviation is among prior policies of a country. All of these can increase allocations of water to agriculture at the expense of industrial and household water use. Yet, agriculture is a sector that consumes high volume of water. Industry, household consumption and environmental flows are other sectors. If it is not know the economic benefits of the water, it cannot be managed efficiently. Therefore, all sectors using water needs a transparent system of resource evaluation with which to negotiate and regulate allocation of the resource.*

**Key words:** agriculture, allocation, economic evaluation, economic sectors, water, water pricing

### **INTRODUCTION**

Water is a vital for humans and should be used efficiently. While economic activities require using water to a certain level, individual sector in economic system cannot use the water in the same amount. In addition, they are not able to produce economic added value in the same amount. The competition for raw water is intensifying and agriculture is often considered as the principle user of water. Nevertheless, national agricultural policies, especially in developing world, continue to promote irrigated agriculture in order to keep the yield in a certain level. It is totally due to devastating competition policies of developed countries. Following graphical illustration depends on real data and supports abovementioned phenomenon. The graphical illustration shows that less developed countries' agricultural foreign trade balance was not problematic (Figure 1). After the years of 1990s, they started to be importer of agricultural productions whereas agriculture is essential sector in such countries. The conservative agricultural policies of

developed countries and high subsidize levels had increased the international competition. In a research, it is stressed that a European Union' farmer has been subsidized 6 times more than that of a Turkish farmer (Gürlük and Turan, 2013) [4].

Other pressures coming from international area are changing meals of high developing countries such as China. High income means high per capita income, consequently the people who consume inferior goods they furthermore started to consume superior goods. Per capita red meat consumption in such countries has been doubled in the last two decades. In addition, fossil fuel need led to use industrial crops. Thus, agricultural fields that will be cultivated for human needs dedicated to fossil fuel need. All these topics create extra demand for agricultural crops and fields. It means extra irrigation water requirements.

The phenomenon of agriculture is strategic sector drive the countries to act sensitive to the agriculture. However, international issues such as the impacts of climate change are also in the same way: they are not equal the all

sectors. The sectors that use more water are the sectors that will be suffered from water scarcity.

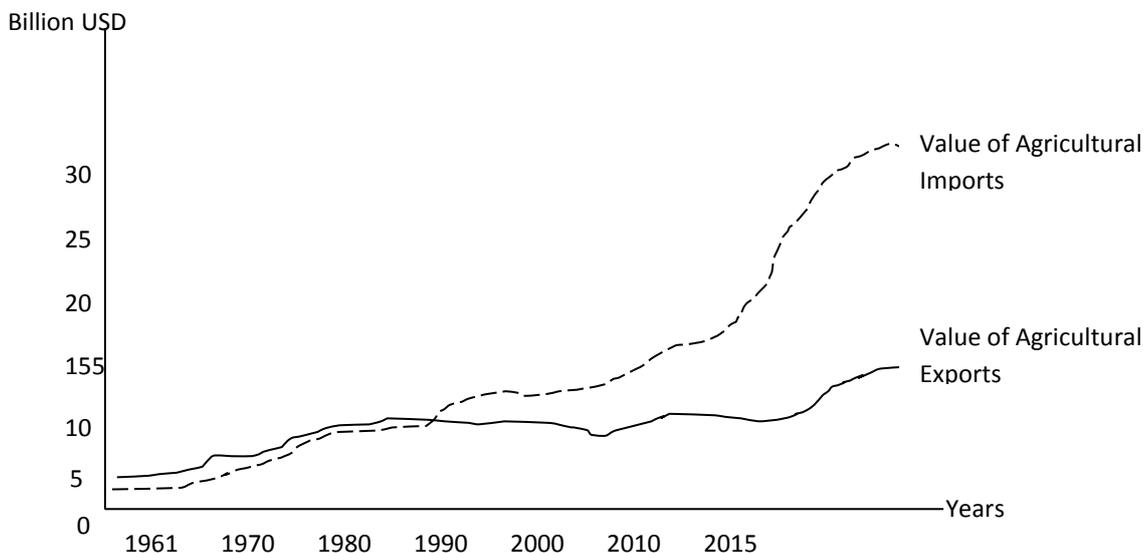


Fig. 1. Evolution of agricultural exports and imports value, 1961-2010 (USD Billion)

Therefore, all sectors using water needs a transparent system of resource evaluation with which to negotiate and regulate allocation of the resource (Turner et al., 2004) [8]. The main aim of this paper is to produce a review on economic value of water resources in order to shed light on sectorial water allocation programs that will be employed by the different countries.

## MATERIALS AND METHODS

Research material consists of science citation index published reports, proceedings and dissertations of different universities.

The research is a review of available literature on water allocation programs.

It gives inferences for water policy-makers and other stakeholders in a country.

## RESULTS AND DISCUSSIONS

Water supplies goods and services that are employed by economic sectors such as agriculture, industry and households. Providing drinking water, irrigation water are important goods supplied from water. Hydroelectricity generation, recreational benefits and other benefits such as biodiversity are vital services for humans. In a

circumstances of growing water scarcity and rising demands for non-agricultural use of water, reassessment of sectorial allocations of water are inevitable. Especially, in less-developed countries, irrigated agriculture plays a vital role in contributing towards domestic food security and poverty alleviation. Consequently, efficient water allocation to agriculture has impacts on policy-making in abovementioned countries which is suffered from low agricultural productivity. However, it is a reality that water is the most used in the agriculture sector. Following figure indicates water use areas in the world.

The economic benefits of the water in the agriculture sector and general economy are computed by the logic of opportunity cost. Food security objectives are essential for many countries in the world. Economic benefits are computed by savings in foreign exchange firstly. It protects domestic producers and consumers from the fluctuations of world markets.

The poverty alleviation is among prior policies of a country. All of these can increase allocations of water to agriculture at the expense of industrial and household water use. It also contributes to the over-extraction of groundwater resources.

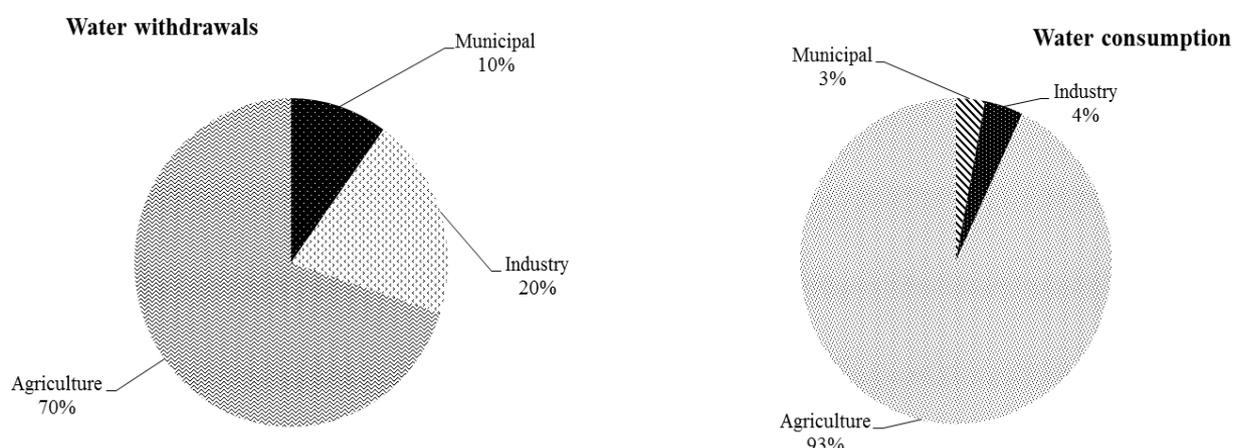


Fig. 2. Water withdrawal and consumption rates in the world (FAO 2015 AQUASTAT-database)

The household water needs are preceding in the sectorial water allocation programs applied. Yet, especially waived electricity production may create considerable opportunity costs. The increasing pressure on agricultural irrigation water is a circumstance developing at the expense of agriculture. According to the UN working report, 66 percent of the world's population will live in cities by 2050 (UN, 2015) [9]. In urban use, the willingness to pay (WTP) of related community for unit water is much more than WTP for same unit irrigation water. Therefore, increased water supply needs may have impacts on costs of increasing irrigated water in arid region.

Hydrologic characteristics supply many economic benefits to related community. Firstly, the economic value of the flood control may become important in the regions having strong precipitation rates. Therefore, the economic value is the value of goods and services that will be affected by flooding (Perry et al., 1997) [7]. Energy related benefits are other benefits that produce economic value arising from hydrologic resources. Increasing energy demand with the changing consumer patterns is also another factor which put pressure on the water. Hydropower plants work twofold by storing the water in a certain time period and flowing system. Opportunity cost of keeping the water in reservoir is the loss of yield due to insufficient water in irrigation districts

(Barbier, 1994) [1]. The water may have impacts on fostering of local industries. It is easy to compute the economic value of industrial productions because they have regular market prices. Economic values of water ecosystems are due to provision of overall habitat structural diversity; provision of microsites; and provision of plant and habitat diversity (Costanza et al., 2006; Gürlük, 2006, Zaag and Savenije, 2006) [2, 5, 10]. Such benefits are indirect benefits for humans, and there is no market for marketing such benefits. Mostly survey studies are applied to related residents. Contingent valuation, hedonic price method and travel cost method are such of valuation methods (Hanneman, 2004) [6]. Yet, those methods are not widespread in less-developed countries and developing countries because environmental policies are not in the first place of governmental policies.

The water allocation programs are the best method if it convinces the related community. In this method, administrative allocation of water is determined by the state. It enables intersectoral allocation of water by considering economic considerations (Dinar et al., 1997) [3]. The state can control allocation within sectors through various subsidizing instruments such as water permits for abstraction or water use right. In agriculture, the state commonly administers allocation of water to large-scale irrigation schemes and to sections within the schemes.

The state is less commonly involved in allocation at the farm and field levels. Under such allocations, the price of water is usually subsidized, low and charged on a flat-rate (e.g. per hectare) or fixed-charge basis (not according to the amount of water consumed). In this circumstance, water use must be well-priced. Pricing mechanisms can be designed with all stakeholders on behalf of providing equity. In addition, technically hydrologic modeling and environmental studies can support water allocation programs. The volume and quality of fresh water systems and the functions that they provide are determined by the abstraction of water, recharge of water resources and processes of the hydrological system. An assessment of options for water allocation requires consideration of these processes and therefore requires the adoption of an extended geographical perspective. Such a perspective incorporates surface water processes at the catchment scale, ground water processes at the aquifer scale, interactions between surface and ground water, and socio-economic drivers in the wider environment that impact on water resources. Sustainability of water resources also requires a longer i.e. intergenerational, time scale for planning and management, with due regard for precautionary motivations (Turner et al., 2004) [8].

## CONCLUSIONS

The agricultural sector is a priority sector in every country. Developed countries want to keep the food supply at a certain level where less developed countries face problems of self-sustainability. Since agriculture is the sector which uses the most water, there is need for planning for the existing consumption. Agricultural policies in developing countries continue to promote irrigated agriculture to minimize risks in food supply and distribution. In addition, the promotion of agricultural activity is considered strategic in fixing and developing rural economies and in many cases the existing systems of water use rights has reinforced the seniority of agriculture user rights. The agricultural sector therefore needs

a transparent system of resource evaluation with which to negotiate and regulate allocation of the resource. Water allocation programs may help in this context.

Choosing less water-consuming production patterns, breeding species that are drought-resistant and adapting technologically advanced irrigation systems to agriculture are among important policies. Water allocation system is a successful methodology if it can be managed with the stakeholders' input. Sectoral water allocation can also be made by estimating the future needs of the country and the local areas. Another digger instrument that can support sectoral water allocation is water pricing. Volumetric method is used in many countries in water pricing. Other countries price water per land. However while irrigation systems are available in large lands, in smaller lands techniques that are not modern are used. This causes an increase in water consumption. Industrial and domestic water consumption is the sectors that use less water. Water consumption for energy production is very important for countries that have an energy deficit. While this reduces foreign dependency it also helps industry to work with fewer costs. However power plants that will be constructed in areas that have fragile ecosystems should have social cost-benefit analyses that have been prepared carefully. Another sector that needs water is environmental flows. Especially in areas where biological diversity is important, water flow needs to be as close as possible to its original level. Since services that are obtained from environmental flows are not a part of economic systems, by using existing alternative markets or creating new alternative markets valuation studies can be done. Because, in every sector the economy that is created by water is clear and calculable.

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## THE ANALYSIS OF ECOLOGIC PRODUCTS CONSUMPTION AND CONSUMER. CASE STUDY.

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### *Abstract*

*This research has as objective to encourage the contact and cross-border communication and to facilitate the exchange of information and experience in the production and marketing of the ECO products sector in order to improve the economic and social development of the Romania- Bulgaria cross border area. The study was made on a sample of 273 persons, 139 persons in Calarasi county, Romania and 134 persons in Silistra County, Bulgaria, divided into four age groups. As a research method, the quantitative study was made through the questionnaire, applied face to face by interviewers. The questionnaire consists of 13 questions, including: filter questions, consume behaviour, perceived differences between ECO food and regular food, other aspects. The most important criteria used in choosing the food products are according to the results obtained: aspect, price, taste, preserving content and producer. Regarding the ECO food consumption behaviour. It results that 33.63% of the interviewed persons consume ECO products occasionally and 45.13% more times a week. Among the variants of purchase points where the questioned persons consider they can buy ECO food products, the market represents 43,70% of the answers. It is mentioned that the urban areas where the research was made have many sale markets for traditional ecologic products and their selling price is quite affordable. Also, the traders of ecologic products have crossed sale market – the Romanian traders capitalize their products in Bulgaria and the Bulgarian traders capitalize their products in Romania.*

**Key words:** consumption behaviour, ecologic products, market, quantitative study

### INTRODUCTION

The market research shows what people want to buy, consume or use. Usually that means something else than what companies design, produce and sell. It is not enough to examine the needs [1], [8]. The wishes and aspirations of the people must be known. The consumer behaviour research deals with different attitudes in the buying decision (eg, choice of place of purchase, brand loyalty, price awareness and difficult attitudes of the consumer, etc.) [10]. The consumer buying behaviour, as recent field of marketing research, refers to the behaviour of the final consumers, who buy goods and services for personal consumption - individuals and households – by which they satisfy their current requirements and indicate their role in the society [2]. The research problem which was the basis of this market survey is to collect information about the current trends and needs of existing on the food products

market in Romania-Bulgaria cross border area and especially about the attitude toward these products, which form the basis for the future collaboration initiatives with the traders and commercial changes in this area. In order to help achieve this objective, a number of aspects were taken into account, such as: creation of a permanent communication infrastructure for specialists, producers and other interested persons, in the sector of organic products production and sale, under the form of a network of cross-border cooperation for the organic agriculture; development of joint initiatives for the harmonious development of the technical and managerial capacity of organic products production and sale in Romania-Bulgaria cross-border area; increase of the flow of producers and products in the sector of organic agriculture, through a higher interaction between producers and consumers in the cross border area.

The offer in the market of organic food makes

reference to two product categories [3]: biological-organic products resulted by strictly observing some technologies required for obtaining these products; products with "organic image" considered intermediate that interfere between the biological-ecological food products and current food products (in these products, also farm products or the products of the farmer can fit). In this case the product must meet the following three cumulative conditions [4], [6]: the product to be obtained in the farm; the ingredients transformation of this product must also come from the farm; to be a small-scale manufacturing way (by practicing a specific tradition in preparing the product).

## MATERIALS AND METHODS

The study was made on a sample of 273 persons, 139 persons in Romania and 134 persons in Bulgaria, divided into four age groups. All respondents reside in urban areas. As a research method, the quantitative study was made through the questionnaire, applied face to face by interviewers. The questionnaire consists of 13 questions, including: filter questions, consume behaviour, perceived differences between ECO food and regular food, other aspects.

Given the fact that it was proposed to use a sample with a defined structure, in the first part of the questionnaire, the identification question of the filtration characteristics were positioned: gender and age. The second group of questions aimed at identifying the respondents' perceived differences between organic and usual food. In the last part of the questionnaire there are questions on the demographic characteristics of the respondents. The research instrument was pre-tested on a sample of 15 people in order to check: the degree of understanding of the questions and the used terms; the degree of coverage of the categories of the closed questions; questions that induce the response that can be interpreted differently by the respondents; redundant questions that require obvious answers obvious.

The questionnaire was pre-tested by applying face to face under the form of a structured

interview adding to the questions included in the questionnaire, clarifying and clarification questions. A special problem was posed by the open question where the respondents needed more time to respond. The difficulty of the question was explained by the fact that the questionnaire addresses a little known field. Given that the objective of the questionnaire was just to verify the respondents' familiarity with the terms of ecological, organic, bio and natural product and with the specific characteristics of these products, the open question was kept with the argument that the difficulty can be overcome if the interview operator insists that the respondent answers or fills in with "I do not know" where this is the reason of the lack of response. The variant "I do not know" is itself a category relevant to the study. Compared to the aspects above mentioned, the paper aimed to analyse the consumption of ECO products in Romania, as well as the perception and the attitude of the consumer based on a statistic survey and questionnaire.

## RESULTS AND DISCUSSIONS

In the language of the population as well as the various advertising messages, the same names of ecological, biological, organic and natural products are used in parallel. In terms of gender, the sample consists of 52.50% women and 47.50% men.

The respondents were selected from the age group 20-50 years old, 24.50% being part of the segment 20-29 years old, 36% of the segment 30-39 years old and 39.50% of the segment 40-49 years old.

The structure on net monthly income of the questioned sample indicates a percent of 25.94% for the income level 1001 – 1500 ron, 6.91% under 1000 ron, 29.49% between 1501-2000 ron, and 24.66% over 2000 ron (Fig. 1).

The most important criteria of selection of food products are according to the obtained results: *aspect, price, taste, contents of preservatives and producer*. That shows the percent of questioned persons for which a certain criterion is important, the aspect is considered an important criterion in selecting

the good products by 65.04% of persons, the price by 52.65%, the taste by 43.81%, the contents of preservatives by 40.27% and the producer by 36.28% of questioned persons.

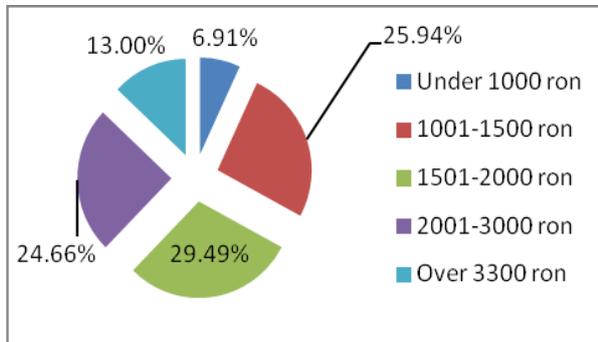


Fig.1. The demographic profile of the respondents: level of net monthly income

The most consumed types of ECO products are fruit, vegetables, drinks, milk and basic products (sugar, flour). About a fourth of the questioned persons verify always if the products purchased are ECO. It results that 33.63% of the interviewed persons consume ECO products occasionally (Figure 2) and 45.13% more times a week (28.32% of 3-4 times a week and 16.81% daily).

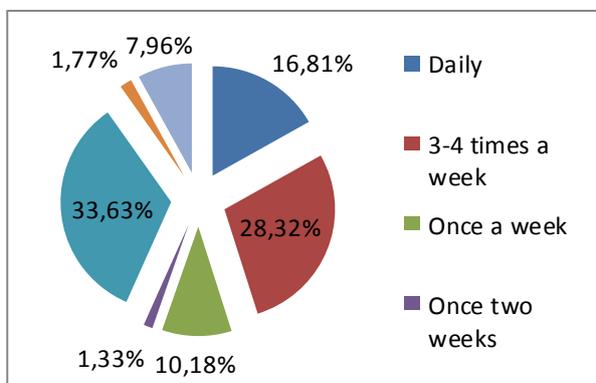


Fig. 2. Frequency of ECO products consumption

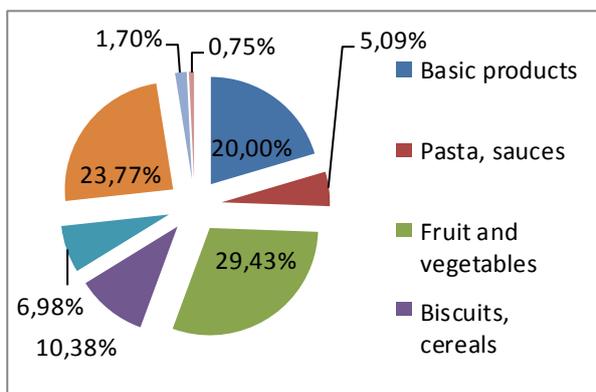


Fig.3. Categories of ECO products

The most consumed ECO food products mentioned are fruit and vegetables (29.43% of products), drinks and milk (23.77% of answers), basic products (sugar, flour, etc. – 20% of answers), biscuits and cereals is 10.38% of answers (Figure 3).

A percent of 42.21% of the answers related to the identification elements of ECO products indicate the label, 33.17% the product aspect and 23.62% the smell. 68.85% of the questioned persons indicated as element of recognising ECO product, the label, 54.10% the aspect and only 38.52% the smell.

Among the variants of purchase points where the questioned persons consider they can buy ECO food products, the market represents 43.70% of the answers, supermarket 14.90% of the answers and natural food stores 21.40% (Fig. 4).

It is remarked the fact that 33.68% of the questioned persons mentioned as difference between the ECO food products and the usual food products the contents of artificial substances, 31.58% mentioned the ECO products quality and the fact that they are healthier and 28.42% the taste.

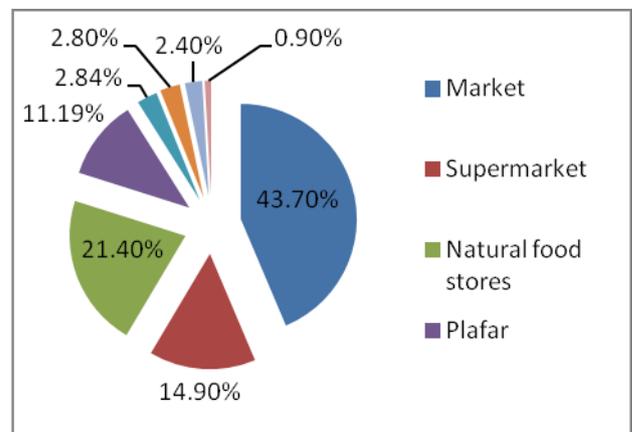


Fig. 4. Purchase points

The results indicate that from the point of view of consumers aspect there is not a clear difference between ECO food products and the usual food products. 45.74% of the respondents answered that the two categories of products have an equal enjoyable aspect. 30.32% said that ECO food products have a less pleasant aspect and 23.94% they look more pleasant. The results are supported by those obtained at the previously analyzed

question where the aspect is mentioned as the difference between the two product categories only by 6.84% of the respondents. The situation is completely different but when people are asked which of the two categories of food is healthier. A clear majority, 82.09% of the respondents believe that organic food is healthier than the usual one.

As regards the opinion on the difference between the usual food products and ECO from the point of view of the taste, 61.65% of the questioned persons consider that ECO products are more tasteful than the usual ones, 22.82% consider them as tasteful as the usual ones, 40.45% consider that there is no difference between BIO and ECO food products. 65.02% of the questioned persons consider that ECO product is the same thing with the natural product. 46.15% of the questioned persons do not know if there are differences between the process of obtaining ecological food products and of obtaining organic products.

## CONCLUSIONS

The study results show that it is necessary to better clarify and educate the population regarding the notions of ecological, bio, organic and natural product, given the high percent these terms are used with the aim of creating an image that does not coincide with the reality (products promoted as organic when in fact they should be classified in the categories of natural products, etc.) [5], [7]. Given the fact that the organic products are considered healthier than the usual ones and are appreciated due to their low contents of artificial chemical substances, an opportunity for promotion is to inform people about the standards that define the organic products [9]. It is important that the potential clients can really distinguish ECO products of the others that use this name with promotional purposes without fully observing the necessary conditions. Only 8.8% of the responses regarding the differences between the usual products and the ECO ones indicate the ecological way of obtaining the latter ones. Given the current trend of environment protection, the promotion and awareness of

this aspect can bring more attractive image to the ECO products.

The most mentioned differences between ECO products and the usual ones are: the contents of artificial substances, that are healthier and the taste. Over 80% of the respondents believe that ECO products are healthier than the usual ones. Over 60 % believe that ECO products are more tasteful and they deteriorate more quickly than the usual ones. The results indicate as the main qualities perceived of ECO products that should be considered in the promotion strategies: the low content of artificial chemical substances, the better taste and the better quality and healthier for the body than the usual ones. The label and aspect represent also elements that influence the buying decision and they should be considered in the marketing strategies of the ECO products.

The study results show that it is necessary to better clarify and educate the population regarding the notions of ecological, bio, organic and natural product, given the high percent these terms are used with the aim of creating an image that does not coincide with the reality.

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## THE PROJECTS EVOLUTION FOR FOOD SECURITY ENSURING IN THE ARAB REPUBLIC OF SYRIA

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### Abstract

*The purpose of this study is to capture the rural development programmes of the Governments that have succeeded in conquering Syria's independence so far. The paper analyzes the laws and decrees that have endorsed the reforms in agriculture, difficulties in the application thereof. Research on the way in which they have carried out agrarian reforms in Syria are numerous and are contained in the Reports of the economic and agronomic studies published by the universities and international organizations (ONU and FAO, mainly), and studies of the diplomatic service of the United States, France and the United Kingdom. All these are valuable sources for understanding the major problems modernization of the Syrian agriculture. Are highlighted the main achievements, failures and some aspects of the current state of crisis, in which is the Arab Republic of Syria. For a more systematic study, the entire period of time analyzed has been divided into three parts: the first period from the conquest of independence until the year 2000; the second period from the year 2000, the year of the start of economic reforms until year 2010, and the third period from the year 2011, the year of the crisis start until present.*

**Key words:** crisis, evolution, livestock, production, projects

### INTRODUCTION

The right to food is contained in the Universal Declaration of human rights from 1948, and was reiterated in various occasions: the World Conference relating to Nutrition since 1974 and the World Summit on food since 1996.

Food security is defined by three issues: availability (sufficient quantity); access (there are enough economic and physical resources) in order to have adequate food to individual diet; use (to be have sufficient information about nutrition, water and proper hygiene) [14].

Syria, along the time, included in the country's development projects, agricultural development projects, which sometimes were the priority.

These projects included the use of agricultural production factors (especially water, soil, and labor), ensuring the production of agrifood products (wheat, barley, sugar beet, cotton), and import and export of agrifood products, as well as its distribution to consumers.

### MATERIALS AND METHODS

The indicators used have targeted agricultural areas, average and total agricultural production, total and rural population, and the main crops and animal species.

In the study we used the evolution of indicators characterizing the food security, for 3 periods characterizing the recent history of Syria.

The periods analyzed were: the first period from winning the independence by the year 2000, characterized by the application of Decree-Law No 161 of 27 September 1958 concerning land reform; The second period, 2000-2010, of economic liberalization measures application, characterized by decision No 83 of 16 December 2000, which provides the division of the farms in batches of 3 ha in irrigated and 8 hectare in non-irrigated; The third period of crisis after year 2010 characterized by the debut in 2010 of the **National Food Security Project (PNFS)** and

the crisis after 2011.

As econometric methods we used the average, the indicators of fixe and chain base, standard deviation, coefficient of variation, the annual growth rhythm and the polynomial equation of second degree to find the trend.

## RESULTS AND DISCUSSIONS

Studies show that Syria in its brief existence since 1946 and until present has taken into account all the time the observation so current Julian Cribb, that: " in the first place, we must accept that investments in agriculture are actually defense expenditures. (...) If we want to prevent wars, refugees and a food crisis, then we have to renew the global investments in agriculture and agricultural science" [5].

### **Brief overview of the Syria's history.**

Syria is one of the ancient form of civilization in the Middle East. With approximately 10000 B.C., Syria was the Centre of the Neolithic culture, where it appeared farming and cattle breeding for the first time in the world. In antiquity it suffered cultural influences from Sumerians, Assiro-Babylonians, Egyptians, Phoenicians, Greeks, and Armenians.

In the year 64 A.C., Syria was conquered by the Romans and transformed into a Roman province. Starting in the 4th century A.C., was part of the Byzantine Empire.

In the 7th century came under the dominion of the Arabs. In the 11th-13th centuries, some parts of the country were included by the feudal states created by Crusaders in this area. Between years 1260-1526, was under the rule of the Egyptians, and from 1526 to 1918, was a province of the Ottoman Empire. In 1920 he joined the League of Nations mandate, which has entrusted it to the France administration.

During the Second World War, Syria was occupied by British and French troops who, in September 1941, proclaimed the Independent Republic of Syria. The prerogatives of power were handed over to the Syrian Government as late as January 1944, and the real and full independence was achieved on 17 April 1946. Between years 1946 and 1956, Syria changed 20 leadership and has drafted four constitutions.

For a short period of time, between Egypt and

Syria States there has been a political Union of the United Arab Republic. The Union began on 22 February 1958 and ceased to exist on 28 September 1961. In March 1963, at the helm of the country came the Socialist Baas Arab Party that has initiated a policy of structural reforms (land reform, nationalization of large industrial enterprises, etc.) [17].

One of the most important elements which influenced the evolution of trade between Romania and Syria, is determined by the evolution of the crisis affecting this country and the successive imposition of several sets of sanctions on the part of the EU against Syria which clearly aligns our country, in terms of EU membership [16].

### **The period from winning independence by the year 2000**

After gaining independence, competitive aid systems for modernization took place on behalf of the major powers, but the desire to retain sovereignty has led Syria to seek a model that would give the State's initiative and monitoring of economic projects.

The State has considered agriculture as an economic and social priority, following the independence. In agriculture, still unprofitable and unproductive, worked almost three quarters of the population. In a reformer purpose, the Government tried to change the Syrian peasant mentality through various forms of education which has sought Western model application for increase in production, as an opportunity for the Syrian State[9]. In the same time it was considered that the West had to accept all the consequences of the war policy to ensure a stable Syria on the agricultural market, worldwide. It resulted from de factor role that Syria had during the war [6]. But it has not happened because of the political conditions of the Western countries put to Syria that have not been accepted by the governments what came immediately after independence. The land reform from Syria constitutes a rural development project, which aimed at solving the food security and development of rural communities. This project was an essential issue for Syria, immediately after independence, under the accelerated

population growth and inadequate agricultural production. To be noted that in the country was the unfairness manifest of some monopoly owners: regarding the land cultivation for a second crop, on choosing crops and dependence of the owners in relation to traders, that delivered the production to the export. To resolve this issue, in order to increase agricultural production, it took a triple action: latifundia expropriation, the distribution channels nationalization and a loan guarantee for the peasants who worked the land at an accessible interest [3].

Decree-Law 161 of 27 September 1958, promulgated the first agrarian reform in Syria and has been signed by the President of the United Arab Republic, Nasser. In order to apply and organize further were given more 8 Law-Decrees that focused on mortgage loans contracted by the owners of expropriated lands, credit operations and advances to reform beneficiaries, guaranteeing loans for farmers.

During September 1961 to March 1963, the two Governments have delayed the implementation of Decree Law 161 since September 1958, initially through its suspension in November 1961 by Kouzbari and then by the profound changes brought to law after the coup of April 4, 1962.

Beginning with March 1963, the Baas Party, of government, gave again in Syria a Socialist orientation. Regarding the Agrarian Reform, was passed to the application of Decree Law 167/1958 in order to achieve redistribution of agricultural properties and the reorganization of production through State planning. To mention: 88 Legislative Decree of 23 June

1963 amendment of restrictions regarding the owners; Decree No. 1109 of 22 September 1963 on the implementing regulation of the law of Agrarian Reform; 172 law of 15 May 1967, which simplifies and streamlines the operations of land distribution; Legislative Decree No. 163 of 09 December 1967 merging the Ministry of Agriculture and the establishment of other regulations.

The laws have been supplemented by a series of texts for the organization of the sector of agricultural production and which can be grouped in several positions: relations with the agriculture; the development of rural society; cooperatives; State farms, Agricultural Bank and agricultural production. One of the projects of safe agricultural production insurance for Syria is Euphrates Project, started in 1969, through the construction of the dam Assad. This project has ensured irrigation of 640,000 hectares, of which 450,000 ha as non-irrigated lands from the steppe and 160,000 ha irrigated already located along the Euphrates valleys, Balikh and Khabur [1]. Arranging the dam did made to disappear 64,000 ha of alluvial productive land, 56 locations and caused the displacement of 60,000 persons. In contrast, the irrigated areas doubled in this part of Syria, achieving increased agricultural production, vegetal and animal, required for food population (but also for exports), have created a stability and food security, and a massive increase in the agro-industrial production [4]. In the meantime the Euphrates project provides to Syria important hydropower sources: about half of the total value of renewable resources.

Table 1. The size and evolution of the main categories of land use, for the period 1961-2000

Specification	Mu	1961	1970	1980	1990	2000
The total area	thousand hectares	18,518	18,518	18,518	18,518	18,518
Glitter water	thousand hectares	140	140	140	140	140
Of which:	thousand hectares				372	432
(Natural forests)	thousand hectares				197.3	197.8
(Planted Forests)	thousand hectares				174.7	234.2
	%				100.0	118.7
Other lands	thousand hectares				4511	4235
Agricultural surface	thousand hectares	14,941	13,459	14,062	13,495	13,711
Permanent meadows and pastures	thousand hectares	8,560	7,550	8,378	7,869	8,359
Permanent crops	thousand hectares	235	258	454	741	810
	%	100.0	109.8	193.2	315.3	344.7
Arable land	thousand hectares	6,146	5,651	5,230	4,885	4,542
Landscape with irrigation system	thousand hectares	558	451	539	693	1,211
	%	100.0	80.8	96.6	124.2	217.0

Source: FAO,2016, <http://faostat3.fao.org/download/FB/FBS/F>

They were built also three hydro-energetic dams: the dam Al Thawra at Tabqa; Tishreen dam, upstream; Al-dam, downstream. Euphrates project ensures drinking water for major conurbations as Aleppo, Raqqa and Deir Ez-Zor, and numerous contiguous localities.

Hydropower facilities allow an electricity production of 2.5 billion kWh/year.

In the period 1961-2000 it is found that agricultural area had a fall from 14,941

thousand hectares at 1371 thousand hectares, which was mainly due to the decrease in both natural pasture and grassland as well as decrease of arable surfaces (Table 1).

Irrigated area increased during the same period with 217% from 558 thousand hectares at 1,211 thousand hectares in 2010. They followed a sharp increase given by the equation  $Y$  (irrigated surface) thousand ha =  $0.9754 t^2 - 3,847.4 t + 4,000,000$ , which is statistically significant ( $R^2 = 0.9864$ ) (Fig. 1).

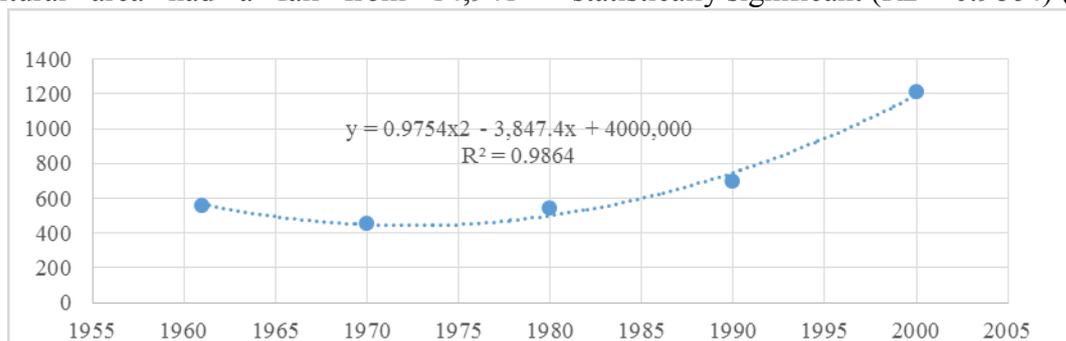


Fig. 1. The evolution of landscaped land in the irrigation system in the period 1961-2000 (thousand hectares)

Parallel with this agricultural production factor growth, the population of Syria, in the period 1950-2000, grew 4 times, and in 2010 increased 6 times from 3,413 thousands persons in 1950 at 20,721 thousands persons in 2010. In the same time the rural population

grew by 3.4 times, in 2000 relative to 1950 and 4.1 times in 2010, from 2,297 thousands persons in 1950 at 9544 thousands persons in 2010. The share of rural population has a decrease from 67.3% in 1950 to 48.1% in 2000, and 46.1% in 2010 (Table 2).

Table 2 Total and rural population evolution during the period 1950-2000, in Arab Republic of Syria

Specification	MU	1950	1960	1970	1980	1990	2000	2010	
Total population	Total	thousands	3,413	4,593	6,379	8,956	12,452	16,354	20,721
	Compared to the 1950s	%	100	134.6	186.9	262.4	364.8	479.1	607
	Average annual growth	thousands		118	179	258	350	390	437
Rural population	Total	thousands	2,297	2,902	3,614	4,773	6,359	7,867	9,544
	Compared to the 1950s	%	100	126.3	157.3	207.8	276.8	342.5	415
	Average annual growth	thousands		61	71	116	159	151	168
	Towards the total population	%	67.3	63.2	56.7	53.3	51.1	48.1	46.1

Source: FAO,2016, <http://faostat3.fao.org/download/FB/FBS/F>

The tendency of population increase is represented by a polynomial equation  $Y$  (thousands persons) =  $3.3755x^2 - 13,076 tx + 10,000,000$ , with a significance  $R^2 = 0.9997$ . (Figure 2)

This increase in population has put a very strong pressure upon food consumption, and on Governments to ensure that agricultural production.

So if we look at the main crops production in this period, 1961-2000, we observe that the wheat production has grown fourfold, from 757 thousand tons in 1961 at 3,105 thousand

tons in the year 2000, with an annual growth rate of 3.69%. (Table 3)

Very high increases are found in corn by 19 times, at potatoes 1.7 times, sugar beet 2.3 times and at apple 1.5 times, grapes of 1.17 times. These total production increases have taken place, in particular on account of increases in average productions at ha.

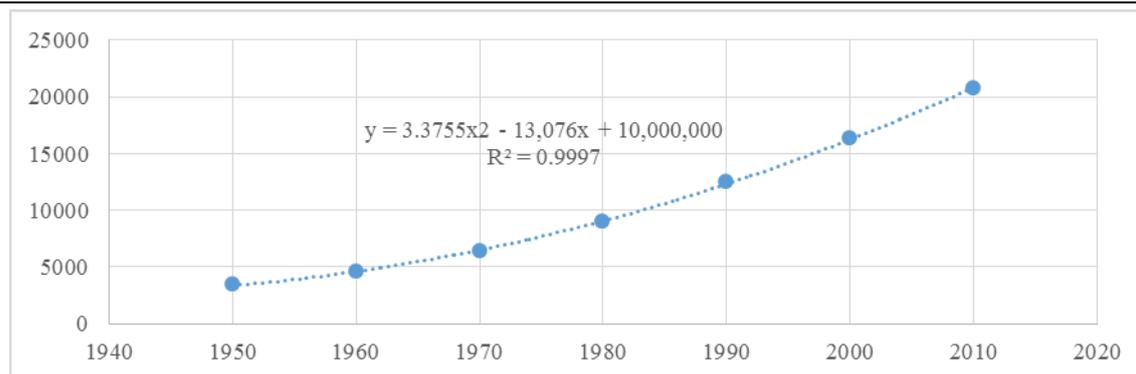


Fig. 2. The total population evolution for the period 1950-2010, in Arab Republic of Syria (thousands persons)

Table 3. The main indicators evolution of the main crops total production during the period 1961-2000

Culture	MU	1961	1970	1980	1990	2000	Average	Annual rhythm	Standard Deviation	Coef. of variation (%)
Wheat	thousands tons	757	624	2,225	2,070	3,105	1,861	3.69	1,034	55.57
	%	100.0	82.4	293.9	273.4	410.2	x	X	x	x
Barley	thousands tons	3,350	2,349	15,872	8,459	2,118	8,132	-1.17	5,424	66.69
	%	100.0	70.1	473.8	252.5	63.2	x	X	x	x
Corn	thousands tons	98	77	481	1,799	1,905	858	7.91	904	105.46
	%	100	78.6	490.8	1,835.7	1,943.9	x	X	x	x
Potatoes	thousands tons	301	653	2,922	3,982	4,847	2,395	7.39	1,598	66.73
	%	100	216.9	970.8	1,322.9	1,610.3	x	X	x	x
Sugar-beet	thousands tons	857	2,275	5,039	4,218	11,753	5,539	6.94	4,639	83.74
	%	100	265.5	588	492.2	1,371.4	x	X	x	x
Apple	thousands tons	100	175	892	2,046	2,867	1,269	8.99	1,043	82.17
	%	100	175	892	2,046	2,867	x	X	x	x
Grapes	thousands tons	2,428	2,065	3,557	4,231	4,094	3,450	1.35	1,180	34.19
	%	100	85	146.5	174.3	168.6	x	X	x	x

Source: Faostat, accessed 15.12.2015, <http://faostat3.fao.org/download/FB/FBS/F>

Thus we note that the reforms that have taken place during this period led to the superior productions in 2000 compared to year 1961, wheat (3% annual rhythm), corn

(annual rate of 7.8%), potato (1.4% annual rate), sugar beets (annual rate of 2%) (Table 4).

Table 4. The main indicators evolution of the main crops average productions for the period 1961-2000

Culture	MU	1961	1970	1980	1990	2000	Media	Standard Deviation	Coef. of variation (%)	Annual rhythm
Wheat	kg/ha	575	466	1,536	1,544	1,850	1,319	622.8	47.21	3.04
	%	100.0	81.0	266.9	268.3	321.5	X	X	X	X
Barley	kg/ha	460	208	1,311	310	161	668	347.9	52.10	-2.66
	%	100.0	45.2	285.0	67.4	35.0	X	X	X	X
Corn	kg/ha	178	140	870	3,254	3,444	1,551	1,635.2	105.44	7.89
	%	100.0	78.7	488.8	1,828.1	1,934.8	X	X	X	X
Potatoes	kg/ha	12,040	11,117	15,503	17,619	21,278	14,903	3,431.3	23.02	1.47
	%	100.0	92.3	128.8	146.3	176.7	X	X	X	X
Sugar-beet	kg/ha	19,494	25,210	22,822	19,710	42,780	28,665	9,239.4	32.23	2.04
	%	100.0	129.3	117.1	101.1	219.5	X	X	X	X
Apple	kg/ha	5,000	2,249	3,742	6,295	7,564	5,653	2,768.0	48.97	1.07
	%	100.0	45.0	74.8	125.9	151.3	X	X	X	X
Grapes	kg/ha	3,498	3,141	3,580	3,882	5,909	4,097	1,356.0	33.10	1.35
	%	100.0	89.8	102.3	111.0	169.0	X	X	X	X

Source: Faostat, accessed 15.12.2015, <http://faostat3.fao.org/download/FB/FBS/F>

Significant growths were noted for this period, 1961-2000, also for the livestock. Such, sheep increased by 4.6 times from 2,901 thousand heads in 1961 at 8,946 thousand heads in 2000 (annual rate 21.2), bovine herds by 2.3 times, herds of goats by

2.3 times, flocks of hens by 7.5 times, the number of hives, 6.3 times. (Table 5).

These increases in agricultural productions have been the result of economic reforms that have taken place and the structural changes in agriculture of Syria.

**The period from year 2000 until year 2010**  
 After year 2000, a series of economic reforms have been started in Syria. In agriculture they have endorsed a reform of land owned by the

State, greater initiative in the choice of crops and a reduction in agricultural production planning by the State.

Table 5. Livestock developments during the period 1961-2000 in the Arab Republic of Syria

Species	Year	1961	1970	1980	1990	2000	Media	Annual rate	Abat standard	Coef of variation (%)
Sheep	thousands head	2,901	6,046	9,301	14,509	13,505	8,946	21.20	4,083	45.65
	Compared to 1961	100	208.4	320.6	500.1	465.5	X	X	X	X
Cattle	thousands head	421	528.4	767.9	787	984.4	674	11.20	180	26.74
	Compared to 1961	100	125.5	182.4	186.9	233.8	X	X	X	X
Goats	thousands head	439	774	1025.5	999.7	1,049.5	900	11.51	205	22.78
	Compared to 1961	100	176.3	233.6	227.7	239.1	X	X	X	X
Hens	thousands head	2860	3669	13849	14794	21,629	11,308	28.78	6,750	59.70
	Compared to 1961	100	128.3	484.2	517.3	756.3	X	X	X	X
Bee hives	thousands	54.4	77.6	134.7	137	345.1	156	25.98	113	72.36
	Compared to 1961	100	142.6	247.5	251.7	634	X	X	X	X

Source: FAOSTAT, accessed 15.12.2015, <http://faostat3.fao.org/download/FB/FBS/F>

Thus, decision No 83 from 16 December 2000 stipulates the division of State farms in batches of 30 donums (3 ha) irrigated and in 80 donums (8 hectares) non-irrigated for a priority distribution to the former owners and beneficiaries of the agrarian reform, agricultural workers and holders of exploitation contracts. Is granted through this decree a right to use land for ten years, after which the beneficiary acquires the full property. In this period it was prohibited the

sale or lease of land. It is considered that it has created some confusion because it was not accompanied by measures to undo the previous Decrees 1971 and 1983 (No. 1033) regarding the division of property (M. Ababsa, 2016).

During this period the land for irrigation continued to increase from 1,211 thousand hectares in 2000 to 1,428 thousand hectares in 2009 and at 1,310 thousands hectares in 2010. (Table 6).

Table 6. The size and evolution of major categories of land use, for the period 2000-2013

Specification	UM	2000	2002	2005	2007	2010	2011	2012	2013
The total surface	thousand hectares	18,518	18,518	18,518	18,518	18,518	18,518	18,518	18,518
Glitter water	thousand hectares	140	140	161	154	155	155	155	155
Of which:	thousand hectares	432	443.6	461	473	491	491	491	491
(Natural forests)	thousand hectares	197.81	197.51	197.05	197.15	197.29	197.29	197.29	197.29
(Planted Forests)	thousand hectares	234.19	246.09	263.95	275.85	293.71	293.71	293.71	293.71
	%	100.0	105.1	112.7	117.8	125.4	125.4	125.4	125.4
Other land	thousand hectares	4,235	4,175.4	4,068	3,994	3,964	3,957	3,951	3,951
Agricultural surface	thousand hectares	13,711	13,759	13,828	13,897	13,908	13,915	13,921	13,921
Pastures and meadows	thousand hectares	8,359	8,338	8,266	8,214	8,212	8,199	8,190	8,188
Plantations of vineyards and fruit trees	thousand hectares	810	828	887	947	1,009	1,054	1,066	1,071
	%	100.0	102.2	109.5	116.9	124.6	130.1	131.6	132.2
Arable land	thousand hectares	4,542	4,593	4,675	4,736	4,687	4,662	4,665	4,662
Landscaped with irrigation system	thousand hectares	1,211	1,333	1,428	1,396	1,341	1,399	1,428	1,310
	%	100.0	110.1	117.9	115.3	110.7	115.5	117.9	108.2
Annual crops	thousands hectares		3,763	3,985	3,773	3,784	3,526	3,428	3,139
	%		100.0	105.9	100.3	100.6	93.7	91.1	83.4

Source: FAO, 2016, <http://faostat3.fao.org/download/FB/FBS/F>

The population has continued to grow from 16,354 thousands persons in 2000 at 20,721 thousand persons in 2010, with an increase of 25%, i.e. the population grew up in a single decade with a quarter of the population. (Table 7).

Analyzing the total productions increase in

the same period, 2000-2010, we note that wheat production had large oscillations (coefficient of variation 23,06%), barley knows a huge increase, characterized by an annual rate of increase by 12.37%, the corn presented some decreases, being the plant that react most to the drought, the potato had an

annual rate of increase of 3.34%, sugar beets at an annual rate of increase of 2.42%, an annual rate of increase for apples of 3.21% and grapes have presented a significant drop

in production, with an annual rate of -2.26%. (Table 8). The same trend can be observed also from Figure 3.

Table 7. The total and rural population evolution in the period 2000-2010, the Arab Republic of Syria

Specification		MU	2000	2002	2004	2005	2007	2008	2009	2010
Total population	Total	thousands	16,354	16,998	17,672	18,133	19,426	20,097	20,567	20,721
	Compared to the 1950s		100.0	103.9	108.1	110.9	118.8	122.9	125.8	126.7
	Average annual growth	thousands		321.7	337.2	460.9	646.4	671.5	469.8	153.7
population	Total	thousands	7,867	8,042	8,234	8,396	8,895	9,174	9,403	9,544
	Compared to the 1950s		100.0	102.2	104.7	106.7	113.1	116.6	119.5	121.3
	Average annual growth	thousands		87.5	96.0	162.0	249.5	279.0	229.0	141.0
	Compared to the total population	%	48.1	47.3	46.6	46.3	45.8	45.6	45.7	46.1

Source: FAO,2016, <http://faostat3.fao.org/download/FB/FBS/F>

Table 8. The total productions main indicators evolution of the main crops during the period 2000-2010

Culture	MU	2000	2005	2007	2010	Average	Annual rate	Standard Deviation	Coef. of variation (%)
Wheat	thousands tons	3,105	4,668	4,041	3,083	4,058	-0.07	935	23.05
	%	100.0	150.3	130.1	99.3	x	X	x	x
Barley	thousands tons	2,118	7,673	7,845	6,797	8,394	12.37	4,797	57.14
	%	100.0	362.3	370.4	320.9	x	X	x	x
Corn	thousands tons	1,905	1,872	1,770	1,330	1,996	-3.53	399	19.99
	%	100.0	98.3	92.9	69.8	x	X	x	x
Potatoes	thousands tons	4,847	6,083	5,701	6,731	5,782	3.34	924	15.98
	%	100.0	125.5	117.6	138.9	x	X	x	x
Sugar-beet	thousands tons	11,753	10,964	13,664	14,929	12,334	2.42	2,239	18.15
	%	100.0	93.3	116.3	127.0	x	X	x	x
Apple	thousands tons	2,867	2,960	2,802	3,931	3,177	3.21	553	17.41
	%	100.0	103.2	97.7	137.1	x	X	x	x
Grapes	thousands tons	4,094	3,063	2,730	3,256	3,246	-2.26	498	15.34
	%	100.0	74.8	66.7	79.5	x	X	x	x

Source: Faostat, accessed 15.12.2015, <http://faostat3.fao.org/download/FB/FBS/F>

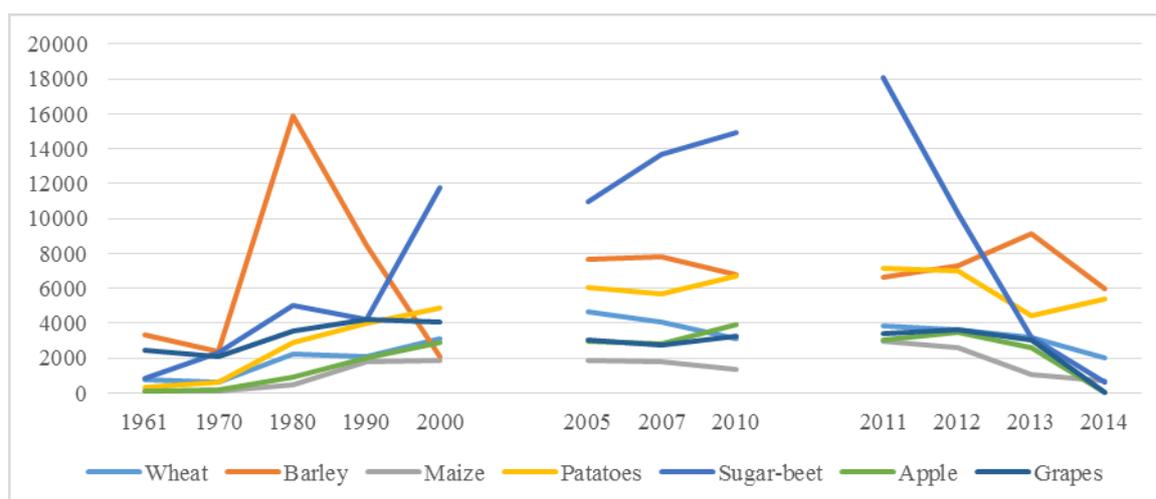


Fig. 3. Total productions evolution of the main crops, for the period 1961-2014

Average productions for the period 2000-2014, have a high annual rate of increase for the crops of barley (8.31%), grapes (0.80%), and decreases for wheat (-1.16%), corn (-1,66%), sugar beet (-0.36%), apple

(-3.40%), wheat (-1.16%), grain corn (0.41%). But analyzing all the period we see a random constant of agricultural productions in conditions quite harsh that came forward in the past decade. (Table 9).

Table 9. The average productions main indicators evolution of the main crops during the period 2000-2010

Culture	MU	2000	2002	2005	2007	2010	2011	2013	2014	Mean	Standard Deviation	Coef. of variation (%)	Annual rhythm
Wheat	kg/ha	1,850	2,844	2,452	2,423	1,928	2,537	2,316	1,572	2,332	444.4	19.1	-1.16
	%	100.0	153.7	132.6	131.0	104.2	137.1	125.2	85.0	X	X	X	X
Barley	kg/ha	161	745	578	576	445	516	721	492	627	322.9	51.5	8.31
	%	100.0	463.1	359.4	357.8	276.8	320.6	448.3	305.6	X	X	X	X
Corn	kg/ha	3,444	4,192	3,678	3,515	3,510	5,048	3,647	2,725	3841	531.2	13.8	-1.66
	%	100.0	121.7	106.8	102.1	101.9	146.6	105.9	79.1	X	X	X	X
Potatoes	kg/ha	21,278	21,294	20,624	18,343	19,513	20,234	19,685	18,060	20,156	1,057.3	5.2	-1.16
	%	100.0	100.1	96.9	86.2	91.7	95.1	92.5	84.9	X	X	X	X
Sugar-beet	kg/ha	42,780	51,448	42,171	48,473	54,291	69,393	49,540	40,666	47,051	7,531.8	16.0	-0.36
	%	100.0	120.3	98.6	113.3	126.9	162.2	115.8	95.1	X	X	X	X
Apple	kg/ha	7,564	6,165	8,872	8,671	7,760	5,946.2	4,825.4	X	8,279	1,990.4	24.0	-3.40
	%	100.0	81.5	117.3	114.6	102.6	78.6	63.8	X	X	X	X	X
Grapes	kg/ha	5,909	6,520	5,676	4,982	6,237	7,300	6,551	X	6,153	901.1	14.6	0.80
	%	100.0	110.3	96.1	84.3	105.5	123.5	110.9	X	X	X	X	X

Source: Faostat, accessed 15.12.2015, <http://faostat3.fao.org/download/FB/FBS/F>

It is interesting to found that during this period, 2000-2010, livestock pose significant increases. Thus the sheep herds have increased from 13,505 thousands heads in 2000 to 15,511 thousands heads in 2010, cattle from 984.4 thousands heads to 1,010

thousands heads, at goats from 1,050 thousands heads at 2,250 thousands heads, for chickens from 345.1 thousands heads to 25,401 thousands heads, and the number of hives from 345.1 thousands to 630.8 thousands (Table 10).

Table 10. The livestock evolution during 2000-2014

Species	UM	2000	2005	2010	2011	2012	2013	2014	Average	Annual rate	Standard Deviation	Coef. of variation (%)
Sheep	thousands head	13,505	19,651	15,511	18,071	18,063	18,019	17,858	17,449	3.5	2,966	17.00
	Towards 2000	100	145.5	114.9	133.8	133.7	133.4	132.2	X	X	X	X
Cattle	thousands head	984.4	1,083	1,010	1,111.7	1,108.5	1,113.2	1,091	1,060	1.29	91	8.61
	Towards 2000	100	110	102.6	112.9	112.6	113.1	110.8	X	X	X	X
Goats	thousands head	1,050	1,296	2,057	2,294	2,293	2,294	2,286	1,785	10.2	576	32.30
	Towards 2000	100	123.5	196	218.6	218.5	218.6	217.8	X	X	X	X
Hens	thousands head	21,629	23,795	25,401	26,203	25,024	19,187	16,601	23,619	-3.2	3,808	16.12
	Towards 2000	100	110	117.4	121.1	115.7	88.7	76.8	X	X	X	X
Bee hives	thousands	345.1	463	630.8	631.5	597.9	544.8		516	6.74	109	21.20
	Towards 2000	100	134.2	182.8	183	173.2	157.9		X	X	X	X

Source: Faostat, accessed 15.12.2015, <http://faostat3.fao.org/download/FB/FBS/F>

The trend of increase in livestock is suggestive in Figure no. 4. It follows this growth for the two studied periods that preceded the crisis that began in the year 2011.

To those shown in paragraphs 3.2 and 3.3, it is found that population growth was supported by the increased agricultural production.

### The period after 2010

Events of the Arab spring took by surprise the whole international community because objective economic and social indicators presented a progressive improvement of the economies in those parts of North Africa and Middle East, namely: economic growth,

reasonable prices of agri-food products, the rate of absolute poverty decreasing, inequality level quite low and with middle-incomes, declining infant mortality rates, life expectancy in increase [7].

After year 2010, we find drastic decreases for the total productions. Thus in relation to 2010, in year 2014 total production fell to the wheat crop to 65%, the barley crop at 88.3%, corn culture 50.4%, potato crop at 80.2%, the cultivation of sugar beet at 4.4%.

The total apple production at 65.3% and grapes production at 95.2% in 2013. (Table 11).

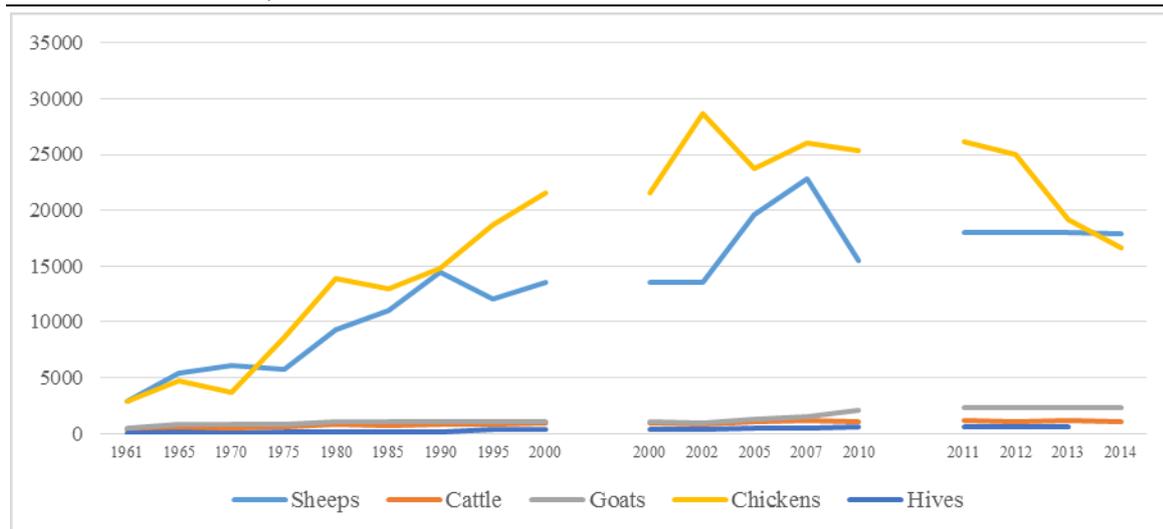


Fig. 4. The livestock evolution, for main animal species, for the period 1961-2014 ( Th.)

Table 11. The total productions main indicators evolution of the main crops during the period 2010-2014

Culture	UM	2010	2011	2012	2013	2014	Average	Annual rate	Standard Deviation	Coef. of variation (%)
Wheat	thousands to	3,083	3,858	3,609	3,182	2,024	3,151	-9.99	705	22.36
	%	100.0	125.1	117.1	103.2	65.7	X	X	x	x
Barley	thousands to	6,797	6,667	7,280	9,109	6,001	7,171	-3.07	1,176	16.40
	%	100.0	98.1	107.1	134.0	88.3	X	X	x	x
Corn	thousands to	1,330	2,983	2,576	1,091	670	1,730	-15.75	997	57.64
	%	100.0	224.3	193.7	82.0	50.4	X	X	x	x
Potatoes	thousands to	6,731	7,152	6,981	4,417	5,396	6,135	-5.38	1,184	19.29
	%	100.0	106.3	103.7	65.6	80.2	X	X	x	x
Sugar-beet	thousands to	14,929	18,051	10,279	3,168	653	9,416	-54.27	7,442	79.03
	%	100.0	120.9	68.9	21.2	4.4	X	X	x	x
Apple	thousands to	3,931	3,077	3,491	2,566		3,266	-13.25	583	17.84
	%	100.0	78.3	88.8	65.3		X	X	x	x
Grapes	thousands to	3,256	3.79	3,624	3,067		3,332	-1.97	233	7.01
	%	100.0	103.8	111.3	94.2	0.0	X	X	x	x

Source: Faostat, accessed 15.12.2015, <http://faostat3.fao.org/download/FB/FBS/F>

It is interesting to found that during this period, 2012-2014, livestock presents insignificant decreases. Thus the sheep herds have increased by 32%, 17,858 heads in 2010 thousands to 13,505 heads in 2014 (annual rate of growth of 3.5%). Herds of cattle have had an annual growth rate of 1.29%. Herds of goats increased from 1,050 thousands heads in 2010 to 2,286 thousands heads in 2014, with an annual growth rate of increase of 10.2% (Table 10)

By the end of 2013, the total economic losses since the beginning of the conflict has been estimated at \$ 143.8 billion, which is equivalent to 276 % of 2010's GDP in constant prices. Capital stock damaged of 64.10 billion \$ accounted for 45% of this loss[18].

Syria, however, continues to be a place where

many thousands of activists are fighting against violence, resist in the name of self-determination, freedom, citizenship, equal opportunities and social justice.

The events that followed in Syria after 2011, there were complex especially by internal conflict, militarization and its internationalization. This fact has determined ONU that in January 2013 to declare the crisis from Syria at level three (L3), being the highest level of humanitarian crisis ever launched by the United Nations[13]. The commune analysis of the three bodies aims to provide a common understanding of the situation, ready to use, to save time for the evaluation teams and to avoid activities duplication. The work of the three bodies materialized in the "Report Commissioned IASC by the Inter-Agency Humanitarian

Evaluations Steering Group as part of the Syria, Syria Crisis Common Context Analysis”, edited in May 2014[10].

The report reviews the history of the Syrian territories after World War I, and how these territories were divided by the San Remo Conference of 1920, which granted France the mandate for North Syria "(Lebanon and Syria), and Great Britain a mandate for" Southern Syria "(today's Israel, the Palestinian territories, Jordan and Iraq)[10].

In 1920, the French authorities have created other States: Lebanon (Lebanon), Damascus, Aleppo, Alawite. In 1921 they also created the State of Jabal and Alexandretta, which was transferred to Turkey and became the province of Hatay, where today many Syrians refugees fled recently.

In 1943, when the Arab Republic of Syria won formal independence, it was the result of a merger between the progressive States of Damascus, Aleppo, the Alawite and Jabal Druzes.

The report describes a mosaic of peoples of Syria which has been enriched by the smaller ethnic communities, such as Circassians, Turkmen, Armenians and Syrians, and according to different religious professions, such as the Twelver Shia, Druze, Ishmaelites, Melkites Christian, Maronites, Chaldeans, Copts, Protestants and Jews. There were also significant populations of refugees from neighboring countries and who worked in Syria. A population of 500,000 Palestinians have lived in different communities. A smaller population and more recent refugees almost 63,000 Iraqis have been integrated in the Syrian cities.

The report considers the 2011 crisis from Syria, as a political crisis in a highly developed country in relation to most of the countries in the region, but that has been vulnerable economically and politically. The drought in 2010, had an adverse impact, who had been warned by the The United Nations, concerning the 2.3 million Syrians are being affected by the poverty extreme "[11]. In this case migration was not the only from the rural toward the periphery of the city, but also from the city center into the suburbs. Many of the Sunni bourgeoisie families were no longer

able to sustain the standard of living in the city, where rents have increased in competition with new Iraqis refugee [2].

It is worth noting that in response to the requirements of democratization in spring 2011 was abolished the martial law (April 2011). The President of Syria, has indicated its intention to launch a "national dialogue" (May 2011) and promised "reforms". These included a new electoral law (July 2011), a new press law (august 2011) and a new Constitution (February 2012)[12].

However, these steps have not resolved the crisis. The Civil Uprising became militarized in autumn 2011, with the creation of the Syrian Free Army (FSA) made up of deserters, mostly Sunni from Governmental Army, who fled to Jordan and Turkey. Initially, these groups have used guns taken from the raids against the Government army. Subsequently pro-Western regional powers have begun to organize and support many different FSA parts, with weapons and money [15].

Another report points out that the international military interventions have been proven not to be a support to a democratic, representative and effective change. The human and economic cost of such intervention was not justified by the results that have emerged in many cases around the world, the most recent example being Iraq. The exacerbated sanctions have caused economic and social losses, including the damage to Syrian household welfare and especially to poor and vulnerable families. Moreover, the sanctions have hindered Syria's development and progress, mainly through restrictions on trade and financial transactions, including imports of vital goods [8].

## CONCLUSIONS

### **1.Positive effects resulting from the agricultural policies and development plans**

-Government programmes applied in Syria have done to grow areas taken into cultivation and irrigated areas.

-The realization of strategic stocks of crops (wheat, corn, cotton), most fruits and

vegetables (olives and olive oil) and others and a surplus for export.

-The completion of important steps to improve living conditions in rural areas and in the city, the increase of food goods food components per capita, for example, the increase in the number of calories per capita from 2,350 calories/day in 1970 to around 3,200 calories per day in recent years.

-The increase in the contribution of primary and processed agricultural products for export.

-Development of infrastructure in rural areas to ensure services for the agricultural sector (agricultural roads, electricity, water, communications, transport and storage, etc.).

-Development of educational services and for consultancy that addresses the agricultural sector (education, guidance, vocational training, health and veterinary protection, etc.).

## **2.The negative effects resulting from the agricultural policies**

-Significant reduction in fertility by area pollution of soil and water resources.

-Reduction of water resources, in particular groundwater as a result of random drilling of wells and unbalanced or unscheduled pumping.

-Natural pasture degradation and the desert advancing as a result of plowing, irrigation, of the random machinery movement.

-Fragmentation of agricultural properties up to exploitation and automation prevention limit.

## **3.Issues and challenges that the agricultural sector faces**

-Limitation of the main natural and agricultural resources (water and land) and their impact on environmental factors and climate.

-Demographic development and employment occupancy in the agricultural sector.

-Fragmentation of agricultural properties.

-Reduced volume of financial resources and the fear of investors moving towards the agricultural sector due to the big term of investment recovery and the crisis in which the country is in

-The Subsidies for agricultural products in other countries, what is causing the increase in competition?

-Issues related to policies affecting directly or indirectly the agricultural sector (such as financial policies, exchange rates and tariff policies)

## **4.The effects of the crisis on the country's development**

-Political Dissension have made their mark on some projects of great importance for the economy of Syria, such as the association agreement between Syria and the EU, whose negotiation process was completed in December 2003 and was initiated in October 2004 but has not been implemented, because at the request of France, the ratification procedure has been frozen as a result of the assassination of former Lebanese Prime Minister Rafik Al Hariri; Syria's adherence project to OMC, , which opposed the United States, which argued that Syria does not recognize the State of Israel.

-It is considered that 28.3% (6.8 billion dollars) of the total GDP in 2011 and 2012 loss was due to the impact of sanctions <sup>[23]</sup>.

-The applied financial sanctions on Syria as a result of internal upheaval that took place starting in spring 2011.

-Internationalization of the conflict following the intervention of the region states and the international powers had devastating effect on economic and social activities and whose solution is hard to predict.

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## THE ROLE AND IMPACT OF QUALITY ASSURANCE SYSTEM IN OBTAINING COMPETITIVE FOOD PRODUCTS

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### Abstract

*Quality food products require efforts across the whole sector, whether it is fruit, dairy or bakery. Policies addressed are the more prominent with every actor in the sector, as for food products, recognizes that the quality is more important factor in entrepreneurial decisions. In this context, the paper aimed to analyze the role and the effects of the quality assurance system in obtaining competitive food products using monographic method, analysis, synthesis, induction, deduction, comparison method. As a conclusion, in our opinion, taking over best European practices in policies to increase the role of quality systems is the best choice, because: they are performing, we benefit from EU funds in programs that fit these measures and in addition, we can borrow the experience of the states which had similar deficiencies, such as Romania or Lithuania, for example.*

**Key words:** agro food products, competitiveness, export, quality management system

### INTRODUCTION

Getting competitive food products in terms of quality assurance system and in the framework of defining actions is a very current study which is an important issue of study, both at academic level and at the level of the governing bodies of the state. At the same time, we consider that the quality of food products requires efforts along the entire chain, whether it is fruit, dairy or bakery. The addressed policies are the more prominent the more each actor in the sector recognizes that for certain food products quality and not other criteria determines the characteristics of the product at the level of corporate decision and the choice of a particular product by the consumer.

The importance of quality resulting in at least following reasons:

-Firstly, for an enterprise, obtaining and maintaining the quality, required by the customer, is a business necessity.

Realization this goal is conditioned by planned and efficient use of human, material and financial enterprises resource;

-Secondly, the customer wants to have the certainty, that the enterprise in future also will

deliver the same level of quality of production. To win the trust of customers and increase competitiveness, the enterprise must demonstrate that it has implemented an effective quality system.

Besides the two issues mentioned, the enterprise must take into consideration the increasingly demands of society on regulations and restrictions aimed at protecting the individual's health and environmental protection [6].

The regulation of the activities related to quality assurance of food products in the Republic of Moldova is shown into a series of laws and government decisions. Legislative infrastructure provides, in great part, addressing many aspects related to specific hygiene rules, for food safety, technical regulations, etc. Here refers the normative basis underlying the institutions tangent to the subject (National Agency for Food Safety - NAFS), and the concept of quality infrastructure. Besides these, recently a number of projects are being proliferated aimed at reinforcing the institutional elements on quality management.

## MATERIALS AND METHODS

The study was conducted basing on national and international normative acts, manuals, monographs and other publications specific to the theme, which helped us to understand, explain and argue the role and impact of the system of quality assurance in obtaining competitive food products and to identify measures to increase their competitiveness through the improvement of the quality system. To carry out the study the following methods of scientific research were applied: monographic method, analysis, synthesis, induction, deduction, comparison method.

## RESULTS AND DISCUSSIONS

The need for a common policy concerning quality food products derived from the unitary character of the EU internal market [5]. We must understand that, as part of the Common Agricultural Policy (CAP) it targets

businesses, primarily by targeting the quality and quality management systems; it targets consumers by ensuring food safety and better information on quality standards; it addresses public institutions of national and European level through the support required by regulations which determine high quality.

European policy performance derives from the approach that it has on the quality of food products, based on the following components:

- technical qualities approach ensures the hygiene and safety of the food;
- organoleptic approach generated by the reaction of consumers with regard to product quality;
- "good manufacturing practice" approach, rules on regulating products with names of origin (geographical indications) [2].

The harmonization of the principles of European policy on the quality of food products [9] at the national level can be implemented, in our view, through the following measures:



Fig.1. Strategic measures in the implementation of best practices on quality assurance of food products.  
 Source: elaborated by the author

It is estimated that currently agri-food quality policy is based and transposed into reality by the Ministry of Agriculture and Food Industry, which acts through standards, resolutions and ordinances [5]. We can see such intervention through the work with all entities involved in quality infrastructure according to some definite policies that would take into account: finishing the harmonization of national standards based on the European and international ones, institutional strengthening of public entities pursue inspection and agri-food certification, technical staff stimulation, creator of regulations and standards, the dissemination in the society of a consumption culture and the appreciation of the products qualities. To ensure national quality infrastructure there

must be operational the following entities: a national body for standardization, accreditation body and national metrology institute.

Moreover, these directions may crystallize into a unified strategy of quality that would succeed the current concept of quality infrastructure adopted in 2006; it would solve in the short term, the weakness which in producers and exporters' opinion are the most stringent. They refer primarily to the lack of technical means in laboratories issuing test reports and poor preparation of specialists in the field. Entrepreneurs also mention considerable difficulties in implementing the HACCP system (mandatory for the processing industry) that guarantees food safety. In addition, certification and standardization system is complicated, cumbersome and does

not always meet the immediate needs of the economic agent.

In terms of policy, it is important to understand the working mechanism of the national quality infrastructure, which in our opinion is as follows (figure 2). The

interaction of these entities is justified by the relations arising from the need of common approach to quality infrastructure. The management of each element from figure 2 provides an effective public intervention if the following conditions are met:

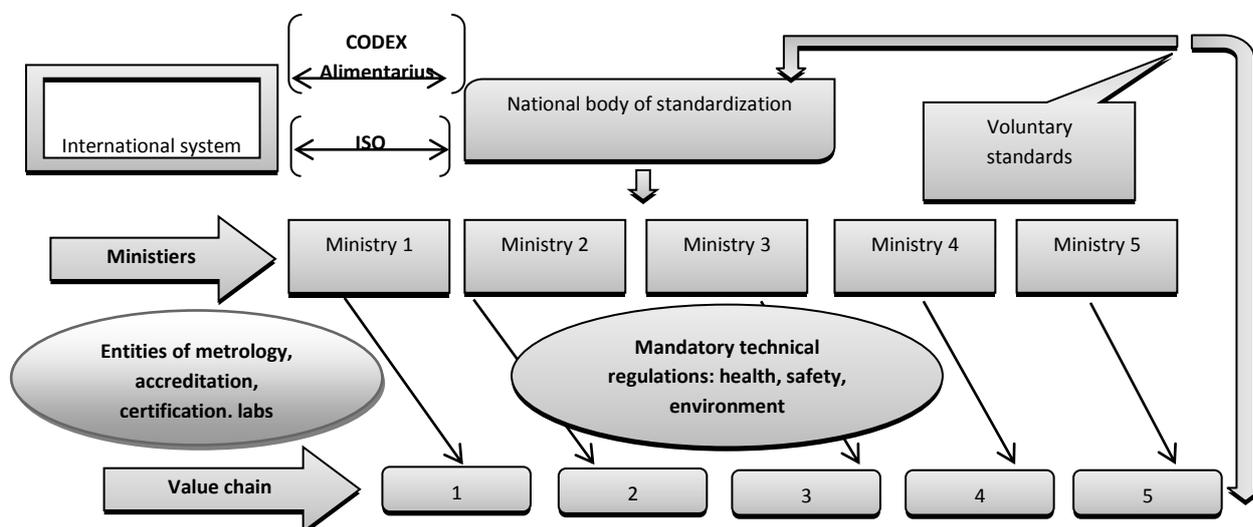


Fig. 2. The algorithm of work of fundamental institutions and the composition of the national quality infrastructure  
 Source: elaborated by the author

- ✓ adopting lucrative legislation acts with advice from local or international experts in the field;
- ✓ establishing a viable mechanism for the verification and certification of food products;
- ✓ strengthening the institutions related to the field by acquiring European experience, of countries with similar environment, such as, for example, Lithuania and stimulating private actors in certification;
- ✓ more effective coordination of donor funds based on strategy;
- ✓ help from development partners on risk, costs and benefits analysis.

In relations with international organizations in the field (International Standardization Organization - ISO) it is important approaching a broader base of standards that would provide significant changes in the agro-food sector.

However, progress in the field has been registered lately (2014) some of them are [8]:

- 2.658 standards were adopted, including 601 national standards identical to those international (ISO / IEC) and 2.057 national standards identical to those of the European Union (EN); in total, by 2014, they were

adopted 10.500 European standards;

- Moldova joined, as affiliate member, the European Committee for Electrotechnical Standardization (CENELEC);
- National Institute of Standardization became an observer member of the European Telecommunications Standards Institute (ETSI).

It is important to recognize that the tools currently offered to the Republic of Moldova to make the quality of food products t meet international requirements represents a favorable regulatory, technical and organizational change. In this context, the Free Trade Agreement between the EU and the Republic of Moldova (DCFTA) by Title IV (Chapter 12 Agriculture and rural development) addresses the approximation of the standards of crops and livestock branch, as well as quality policy [10]. This substantiates some perspectives favorable to the domain: EU standards are stringent - if we meet them, we can meet the requirements of many other regions / partners; we will be able to get current, operational, sector development assistance; we will have the technical assistance of foreign experts.

However, the process of taking over of the European standards (estimated to be about 18 thousand) will require a transition period and consultations with business environment on the implementation of EN standards [1].

At the enterprise level, to implement a quality management system (ISO 9001, ISO 22000 / HACCP, Global GAP, etc.) depends on its ability to provide accurate information and to

accept changes. Food producers have stated, first of all, informative and technical difficulties in implementing these systems; from this fact arises the need for trainings and information sessions on those procedures. Until now, very few projects have addressed these needs. Figure 3 shows the "strengths" in the implementation of such systems in the agri-food businesses.

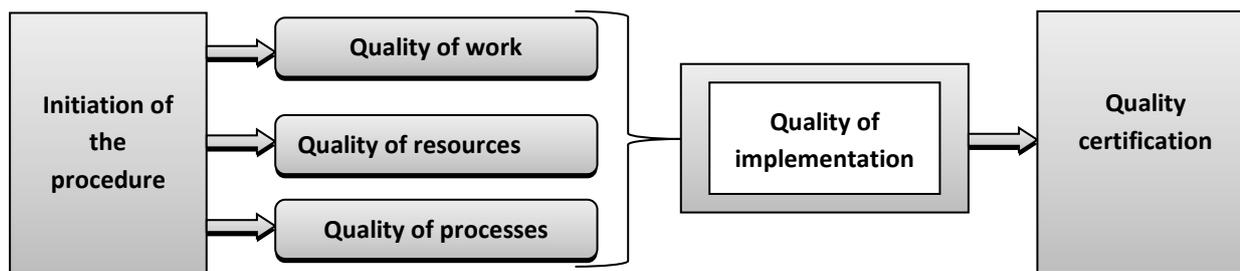


Fig. 3. "Pillars" of the implementation of quality management systems in enterprises  
 Source: elaborated by the authors

It has been observed that the more outsourced is the company's activity, the more it tends to implement a more efficient and less "traditional" quality management system for the local market, for example Global Gap [4]. The best companies understand that the implementation of quality management systems (ISO 9001) simplifies the management of enterprise; it streamlines management and reduces the risk on product having a significant lasting impact on reputation. At the same time, standards helps manufacturers and exporters have a trading system without barriers (mainly technical) and better adapt products to market requirements, gaining a higher level of competitiveness, especially because these systems provide greater efficiency, which is a determinant of competitiveness.

Specific features of developing states, the creation of an infrastructure of quality food products present significant challenges at the institutional and legislative level [3]. In this sense, we consider appropriate the establishment of a *Quality Council*, with broad representation from the entities involved in this infrastructure. It will be the "voice" of the parties for authorities to show the current needs in terms of quality and how they should be treated by national approach.

An example of it could be Costa Rica.

Of the challenges that constrain this project, we highlight the large number of participants in quality assurance infrastructure (associations, businesses, ministries), and their availability to generate such a project. However, we consider it a viable measure, especially as the activities concerning the deepening of food quality assurance system are not at the initial stage - regulatory framework has been created, skilled institution has been founded - it is National Agency for Food Safety (NAFS). So, the Council will address current challenges, the consolidation of the system and identifying challenges in its implementation.

A further step in strengthening the quality infrastructure is the sustainability of such projects. Although initially being financed by the public budget, consolidation measures have to be transferred to the private sector through the payments they receive. At the same time, winning international certification of testing entities, and establishing regional networks will increase technical capacity and personnel, including through training.

Furthermore, the convergence of the membership of the WTO and the development of partnership relations (and associated member) with international standards

organizations is becoming a "must-have" for the sustainability of relationships in foreign markets, not just an option.

A number of programs to develop the capacity of agro-alimentary infrastructure food is available through the European Union, the United Nations Industrial Development Organization (UNIDO), USAID, the Government of Japan etc. These programs require an adequate structure and efficient institutions but if there appears a specific issue of bilateral importance with trading partners, there are real opportunities to receive assistance [7].

In defining an effective infrastructure of agro-alimentary products quality, in our view, we must start from the following steps :

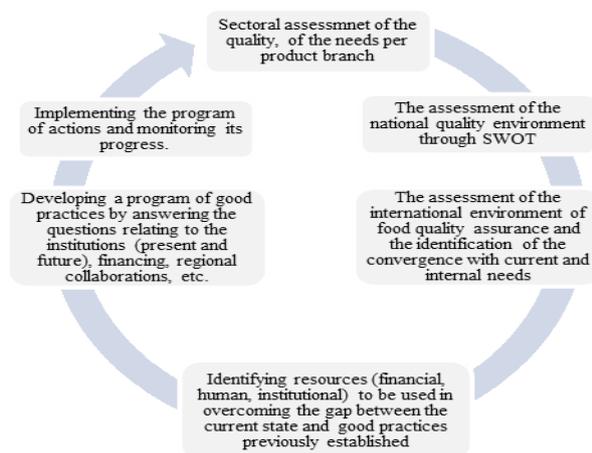


Fig. 4. Stages of defining efficient infrastructure of the quality of food products  
 Source: elaborated by the authors

When we talk about the assessment of the international environment of food products quality assurance, it is important to identify the examples of strategies applied by the states whose economic systems are similar to that of the Republic of Moldova (you can choose a historical aspect - former USSR, regional aspect - Central and East Europe or the economic magnitude - Estonia, for example).

For exporters it is important to emphasize several critical points in assessing the selection of the system of quality management:

1) determining the need for a generic system (like ISO 9001) or specific sectorial (like ISO 22000, Global GAP);

2) if we choose a generic one, then what will be the focus - quality system, environment or another

3) if we choose one specific system - which will be the system that best meets the challenges of quality and competitiveness of a company.

At the same time, we understand that quality assurance requires innovative solutions currently generated by private initiative. In this regard we propose two relevant solutions: one that of hazard management and micro-climatic approach and the second- referring to the implementation of ICT in monitoring agricultural production.

**I.** As we know, the quality of food products depends primarily on basic factors, involved in the production: soil, climate, varieties, breeds. The conditions of these factors determine the physical, biological, chemical and organoleptic characteristics of the products. Therefore, information on local natural factors is extremely necessary, even critical. At the same time, we note that meteorological forecasting infrastructure in Moldova has not developed additional services that would converge with the interests of farmers. Its essential functions are limited to providing general information on the country and its regions. Weather forecasts bear a synoptic nature and their operativity is often challenged by agricultural entities

Our initiative concerns the development of an entity or entities that would address the growing needs of farmers in the knowledge and the possibility of influencing agricultural hazard and micro-climate conditions. This unit (s) could be initiated under public patronage (Hydrometeorological Service, Institute of Soil Science, Agrochemistry and Soil Protection), in order to obtain later financial and operational autonomy on the account of the rendered services. However, the variant of a public-private partnership can also be analyzed.

In medium-long perspective, with the DCFTA's benefits valorization, but also when exploring new markets, manufacturers and

exporters of agri-food production will feel the need to provide such services, since the requirements on product quality will increase exponentially.

**II.** The implementation of informational solutions passed from the fields of high technology in other areas of economic life. Agriculture is not, in this respect, an exception. Monitoring food production in the European Union is a well-organized practice and the quality of agri-food exports is directly related to how good practices procedures, monitoring and information of production are applied.

## CONCLUSIONS

From the analyzed items, we find out that the systematic improvement of the quality assurance system may contribute to a positive image and a well-deserved prestige in the competitiveness of products, particularly abroad.

Broadening geography of export of Moldovan agricultural production in foreign markets can produce in the way of ensuring adequate mechanisms to promote and enhance production quality.

The implementation and certification of Quality Management System is an important factor for improving competitiveness and enhancing consumer's confidence in the offered product quality, confirming the compliance of production with certain requirements, standards and technical conditions.

## ACKNOWLEDGEMENTS

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## MOLDOVAN AGRI-FOOD EXPORT POTENTIAL ASSESSMENT IN THE CONTEXT OF COMPETITIVE PERFORMANCE

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### **Abstract**

*The paper aimed to present the assessment of the agrifood export potential of the Republic of Moldova. The data involved came from Moldavian balance sheet, as well as international trade data like Comtrade, UNCTAD Statistics. During the analyzed period the national agrifood export potential suffered crucial downturns in terms of performance and volume (value) diminutions. The most affected were the High Value Added products, such as fruit, milk, meat. This transposed in major revenue losses from performing export. Internally, reserves confirming Moldova's agrifood export potential are still untapped and export performance still low compared to Moldova's competitors in the regional agrifood markets.*

**Key words:** agrifood production, competitive performance, export potential

### **INTRODUCTION**

Positioned between two major water arteries - the rivers Prut and Dniester, Moldova has exceptional resources inclined towards agri-food production. Temperate - continental climate allows the growth of early crops and relatively skilled labor and cheap land emphasize the competitive advantage that can capitalize on foreign markets.

At the same time, farmers have important practices in the cultivation of a wide enough variety of crops.

National competitiveness can be ensured by involving the export of high value added products which provide increased profits and respectively allow increasing wages.

Also, emphasis should be placed not only on price but on quality parameters too, which would allow exported products to maintain retail market even under a strong national currency. Currency appreciation leads to higher prices of exports relative to imports.

In these circumstances, the income received from exports can increase the volume of imports, including modern technologies, and thus having a positive effect on the trade balance, even with reduced exports.

### **MATERIALS AND METHODS**

In order to characterize the agri-food export potential of Moldova, the following indicators were used: export volume, import volume, related domestic market, inclination to export, inclination to import, the degree of trade openness.

There were used data from international organizations, national statistics and analysis reports.

The methodology used allowed the analysis, synthesis and comparison of various indicators related to agri-food export potential.

### **RESULTS AND DISCUSSIONS**

It is considered that the export potential of agriculture could be assessed on the basis of natural resources and the ability to supply products concerned [3].

The author's vision on assessing export potential includes a proposal of the complex methodology, that elucidates both export potential based on internal resource (production, self-sufficiency), as well as the external resource (foreign markets). This view is illustrated in Figure 1.

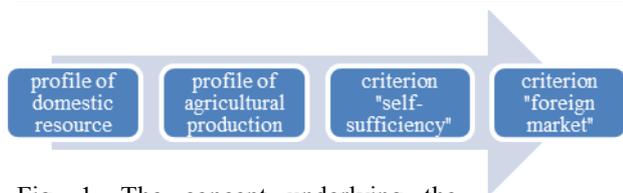


Fig. 1. The concept underlying the methodology for determining the export potential of the agri-food sector

Source: Own determination.

In the national agri-food sector that is performing poorly, involved resources correspond to the context. The large share of people employed in agriculture, large areas of eroded land, as well as outdated agricultural machinery intake resource poor quality. Furthermore, Coser and Litvin [3] argue that the background of the region and Moldova's similar to that territory and potential there is a poor condition of human resources and national land.

Relationally, it will complete the definition of agri-food export potential by determining methodological convergence of potential export competitiveness.

On the one hand, the openness of trade [7] relies on competitive positioning in the market and from another point of view, derived from (and has relationships with) internal food market. Used in the European Union, this technique can be developed, as in Table 1.

It is obvious that Romania's agri-food sector has a degree of commercial opening much higher than in Moldova, which is at least two times higher.

Internally, reserves confirming Moldova's agri-food export potential are untapped, given that Romania has a propensity to export 2-3 times higher, and the self-sufficiency of them is smaller than in the case of Moldova.

In the continuation of internal resources, we apply the concept of "propensity to export" (PE) to determine the revealed particular crop export potential.

The relevant method in this regard is related to applying propensity to export on the balance of food resources [7].

From these calculations can be deduced the highest values of PE and products with export potential (Table 2).

Table 1. Indicators on trade potential and openness, agri-food sector of Moldova

Indicator	2009	2010	2011	2012	2013
Total agri-food production, million MDL	22.556	31.610	36.818	35.509	40.036
Agri-food import, mln MDL	6.317	7.186	8.053	8.964	10.228
Agri-food export, mln MDL	7.438	8.896	10.739	10.599	13.252
Agri-food domestic market (ADM), million MDL	21.435	29.901	34.133	33.874	37.012
Self-sufficiency rate, %	105.23	105.71	107.86	104.82	108.17
Propensity to import	0.294	0.240	0.235	0.264	0.276
Propensity to export	0.347	0.297	0.314	0.312	0.358
Degree of trade openness, Moldova	0.64	0.53	0.55	0.57	0.63
Degree of trade openness, Romania	1.65	2.07	1.62	2.48	2.47

Source: Own calculation based on [2,5,8]

Table 2. Export potential on quantitative approach, based on the balance of resources, 2013

Product	ADM, thous tons	PE	Position on export potential
Wheat	771.4	0.423	5
Corn	1288.4	0.103	9
Barley	115.0	1.089	3
Sunflower	229.7	1.197	2
Potato	272.0	0.003	14
Field and covered terrain vegetables	295.1	0.146	7
Tomato	65.1	0.190	6
Watermelons	54.6	0.014	12
Fruits, berries, nuts	110.1	3.363	1
Grapes	591.7	0.064	10
Table grapes	53.2	0.703	4
Meat, including offal	164.3	0.008	13
Mutton and goat meat	6.4	0.140	8
Dairy, including butter	606.5	0.027	11

Source: Own calculation based on [2,5,8]

For a number of crops, export potential indicators can't be calculated, since these items are missing.

The largest export potential of the products analyzed was found to be present in fruits, berries and nuts (3363), which have ranked first. PE for these crops is about 9.3 times bigger than sector PE (Table 2).

These crops are followed by sunflower (1197), barley (1089), table grapes (0.703), wheat (0.423).

In terms of value aspect, determining export potential may involve also the internal resource.

This refers rather to an untapped theoretical export potential (UTEp). We introduce this variable to quantify the lost export of agrifood value, with reference to yields recorded decades ago, during the years 1971-1995, depending on the maximum amounts that were collected within that period.

Methodologically we see UTEp as an indicator that can be derived from the relationship:

$$PETN = [(P_a - P_{a-1}) * P_{exp}] * PC$$

where:

$P_a$  - crop production, current year

$P_{a-1}$  - crop production, the reference period

$P_{exp}$  - the share of exports in output this year

$P_c$  - the export price of item.

UTEp expresses the lost revenues from agro-food exports that could be exploited, based on historical yields.

In this sense, whether  $P_a - P_{a-1} \geq 0$  then UTEp existence is not justified and vice versa if

$$P_a - P_{a-1} \leq 0.$$

Using national statistics and data deriving from international statistics one can calculate UTEp for crop plant and animal products.

It has resulted that corn, grain crops and sunflower had attested the relationship:

$$P_a - P_{a-1} \geq 0 \text{ (Table 3).}$$

In value terms and relative to historical harvest, the export potential untapped revenue expressed above shows that tobacco products are the largest losers (-290,6 million USD), fruit and berries (-258,4 million USD), milk (-97,9 million USD), vegetables (-42,8 million USD) and barley (-23 million USD), i.e., the vast majority of intensive crops, which inhibits the development of potential and competitiveness.

On external resource the modernist method of the potential in export refers to the recommendations of International Trade Centre (ITC) (UNCTAD STAT, 2015.) underpinning its assessment by comparing the current trade between the partners, the demand for import and export capacity.

Table 3. Untapped theoretical export potential (UTEp) on vegetable crops and animal products, 2013

Product	Revenue from export potential, untapped, thousand USD	Rank on lost revenues from export
Wheat	-3,663.17	9
Barley	-23,059.07	5
Corn for bean	X	X
Sunflower	X	X
Tobacco	-290,657.81	1
Potato	-216.41	10
Vegetables	-42,850.21	4
Watermelons	-2.53	11
Fruits and berries	-258,424.80	2
Grapes	-17,220.78	7
Milk	-97,957.31	3
Eggs, million pieces	-4,751.89	8
Meat	-18,109.74	6

Source: Own calculation based on [2,5,8]

In the author's view, this methodology is useful in assessing potential products.

Regarding his own vision, an assessment of the export potential should meet the following components that form, in our opinion, Method of External Resources (MER), consisting of 2 approaches:

I) approach on untapped export potential:

- analyzes the dynamics of global imports by product (top 10 countries), but with an increase of not less than 20% - it here identifies potential markets to boost national exports;
- the average import tariff analysis, market data.

II) partially redeemed export potential approach:

- states important share partners of Moldova (top 10) in the global demand for this product and import dynamics - analysis of the existing partners.

Subsequently, an analysis of share highlights destinations with the greatest potential to attract agrifood exports.

However, initially it is necessary to identify the product in the magnitude and dynamics of export and trade balance.

Once identified, these products will be analyzed by MER.

Table 4 summarizes and reveals both approaches to external resources method.

For most products, there are potential markets– these are concentrated particularly in the Middle East and Central Asia countries. Subsequently, those markets are to be analyzed from the perspective of domestic consumption etc.

Table 4. Representation of MER results on markets with export potential agri-food, 2014

Product, HS code	Top destinations, unused	Top current destinations that have a perspective
2204 Wine	Georgia, Iran, Oman	China, Poland, Kazakhstan
0802 Nuts	Nicaragua, Cuba, Cambodia	Germany, Italy, Spain
1206 Sunflower	Myanmar, Oman, Tajikistan	Turkey, Ukraine, Pakistan
1005 Corn	Nigeria, Finland, Congo	Great Britain, Italy, Turkey
1512 Sunflower oil	Myanmar, Mozambique, Rwanda	Italy, Egypt, Spain
2208 Spirits, liqueurs	Libya, Mozambique, Iran	USA, Kazakhstan, Germany
2009 Fruit and vegetables juice		
0808 Apples, pears, quinces	Japan, Myanmar, Belarus	Belarus, Romania, Egypt
0809 Apricots, cherries, peaches, nectarines, plums	Kyrgyzstan, Kazakhstan, Nepal	Belarus, Romania, Kazakhstan
0806 Grapes	Libya, Myanmar, Yemen	Belarus, Romania, Iraq
0409 Natural honey	Bulgaria, Libya, Kyrgyzstan	France, Romania, Italy
0201 Beef	Kazakhstan, Venezuela, Belarus	Belarus

Source: Own calculation.

At the enterprise level, those responsible for foreign economic activity may have a number of very useful tools in assessing the export potential for their products and destinations to be approached.

International Trade Centre (Geneva) proposes the structured information, which can stand at the basis of export decisions (product and market).

However, we consider appropriate to perform an algorithm of clear stages that would help economic entities to:

- assess the potential export on product and markets;
- identify external partners at the country level and the enterprise;
- understand the import markets.

Overall, Moldova must determine the development paradigm, at least in two aspects:

- the model of economic growth - currently it is underperforming, based on consumption boosted by remittances, but should be driven by exports, investment and innovation;
- how to position the country on the international market - here we have only two options: either try to be competitive against the "giants" that drive the factor of labor cheap, i.e. China, India and countries in South-Eastern Asia, having fundamentally clear strategy on export development, involving other structural elements - infrastructure, export performance, investment in quality etc.

Since the first option is not sustainable, but also practically impossible to implement with such economies of scale, Moldova has to formulate and achieve clear action points to become competitive and progressive.

Lack of sustainability on first model derives from the convergence of national exports on world food commodity prices, which most likely will be increasing.

But this does not ensure a dynamic perspective, since exports should focus on broadening the range of products and prospecting new markets and products of quality.

Methodologically this analysis involves assessing commercial performance by using Commercial Performance Index - CPI [6]. It is calculated this way:

$$CPI = (\text{growth rate of agrifood exports}) / (\text{growth rate of agrifood imports})$$

An index higher than 1 shows a relative commercial expansion, while an index below 1 - a relative contraction.

That period, we evaluated the years 2005-2006 and 2013-2014, and as a reference, calculations were made for states in the region. The analysis results are shown in Table 5.

At regional level, in the period of 2005-2006, Moldova has a quite favorable position for CPI of food sector, second after only Georgia. This explains, to some extent, the sector's

weight in the national economy and a constant positive trade balance of agricultural products. Serbia (1.17), Romania (1.05) and Poland (1.01) proved to be the most efficient.

In the recent period, there are already indexes above unit in Moldova, Ukraine and Russia. The biggest losers were Belarus (0.83) and Bulgaria (0.90).

Osadci [7], Albul [1] argues the dynamic issues by using a series of indicators in relation to GDP, price etc. that reveals business performance. Authors believes that the most relevant indices take into account opening should be dynamic economy and foreign trade elasticity coefficient of Moldova.

Table 5. Agri-food trade performance of Moldova and regional countries, 2005-2006, 2013-2014

	CPI, agri-food sector	
	2005-2006	2013-2014
Moldova	0.70	1.14
<b>Regional states:</b>		
Romania	1.05	1.009
Ukraine	0.93	1.32
Russia	0.99	1.25
Belarus	0.94	0.83
Poland	1.01	1.02
Hungary	0.99	0.93
Serbia	1.17	1.07
Bulgaria	0.82	0.90
Georgia	0.55	1.04
Turkey	0.96	0.95

Source: Own calculation based on [2,5,8]

Trade opening dynamics (TOD) derived from the relationship:

$$TOD = (X + IM) / Y$$

where:

X – exports, mln MDL

IM - imports, mln MDL

Y - Gross Domestic Product (GDP), mln MDL.

This index can be calculated as the share of foreign trade in GDP and as a share of exports and imports in GDP (Table 6).

It believes that the openness of the economy has an impact on national economic system when it reaches at least 25% of GDP.

In Moldova's case, this indicator is far exceeded, indicating, however, the national

economy and vulnerability to global developments and regional.

In Romania, for example, foreign trade index was 82% in 2014, while in Ukraine has never descended below 100% in 2010-2012, 2014.

Table 6. Dynamics of trade openness in Moldovan and in regional countries, 2010-2014 (% to GDP)

	2010	2011	2012	2013	2014
Foreign trade, Moldova	92.83	105.58	101.24	99.22	93.62
Exports, Moldova	26.51	31.59	29.67	30.41	28.60
Imports, Moldova	66.32	73.99	71.56	68.80	65.01
Foreign trade, Romania	77.0	85.0	85.0	85.0	82.0
Foreign trade, Ukraine	104.0	106.0	104.0	95.0	102.0

Source: Own calculation based on [2,5,8]

Generally, a deeper analysis of agrifood export performance implies, in our opinion, consequential indices of export growth, the general market positioning, increasing global imports or exports competitiveness.

National data indicate that export growth from 2009 to 2013 by 87% was generated by external factors such as world trade growth and less export performance, such as competitiveness and specialization in certain products or in certain markets. Such clarifications are extremely valuable to argue sectoral policies.

At product level, the actions of Moldovan exporters have reflected poor performance and export growth was driven by the growth of traditional products in traditional markets, while increasing the market share of new products on the same traditional markets generated only 7% of export growth.

The most important element here is that the assimilation of national exports are very strongly linked to traditional markets and traditional products.

New products in new markets are not basically a generator of growth in Moldova and prospecting new markets with traditional products reflected only 0.7% of growth.

Based on these data we note that Romania, in most product groups is more powerful than Moldova.

This is seen especially in the number of

products exported per each group - a significant disparity we see in oil, grain, oil, meat and edible offal, vegetables, dairy.

Moreover, Moldova is losing the very limited diversification of beverages, cereals, oil crops, oil, sugar, meat, dairy and eggs.

As for the retail market, the smallest diversification is encountered in meat, vegetables, tobacco and oil.

## CONCLUSIONS

Low trade performance is characteristic for Moldova compared to regional countries.

A series of other indicators like trade openness show relative improvement in Moldovan agri-food exports taking into account the positive trade balance with agri-food products. However, high-value added products amount a large trade potential loss, in terms of quantity and value.

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## MANAGEMENT OF LAND RESOURCE, AGRICULTURAL PRODUCTION AND FOOD SECURITY

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### Abstract

*This article deals with Romania's land policy in the second half of the twentieth century, with an introduction to the global context of the actions undertaken in order to increase the agricultural production, to ensure food in relation to the demographic evolution. For a very long time, i.e. for several millennia, the attention was directed toward the extension of the cultivable area, by deforestation, meadows grubbing, terracing, in parallel with the expansion of the areas equipped for irrigation, which, in 2000, were assessed at about 270-275 million hectares. Lately, and especially in the twentieth century – the 2nd half – the attention was directed towards technological enhancement, in order to double or even triple the production capacity of the land. In Romania, the mid-twentieth century agriculture is characterized by a very low yield, due to an extensive technological system associated with the phenomenon of drought, affecting more than 2/3 of the arable land. In these circumstances, the land policy of the state aimed at expanding the arable area to 10 million hectares and at enhancing technology; in this regard, a priority role was played by land reclamation works, especially by irrigation, which would be imposed on 5.5 thousand ha - about 55% of arable land. By the end of 1989, about 3.1 thousand ha were equipped; this area is questionable if we were to compare it to other countries with similar climatic conditions. With its over three million ha, Romania had 0.14 ha of irrigable land per capita, one of the largest in the world. This performance was achieved through extreme investment efforts, exaggerated in connection to the economic strength of the country. Whereas the land reclamation investments were assessed to over \$10 billion, the country resorted to massive foreign loans whose repayment required great sacrifices, while the objectives of land productivity and economic efficiency were not met. The increase in the average yield per ha was well below expectations, particularly in high intensive crops, such as maize, that occupied the largest land area equipped for irrigation. The yield was 3-4 t/ha for wheat and maize, instead of 6-10 t/ha, as it had been planned; 1.0-1.5 t/ha for soybean and sunflower, instead of 3 t/ha; 15-20 t/ha for potatoes or sugar beet instead of 25-30 t/ha or 40-50 t/ha. The authors consider that the main cause of the failures in this field is represented by the disproportion between the financial resources allocated to investments, in arrangement of great surfaces for irrigation, and those allocated for their rational exploitation. Fertilizers and other inputs required for the irrigation technological system and even those required for the integral irrigation of the equipped surfaces were missing. The main attention paid to irrigation was accompanied by the neglect of the other two categories of land reclamation works, i.e. erosion control moisture control, which were affecting Romania's agricultural areas in the same way as drought, and even more, according to the opinion of experimented specialists. In the recent years, under the market economy, the attention of policy makers is still focused on irrigation, i.e. on the rehabilitation of areas as large as possible from the old irrigation systems, erosion control and moisture control being neglected.*

**Key words:** economical efficiency, food area, land reclamation

### INTRODUCTION

In view of the demographic evolution – approximately nine billion inhabitants worldwide for the 2050 horizon, the major concern of the governments, scientists and researchers is food safety. It is known that the land, practically the only resource which can ensure food, is limited in extent, while the population continues to grow. Over time,

surpassing the so-called *hunting civilization*, when in order to ensure the food for one individual 5,000 ha were needed, in the *modern civilization of the tractor* this was reduced to 0.25 ha, which is almost equal to the current world mean surface corresponding to one individual [1].

To reach this performance, different techniques, such as, for example, deforestation, following, dewatering, as well

as erosion control works have been performed. An important role in assuring the food for a population of more than a half of the inhabitants of Earth is played by irrigations, which, for a surface assessed to 18% of the cultivated area, lead to obtaining 35-40% of the agricultural production. Similarly, approximately 15% of the agricultural production is obtained from dewatered areas.

On the whole, land reclamations and especially irrigations are among the techniques leading to the significant increase of the yield on the cultivated lands. Although in the world significant surfaces which could be cultivated have been identified, amounting to 40-60% relative to the current cultivated but area, technological enhancement on the currently cultivated areas is preferred, which is less expensive than extension of new cultivable areas.

Land reclamations are an integral part of the technological enhancements which, although costly, is feasible to the enlargement of the cultivated surfaces. Other components of the technological enhancement, such as fertilizers, pesticides, as well as irrigations, aggress the environment, but the need for food is so great that the risk is accepted rather than avoided.

Irrigations, which contribute the most to the enhancement of the productivity of the land, are also aggressive towards the environment. Their irrational exploitation, a frequent case, leads to negative phenomena such as swamp formation, salinization, eluviation and erosion. All these problems are known and solutions are being sought for avoiding, or at least reducing them.

To all this is added the water crisis, which, along with energy and food, represents one of the global problems of mankind. Currently, agriculture spends approximately 75% of the freshwater reserves and in the near future this share might reach 80%. All these problems are known and solutions are being sought for solving them, hence the preoccupations in this field represent a pressing current activity.

In Romania, in the second half of the 20<sup>th</sup> century, land reclamation has represented one of the priority objectives of the agricultural

policy in view of increasing agricultural production. The inadequate exploitation of the arranged areas did not lead to the expected results and at present there are ongoing rehabilitation programs in the conditions of the market economy.

## MATERIALS AND METHODS

Statistical data at world level regarding the current and prospective problems in the studied field have been used.

For Romania, the following aspects have been analyzed and reviewed:

- a) The evolution and size of the arranged surfaces with land reclamation works;
- b) Technical and economic results obtained by the exploitation of the works, compared to the period prior to the arrangements;
- c) The impact on the national economy in general and on agriculture in particular;
- d) The proposals for rehabilitation, conservation and sizing of the main land reclamation, irrigation, dewatering, erosion control works.

The method used is that specific to economic research: the collection and selection of the material, processing, synthesis, conclusions.

## RESULTS AND DISCUSSIONS

### Land reclamations. Food surface.

Undoubtedly, deforestation and followings have been the first land reclamation works. We do not have statistical data on the evolution of the surfaces claimed for cultivation using these techniques. Some of the first estimations were performed by the Club of Rome, which estimated the world cultivable area to amount to 3.2 billion ha as early as 1650. This is maintained fit 300 years, namely until 1950 [8].

More recent research (2002) have identified a somewhat greater cultivable area of 4,153 million hectares, of which 38.5% (1,603 million ha) is cultivated [1].

Greater reserves of cultivable lands have been identified in Latin America and in the Caribbean, as well as in developed countries, and lower reserves in Asia, where the current cultivated surface per capita is the lowest:

0.15 ha/capita in India, 0.11 ha/capita in China and 0.04 ha/capita in Japan. Only 30 years earlier, FAO specialists identified only 1,454 million ha cultivated of 2,454 million ha cultivable, the share of the cultivated ha being 59.5% (Table 1).

Table 1. The food surface of planet EARTH. Lands cultivated in 1970 and the potential reserves relative to the population in different geographical regions

Specifications	Population million inhabitants	Cultivated lands million ha	Cultivable lands million ha	Cultivated lands ha/person	Cultivable lands ha/person	The degree of use of the cultivable lands, %
South Asia	716	197	195	0.27	0.27	101.0
China	760	111	113	0.15	0.15	98.2
Near East	171	85	88	0.49	0.51	96.6
North America	227	236	274	1.03	1.20	86.1
Europe	462	144	180	0.31	0.39	80.0
Central America and the Antilles	93	38	52	0.40	0.55	73.0
USSR (former)	243	233	352	0.95	1.45	66.1
Oceania	15	45	70	3.00	4.66	64.3
Other developed countries	127	18	28	0.14	0.22	64.3
East and South-East Asia	317	72	115	0.22	0.36	62.6
East and West Africa	199	135	228	0.68	1.15	59.2
North Africa	36	19	39	0.53	1.08	48.7
Other Asian countries with planned economy	36	5	11	0.13	0.30	45.4
Central Africa	36	29	169	0.80	4.69	17.1
South America	190	87	540	0.45	2.84	16.1
<b>Total</b>	<b>3,628</b>	<b>1,454</b>	<b>2,454</b>	<b>0.40</b>	<b>0.68</b>	<b>59.5</b>

Source: FAO Yearbooks [1]

In the year 2001, the agricultural area was 5,016.7 million ha, that is 0.82 ha/capita and 1,399.7 million ha arable land, that is 0.23 ha/capita for a world population of 6.086 million inhabitants (year 2000) [1]. Comparing these data with the assessment of the Club of Rome – 1.3 billion ha cultivated in 1970, we observe that the cultivated area did not increase and the chances are slim for it to increase, considering the increasing demand for land for other needs, such as high ways, habitats and even the degradation of some significant land surfaces due to wasteful exploitation. In this case, the sole possibility to increase the agricultural production remains technological enhancement, although its aggression on the environment is well known. In Romania, after World War II, the land resource per capita was relatively high (0.96 ha/capita land area) and 0.60 ha/capita arable

land, but the yield of the land was extremely low, 550-600 kg/ha wheat or maize. The yields did not increase too much even after 10 years. The average yield for the years 1963-1965 was 1,533 kg/ha for wheat and 1,860 kg/ha for maize.

The cause of this situation was an extensive technological system, in which the lacks of fertilizers, of tractors, of irrigation were the primary factors. In these conditions, it was considered that the extension of the agricultural area and especially of the arable area could contribute to the increase of the agricultural yield.

In Romania, during the whole period of the planned economy, one of the objectives of the land policy was to increase the agricultural area to 15 million ha and of the arable area to 10 million ha. Obedient to the leadership of the Romanian Communist Party (the initiator of the land policy in the period the study refers to), the statistic of the time confirmed the fulfillment and even the over-fulfillment of the 15, respectively 10 million ha agricultural area, respectively arable land (Table 2).

Table 2. The evolution of the land use in the period 1945-1989

Years	-thousands ha-			
	Agricultural area	Arable land	Perm. pastures	Perm. crops
1945	15,062.0	9,472.0	5,147.0	443.0
1965	14,791.4	9,816.7	4,316.1	658.6
1987	15,094.1	10,080.4	4,407.2	606.5
1989	14,759.0	9,458.3	4,705.2	595.5

Source: Yearbooks of Romania [10]

Naturally, as usual, *the directive was not fulfilled*, which would be confirmed in the Statistical Yearbook of Romania of 1990, which would confirm an agricultural area of 14.7 million ha and an arable land of only 9.45 million ha.

The need of an arable area of 10 million ha considered as strategic objective of Romanian agriculture and which should have been fulfilled by breaking up of pastures (Fig.1) on slopes was subsequently noted by specialists in the field, such as docent doctor Teaci, who for Romania deemed sufficient 8 million hectares of arable land [13].



Fig. 1. Grasslands transformed in arable land to the top of the slope: Lăpuș area, Maramureș (Photo A. Lup)

**Land reclamations. Irrigations.** Considering the role of irrigations in the enhancement of agricultural yield, worldwide there has been a permanent preoccupation with the increase of the surfaces arranged for irrigation. The first assessments of the surfaces arranged for irrigations are available from the 8<sup>th</sup> century, when it is believed were irrigated 800 thousand ha, while in the 13<sup>th</sup> century the irrigated area is supposed to have reached 1,500 thousand ha.

Until the beginning of the 20<sup>th</sup> century, the surface arranged for irrigation reached 40 million ha, and in the first two thirds of the 20<sup>th</sup> century (1965), it reached 140 million ha. Nevertheless, in the last decennia of the 20<sup>th</sup> century the rhythm of the arrangements decreased and the surface of 300 million ha forecasted for the end of the 20<sup>th</sup> century was not fulfilled. This is also due to the improper exploitation of the arranged areas, of which at least half are degraded through salinization and swamp formation.

On the other hand, the yield obtained on the irrigated surfaces has been much lower than expected, which was observed by the financiers of the big projects.<sup>2</sup>

<sup>2</sup> Responsible factors from the Inter-American Development Bank have shared their concerns regarding the arrangement of 40 major catchments in the world: in their view, 39 of them represent failures. The major irrigation projects have had mediocre financial and agricultural results. Where a production of 4-5 tons of cereals per hectare was expected, only 1.7 were obtained. In most of the countries, irrigation programs do not cover the costs. This means that the severe criticism set forth against the great works are most of the times legitimate and that failure is obvious if we compare the objectives to reality. This waste requires huge budgets and makes us wonder every time: wouldn't these sums have found a wider and more profitable use for the Third World peoples, had the investment been made in more modest, but more general forms, of development? If these are the terms in which was expressed a kind of a general agreement to condemn a development policy which has shown, throughout two decennia, that it is not suitable for the resolution of the problems, a new concept of development has not yet imposed itself. [6].

The evolution of the arranged surfaces worldwide in the period this study refers to (the second half of the 20<sup>th</sup> century) is presented in Figure 2.

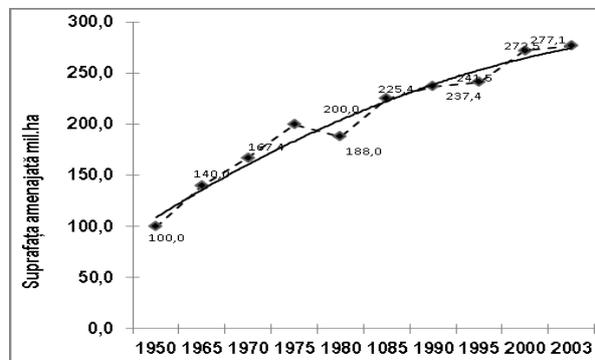


Fig.2. The evolution of the surfaces arranged for irrigation worldwide in the period 1950-2003

The last data from the years 2001-2003 records a surface arranged for irrigations of 2,771 million ha. In Romania, considering the lag compared to other European countries, it was programmed to be arranged for irrigations a surface of 5,500 thousand ha, which would have represented more than 55% of the arable land of the country. By the end of 1989, 3,100 thousand ha were arranged, that is 56.4% compared to the program (Fig. 2).

Regarding the surface of 5,500 thousand ha proposed for irrigation, this was subsequently revised by the teams of foreign specialists [12], who assessed that considering the cases in which water would have to be pumped to very great heights (over 70 m), in Romania should not be arranged for irrigations a surface of more than 1.5 million ha.

**The exploitation of the irrigations systems.**

Due to the constructive characteristics and to the insufficiency of the resources necessary for exploitation, the results obtained were much lower than the designed parameters. First, in the opinion of the most competent specialists, was wrongly appreciated the importance and thus the order of priority of the different works.

Professor Botzan (the greatest Romanian specialist in the field of irrigations) for instance considered that the primary problem of Romanian agriculture was erosion and that it should have started with works for erosion

control.

Secondly, it should have continued with the moisture control and after that would have come irrigations [9]. Professor Vlad Şişeşti was of the same opinion<sup>3</sup>. [5]

One of the main structural characteristics was the choice of the river Danube as the main source of water for irrigations (in over 75% of the irrigation systems).

The consequence: the pumping of water from below upward, sometimes at very great heights, while everywhere in the world it is irrigated from water accumulations situated upstream of the land to be irrigated (Fig. 3).

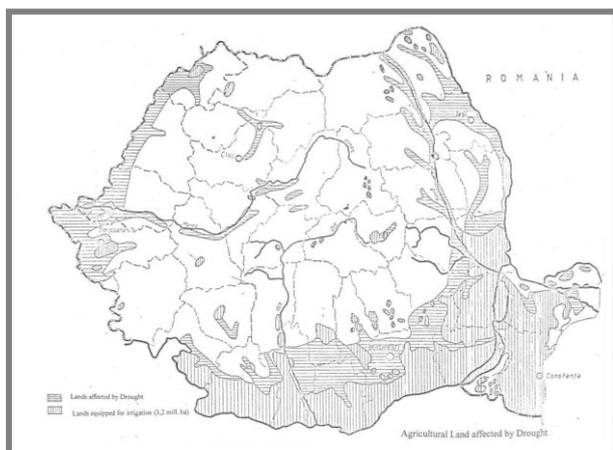


Fig. 3. Lands affected by draught in Romania and the degree of arrangement at the end of 1989 [9]

In Romania, the use of water accumulations from dams for irrigations is very low (for less than 20% of the surfaces arranged for irrigations). In 1950, when the hydroelectric power plant of Bicaz was designed, were programmed for irrigation from the water reservoir 300 thousand ha.

Nothing was irrigated from this reservoir, just as nothing was irrigated later from the reservoirs of the hydroelectric power plants Portile de Fier I and Portile de Fier II [Iron gates I and Iron gates II].

<sup>3</sup> In 1975, an important meeting at the Ministry of Agriculture took place, with all the decision factors, for the discussion and approval of the program of land reclamation works for the next quinquennial. The minister presented the order of priorities: irrigations, dewatering, salinization control and erosion control. I asked to speak and I said approximately as follows: "Although I am a professor of irrigations and especially since I am acting in this capacity, I propose to invert the order of priorities. First erosion control works, then the control of the excess moisture, salinization control and, at the end, irrigations, which will be installed on the already improved lands, only if it is necessary." The Minister, obviously disconcerted, answered: "Maybe you are right, but "the comrade" want it this way, so let's not discuss the issue of priorities anymore." (Vlad Ionescu-Şişeşti, 1990) [5].

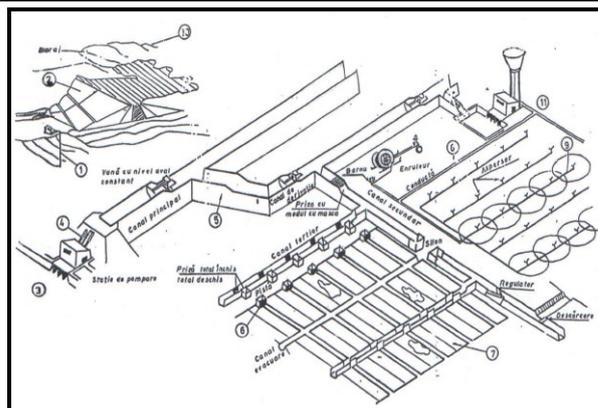


Fig.4. The position of the dam on the Rhone river (France) upstream of the irrigated lands [3]

For pumping the water from the Danube 54 floating base stations were built (Fig. 5).



Fig.5. The floating pumping station of the irrigation system of GALATUI, Calarasi County

**The exploitation of irrigation systems.**

During the exploitation, the designed technical and economic parameters failed to be fulfilled in all of the irrigation systems in Romania.

Some of the causes are due to the structural characteristics and another cause is the failure to assure the water inputs necessary to be administered to plants.

From the intent to arrange surfaces as large as possible, irrigation systems lacked some essential components such as: the impermeability of transport canals (Fig. 6), the lack of drainage systems, the lack of water measurement equipment and others.

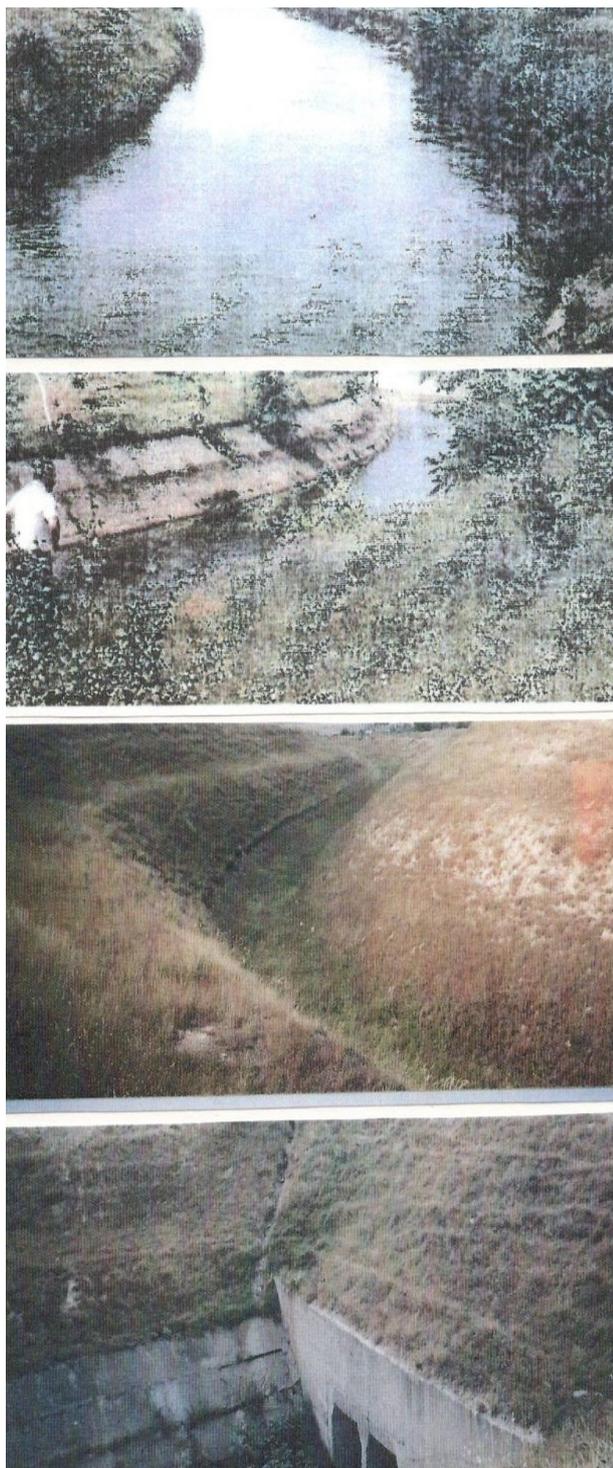


Fig.6. No-waterproof and partial waterproof irrigation canals in irrigation systems of Constanta County (author's archive)

In these conditions, the leakage of water reached over 40% of the water pumped for the source, which with time has led to swamp formation. The quantity of water was approximated and paid by the farmers as such. Deficiencies have also come from the side of the farmers, who lacked most of the

equipment for the administration of water to plants.

Water losses also occurred in the field, due to the improper quality of the equipment for the administration of water to plants, as well as due to faulty handling.

We also add that due to the many deficiencies including of organization, the arranged surface was only irrigated at a rate of 80-85% and on the irrigated surface the number of applications and quantities of water required by the different species of plant failed to be applied.

The main reason why the whole arranged surface was not irrigated and why the water application rules were not applied was the lack of the electric energy required for pumping, for transport and for ensuring the water pressure in the pipes (over 80% of the systems were irrigated through aspersion at different pressures) (Table 3).

Table 3. Actually irrigated area during 1971-1989 and electricity provision rate

Period	Irrigated area thousand ha	Electricity consumption mil. kWh		Provision degree %
		Necessary	Provided	
1971-1975	4,335.3	8,191	4,686	57.2
1976-1980	7,097.8	15,726	7,207	45.8
1981-1985	9,388.6	17,387	9,544	54.9
1986-1989	9,424.3	17,812	8,956	50.3
1971-1989	30,246.0	59,116	30,393	51.4

Source: DGEIFCA operative data [4]

The surfaces equipped for irrigation in the southern province of Moldova and Dobrogea, totaling more than 700 thousand ha (one fourth of the national total), due to high water pumping heights (over 100 m) had a significant impact on the irrigation operating costs.

Alongside the lack of equipment for water application, for about half of the equipped area, the failure to provide the electricity for water pumping, transportation and irrigation itself was one of the main causes, if not the first, wherefore the planned yields were not achieved.

The frequent interruptions of the electricity supplier required as many times the re-pumping on the main channels, triggering

additional electricity consumption, which was already insufficient.

Table 3 and figure 7 and 8 present the electricity provision rate for the effectively irrigated areas during 1971-1989. It is noteworthy that actually irrigated area is, in fact, lower by 15-25%, compared to equipped area that should have been irrigated.

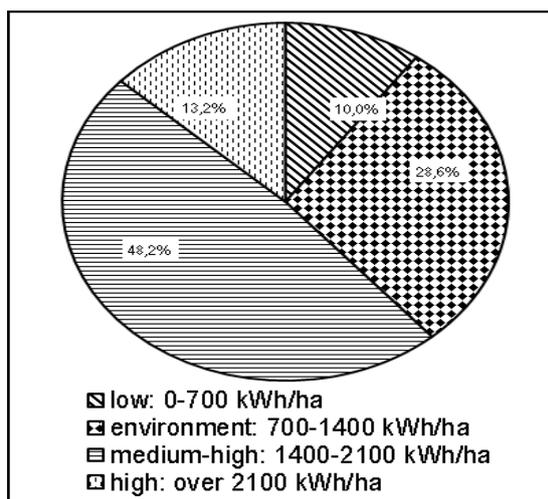


Fig. 7. Grouping the surfaces equipped for irrigation according to the electricity consumption, necessary for the irrigation of a ha, with an average crop structure  
 Source: Study of Irrigation and Drainage in Romania (1991-1994) [12]

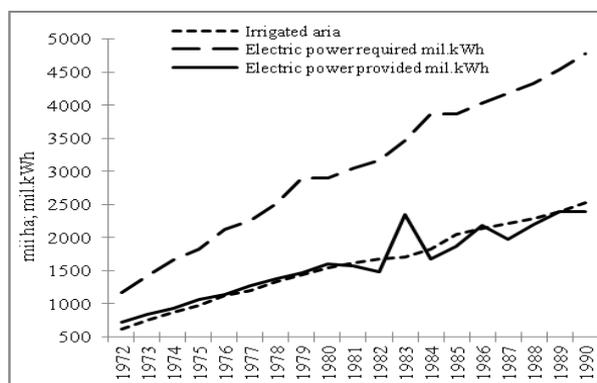


Figure 8. Irrigated area, energy power required and electric energy provided during 1972-1990  
 Source: DGEIFCA [4]

**The influence of irrigation on the average yields per ha.** The fight against the drought that affecting more than 70% of the agricultural land area was the main purpose of building an impressive irrigation system, on about one third of the arable land. However, at the same time, the irrigation was considered the main factor that was intensifying the Romanian agriculture and that was increasing the agricultural yield, taking into account it's

in increasing the production per ha.

In table 4 we can trace the influence of irrigation on the yields per ha during 1971-1989, on the whole agriculture. In 1966, the area equipped for irrigation occupied 220 thousand hectares (2.2% of the arable land), and, in 1970, less than 700 thousand hectares.

Table 4. The evolution of the average yield in some crops (1966-1990)

Crop	kg / ha				
	1966-1970	1971-1975	1976-1980	1981-1985	1986-1990
Wheat	1,955	2,441	2,974	3,015	3,162
Maize	2,230	2,684	3,260	3,407	2,919
Sunflower	1,396	1,445	1,585	1,583	1,582
Soybean	1,003	1,386	1,200	1,033	830
Sugar beet	19,239	22,139	24,165	21,571	21,371
Potatoes	9,407	11,644	14,795	17,592	12,744

Source: DGEIFCA [4]

This period (1966-1970), when the irrigation played an insignificant role in crop development, was taken as a reference period for the crop evolution until 1989, when the area equipped for irrigation represented 1/3 of the arable land.

It is noteworthy that, overall, in agriculture, the influence of irrigation on crops was low considering that, in the projects of the irrigation systems, high yields had been planned: 6,000 kg/ha wheat; 10,000 kg/ha maize; 3,000 kg/ha soybean or sunflower; 40 t/ha sugar beet or 25 t/ha potatoes (the latter two crops being grown throughout the period only on areas equipped for irrigation).

The irrigation facilities were concentrated on the most fertile land areas in the Romanian Plain and Dobrogea, nine counties concentrating about 80% of the entire area equipped for irrigation in the country<sup>4</sup>.

In these counties, the share of the arable area equipped for irrigation has reached, at the end of the period, over 60% of the whole group (40% in Olt County, more than 80% in Calarasi and in Constanta counties and 100% in Braila County). In this group of counties, the influence on the average yields can be traced in Table 5. In this group of counties with larger areas equipped for irrigation, the yields did not reach the expected levels.

<sup>4</sup> Counties: Braila, Calarasi, Constanta, Dolj, Giurgiu, Ialomita, Olt, Teleorman, Tulcea.

Table 5. The average yield of state farms and agricultural cooperatives during 1986-1988, compared to 1967-1969 (no irrigated), on an area equipped for irrigation at a rate of 60%

- kg/ha -

Crop	1967-1969	1986-1988		1986-1988 / 1967-1969 %	
		State farms	Cooperative agricultural	State farms	Cooperative agricultural
Wheat	2,083	3,392	3,395	162.8	163.0
Maize	2,740	3,355	4,043	122.4	147.6
Sunflower	1,559	1,536	1,785	98.5	114.5
Soybean	719	1,000	815	139.1	113.4
Sugar beat	22,061	21,846	18,462	99.0	83.7
Potatoes	6,729	14,886	7,992	221.2	118.8

Source: DGEIFCA [4]

**Irrigation costs.** In Romania, the major irrigation systems were built by the state that, during the operation period, provided water to farmers based on fees and charges established by it.

Table 6. Evolution of the irrigation expenditures per ha, at the agricultural units, the water provider, per total, and the water subsidy rate during 1971-1989

- lei / ha -

Period	Expenditures at agricultural units	Expenditures at the water provider	Total irrigation expenditures	Revenues from provider tariffs	The difference uncovered at the	Subsidy rate %
1971-1975	798	731	1,529	178	553	75.7
1976-1980	1,040	798	1,838	323	475	59.5
1981-1985	1,383	1,133	2,516	308	825	72.8
1986-1989	1,532	1,017	2,549	335	682	67.1

Source: DGEIFCA [4]

On the other hand, the farmers also invested both in the equipping process of their land and in the water provision equipment. Other expenditures added to the investment costs, such as those incurred by the irrigation itself. The operating costs of the irrigation systems for the two partners (the state and the agricultural units) are shown in Table 6. These data reveal that the units spent more on irrigation than the state did. In its turn, during

this entire period, the state spent more than it collected from the agricultural units for water delivery and for the maintenance of the irrigation systems, the water supply being subsidized by 68.6% during 1971-1989<sup>5</sup>.

**Irrigation investment efficiency.** According to some authors [9], over 10 billion dollars had been invested in land reclamation, of which almost 2/3 for irrigation. Two partners were involved both in investment and in operation: the state, with the largest investment share, and the agricultural units with the infrastructure incumbent on each unit and with the water application equipment. Since the pressurization stations had been built and operated by the state, their value was included in the investments belonging to the state; for agricultural cooperatives, the internal combustion engines that provided the water pressure in the irrigation pipes constituted an important and expensive investment, purchased by loans and never repaid.

According to the investment projects in irrigation systems, they appear very profitable. Yield increases range between 83.3 and 150% and profit increases range between 154 and 216%, depending on the validity period of the projects. These extremely optimistic efficiency parameters were obtained by planning average yields per ha of 6 t/ha in wheat, 10 t/ha in maize or over 3 t/ha in soybeans and sunflower. The differences in income also included the low average yields per hectare taken into account during the period before the equipping process (Table 7). In order to obtain high profits, the expenditure per ha were sparingly planned.

Although the income somewhat approached the design parameters during the operation period (by 10% less in the case of Carasu complex, in Constanta county) the operating expenses have nearly doubled – from those projected to 196.2%; therefore, instead of profits, there were registered losses assessed at 2803 lei/ha. This also happened for the projects developed after 1981.

<sup>5</sup> By non-equivalent trade - expensive industrial product sales and purchases of cheap agricultural products, the state has recovered its subsidy.

Table 7. The evolution of the planned economic efficiency parameters of the irrigation equipment, depending on the period for the design and execution of works (averages)

Specification	U/M	Design period		
		Before 1981	After 1981 (1981-1989)	1981-1989 < 1981 %
Income before the equipping process	lei/ha	3,714	7,605	204.7
Income after the equipping process	„	9,077	17,724	193.1
Income increase	„	5,363	10,119	185.2
Expenditures before the equipping process	„	2,344	5,643	240.7
Expenditures after the equipping process	„	5,600	11,527	209.6
Additional expenditures	„	3,256	5,884	186.4
Net income before the equipping process	„	1,370	1,962	143.2
Net income after the equipping process	„	3,477	6,197	168.5
Additional net income	„	2,107	4,255	183.6
Specific investment	„	17,330	45,800	264.3
Recovery period	years	8.2	10.8	131.7

Source: Data processed according to ISPIF [13]

When there was registered a relatively significant increase in the prices of agricultural products, the income per ha was even higher than the projected one, by 6.3%. Nevertheless, the costs per ha were higher than double and, therefore, instead of profit, there were registered losses assessed at 3.864 lei/ha.

**The efficiency of the agricultural crops on the lands equipped for irrigation.** Tables 2-3 present the influence of irrigation on crops, across agriculture and the group of the nine counties where the percentage of the area equipped for irrigation represented 60% of their arable land.

Both in the first and in the second case, due to several causes belonging to the water supplier – i.e. the state – and to the user – i.e. the agricultural unit – the yields per hectare and, consequently, the projected profit were not achieved.

In an attempt to determine with greater vigor the influence of irrigation on the technical and economic results of the agricultural units from the group of the nine counties, there were selected all the state and cooperative units whose land was equipped for irrigation at a rate of more than 90%, during the analyzed

period. The results are shown in Table 8.

Table 8. Average yield, income, technological expenditures and profit per ha in some cultures, in the area equipped for irrigation at a rate of 60% (Romanian Plain) and on the farms whose areas were equipped for irrigation at a rate of more than 90%

	Share of the irrigated area %	Average yield kg/ha	Income lei/ha	Technological expenditure lei/ha	Profit lei/ha	
<i>Wheat</i>						
State farms	Irrigated 60%	3,509	6,364	4,723	1,641	
	Irrigated <90%	3,375	5,323	4,783	540	
	<i>Maize</i>					
	Irrigated 60%	3,492	5,147	7,230	-2,083	
	Irrigated <90%	4,078	5,638	6,580	-942	
	<i>Soybeans</i>					
	Irrigated 60%	1,010	3,774	5,350	-1,576	
	Irrigated <90%	1,100	3,641	5,783	-2,142	
	<i>Sunflower</i>					
	Irrigated 60%	1,750	5,538	5,178	360	
	Irrigated <90%	1,646	4,852	4,623	229	
	<i>Potatoes</i>					
	Irrigated 60%	15,024	16,815	26,587	-9,772	
	Irrigated <90%	-	-	-	-	
<i>Sugar beet</i>						
Irrigated 60%	-	-	-	-		
Irrigated <90%	-	-	-	-		
<i>Wheat</i>						
Agricultural cooperatives	Irrigated 60%	3,073	5,592	5,237	355	
	Irrigated <90%	-	-	-	-	
	<i>Maize</i>					
	Irrigated 60%	3,816	5,827	7,005	-1,178	
	Irrigated <90%	-	-	-	-	
	<i>Soybeans</i>					
	Irrigated 60%	765	2,493	3,982	-1,489	
	Irrigated <90%	-	-	-	-	
	<i>Sunflower</i>					
	Irrigated 60%	1,603	4,955	4,584	371	
	Irrigated <90%	-	-	-	-	
	<i>Potatoes</i>					
	Irrigated 60%	10,167	9,884	17,130	-7,246	
	Irrigated <90%	-	-	-	-	
<i>Sugar beet</i>						
Irrigated 60%	23,909	9,097	10,852	-1,755		
Irrigated <90%	-	-	-	-		

Source: A. Lup, Irrigation in Romanian Agriculture [7]

We first notice small differences in the average yields per ha between the area equipped for irrigation at a rate of 60% and the agricultural units whose areas were equipped for irrigation at a rate of more than 90%.

The explanation lies in the fact that, in reality, neither of the two categories of agricultural units had irrigated their entire surface, and the application of water to the plants was faulty, as already mentioned.

The low yields per ha obtained in these conditions entailed the economic inefficiency. Of the six crops analyzed, only those of wheat and sunflower were profitable.

Because of the low crops per ha, the greatest losses were registered especially in the crops specific to the irrigation technological system, such as sugar beet or potatoes.

Since 1990, the land has been watered less

and less reaching, in recent years, 10% of the existing 3 million ha in 1989. Parts of the major irrigation systems, particularly in the Danube Valley, are being rehabilitated.

***The fight against soil erosion and water logging.*** The last land reclamation program approved by the Grand National Assembly of Romania in 1983 (the parliament of that time) provided for soil erosion control works for 5.3 million ha and for water logging control works on 5.53 million ha.

## CONCLUSIONS

The provision of food to a steadily increasing population represented, across time, a major concern for both state leaders and international bodies, researchers, scientists. After a long time – thousands of years – the attention was directed towards increasing the cultivable areas by deforestation, grubbing, terracing, and drainage.

The land resource in our time is limited and, thus, the attention has been directed towards technological intensification, in order to significantly increase the agricultural yield, but not enough as to ensure a decent food supply for the entire population of the Earth.

Romania followed the same line strategically, focusing, in the second half of the twentieth century, toward expanding and improving the productive capacity of arable area, on land reclamation works, represented especially by irrigations.

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## THE ROLE OF MICROFINANCE IN SUSTAINABLE RURAL DEVELOPMENT

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### *Abstract*

*More increasingly we are concerned about a real problem, that of economic and social gap between the welfare of the rural population in developed European countries and in Romania. This has always been a big problem, but never the number of those in poverty was so great like today - about 5.6 million people. The article is based on this reality and attempts to synthesize the ideas of those who are at the forefront of rural society and who are able to save the Romanian village of this state of decline. Once integrated in the EU, the Romanian authorities should present new principles and rules in order to adjust the Romanian legislation with EU legislation. Social inclusion and financial progress are the results of digitization trend of the financial sector, with a major impact on financial and non-banking institutions. Creating new distribution models (networks of external agents, banks without branch network), the emergence of new opportunities for customer access and management of back-office are just some of the challenges that microfinance sector has passed through on a continue process of innovation and adaptation.*

*Key words:* economic models, family farms, financial, microfinance, poverty, social inclusion

### INTRODUCTION

Nowadays, 2.5 billion people all over the globe have no access to formal financial instruments. For Romania, the situation is like currently about 2.5 million rural households are not bankable. Innovative financial products can improve the lives and living standards by reducing risks, improving financial security and income, matching, to suit the specific needs of households involved in farming operations with a holistic approach to meet their needs, including technical assistance, supporting the value chain and providing market access to clients. In support of ideas and points of view expressed in this paper, it is considered necessary to draw up some questions and considerations of alignment innovations in microfinance to rural and Romanian agriculture to existing trends both, in the member states of the European Union and in emerging countries. **The first is whether the current level of development of rural microfinance in Romanian economy supports the new trends and objectives of the Common Agricultural Policy in the new stage of development?** The scientist and

representatives of Romanian farmers' opinion is that the current state of affairs of the Romanian agriculture should determine the influencing factors to promote a strategy with other priorities, including the development of the new integrated solutions for microfinance. It is about the restructuring and consolidation of agricultural holdings, a massive allocation of funds to ensure higher yields in crop production and especially in animal husbandry. The natural fertility of soil is one of the great opportunities to ensure the competitiveness of our products in the world markets, and of course on the Romanian market. Referring only to the determination of the major factors of rural development, the forefront priorities should be to ensure a fair level of living for rural population and poverty elimination that today comprising over 4.5 million people in the country. Absolute poverty affects particularly very rural area, where the food is produced. It seems incredible, but poverty pockets are located mainly in the most fertile agricultural areas of Romania, which is precisely where it operates most of landlords of Romania. Social studies and statistics show that today almost 40% of rural inhabitants are exposed to

ongoing famine. Specialists in rural areas continues to claim the need for a true national development strategy for agriculture. These should have as a starting point the main problems like: involution of investment process in rural area, the financial exclusion of the farmers.

Finalizing a strategy for economic development of rural areas must be based on the truth that, under the circumstances, a great chance to ensure food security of the nation lies in restoring production and trade in the area of family farms. In the context of the reality of activities in rural areas, the desideratum is a kin to help the development of models of microfinance to respond to these realities and to contribute to the current phenomenon of social inclusion and financial, as well as sustainable development of farms and support non-agricultural activities.

## MATERIALS AND METHODS

Regarding the methodology of research on microfinance, the complexity and diversity of the issues approached have required the use of methods, techniques, tools and procedures of scientific investigation and interpretation to which we attached particular importance:

□ Documentation, namely accessing and studying general and specialized bibliography, domestic and foreign, state approach to knowledge issues investigated rural microfinance and scientific substantiation of the research;

□ Rational method, used as an instrument of knowledge, reflection, analysis, organization and ongoing scientific research approach;

□ Integration of forms, methods and logic operations research carried out through the use of analysis and synthesis, abstraction and concretization, comparison, generalization and systematization;

□ Statistical methods, through the use of descriptive statistics and statistical analysis;

□ Observation method, carried out systematically and analytically;

□ Discussions with experts from institutions and national and international institutions, but also the beneficiaries of microfinance products and services;

□ Data analysis and interpretation, using graphs, charts and figures to highlight various developments in microfinance.

Using the classic instruments of scientific research, based on analysis and synthesis, induction and deduction, general and particular and adding modern methods, we achieved substantial and pertinent analyses and studies on rural microfinance main ways, both internationally and especially national.

**Our own contributions** to the investigated issue are highlighted during the research work and theoretical and applicative significance value resulting from the conclusions and proposals that we have formulated and promoted. Also, the results of research were disseminated during 2015 within of the national and international scientific conferences and by articles published in scientific journals. The research results are presented using tables, figures and graphs. The theoretical information needed for the research were taken from literature and specialized works (books, studies, papers, articles etc) in the field of microfinance investigated, from Romania and abroad. Statistical information and concrete data on how microfinance works were taken from reports and statistics of institutes involved in microfinance in the country and abroad as well as from public bodies and private specialist.

## RESULTS AND DISCUSSIONS

***The Rural microfinance opportunities are a research topic of great interest internationally and especially nationally, in the current economic environment generated by the global economic crisis.***

The construction of microfinance theories aims to establish correlations between the amount of financed entity (person authorized, rural household, farm - economic agent, etc.), financial structure and cost of capital procurement. Although some theories developed argue that microfinance optimal structure has a positive effect on the market value of the financed entity, there are also theories that claim that an elaborate financial structure has a neutral effect on the financed

entity. In this regard, this paper highlighted the relevance of theories on evolution and structure of the microfinance optimal legal entity (e.g. farm), respectively: traditional or classical theory; theory of compromise; agency theory; signal theory; the theory of hierarchical microfinance; modern theory on capital structure.

If theoretically it is possible to achieve an optimal structure of microfinance, in practice this objective is difficult to achieve due to problems of quantifying the different variables which appears in the microfinance decision on medium and long terms. However, the theories presented on the optimal structure of microcredits offer some important lessons to entrepreneurs in rural areas.

**First**, they argue the opportunity to identify the factors influencing capital structure and, on this basis, developing a decision - target structure. Structure - can be a target capital borrowing rate range that changes over time while generating conditions change.

**Secondly**, entrepreneurs should aim for a specific capital structure consistent with the overall strategy of the financed entity (e.g. farm) on earnings growth, market position etc, and decisions of microfinance should be developed based on this structure.

**In the third line**, to establish a microfinance optimal structure is a complex process involving a combination of quantitative analysis with characteristic value judgments of each enterprise management areas.

The issue of microfinance company cannot be investigated scientifically without an adequate approach to the concept of cost of capital as the main variable information integration market microfinance among those who make capital available (investors) and those who need them (entrepreneurs and companies). The truth is there are not microfinance free resources. That is why a good knowledge of contractors of the cost of capital is a necessity [6].

To meet this need it was realized a quantification of the legal entity that manages a microfinance structure.

The microfinance activity at national or international level offers for businesses in

rural areas a limited range of microfinance solutions. For the microfinance decisions, rural entrepreneurs must have rigorous criteria, allowing choosing and combining these resources. Undoubtedly, the cost of microfinance is the main criterion in choosing the microfinance resources.

Without knowing this cost it can not be obtained the company's market value maximization. Also, the correct estimation of the cost of the capital is important in the process of adopting investment decisions by legal entity in rural areas (e.g. farm). Each of us is or was under the situation of being unable to access the credit necessary to meet unexpected expenses or trying to develop small businesses. The impossibility of accessing microfinance pushes people into poverty. How do we prevent the increase of poverty? The answer is found in the current microfinance policy directed especially to those who are financially excluded. But the access to credits, as they are too expensive, it could also contribute to indebtedness and impoverishment of individual levels. They have serious macroeconomic consequences, like the crisis of the year 2008. Therefore, poverty and social exclusion can be fuelled by the inability to access credits or access to inappropriate forms of financing. Such difficulties are undermining the economic growth and social cohesion. Instead, poverty and financial difficulties are supporting social exclusion. Low - income households are most likely to be unable to access appropriate financial services. Along with poverty, age, place of residence (rural or urban), gender are direct causes of financial exclusion. Combating it is a difficult task, being both a cause and a consequence of poverty and social exclusion [5]. In June 2010, the G20 summit in Toronto launched the Global Partnership for Financial Inclusion. United Nations, World Bank, International Monetary Fund and the International Labour Office have oriented their programs on the issues of financial inclusion as an essential condition for creating jobs and generating revenue [9]. Also, the European Commission, in cooperation with the European Investment Bank, have established programs such as

"Jasmine" and "Progress" to support microfinance institutions and for employment and social inclusion. More recently, in the *Europe 2020 strategy for smart, sustainable and inclusive growth* adopted in 2010, the European Commission to improve the microfinancing conditions. Therefore, microfinance is facing real challenges in order to contribute to the realization of the Strategy 2020. Will it be able to provide the expected impact in terms of financial and social inclusion? Impact assessment of microfinance requires awareness that "microfinance" is a generic term for a wide variety of products and services. It covers areas such as micro-credit, micro-economics, micro-guarantee and micro-insurance while in each of these subcategories services provided differ in their characteristics, cost, target audience and the institutional context in which they occur. The impact of microfinance service provider is only one aspect of its social performance. The concept of social performance involves to take into consideration factors such as:

- Purpose and goals of an organization;
- Its inputs (resources and procedures);
- Results;
- Impact.

Performance analysis of social service providers microfinance involves understanding and assessment of inputs from suppliers and their efficiency in order to achieve the purpose and objectives initially set [7]. Social Performance evaluations have two complementary objectives: providing an understanding of the processes implemented to promote their improvement where necessary and to demonstrate the effectiveness of action by measuring change impacts principal supplier to customers [7].

In this regard, the impact assessment of microfinance service providers is not only a way to ensure ongoing funding, but a tool to help the organization to learn and perform better by designing products and processes that proves more suitable for both in terms of customers and suppliers [3],[2],[4]. Improving the impact of organizations can be done by collecting data internally on a regular and reliable method, but not necessarily in a "scientific manner". What matters is that the

results are meaningful and credible assessment in order to take the relevant decisions. To prove the impact of an organization requires a methodology that not only meets domestic needs, but also has an external standard of credibility. This "change" in the methodology of implementation was also supported by two factors. The first is that foreign donors were often more interested in evidence of the impact their financial support for microfinance organizations rather than to contribute to the learning process and improve it [8],[2]. The second factor is that most of the information needed to assess the social performance of an organization are easily accessible internally while impact assessment requires the collection of information by engaging discussions with potential customers and non-customers (i.e., counterfactual). Data collection is a particularly difficult task for staff is not ready for such research tasks.

#### **Quantitative impact evaluation methods**

Quantitative impact assessment methods are implemented in order to quantify the degree of change due to a microfinance program. They should be implemented once there is a certain understanding of the nature of the impacts to be measured. Methods of assessing quantitative analysis can be classified into three main groups depending on the type of methods used. The first group of methods are so called "non-experimental" methods. These methods are considered the worst design assessment. The second group consists of "quasi-experimental" methods, which provides an counterfactual approach from customers whose access to the program is retained. Finally, the third group consists of "experimental" methods. This involves the random selection of a treatment group who will benefit from the program and a control group or comparison that will not benefit from the program. Randomness should ensure that the two groups are absolutely similar, in average, and therefore, that their only differences are given by taking advantage of the program or not. Evaluation of the impact of microfinance is not a simple activity. There is a variety of different approaches each with relevant targets for different purposes.

#### **The impact of microfinance in Europe**

In Europe it is difficult to offer some conclusions as there are impact assessment studies. Despite these reservations, the available literature in the developed countries provides some valuable insights.

#### **Agricultural credit: past and present**

A leap in time reveals a setback which nevertheless urges meditation. The rural economy has increased 4 times in the last 50 years, but unfortunately not the social status of those who inhabit in the Romanian villages. The pace of change is evident in some sectors, especially in large companies, where the yield of crops gradually approaching to those made by countries that joined the EU in 2nd and 3rd wave.

#### **Rural credit structure**

The beginnings of agricultural credit in Romania dates back to late 1872 when those times landlords conclude that the next chance of their existence lies in the establishment of institutions to ensure their financial resources for their prosperity. The institutions establish a new law that was promulgated by royal decree. Under this law, the only access to rural credit was available for great landlords, who are given loans up to half the value of estates by mortgaging them. In fact, the Land Credit institution serve as an intermediary between landlords and capitalists who lent their bank asks some of the funds placed in so-called writs issued or guaranteed by the new institution. A time analysis of Rural Land Credit activity demonstrates that, at that time, this institution was one of the most viable forms of financial support for those who were the landowners class Romanian. This appreciation is the positive activity of the Rural Land Credit institution of those times. The downside is that this institution could not (nor have such) to financially support the vast majority of small landowners and even those who will later form the so-called middle class in villages. However, regarding the activity of the Credit Rural Land institution, it should be noted that an important moment in the evolution of rural credit is the reorganization of this institution in 1924 when extending not only the lending, but categories of owners, who had access to this credit. This fact would open the way to attract rural credit system

within certain categories of farmers who, over time, will lead to economic stratification of rural society.

The strongest and most respectable social class in rural areas will be the middle peasants. Around outbreak of collectivization process, they represented an economic force capable of imposing Romania on Europe's agricultural market by products of exceptional quality. It was to be so, because the 1945 land reform and collectivization process triggering especially have to defeat the aspirations of the general welfare of the rural community. Going back in history and analyzing the policy of financial support for agriculture it should be noted that the great turning point occurred with the advent of popular banks. These institutions have experienced the most widespread in Romania and had a decisive role in supporting and developing small owners. A massive intervention of the National Bank in organizing and supporting agricultural credit in Romania occurs especially in the interwar period. This change was materialized in the creation of agricultural credit institutions, cooperative reorganization, especially in setting monetary fund of banks serving agricultural or farming interests. The support was materialized by providing credit institutions amounts of market interventions in the recovery of agricultural products, particularly cereals, construction of silos, upgrading methods of cultivation and production technologies. In this regard, they were made available to banks cheap loans, with interest of 2-4% and by requiring them to charge in its turn an interest rate of no more than 2-5%. The size of credit to support agriculture represents up to 40% of the total portfolio of the National Bank. The rationale behind this massive support was from the reality that, at that time, agriculture represented the main branch of the national economy. Moreover, in 1934, by law enforcement agricultural debt conversion, the debt to those who received loans from the Bank's portfolio was reduced by 60% as a result of their takeover by the Romanian state. This financial support of the National Bank to agriculture deserves a little comment. The first conclusion is that the leadership of the

National Bank was represented by outstanding professionals, trained in the school of erudite scholars of those times.

The great scientist Gheorghe Ionescu - Sisesti demonstrated with data and facts that Romania without a developed agriculture is unlikely to impose on economic market of Europe. Praise of my addresses those who a century worked hard, especially with the power of mind in the realization of structures and financial institutions that allowed Romania to measure on an equal footing with all that was best in European agriculture and the world of those times. Beyond the great wrong to pull out the credit system for agricultural producers outside the organization socialist system, bank loans were granted mainly to political order. Proof and that, especially after 1980, we have witnessed a process of financial spoliation of the majority socialist agricultural units.

#### **Post-revolutionary lending reform**

The new system of agricultural credit has started with a large financial balance. The post-revolutionary laws restructuring the agricultural system, however, led to the destabilization of agricultural lending system, ultimately resulting in the development and handing it to banks with foreign capital. Unfortunately, today in their portfolio, the share of loans for agro-food sector is shrinking worrying. In fact, if we exclude the emblem displayed on buildings banks operating in Romania, it is currently difficult to define which is still the largest bank operating in the food sector in Romania. A long time standard, including after 1990 the privatization of Banca Agricola, the food sector in Romania has received financing lines at preferential rates which created the illusion of a lasting access to abundant and cheap loans. This preferential financing mechanism was redesigned in 1992. For instance, only in 1992, Agricultural Bank benefited from cheap credit lines, totalling 105 billion. Difficulties in the agricultural sector after the application of the Land Law 18 forced the authorities to continue preferential credit system to prevent the emergence of a major food crisis. Thus, compared to 1995, the total volume of

agricultural loans totalled 1,400 billion lei in the coming year totalled nearly 4,000 billion. The truth is that in 1996, structural loans continued to hold 50 percent of the total refinancing. This policy would be complete bankruptcy of the first two banks - Albina and Bankoop, while Agricultural Bank was sold to foreigners at a price of mockery. The cost of the National Bank, respectively the Romanian state to stop these bank losses exceeded 1,000 billion ROL.

#### **Possible models of rural microcredit**

Before entering the substance of the issue, it is worth specifying that microcredit makes nothing new nowadays. Groups and microcredit institutions have a historical past, being established at the beginning to provide services to people who did not have access to commercial banks. The reconstruction of this lending system in Romania today, a first inspiration could come from lending models practiced over the years in the Romanian countryside. We regard the banking system that functioned with positive momentum in Romania during the Romanian village. After a period of searching and calling some improvisations, we are at the stage where we are obliged to adopt decisions leading to the reestablishment of new principles of institutions to provide lending to local actors and vital sectors to the economic consolidation of settlements and welfare. We regard the establishment of banking institutions to finance economic entities with legal personality: banks crediting legal entities and active individuals: banks to finance exclusively educational or health institutions. Capital required to set up such institutions should be ensured through government financial contributions for which payment to be repaid in time. Also, in this action may be involved the 25 commercial banks operating in Romania and food companies involved in lending.

In achieving this goal, to develop a national system of microcredit for the rural environment it should be started from what was good in the credit system areas in Romania in the interwar period, especially from the existing models today in some countries of the European Union. In the

current concept of the European Commission, microcredit is a loan not exceeding 25,000 euro for micro and entrepreneurship. It is worth mentioning that the European Microfinance Facility does not provide funds directly to contractors but also supports selected microcredit providers in the EU, providing them with guarantees. This to minimize losses and increase the volume funded microcredit. The impact of this loan is twofold: the economic impact - enabling the development of income generating activities; social impact - enabling a contribution to social inclusion and better financial inclusion of individuals. It stressed that the concept of community experts, microcredit is geared towards the specific needs of the beneficiary, with the ultimate aim is not profit, but customer wellbeing. The destination of microcredit - as rules current main beneficiaries of microcredit producers groups or associations of SMEs individuals:

- Loans to a group of association: this is known as group lending solidarity and refers to a financial mechanism allowing more people access to microcredit through a mutual guarantee the loan (a form of collateral collective) ;
- The individual SME loans: they are granted a single SME or a single person that does not require collateral.

#### **The challenge for the financial system**

Sooner or later, the Romanian financial system will be forced to align funding and lending practices of countries with developed agriculture. Primarily, used in European Community countries, but also in those areas of the world where agriculture has experienced a spectacular development, especially from the implementation of funding schemes and accessible credit to all farmers.

#### **The big challenge for the financial system**

Aware of this chance Business Development Association (ADA) within the Romanian Group for Investments and Consultancy (RGIC) completed at the end of 2015 a project with a total budget of 8,045,909.66 lei [1]. The project objective was the development of uniform, comprehensive, functional and sustainable micro-enterprises specialized in microfinance in 25 communes in six regions.

It was intended to support individuals looking for a job, unemployed, managers and employees in rural areas. It is implemented in the North-East; South East; South-Muntenia; Northwest; West; Center; Bucharest-Ilfov, for a period of 17 months. In this project there were submitted to participant's practical skills. The proposed target group was made up of approx. 1,830 rural people. Of these, 1,830 people receive counselling/guidance, and 312 will participate in training programs. The pilot project represents a starting point in implementing a new system of financing / co-financing in rural areas. Our approach is to expand the project in the country, being able to create a network of 150 financial services to rural microenterprises. The actors who may be involved in a strategic program to support the system of microcredit to rural areas for involving ADA of the Romanian Group for Investments and Consultancy (RGIC) IFN SA, together with the National Union of Credit unions of Employees in Romania (UNCARSR) - about 1 million members in the country and UTCAR (Union Territorial Credit unions), with approximately 10,000 members and the constitution to the employers and trade unions to enterprise specialized in microfinance in supporting economic growth, namely financial and social inclusion. Through national and EU funds can create a mechanism financial support, similar JEREMIE - Joint European Resources for Micro to Medium Enterprises. This could be possible through COSME program and/or H2020, and through the European Investment Funds currently in formation. In this context, it would be useful to support and develop specific policies in Romania the mechanisms for the creation of specialized institutions for SME financing and in particular SMEs through microcredit for rural:

- Initiation of financing means as Investment Funds to support SMEs in Romania in accordance with our laws and procedures of Community directives;
- Initiation of financial institutions that operate under the concept of "ethical finance" which so far have been highly recognized by legislators of the European Union member states. Due to the fact that at present, the

biggest problem is projects financing related to client-bank /financial institution relationship that currently suffer. We believe that ethical finance company reflects the need for a greater morality, equity, solidarity and financial accessibility;

-Microfinance institutions: providing financial services to low-income customers who normally do not have access to traditional banking services Is;

-Self-help initiatives / cooperatives / credit unions.

## CONCLUSIONS

Rural areas, as reported by the EU Rural Review, are estimated to generate 48% of the gross value of the EU economy and 56% of total employment in the Member States. A typique future is the presence of the rural economy small and medium enterprises (SMEs), many of which are micro-enterprises with a high percentage of self-employment jobs. As in all fields, the agriculture policies give decisive significance fair allocation of investment to agricultural production and productivity. Supporting these policies gives new models of microfinance adapted to the current environment of structuring the farm to the needs of small farmers; given that at present in Romania have over 2,500,000 small semi-subsistence farms, contributing directly and indirectly to sustainable development of the Romanian village. After a period of searching and waiting, we are obliged to approach the decisions that lead to the restoration of new principles and creating new institutions to provide loans for actors and local sectors vital to the economic consolidation of settlements and human welfare. It is about the creation of specialized microfinance institutions to finance economic entities with legal personality: non-banking financial institutions in rural areas to support crediting legal entities and individuals active: institutions that conduct microfinance institution specialized education in rural areas. The capital required to establish such institutions should be ensured through government financial contributions for the

payment to be repaid in time. Another very important aspect is to create innovative models of microfinance and continuous training of human capital involved in providing financial services in rural areas and in the financial education of those accessing microcredit. To achieve this goal of establishing a rural microfinance innovative and coherent it would be desirable to start with what was good in the areas of the credit system in Romania in the interwar period, especially the innovative models today's existing in some EU countries and creating our own innovative models of microcredit.

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## SECTION FOR A MACHINE OF SEEDLING PLANT IN NUTRITIVE POTS: PRECISE, FAST AND SECURE

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### **Abstract**

*Within the technology of vegetables, the plantation represents the most expensive and time-consuming process and requires energetic and quality costs. Time is related to the simultaneous plantation of the seedlings which have the same age and belong to the same variety in the optimal period and in a short interval. The energetic costs are represented by the mechanization of all the work for the preparation of the seedbed and the avoidance of the manual plantation. The quality is referred to keeping the distance between the rows, the distance between the pots within a row, the pot plantation depth, maintaining a slight subsidence of the pots and realizing irrigations after plantation, if they are needed. All these requests can be accomplished by mechanizing the process of plantation of seedlings sowed in pots.*

**Key words:** mechanization, pot, precision, seedling

### **INTRODUCTION**

The section is provided with a mechanism for the transmission of movement of some pot carriers, whose position related to the soil in a vertical plan remains constant depending on the slope of the terrain [3, 4]. The idea was assimilated by observing the position of the pallets from the reel of combines used for straw cereals during work.

The plantation apparatus of the section receives the rotation movement by Gall chain from a soil-copy wheel and presents the possibility of adjustment of the distance between plants within a row.

The section can be a component part of a machine of seedling plantation in pots on 1-2 rows when the soil is covered with mulch film or on 1-6 rows on uncovered soil.

It can be a component part of an agricultural aggregate used for soil processing, mulch film mounting or mounting hose for drop irrigation. The transmission of movement

from the copy wheel presents the possibility of the adjustment of the speed of the cup support in order to adjust the distance between plants within a row and the radial component elements of the pot-bearer part have an adjustable length for the same reason. It was treated especially the action of the soil over the active organs for establishing the most appropriate material to be used for the cup construction, taking into account the number of dents that must be made in the soil using them. The material also depends on the type of planted seedlings and its technology of cultivation.

Within the technology of vegetables, the plantation represents the most expensive and time-consuming process and requires energetic and quality costs. Time is related to the simultaneous plantation of the seedlings which have the same age and belong to the same variety in the optimal period and in a short interval. The energetic costs are represented by the mechanization of all the

work for the preparation of the seedbed and the avoidance of the manual plantation. The quality is referred to keeping the distance between the rows, the distance between the pots within a row, the pot plantation depth, maintaining a slight subsidence of the pots and realizing irrigations after plantation, if they are needed. All these requests can be accomplished by mechanizing the process of plantation of seedlings sowed in pots [1,2].

In the literature [4], some general rules for seedling plantation are presented. That is:

- the seedlings are planted on well-prepared soil;
- in the process of planting in field, the seedlings must have at least 45 days of vegetation and must be vigorous, healthy and well-hardened;
- the soil temperature must not exceed 10°C at a depth of 10-15 cm in the soil;
- the distance of planting between pots within a row and between rows depends on the soil and plant characteristics;
- the depth of plantation of pots is 7-15 cm, depending on the species;
- all the seedlings must be planted at the same level as they were used as seedlings (exception for tomatoes and eggplants);
- the actual plantation is made using the planter, a garden shovel or any other object that can make a large hole, enough to enter the seedling without forcing it;
- the latter rule is the one wanted to be avoided by realizing a section of plantation of seedlings grown in pots.

Table 1. The seedling distance

Species	Distance between plants within a row [cm]	Distance between rows [cm]
Cabbage	30-60	90-100
Eggplant	45-75	60-120
Pepper	30-60	90-100
Tomato	45-120	90-120
Watermelon	60-90	180-240

Source: Own calculation

## MATERIALS AND METHODS

This paper is a continuation of the studies and researches made with the purpose of obtaining the seedlings in pots by direct sowing, presented in the paper “Studies regarding the realization of a pneumatic equipment used for

sowing small seeds in sockets”, published at The International Symposium ISB-INMATEH 2013 by Sărăcin and collaborators and which is the object of the patent request registered at OSIM with the number A/00816/2013. In this paper, the author proposed and made a device for sowing small seeds in pots at depths comprised between 0.6 and 3.3 mm, depending on the species.

The seedling obtained in the pots must be planted after approximately 45 days from sprouting, in the optimal period, in the conditions requested by the technology of cultivation, in greenhouses, solariums or in field, during a short period of time, in order to avoid the staggered growth of the plants.

The idea of the realization of the plantation section started from the work process of the reel, which equips the cereal croppers. The reel pallets, provisioned with fingers used for elevation and sustainment in vertical position of plants, have a fixed position in a vertical plan to the soil. For realizing the section, it is used the sustainment part of the pallets, provisioned with two rotation elements which are mounted in extremities. Their extremity can represent the work depth of the section.

From a constructively point of view, the section is formed of:

- a framework, provisioned with the possibility of attachment to a device of tractor grip by articulation, which permits the copy of soil;
  - a pneumatic wheel in the posterior part, which is also articulated at the framework, with the possibility of the adjustment of the position in a vertical plan, used for adjusting the planting depth and its constant maintaining;
  - the device with extremity, formed of two octagonal elements which are articulated to one another at the corners, mounted on an arbor which receives the movement by Gall chain;
  - cogwheels from the soil-copy wheel, which also makes the slight subsidence of the soil next to the pots which are planted in the soil.
- The cups are mounted on the eight corners of the device with extremity. These cups are formed of a fixed part, which makes the dent in the soil, and a mobile part (the bottom of the cup), articulated to the fixed part and

provided with a lever on which a resort with special construction is found. This resort keeps the bottom in the position “closed”. During functioning, the lever is actioned by a cam fixed in the inferior part of the device with extremity, which opens the cup, plants the seedling and, after raising (over the height of the seedling), the cam release the lever of the mobile bottom, which is brought to the “closed” position with a certain speed, realizing in this way the removal of the potential soil rests remained in the cup. The transmission of the machine, which is, besides, simple, can assure at least two ratios of movement transmission to the planting device. That is, the adjustment of the distance between plants can be brought from 20 to 40 cm by the removal of some cups or to larger distances by the modification of the transmission ratio.

## RESULTS AND DISCUSSIONS

The section is provided with an arbor on which 3 bows are mounted, bows which are supported by a metallic plate fixed on the arbor. The bows assure the extremity of one of the octagons related to the section arbor. The section arbor receives the rotation movement from the soil-copy wheel and its subsidence next to the pots. The two octagons are linked one to another by articulation elements provided in the interior with squared holes. In these holes, the cups that transport the pots and make the dents in the soil can be mounted, as seen in Figure 1.

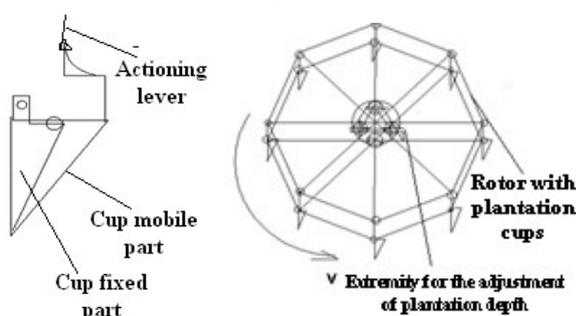


Fig. 1. The scheme of the plantation section  
 Source: Own determination.

It is provided with a mechanism for the transmission of movements to some pot-bearer elements, whose position to the soil in

a vertical plan remains constant, depending on the slope of the terrain. It can be a component part of a machine of seedling plantation in pots on 1-2 rows when the soil is covered with mulch film or on 1-6 rows on uncovered soil. The transmission of movement from the copy wheel presents the possibility of the adjustment of the speed of the cup support in order to adjust the distance between plants within a row and the radial component elements of the pot-bearer part have an adjustable length for the same reason. During the work process, the cups have two movements: a translation movement  $V_t$ , given by the speed of section movement, and a rotation movement to the arbor of the section, which has the angular velocity  $\omega$ , as shown in Figure 2.

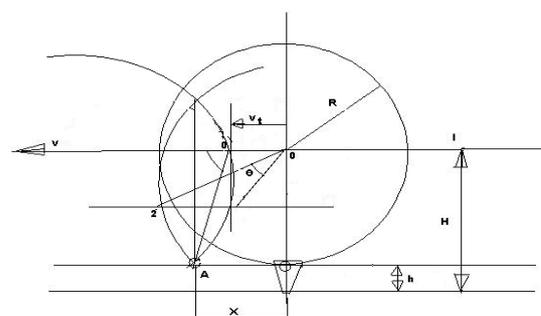


Fig.2. The cinematic scheme of the plantation apparatus: h-working depth; H-distance from the center of the wheel transportation to tip cup cups; x-the distance between plants;  $v_t$ -speed; v-direction of travel; R-bucket rotor radius  
 Source: Own determination.

The angular velocity of the cups will be:

$$\omega = \frac{\pi \times n}{30} \frac{rad}{sec}$$

where n represents the arbor revolution.

The trajectory described by a cup mounted on the articulation element between the two octagons depends on the ratio between the velocities  $V_t$  and  $V_c$ .

$$V_c = R \times \omega$$

$V_t$  -  $v_t$ -speed;  $\omega$ - the angular velocity of the rotor; R is the distance from the centre of the section arbor at the point of the grip of the cup on the articulation element and  $V_c$  is the peripheral velocity of the cup.



Fig. 3. Demonstrative images during the experiment  
Source: Own determination.

Because in the moment of entrance and emergence from the soil the cup must have a vertical position, as well as for the rest of the rotation on the whole 360° circumference, the ratio  $V_c/V_t$  must be equal to 1.

In order to study the functioning of the section, the movement of a cup related to the soil is analysed by considering the cup a point A found on the circumference of the circle described by its movement during the work process. Theoretically, the position of a point related to an axis can be considered in this way (Mathematics Encyclopedia): a point  $P(x,y)$  is found on an axis  $d$  or the axis  $d$  passes through the point  $P(x,y)$  if the coordinates  $x$  and  $y$  verify the axis equation, as seen in Figure 4.

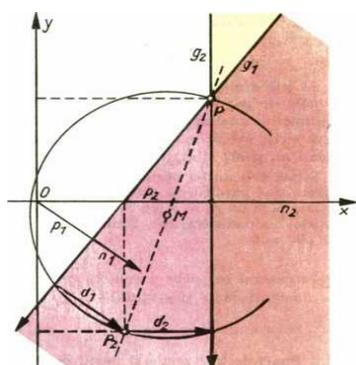


Fig. 4. Position of a point related to an axis, according to [5]  
Source: Own determination.

We consider the axis given by the equation  $y=2x-7$  and the point  $P_1(4,1)$  from Figure 4.

Its equation is verified for  $x_1=4$  and  $y_1=1$ ;  $1=2 \times 4 - 7$ . That is, the point  $P_1$  is found on the axis. The point  $P_2(2,4)$  is not on the axis, because its coordinates  $x_2=2$  and  $y_2=4$  do not verify the axis equation  $4 \neq 2 \times 2 - 7$ .

A point  $P_1(x_1,y_1)$  is found on the axis if its coordinates  $x_1$  and  $y_1$  verify the axis equation. Examples and possibilities of study of the cups to the soil are:

1. The point  $(2,3)$  is not on the axis  $2x - \frac{1}{4}y + 8 = 0$  because  $2 \times 2 - \frac{1}{4} \times 3 + 8 \neq 0$ .
2. The axis  $\frac{x}{2} + \frac{y}{3} - 17 = 0$  does not pass through the origin because  $\frac{0}{2} + \frac{0}{3} - 17 \neq 0$ .
3. The point  $P_1(57,88)$  is found on the axis  $y - 8 = 2(x - 17)$  because  $88 - 8 = 2(57 - 17)$ .
4. The axis equation which pass through the points  $P_x(0, \frac{3}{2})$  and  $P_2(2, \frac{5}{2})$  is:

$$\frac{\frac{5}{2} - y}{x - 0} = \frac{\frac{5}{2} - \frac{3}{2}}{2 - 0} \text{ or } y = \frac{x}{2} + \frac{3}{2}.$$

This axis intersects the Ox axis in the point S which has the coordinates -3 and 0. The value  $x_1=-3$  nulls the function.

5. The point  $P_1$  with the abscissa  $x_1=5$  which is found on the axis  $y = \frac{2}{3}x - 2$  must have the ordinate  $y_1 = \frac{2}{3}x_1 - \frac{10}{3} - 2 = \frac{4}{3}$ .
6. Through the point  $P_1(6,4)$  the axis at the distance  $d=3$  from the point  $P_2(3,-5)$  is built. Geometrically, the problem can be solved using the circle of Thales which has the diameter  $\overline{P_1P_2}$ . We obtain two axes  $g_1$  and  $g_2$  which have the distance of  $d_1=+3$ , respectively  $d_2=-3$ , taking into account the orientation of the perpendicular axis to the origin (Figure 3). In the same time, we find out that the distance  $d$  must be lower than the amount of distance  $\overline{P_1P_2}$  in order for a solution to exist. This axis must pass through the point  $P_1(6,4)$  and to have the distance  $d=\pm 3$  from the point  $P_2(3,-5)$ .

$$\begin{aligned} 6 \cos \alpha + 4 \sin \alpha - p &= 0 \\ 3 \cos \alpha - 5 \sin \alpha - p &= \pm 3 \\ \cos \alpha + p \sin \alpha &= \pm 3 \\ \cos^2 \alpha + \sin^2 \alpha &= 1 \\ \cos \alpha &= 1 - 3 \sin \alpha \end{aligned}$$

$$1 \pm 6 \sin \epsilon + \sin^2 \epsilon + \sin^2 + \sin^2 = 1$$

$$\cos \epsilon_1 = 1; \cos \epsilon_2 = \pm 4/5$$

$$10 \sin^2 \pm 6 \sin \epsilon = 0$$

$$p_1 = 6;$$

$$p_2 = \pm 2 * 2/5$$

$$\sin \epsilon_1 = 0; \sin \epsilon_2 = -3/5$$

By replacing  $\cos \epsilon_1 = 1$ ,  $\sin \epsilon_1 = 0$ ,  $p_1 = 6$  and, respectively,  $\cos \epsilon_2 = \pm 4/5$ ,  $\sin \epsilon_2 = -3/5$ ,  $p_2 = \pm 2 * 2/5$  in the equation, we obtain two equations:

$$\frac{4}{5} * x - \frac{3}{5} * y - 2 * \frac{2}{5} = 0$$

and

$$x - 6 = 0$$

or, written in the implicit form:

$$y = \frac{4}{3} * x - 4$$

and

$$x = 6$$

By introducing the coordinates of the origin  $x=0$ ,  $y=0$  in the two functions:

$$f_1(x, y) = -\frac{3}{5} * y + \frac{4}{5} * x - 2$$

and

$$f_2(x, y) = x - 6$$

it results that the origin is found to the both axes in the negative part of the plan.

At an arbitrary point, the trajectory of the point A in plan can be described by the equations:

$$x = V_t * t + R * \cos \omega t$$

$$y = H + h - R * \sin \omega t$$

in which:

- H is the height of the axis of the section to the soil;
- R is the radius of the circle described by the cup;
- h is the planting depth;
- $\omega t = \varphi$  is the angle of rotation of the cup after a certain time t.

The equations of the velocity components are:

$$V_x = \frac{dx}{dt} = V_t - \omega R \sin \omega t$$

$$V_y = \frac{dy}{dt} = -\omega R \cos \omega t$$

$V_x$  represents the horizontal component of the cup velocity in a horizontal plan.

Because the ratio between  $V_c/V_t=1$ , it results that  $V_c=V_t=R \times \omega$  or, from the equation (), the term  $\omega \times R \times \sin \omega t = 0$ .

In order for the plant to be let in a vertical position in the soil, the projection of the absolute velocity on the direction of movement of the section in the moment of cup entrance in the soil must be null, that is:

$$V_t - V_c * \sin \varphi_1 = 0$$

, in which  $\varphi_1$  is the angle of permeation of the cups in the soil, or:

$$\sin \varphi_1 = V_t - V_c = 1$$

Taking into account that  $\varphi_1 = \omega t_1$ , it results that  $\omega t_1 = \arcsin 1$ , which means that is equal to  $90^\circ$ .

The revolution of the octagon is determined by the peripheral velocity of the cups, which must also be correlated with the movement velocity of the section that is the ratio  $V_c/V_t=1$  must remain constant in any point of the trajectory, as seen in Figure 5.

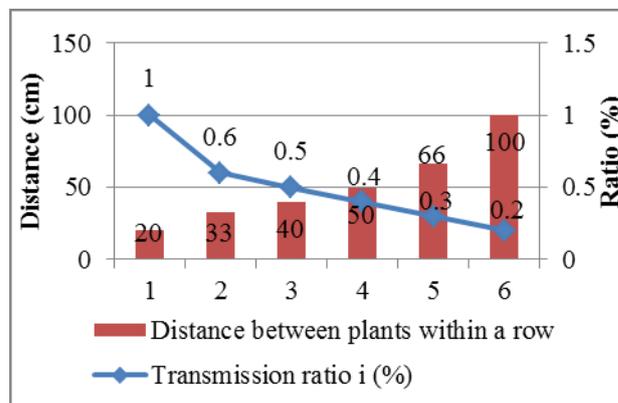


Fig. 5. The variation of the distance between plants within a row, depending on the transmission ratio at the action wheel and the plantation apparatus arbor at the peripheral velocity of 1.5m/min

Source: Own determination.

Note: by (symmetrically) reducing the number of cups of the plantation apparatus, the distances between the plants, presented in Figure 5, are doubling as values, for the same transmission ratio.

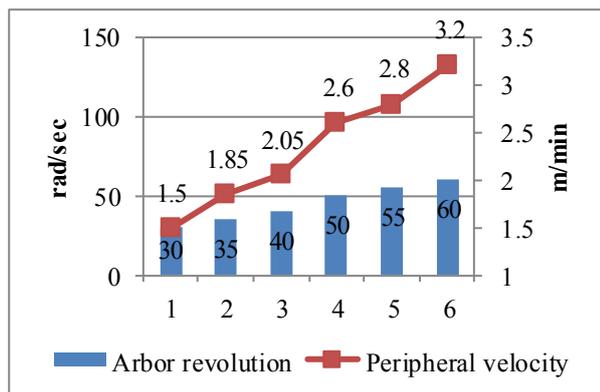


Fig. 6. The variation of the peripheral velocity of cups depending on the arbor revolution

Source: Own determination.

Note: The peripheral velocity influences the uniformity of plantation by the alimentation modality of the cups with seedlings.

## CONCLUSIONS

The section of seedling plantation grown in pots assures the uniform plantation on a row regarding the distance between plants and the planting depth.

The uniformity of the plantation depends on the peripheral velocity of the cups and on the reaction speed of the user.

The section of plantation of seedlings grown in crops can be a component part of a planting machine equipped with two, four or six sections.

During the work, the plantation apparatus has the possibility of adjustment of the position of cups in a vertical plan.

The soil-copy wheel has the possibility of adjustment of the planting depth.

By their form, the cups present the possibility of plantation of pots of different sizes and shapes.

The mechanized plantation reduces the plantation time, assures high productivity with minimal costs and also assures the possibility of mechanized effectuation of other works in the vegetation period of the culture.

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## RESEARCH REGARDING THE USAGE OF THE CAPSAICIN-CORN FLOUR-ETHYLIC ALCOHOL IN THE NATURIST TREATMENTS

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### Abstract

*This paper presents a modality of usage of pepper as aliment, but also as ingredient for the obtaining of preparations successfully used in the naturist medicine, for the control or improvement of certain diseases. We took into study a preparation obtained from pepper tincture mixed with a base represented by a natural cream and corn flour. This product was experimented on four persons of different ages which had chronic cold. The obtained results were satisfying and, after these applications were made, an improvement in the health status was noticed (the cold was curing), followed by complete cure, without the usage of the chemical-based medicine. The preparation of this cream is easy to be made, without the requirement of high costs and immediate results, this cream being an ecological plant-based product obtained in the laboratory.*

**Key words:** capsaicin, cream base, naturist medicine, tincture, vitamins

### INTRODUCTION

Pepper takes part of the family *Capsicum* and is known as *Capsicum annum*. The pepper is known for its chemical composition of pepper fruits which reached the physiological maturity [4,6]. As known from the literature, the pepper has a high content of vitamin C (higher than the citrus fruits), but also of other vitamins: B1, B2, E1 and is rich in water, sugars, cellulose fibers, proteins, lipids, beta-carotene, oxalic acid [1,3]. The capsaicin is found in a percent of 90% in the pepper seeds and just 10% in the pepper pulp.

It helps to the stimulation of our metabolism, through the action on vein structure. Pepper is one of the most adequate remedies for high blood pressure, cleans arteries and has contribution in decrease of bad cholesterol or triglycerides [5,6].

Given that the cardiovascular diseases are the first cause of death on globe, the proprieties of pepper are particularly important. Pepper is beneficial both for stomach and gastrointestinal tract, because stimulates the

peristaltic movement, helps to eliminate feces and contributes at the reconstruction of stomach tissue, easing the heal of stomach injuries and intestinal ulcers.

When pepper is consumed, it triggers a heat sensation in the whole body and for this reason it was recommended in case of frostbites. Sharply and spicy, pepper is added in different type of tasty food from all over the world [2, 7].

Because of the high content in capsaicin, which is found in various forms or preparations, especially in the naturist medicine, it has the properties of stopping the vomiting, fighting the fever and dysentery, but the most important role is had by the creams and ointments used in the improvement and combat of rheumatic diseases and colds. Nowadays, capsaicin is found in many pharmaceutical products in various concentrations, from 0.025% to 8% in creams and patches [7].

As established in various studies, the alcohol used as remedy in some naturist treatments is indicated and even benefice in fighting colds,

applied in various compresses, because of the high content in ethanol, and, due to this fact, it stimulates the blood circulation and causes sweating, the organism getting rid of the toxins and viruses which attack it.

An important role in the cure of rheumatic diseases is detained by corn flour. It is known that corn beans are rich in vitamins A, B, C and E, but also many minerals. This is the reason for which the corn flour is used as medicine, in the form of polenta, or grinded, administered internally or externally. It has detoxifying, anti-inflammatory, hepatic, calming and digestive effects and it helps to the improvement of rheumatic pains, keeping the therapeutic qualities of corn beans.

## MATERIALS AND METHODS

Studies and research were made by the authors in 2014, on four persons of different ages, whose were applied the preparation on different places affected by cold. Also, numerous local populations of pepper were harvested from a private household, from village of Dobrotești, Dolj County, and the bird fat was taken from the same owner, with the exception of the ethylic alcohol, which was bought from the drug store.

Different determinations were made with the purpose of the establishment of pepper composition: the content of vitamin C, carotene, acidity and protein.

### Determination of vitamin C and acidity in the laboratory

The vitamin C from the pepper is destroyed fast by boiling. In 100 g of pepper are found 80-300 mg of vitamin C on the average, the necessary daily dose of vitamin C being 100 mg.

### The method for vitamin C

5 g of fresh substance from the sample plant are powdered and washed with 50 ml of hydrochloric acid 2%, in large glasses of 250ml by filtration. 10 ml of extract are taken 5 ml IK 1%; 5 ml HCl 2%; 30 ml of distilled water; 2-3 drops of starch. It is titrated with potassium iodide 0.001 n and a slightly blue color results. The results of titration are multiplied by a coefficient of 8.8. The result is expressed in mg of ascorbic acid/100g of

fresh substance (mg %).

### The method for acidity

5 g of fresh substance of sample plant are powdered and washed with 25-25 ml distilled water and then the composition (solution) is moved in 50 ml balloons.

This solution is boiled for 30 minutes at 80°C and brought to mark (50 ml). It is filtered. Other balloons or glasses are prepared, 10 ml of extract and 2-3 drops of phenolphthalein are poured and this solution is titrated with NaOH 0.1 n, resulting an accentuated pink color.

The coefficient of malic acid is 0.0067 and the titration result is multiplied by 0.67=% malic acid.

### The determination of carotene and protein

To determine the carotene content from the pepper the chlorophyllian pigments method was used. 5g from the fresh substance from the sample plant to be analyzed are weighed and powdered very well and 25-30 ml of ethylic alcohol are poured over the powder in small glasses of 50 ml. In the next day the solution is brought at mark (50 ml) also using alcohol.

The readings are made at the photometer and the results are introduced in the formula. The protein content is obtained after the nitrogen from the plant is determined.

## RESULTS AND DISCUSSIONS

These results obtained by biochemical determinations are necessary materials which will represent the study object for obtaining pharmaceutical products which have components obtained from pepper as active substance, knowing that the replacement of chemical-obtained products with naturist products is tried with success.

The preparation of the material for the cream preparation and the natural drying of peppers Before the establishment of the experimental program which will be made, pepper fruits originated from various local populations and reached to the full ripening are examined if they are healthy, if they have impurities (leaves, soil particles), certain anatomical parts and colour, taste and smell are compared with those which correspond with the pure

plant product.

Table 1. The determination of vitamin C and acidity at the 10 local pepper populations

No.	Local populations	Vitamin C	Acidity
1		270.30	0.37
2	Local	216.69	0.28
3	populations	218.41	0.39
4	from Dobrotesti	269.52	0.35
5	Village, Dolj	262.79	0.42
6	County	293.43	0.30

Source: Own calculation.

Table 2. The determination of carotene and protein at the 10 local pepper populations

No.	Local populations	Carotene	Protein
1	Local	5.723	15.24
2	populations	4.257	15.07
3	from	4.948	14.68
4	Dobrotesti	4.591	15.43
5	Village, Dolj	5.642	14.35
6	County	5.650	12.79

Source: Own calculation.

Then, the fruits are grinded in order to be dried. The fruits are then deposited in clean trays in thin layers for 14 days for a uniform dry.

#### The preparation of capsaicin tincture

After dry, the obtained material is transferred in a glass recipient. Over this, we poured ethylic alcohol of 96°C until the preparation is covered, followed by recipient closing with a run stopper for 14 days.

During this period, the recipient is stirred every day, being deposited in a place protected from light and heat. After maceration, the resulted liquid is filtered using filtering paper, resulting a reddish brown liquid.

The ethylic alcohol, taken into combination with the pepper, especially with the capsaicin from the composition of the pepper, accelerates the effects on the human organism which is affected by cold.

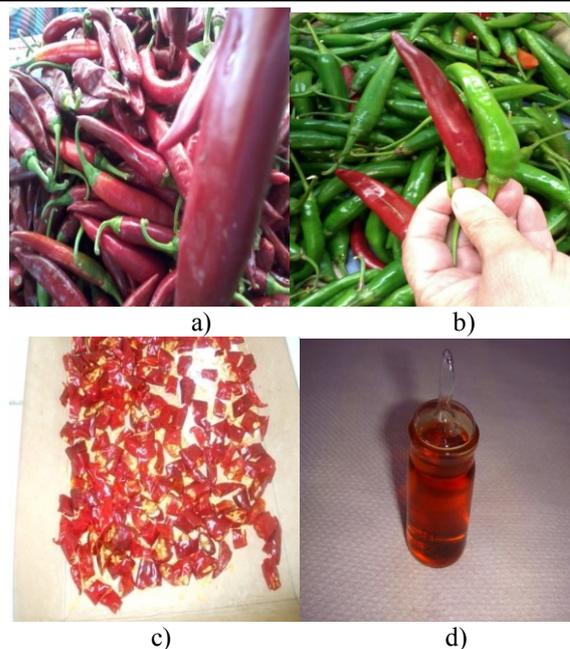


Fig. 1. The preparation of pepper tincture: a) pepper harvest; b) the choice of the peppers reached at the physiological maturity; c) pepper grind and dry; d) the obtained pepper tincture

Source: Own determination.

The quantities of material necessary for obtaining 300 g of rheumatic cream 250 g of this paste are taken. We pour 25 ml of tincture on it and 50 g of a cream base obtained from bird fat, made by melting until a soft paste is obtained.

The obtained composition is mixed well and it is spread on the painful or cold surface using a spatula. A thin and uniform layer of composition is applied on the skin and the next step is the packing in thermos-insulating foil for 30 minutes.

Then, the foil is removed, followed by the rests from the composition, and the treated skin is gently cleaned, followed by the appliance of a calming cream, if there is necessary.

After the presented steps are followed, in all cases it was observed that this cream successfully manages to neutralize the cold, by slight or strong skin reddening in the affected place.

If it is necessary, this naturist remedy is repeated, but only for maximum two days, in order to avoid sensible skin injuries.



Fig. 2. Results obtained after the appliance of the natural cream against the cold  
Source: Own determination.

## CONCLUSIONS

The elaboration of conclusions was the base of the research made by the authors starting from 2010 by the publication of several papers in this domain, by the publication of a book that was the base of a research contract, regarding the importance of the pepper consumption for the human organism because of their composition, but also for its promotion on the naturist medicine.

Treatment with capsaicin first time must be applied with caution, because each individual has a different reaction at a new therapeutic product, or may be allergic given the allergenic potential of capsaicin.

To obtain rapid effects for rheumatic pains, after applying the cream on the affected place applying a thermal insulator, and after a short time the place is heated and pains disappear.

Treatments with obtained cream is shown to be made of 1 times per day for 4 weeks

After using the cream, hands should be washed with soap and water, because as contact with eyes and lips are affected by burning (hot).

Use protective gloves for cream application for people with high sensitivity, with injuries, cuts and recent manicure done, or those that suffer from diabetes.

This capsaicin-based cream is forbidden to be applied on open wounds, eczema, high skin sensitivity.

The establishment of the capsaicin quantity existent in this product is important to be established, because it has a negative effect in case of certain skin diseases, certain degrees of sensibility of the human organism and especially age.

These creams made in house are cheap, can be prepared easily and quickly, have a period of six months use if they are kept properly and they are 100% natural, and the results obtained in the treatment of rheumatic diseases is high.

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## THE MILK MARKET CONCENTRATION AND COMPETITION THRESHOLDS IN ROMANIA

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### Abstract

*The paper aimed to determine the concentration and competition degree in Romania's milk market using a sample of the top 10 dairies, their market share in terms of turnover, and Herfindhal-Hirschman Index highest and lowest thresholds and concentration rate. The Herfindhal-Hirschman Index had a low value varying between 597.68 and 484.2602, therefore lower than 1,000, meaning a low concentration degree and a high competition among the companies operating in milk processing industry. As a conclusion, a higher competition among the dairies on this market could be an incentive to find solutions to reduce production and marketing costs by improving the distribution channels.*

**Key words:** competition, concentration, Herfindhal- Hirschman Index, milk market, thresholds

### INTRODUCTION

Milk market in Romania is characterized by a large variety of companies regarding their size, production capacity, offer of milk and dairy products, turnover and economic power. In 2013, there were still operating 472 dairies in Romania, but because of the milk market crisis, year by year some of these companies disappear (Mihu Cristian, 2015) [6].

The main cause of the milk market industry and market crisis is the reduction of dairy cows live stock, the lack of raw milk compared to the processing capacity, the imports of fresh milk and powdered milk by milk processing industry which affects the Romanian producers, the lack of financial support for dairy farmers, the invasion of dairy products from the Western countries in the Romanian market (Demetriad Maria, 2015, Popescu Agatha, 2015) [3, 8]

The turnover of those 472 dairies accounted for Euro Million 882.6 in the year 2013. However, a few companies, more exactly about 30 dairies are in the top, registering a higher market share, while all the others have a very low market share.

Concentration degree offers a general picture on a market, as well as on the competition

running among various companies with the same profile and purpose operating on that market.

Among the market concentration degree and the economic performance of the firms operating on that market there is a direct connection. Thus, the companies with high economic performance have the capacity to dominate and influence the market.

The assessment of concentration and competition in a market is usually carried out using specific methods and indicators such as "market share", "concentration rate" and "Herfindhal-Hirschman Index".

The purpose of the paper was to determine the highest and lowest thresholds of Herfindhal-Hirschman Index based on the turnover and market share of the top 10 dairies operating in milk processing industry and milk and milk products market. This is justified by the fact that in the milk market there are 472 dairies and it is difficult to collect information from all of them to calculate the concentration degree in terms of Herfindhal-Hirschman Index.

In this respect, it was used the mathematical model presented and used to analyze the competition and concentration degree in the field of insurance (Busu Mihai, 2012, 2013) [1,2].

## MATERIALS AND METHODS

In order to set this paper, the empirical data were collected from the Ministry of Finance, regarding the turnover of the top 10 dairies operating in food industry and in the market in the period 2011-2013 [7].

To characterize the concentration and competition degree in the milk market, there were determined the following indicators: Market Share (MS), Concentration Rate (CR) and Herfindahl-Hirschman Index (HHI) using the turnover of the top 10 dairies.

**(a) Market Share (MS)** shows the weight of the turnover the company  $i$  ( $T_i$ ) in the total turnover in the field of milk processing,  $\sum_{i=1}^K T_i$ , according to the formula:

$$MS_i = (T_i / \sum_{i=1}^K T_i) * 100$$

The firm with the highest market share is the most powerful company in the market, while the company with a low market share has an weak economic performance and reduced influence in that market. The market share values could range between 0 % up to 100 %.

**(b) Concentration Rate (CR)** is given by the sum of the market shares of the top companies operating in the market, according to the formula:

$$CR_K = \sum_{i=1}^K MS$$

Table 1. Market types and concentration degree in terms of HHI Value

HHI	Source	Low concentrated market	Middle concentrated market	High concentrated market
	EU Commission	<1,000	1,000-2,000	>2,000
	DOJ-FTC	<1,500	1,500-2,500	>2,500

Source: EU Commission and DOJ-FTC, [4, 5]

Most of times it is difficult to exactly calculate HHI because of a lack of information as long as many companies are operating in the market.

In this case, the concentration degree in the market should be calculated based on the market shares of the best K companies situated in the top positions. These firms will be of much help in providing information about the HHI superior and inferior threshold. In this purpose, considering the best 10

where MS = market share and k represents the top companies operating in that market.

The concentration rate varies between zero and 1,  $0 < CR < 1$ . If  $CR = 0$ , it is said that there is a perfect competition or there is no concentration, because the market share is uniformly distributed among the firms operating in that market, therefore it is about oligopoly. If  $CR = 1$ , it is about a perfect concentration or no competition, therefore it is monopoly, only one firm is operating.

**(c) Herfindahl-Hirschman Index (HHI)** is given by the sum of the squares of the market share of all the companies operating in the market. Its formula is:

$$HHI = \sum_{i=1}^K MS^2$$

HHI value varies between 0, meaning perfect competition, in case of an oligopoly economy and 10,000, meaning monopoly in the field, only one company is operating.

According to the EU Commission Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations from 2004 and Federal Trade Commission and U.S. Department of Justice Issue Revised Horizontal Merger Guidelines from 2010 (DOJ FTC), markets are classified in three categories: (i) low concentrated market, (ii) middle concentrated market and (iii) strong concentrated market.

companies in the field whose market share is known, they should be arranged in the decreasing order of their market share as follows:

$$MS_1 \leq MS_2 \leq MS_3 \leq MS_4 \dots \leq MS_{10}$$

Then, we should continue with the unknown market share of the other companies operating in the same field of activity as follows:

$$MS_k \leq MS_{k+1} \leq MS_{k+2} \leq MS_{k+3} \dots \leq MS_n.$$

The HHI formula will be in this case:

$$HHI = MS_1^2 \leq MS_2^2 \leq MS_3^2 \leq MS_4^2 \dots \leq MS_{10}^2 \leq MS_k^2 \leq MS_{k+1}^2 \leq MS_{k+2}^2 \leq MS_{k+3}^2 \dots \leq MS_n^2.$$

Starting from this equation, using mathematical demonstrations, we may determine:

**(a) HHI highest threshold ( HHI-HT) based on the formula:**

$$HHI-HT = MS_1^2 + MS_2^2 + \dots MS_K^2 + [ 100 - (MS_1 + MS_2 + \dots MS_n) ] * MS_K$$

**(b) HHI lowest threshold ( HHI-LT) based on the formula:**

$$HHI-LT = MS_1^2 + MS_2^2 + \dots MS_K^2 +$$

$$+ \frac{(MS_{K+1} + \dots + MS_n)^2}{n - K}$$

Therefore,  $HHI-LT \geq HHI \leq HHI-HT$ .

This is the model described by Busu, M.(2012, 2013). [1, 2]

## RESULTS AND DISCUSSIONS

**The turnover of the top 10 Romanian dairies.** In 2011, the turnover varied between Lei Million 502.9, the highest level, in case of SC Danone PDPA SRL Bucharest and Lei Million 90.4, the lowest level among the top 10 dairies, in case of SC Covalact SA, Sfantul Gheorghe, Covasna. In 2012, SC Danone PDPA SRL Bucharest remains on the 1st position with the highest turnover, Lei Million 506.4 and on the 10th position also came SC Covalact SA, Sfantul Gheorghe, Covasna with Lei Million 96.4 sales. In 2013, in the top is also SC Danone PDPA SRL Bucharest with Lei Million 481 sales and on the 10th position is Industrializarea laptelui Mures SA, Tg.Mures with Lei Million 128 turnover.

Analyzing the evolution of their turnover, one can notice that almost all the dairies recorded an increase of their sales, except SC Danone PDPA SRL Bucharest, SC Friesland Cimpina Romania SA, Cluj-Napoca, and La Dorna Lactate SA, Dorna Candrenilor, Suceava,

which registered a decline of their sales. (Table 2).

**The market share of the top 10 Romanian trademarks in milk processing industry.** In the year 2013, Danone Company was situated in the top position with 12.11 % market share. On the 2nd position it was Albalact Company with 10.65 % and Friesland Company with 9.09 %. Fabrica de lapte Company had 6.07% market share, Napolact Company had 5.61 %, Hochland Company 5.43 %, La Dorna lactate 4.42 %, Simultan 4.04 %, Covalact 3.31 % and Industrializarea laptelui Mures 3.22 %. All these top 10 Romanian trademarks operating in the milk market totalized 63.90 % market share ( Table 3) (Popescu Agatha, 2015) [8]

**Calculation of Herfindahl-Hirschman Index Thresholds.**

**(a) HHI highest threshold ( HHI-HT) based on the formula:**

$$HHI-HT = MS_1^2 + MS_2^2 + \dots MS_K^2 + [ 100 - (MS_1 + MS_2 + \dots MS_n) ] * MS_K$$

Replacing the symbols with the corresponding figures, it was obtained:

$$HHI-HT = 12.11^2 + 10.65^2 + 9.09^2 + 6.02^2 + 5.61^2 + 5.43^2 + 4.42^2 + 4.04^2 + 3.31^2 + 3.22^2 + MS_{11}^2 + \dots MS_{472}^2 = 481.4394 + (100 - 63.90) * 3.22 = 597.68.$$

**(b) HHI lowest threshold ( HHI-LT) based on the formula:**

$$HHI-LT = MS_1^2 + MS_2^2 + \dots MS_K^2 + \frac{(MS_{K+1} + \dots + MS_n)^2}{n - K}$$

Replacing the symbols with the corresponding figures, it was obtained:

$$HHI-LT = 481.4394 + \frac{(100 - 63.9)^2}{472 - 10} = 484.2602$$

Table 2. The turnover of the top 10 Romanian dairies in Milk Processing Industry, 2011-2013 ( Lei Million)

Romanian Brands	2011	2012	2013	2013/2011 %
SC Danone PDPA SRL Bucharest	502.9	506.4	481.0	95.6
Albalact SA Oiejdea, Alba	338.2	343.8	423.1	125.1
SC Friesland Cimpina Romania SA, Cluj-Napoca	382.7	407.1	361.3	94.4
Fabrica de lapte Brasov SA, Baraolt, Covasna	97.1	169.3	239.1	242.2
SC Napolact SA, Cluj-Napoca	222.3	224.5	222.8	100.2
Hochland, Sighisoara, Mures	197.9	197.4	216.0	109.1
La Dorna Lactate SA, Dorna Candrenilor, Suceava	185.2	182.0	175.7	94.8
Simultan SRL, Faget, Timis	127.7	96.4	160.6	125.7
SC Covalact SA, Sfantul Gheorghe, Covasna	90.4	118.5	131.8	145.7
Industrializarea laptelui Mures SA, Tg.Mures	124.3	135.0	128.0	102.9

Source: Own calculations based on the data provided by Ministry of Finance Database, 2014. [7]

Therefore, even though we do not know exactly the market share of all the 472 dairies operating in the milk market, we know that Herfindahl-Hirschman Index has the highest threshold equal to 597.68 and the lowest threshold equal to 484.2602.  $484.2602 \geq HHI \leq 597.68$ .

According to the data mentioned in Table 1, we can notice that the values of HHI are smaller than 1,000, that is the concentration degree in the milk and dairy products market in Romania is a low one.

A low concentration degree involves a higher competition in the milk market, but besides the market share, the companies could adopt various distribution channels and direct sales

as measures to diminish the competition impact.

Table 3. The market share of the top 10 dairies operating in the milk industry and market in Romania in 2013.

Crt. No.	Romanian Dairy name	Market share (%)
1	SC Danone PDPA SRL	12.11
2	Albalact SA Oiejdea, Alba	10.65
3	SC Friesland Cimpina Ronania SA, Cluj-Napoca	9.09
4	Fabrica de lapte Brasov SA, Baraolt, Covasna	6.02
5	SC Napolact SA, Cluj-Napoca	5.61
6	Hochland, Sighisoara, Mures	5.43
7	La Dorna Lactate SA, Dorna Candrenilor, Suceava	4.42
8	Simultan SRL, Faget, Timis	4.04
9	SC Covalact SA, Sfantul Gheorghe, Covasna	3.31
10	Industrializarea laptelui Mures SA, Tg.Mures	3.22
11	Total Top 10	63.90

Source: Own calculations based on the data provided by Ministry of Finance, 2014. [7]

**The concentration rate (CR)** varied between 59.3 % in the year 2011 and 63.9 % in the year 2013 taking into account only the top 10 dairies in Romania. This shows an ascending trend of concentration in the milk market in the analyzed period, which could be considered a positive aspect encouraging the milk processing companies to increase their size and benefit, to have a higher economic performance and resist better to the market pressure.

## CONCLUSIONS

The paper proved that using various mathematical models it is possible to assess the thresholds of concentration and competition degree in case that there are no sufficient data about all the companies operating in a field of the economy.

Using a sample of 10 top Romanian brands in milk processing industry in the period 2011-2013: Danone, Friesland, Albalact, Napolact, Fabrica de lapte, Hochland, La Dorna, Simultan, Industrializarea laptelui Mures and Covalact, whose total turnover accounted for

63.9 % of the total turnover in the field, it was possible to determine the highest and lowest thresholds of Herfindhal-Hirschman Index.

Regarding the milk market analyzed in Romania during the period 2011-2013, it was found a low concentration degree as the Herfindhal-Hirschman Index had a low value varying between 597.68 and 484.2602.

As a conclusion, a higher competition among the companies operating on this market but also an incentive to find solutions to reduce production and marketing costs by improving the distribution channels.

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## DISCRIMINANT ANALYSIS AS A METHOD FOR ESTIMATING THE PROBABILITY OF DEFAULT OF MOLDOVAN SMALL AND MEDIUM ENTERPRISES IN RURAL AREAS

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### **Abstract**

*This study tries to present a method for the estimation of the probability of default (PD) of Moldavian SMEs, which would be a parametric alternative to the expert-based models used nowadays. Discriminant analysis is the most widely used statistical based method for the estimation of PDs in the global financial industry and generally gives rather good estimations. Even with all the particularities of the Moldovan companies, the results obtained are promising and suggest that indeed, a statistical-based model would be very useful for Moldovan financial institutions.*

**Key words:** creditworthiness, Moldavian agriculture, rural development

### **INTRODUCTION**

Since 1991, when the Republic of Moldova became independent, the performance of the banking system continuously improved in order to be successfully integrated in the global financial system. The banking system became deeply integrated into the Moldavian economy due to its role of aggregation of firms' and households' savings and that of granting credits. [4]

This integration also made the banking system rather correlated to the macroeconomic situation of the national economy and a relative high degree of pro-cyclicality can be observed.

The problem of access to credit persisted during the transition period, despite the dynamic development of the banking system. According to several surveys performed by World Bank, the majority of entrepreneurs emphasize that this is one of the major barriers in the continuous development of Moldavian business. Local economists conclude that the lack of sufficient access to credit for local business is a fundamental constraint that hampers the economic development of the Republic of Moldova. [5] The cost of attracted resources is the highest in the region for the past decade, as Moldova

has one the highest real interest rates in the region. This circumstance has a tremendous effect on credit policy of all banks, which are constrained to pay high interests on the deposits they receive, thus seeking opportunities with very high expected return and low risk. In this way, agricultural activities or small production firms are not focused by the banks when seeking projects in which to invest. A high concentration of credits can be observed in some sectors of the economy that are exposed to exogenous shocks, thus determining the pro-cyclical characteristic of the banking system. A particular unpleasant effect has been attested during the 2008-2009 period, when the trade and construction sectors had much to suffer. The large exposures of many banks in this sectors produced losses that were unforeseeable, decreasing the already low degree of credibility of the population in the banking sector.

### **MATERIALS AND METHODS**

At its roots, discriminant analysis is a classification technique which uses data obtained from a sample of companies to draw a boundary that separates the group of reliable one from the group of insolvent ones. [6]

The discriminant function is developed in order to perform this task. If

$$Z = w_1 \cdot X_1 + w_2 \cdot X_2 + \dots + w_n \cdot X_n$$

and

$$X = X_1, X_2, \dots, X_n$$

is a linear combination of the characteristics of the companies, the weights  $w_i$  have to be selected to maximize the distance between the mean values of  $Z$  for “good” and “bad” companies. [1]

Assuming a common sample variance of the two distinct groups, the method of separation is defined as:

$$M = w^T \cdot \frac{m_g - m_b}{(w^T \cdot S \cdot w)^{\frac{1}{2}}}$$

where  $m_g$  represents the sample means of the “good” companies, as  $m_b$  represents the sample means of the “bad” ones.  $S$  is the common sample variance. Intuitively,  $M$  is the ratio between distance between the sample of means of the two groups and the square root of the sample variance of each group.

The value of  $M$  is maximized when

$$\frac{m_g - m_b}{(w \cdot S \cdot w^T)^{\frac{1}{2}}} - \frac{(w \cdot [(m]_g - m_b)^T)(S \cdot w^T)}{(w \cdot S \cdot w^T)^{\frac{3}{2}}} = 0$$

which is equivalent to

$$(m_g - m_b)(w \cdot S \cdot w^T) = (S \cdot w^T) \left( w \cdot [(m]_g - m_b)^T \right)$$

and finally to

$$w^T = (S^{-1}(m_g - m_b)^T).$$

The model finds the weights that applied in the initial linear combination present the best separator of the “good” and the “bad” companies in terms of maximizing the distance between means. After the calculation of all  $Z$  values (discriminant scores), a cut-off point is selected at the average distance between the means of the two groups. [2]

## RESULTS AND DISCUSSIONS

The discriminant analysis will use 20 financial ratios that were computed. As the model uses the stepwise method to eliminate the variables with insufficient discriminatory power, we can afford to input as many variables as possible. [3]

Table 1 depicts the variables (in all cases the transformed version of the variables was performed using Wilk’s Lambda, the ratio of the unexplained variance on total variance.

At each step of the iteration the variable that minimizes the overall Wilk’s Lambda of the model.

Table 2 presents the evolution of these values during the addition of new indicators into the model.

Table 1. Stepwise Statistics

Step	Entered	Variables Entered/Removed <sup>a,b,c,d</sup>							
		Wilks' Lambda						Exact F	
		Statistic	df1	df2	df3	Statistic	df1	df2	Sig.
1	Receivables_Period3	.918	1	1	769.000	68.841	1	769.000	.000
2	ROS3	.875	2	1	769.000	55.055	2	768.000	.000
3	Inventories_Period3	.864	3	1	769.000	40.241	3	767.000	.000
4	Commercial_WC_Period3	.858	4	1	769.000	31.642	4	766.000	.000
5	CashSTAsset_s3	.853	5	1	769.000	26.447	5	765.000	.000

At each step, the variable that minimizes the overall Wilks' Lambda is entered.

- a. Maximum number of steps is 82.
- b. Maximum significance of F to enter is .05.
- c. Minimum significance of F to remove is .10.
- d. F level, tolerance, or VIN insufficient for further computation.

Table 2. Evolution of Wilk's Lambda

Step	Number of Variables	Lambda	df1	df2	df3	Exact F			
						Statistic	df1	df2	Sig.
						1	1	.918	1
2	2	.875	2	1	769	55.055	2	768.000	.000
3	3	.864	3	1	769	40.241	3	767.000	.000
4	4	.858	4	1	769	31.642	4	766.000	.000
5	5	.853	5	1	769	26.447	5	765.000	.000

The most tangible result of the discriminant analysis is providing canonical coefficients for the variables in the model. These coefficients, presented in Table 3, if multiplied by the respective variables and computing the sum will result in the final discriminant score of each company.

Table 3. Canonical discriminant function coefficients

Canonical Discriminant Function Coefficients	
	Function 1
ROS3	.010
Receivables_Period3	-.004
Inventories_Period3	-.002
Commercial_WC_Period3	.000
CashSTAssets3	.033
(Constant)	.621

Unstandardized coefficients

The score that is obtained for each firm can be computed using:

$$\text{Discriminant Score} = 0.621 + 0.10 * \text{Return on Sales} - 0.004 * \text{Receivables Period} - 0.002 * \text{Inventories Period} + 0.000 * \text{Commercial Working Capital Period} + 0.33 * \text{Cash/Short Term Assets}$$

In order to be able to rank the firms using the obtained scores, Figure 4 is useful, as it compares the means of the scores of "good" and "bad" subcategories. In this case, a high score for a firm means lower probability of default.

Table 5. Rating of discriminant analysis

		Risk Category Transformed * Rating_Discriminant3 Crosstabulation									
% within Rating_Discriminant3		Rating_Discriminant3									Total
		1	2	3	4	5	6	7	8	9	
Risk Category Transformed	Performing	67.4%	85.9%	89.5%	90.7%	94.1%	96.5%	98.8%	98.8%	98.8%	91.2%
	Default	32.6%	14.1%	10.5%	9.3%	5.9%	3.5%	1.2%	1.2%	1.2%	8.8%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 4. Comparison of the means

Functions at Group Centroids	
Risk Category Transformed	Function 1
Performing	.129
Default	-1.335

Unstandardized canonical discriminant functions evaluated at group means

As Table 5 suggests, a firm that is positioned in the first rating class will have 32.6% probability of default.

This study has demonstrated that discriminant analysis model is suitable to be implemented on Moldovan data and can indeed be used in real-life decision making processes of the risk departments of banks. The implementation of this model as an alternative to the already used expert system would provide a great added value to the final decisions of the risk management divisions. As demonstrated, the model is able to replicate the ratings assigned by the bank's expert and in this sense the most important features that would improve with the implementation this statistical based model would be in terms of measurability and verifiability. Also, the final decisions will tend to become more objective and homogenous. All these elements will greatly impact the lending policy of the bank and would prove a valuable asset in terms of "know-how" in comparison to the competition.

## CONCLUSIONS

In order to present the main conclusions of this study, the discriminant score computed by the discriminant analysis model has to be transformed into probabilities of default. For this, the whole range of the discriminant score variable was divided into nine equal intervals. These intervals can be interpreted as rating classes and the percentage of defaulted firms from each class represents the estimated PD.

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## INVESTIGATION ON THE AFFECTIVE COMPONENTS TO ENCOURAGE THE RURAL YOUTH TO AGRICULTURAL ACTIVITIES IN IRAN

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### *Abstract*

*The major purpose of this study was to analysis of affective components in encouraged the rural youth to agricultural activities in the West Azerbaijan province of Iran. The population statistics of the study were consisted of the rural youths that lived in rural regions of the West Azerbaijan province. By using Cochran formula sample size was determined as 239 people. The data collection tool was the questionnaire. Reliability coefficient of the questionnaire was obtained by Cronbach's alpha that was 0.87. Results showed that affective components the rural youth to agricultural activities included economical, socio-cultural, policy-making, geographical and - extension - educational components. These five components accounted for 72 percent of the variance in the encouragement of the rural youth to agricultural activities.*

**Key words:** *affective components, agricultural activities, encouragement, Iran, rural youth*

### INTRODUCTION

In Iran, agriculture is one of the most important economic sectors. The agricultural sector provides about a quarter in employments of human labor force and 33% of exports in Iran. Also Iran has advantages in producing agricultural goods [8, 12].

Despite the important role of agriculture in food production, employment and exports, unfortunately rural communities faced with numerous problems. These involve issues such as poverty, unequal income distribution, unemployment, low productivity, unskilled labor force and lack of appropriate extension system in the agricultural sector [9]. New approaches in sustainable development, give most attention to the Human Resources Development (HRD). Governments have taken expanding efforts to use human capabilities factors and orientation to the educational activities for the empowerment of human resources [4, 7].

Future economy depends on the rural youth stability in agricultural sector [15]. Investment in education and empowerment on the rural youth provides assurance and achieves to

economic and social development for the community. The process bring reduces undesirable phenomena such as migration to urban areas [2]. The rural youth have acceptable level of education and literacy in comparison with other member of the rural societies. In addition the rural youth have more readiness for change in the villages. In fact, the rural youth were the potential forces for development in rural areas and these groups have more interest to make changes in the agricultural sector and are more interested to accept new technologies [6]. Country's agricultural development was dependent to the rural youth and young farmers that were interested in agricultural activities [13, 16]. One of the main important subjects of each individual in their life was career choices [14]. There are the major turning points in the lives of people that are influenced on the job selection process. This decision plays an important role in the future of the individual. Usually environment and opportunities have considerable role in the job selection process. Tavassoli [17] believed that the effective values were different with each other in the selection of jobs n each culture. The process

career according to the individuals' ambitions can be influenced by variables such as: education, social class, parental social class, cultural and social issues and geographical region. It is clear that another factor such as: success in competition with others (high financial income) was one of the fundamental principles in career choice process. And other factors in work are job security, job stability, progress considered in choosing jobs among the young people [10].

Today, signs of progress are expressed in any society by labor employment rate [11]. Statistics indicated that there are about 23 million rural youth in rural areas in Iran. This youth population must be educated and influence all level of society. Therefore, policy-makers and planners faced with an important subject to use this huge capacity to development [3]. Alibaygi, et al [2] believed that economical, infrastructural, social and cultural factors affected migration of rural youth to urban areas. Also Bilsborrow [3] pointed to political, financial, social and physiological factors in migration of rural people.

The issues such as migration to urban areas have negative consequences in economic, social and cultural growth rate [1]. Essential condition for agricultural development in the long term was attracting the youth to agricultural activities.

West Azerbaijan Province has good capabilities to investment, like agricultural activities. Also majority of population that live in this province, work in agricultural activates. Considering the importance role of agriculture in the west Azerbaijan province, a variety of procedures must be done by policymakers and governments planers. One of these procedures provides the necessary mechanisms to attract the rural youth to agricultural activities and prevent them from coming to urban areas.

Studies indicated that in the West Azerbaijan Province, participation rate of the rural youth decreased in agricultural activities in recent years. In addition, the trend of rural migration in comparison with last decade has more increased. The rural youth were the major part of the migratory groups. Therefore, researcher

wants to investigate attitudes of rural youth about agricultural activities and also study effective components on the survival of the rural youth in the rural areas of the West Azerbaijan province.

## MATERIALS AND METHODS

The methodology used in this research was survey which included the use of correlation and descriptive analysis as data processing methods. A questionnaire was developed based on interviews and the relevant literature. The questionnaire included both open-ended and fixed-choice questions. A 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was applied as a quantitative measure. Content and face validity were established by a panel of experts consisting of faculty members and experts in the social science. A pilot study was conducted with rural youth people who had not been interviewed before the earlier exercise of determining the reliability of the questionnaire for the study. Cronbach's Alpha coefficient was 0.87, which demonstrated that the questionnaire was highly reliable. The research population included rural youth (14-29 years) that lived in villages of the West Azerbaijan Provinces (N = 25,631). By using a Cochran formula, sample size was determined at 239. Multivariate regression analysis were used, to determine influencing factors in encourage the rural youth to agricultural activities by Statistical Package of social Science (SPSS18).

## RESULTS AND DISCUSSIONS

The results of descriptive statistics show that the average age of respondents were 22.9 years, with 4.7 years agricultural year experience. The average of family land was 6.5 hectares and the average of family annual income was 6.5 billion. The majority of them (66.5%) were male (Table 1).

Job selection process was influenced by various motives.

Table 1. Personal characteristics of respondents

Variables	Mean	SD	Max	Min
Age	22.9	5.14	29	14
Age experience in agricultural activities	4.7	7.5	13	4
Family annual income (billion)	6.5	5.7	40	1.5
Amount of agricultural land(hectare)	6.5	5.2	50	3
Distance from City(km)	20.5	14.37	65	1

The findings indicated that talent and ability of youth was ranked as the first motivates (CV =0.271), also motivation and personal interest (CV=0.318) was ranked as the second and the status of family life style (CV=0.330) was ranked as the main prioritize motivations of career choice from respondents' viewpoints. Other findings are shown in table 2.

Table 2. Motivations of career choice from rural youth perception

	Mean	SD	CV	Rank
Talents and abilities of youth	3.53	0.96	0.271	1
Motivation and personal interest	3.39	1.18	0.318	2
Life style and livelihoods of people	3.27	1.08	0.330	3
Serve to members of society	3.34	1.15	0.344	4
Due to its credibility and social status of the jobs	3.26	1.18	0.361	5
Financial income	3.23	1.19	0.368	6
Being easy job	2.75	1.30	0.472	7

Strongly agree=5, Agree=4, Intermediate=3, Disagree=2, Strongly disagree=1  
Source: Own calculation.

Based on the results of the study, values and credibility of job in the community (CV =0.333) and the personal wishes (CV=0.347) and parental attitudes about jobs (CV =0.355) were the important factors influencing people on the selection process from the viewpoint of the rural youth. Other findings are shown in the table 3.

Table 3. Affecting people in rural youth career from rural youth perception

	Mean	SD	CV	Rank
Values and credibility of job in the community	3.48	1.16	0.333	1
Personal wishes	3.80	1.32	0.347	2
Parental attitudes about job	3.38	1.20	0.355	3
Attitude of other family members	2.87	1.10	0.383	4
School teachers and educational system	3.05	1.23	0.403	5
Mass media and other media	3.12	1.27	0.407	6
Friends and peers	2.62	1.16	0.442	7

Strongly agree=5, Agree=4, Intermediate=3, Disagree=2, Strongly disagree=1  
Source: Own calculation

The various components were effective in the job career process. Major barriers identified inhibiting absorption of the rural youth to agricultural businesses in West Azerbaijan Province. Results showed that difficulties of farming as a job (CV=0.278) and low-income of agricultural activities (CV=0.283) were the main reasons to reduce the rural youth's interest in the agriculture activities (Table 4).

Table 4. The cases that reduces interested of rural youth to agricultural activities

	Mean	SD	CV	Rank
Difficulties of farming job	3.91	1.91	0.278	1
Low-income in agricultural activity	3.67	1.04	0.283	2
lack of interesting to agriculture	3.60	1.07	0.297	3
Lack of suitable future career	3.98	1.18	0.320	4
Less attention of community people to agricultural sector	3.52	1.15	0.326	5
Lack of necessary facilities for agriculture (water, land, capital)	3.38	1.22	0.360	6

Strongly agree=5, Agree=4, Intermediate=3, Disagree=2, Strongly disagree=1  
Source: Own calculation

Spearman coefficient was employed for measurement of relationship between independent variables and dependent variable. Table 5 displays the results which show that there was relationship between perception of respondents about attracting to agricultural activities and socio-cultural, economical, policy-making, geographical and extension-educational factor as independent variables. Table 6 shows the result for regression analysis by enter method. Independent variables that were significantly related to perception of respondents about attracting to agricultural activities were entered. The result indicates that 72 percent of the variance in the perception of respondents could be explained by socio-cultural, economical, policy-making, geographical and extension-educational components.

Based on statistically significant variables in the regression analysis, and constant values, the regression equation could be derived. The final multivariate regression in the model by B and β coefficients was:

$$y = 28.37 + 0.507x_1 + 0.738x_2 + 0.376x_3 + 0.361x_4 + 0.378x_5$$

$$y = 0.388x_1 + 0.466x_2 + 0.320x_3 + 0.253x_4 + 0.357x_5$$

The perception of the rural youth about attracting to agricultural activities in West Azerbaijan province was discussed in this

paper. These findings show that respondent's attitudes about agricultural activities, talent, and people's lifestyle have important role in motivations of the rural youth to be attracted in agricultural jobs.

Table 5. Correlation coefficient measures between independent variables and dependent variable

affective components	rs	Sig.
Socio – cultural components	0.632**	0.000
Economical components	0.726**	0.000
Policy-making components	0.428**	0.000
Geographical components	0.318**	0.000
Extension-educational components	0.522**	0.000

\*\*= P<0.001

Source: Own calculation

Table 6. Multivariate Regression Analysis

Variable	B	$\beta$	t	Sig.
Constant	28.37	---	11.43	0.000
Social – cultural components (x <sub>1</sub> )	0.507	0.388	3.58	0.001
Economical components (x <sub>2</sub> )	0.738	0.466	3.60	0.001
Policy –making components (x <sub>3</sub> )	0.376	0.320	2.18	0.001
Geographical components (x <sub>4</sub> )	0.359	0.253	1.99	0.034
Educational-Extensional components (x <sub>5</sub> )	0.378	0.367	1.97	0.045

R=0.852 R<sup>2</sup><sub>adj</sub> = 0.726 F=47.81 Sig: 0.000

Source: Own calculation

The results show that the values of jobs from viewpoint of community people, individual aspirations and attitudes of parents have the greatest impact on job process choice from viewpoints of the rural youth. Therefore, policy-makers must have good procedures to increase value of agricultural jobs in the public view of community people through cultural programs by various media, especially radio and television. Research findings also show that the hardness and low-income of agricultural activities were the main reasons for lack of attraction to agricultural activities among rural youth people in West Azerbaijan Province.

The results show that there was relationship between perception of respondents about attracting to agricultural activities and socio-cultural, economical, policy-making, geographical and extension-educational factor as independent variables.

The multivariate regression analysis indicated that about 72 percent of variance in respondents' attitudes about agricultural activities could be explained by socio-cultural, economical, policy-making, geographical and extension-educational.

These Findings are in accordance with other researchers such [ 10, 2, 5].

The results of regression analysis demonstrated that economical factor is the important factors affecting the attracting the rural youth to agricultural activities.

## CONCLUSIONS

Rural youth are the primary productive human resource of socio-economic development. It is therefore, essential to locate the role of youth in mainstream development and point to the factors that affecting to attract rural youth to agricultural activities. Young minds are creative minds and youth are capable of achieving seemingly impossible tasks such as monsoon management and doing the agricultural activities. Rural program designers need point to provide the strong services sector in rural area. Agri-business centers and agri-clinics are needed on a big scale. Farm schools will have to be established in the fields of young farmers, in order to promote young farmer to farmer learning. Value addition will have to be done to primary products in order to increase rural people income. New technologies will have to be introduced, such as biotechnology after careful consideration of risks and benefits. Given that agricultural producers age are increasing in rural area of Iran. Therefore it is necessary skilled manpower replace them. No doubt will be possible to provide the workforce with rural youth in rural areas. Accordingly, planners should pay attention to the effective component that attracting rural youth in agricultural activities.

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## ORGANIC FARMING IN ROMANIA AND BULGARIA

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### *Abstract*

*These days, agriculture and also food business confront new tendencies of developing environmentally friendly options. This kind of agriculture sector surfaced due to folk's worries regarding health and ecosystem because of the new technologies. These issues appeared and recognized by the developed nations and the like, are usually firmly associated with ecological pollution along with escalating troubles of health degradation. This research compares Romania with Bulgaria, and indicates the possibilities of developing de organic farming sector. The results of this study indicate that this sector has a great potential of developing over the years, in both of the countries that are analysed. In this exploratory research, statistics data were collected from both official governments in Romania and Bulgaria, and this paper indicates the resources on witch both nations can count for developing this sector.*

**Key words:** agriculture, Bulgaria, organic farming, Romania

### INTRODUCTION

Organic agriculture is a wide spread trend, and has the opportunity to attract a higher return for a farmer in a saturated bulk market. The organic food production seems a very interesting segment for small farmers who cannot benefit from the development of technologically [2]. Organic industry throughout Romania has become bigger in past years [15]. The reason is usually costumer desire for healthy food [12].

Organic agriculture is one segment of general agriculture that uses pesticides, fertilizers that are considered to be natural. Moreover, the organic agriculture prohibits the use of synthetic pesticide and fertilizers, hormones, antibiotic use in livestock, and even the genetically modified organism [13].

Organic agriculture is encouraged within Romania employing different tools regarding farming policy [14]. The EU is devoted in principle to encourage sustainable farming in its Common Agricultural Policy (CAP). As member nation of EU, Romania utilizes the Common Agricultural Policy and so, the principle of encouraging sustainable farming [18]. This calls for ecological and social troubles and, thus, unique equipment for stimulating organic agriculture [6]. To benefit

of natural farming subsidies, farmers need to conform to a number of regulations: ceasing the use of chemicals, farms' adaptation towards the natural biological circuit regarding vegetal and/or animal manufacturing, ventures for alterations and changes (Art. 17, Rules CE 834/2007) [10]. Consequently, Romanian strategy for agriculture can be driven in the direction of natural farming, amid different things.

Organic agriculture started being implemented early in 20th century together with the effective use of several alternative strategies of agricultural manufacturing. Bulgaria is one of the most potential nations in agricultural areas that can be cultivated organic, because of their water purity and earth fertility [11]. According to the situation and the legislation in Bulgaria, the priority in my research is having some results that can improve the situation of organic agriculture [3].

The present document tries to find an answer to the question: what is the organic agriculture prospect for development? Comparative research among Romania and Bulgaria, as neighbour nations, using comparative similar agro-food methods, can be conducted, through gathering record facts from both nations. The aim of this document is to spot the assets that

states can depend on in developing methods based on organic farming.

## MATERIALS AND METHODS

In order to analyse the organic farming sector in Romania and Bulgaria, the data that were used have been collected from the official statistics provided by the Ministry of Agriculture and Rural Development, Romania, and the Ministry of Agriculture and Food, Bulgaria.

Also, in order to analyse the organic farming sector from both countries, I also studied the scientific literature, consulting a more diversified number of specialized books and scientific articles.

Based on the collected data, and on the conclusions of different authors from the scientific literature, a critical approach of the situation of organic farming in the both countries was run by author.

## RESULTS AND DISCUSSIONS

### The situation of organic agriculture in Romania

Romania position is sixteenth worldwide for overall area of accredited organic agriculture areas, and is on the 20th place worldwide for organic goods export.

Table 1. Dynamics of terrain cultivated with main cultures under organic agriculture in Romania (hectares)

Crop/Culture	2010	2011	2012
1. Area with organic agriculture, crop on arable land, of which:	148,033	147,581	174,643
Cereals	72,298	79,167	130,000
Oil crops and pulses	53,375	51,028	105,000
Vegetables	734	914	1,200
2. Area with organic permanent crops: orchards and vineyards, of which:	3,093	4,166	7,781
Orchards	2,199	3,324	-
Vineyards	894	842	-
3. Organic Pasture and hayfields	31,579	78,198	105,835
4. Organic Spontaneous flora cultures	77,294	338,051	1,082,138

Source: The Ministry of Agriculture and Rural Development (ROMANIA) [20]

This is quite amazing, given that the farming terrain used in the “ae” system is merely 3.38% of the overall agricultural terrain of the nation. Organic agriculture is a vibrant system in Romania which has a weighted regular rate of yearly raise of 23% [9]. In year 2012, the arable terrain on which was cultivated organic production was 174,643 ha.

In Romania, on the area of 1 mil. hectares was cultivated spontaneous flora. Throughout 2012, terrain in organic system increased by 45% since 2011, which represents around 3.38% of the overall employed farming terrain of Romania.

The terrain grown using cereals under organic agriculture is 130,000 hectares, the terrain grown using oil crops as well as pulses is 105,000 hectares, the terrain grown using vegetables is 1,200 hectares, the terrain under organic orchards as well as vineyards is 7,781 hectares, the terrain with pasture and hayfields under organic program are 105,835 hectares. In the 2012 year, in Romania were cultivated 1,082,138 hectares of organic spontaneous flora (Table 1).

Regarding the livestock sector in 2012, Romania recorded a growth of organic livestock. Sheep and goats registered in 2012 were 160,000 heads, 85,000 heads laying hens and 60,000 heads of dairy cows (Table 2).

Table 2. Dynamics of livestock under organic agriculture in Romania (heads)

Species	2012
Dairy cows	60,000
Poultry	85,000
Sheep and goats	160,000
Bees	102,882

Source: The Ministry of Agriculture and Rural Development (ROMANIA) [20]

Several providers (producers, manufacturers as well as investors, importers and exporters) listed inside organic growth method, in 2012 totalize 26,736 (Ministry of Agriculture and Rural Development - Romania). Since 2010, the number of providers expanded yearly by around 3 times a year. This was largely because of the recent support methods intended for the period conversion given below. In 2012, from 26,736 suppliers, 103

work inside the processing sector, 211 in trade and promoting and 26,390 tend to be farmers. In relation to manufacturing sector, in 2012 it was an expansion in the volume of processors (from 48 products in 2007 to 103 in 2012) and the assortment of organic goods seemed to be more assorted, such as: product manufacturing sheep and cow milk (cheese, butter, and so on), goods prepared of soy (milk, tofu, in addition to croquettes), sunflower oil, and numerous types of bakery goods (bread, pasta, cookies), prepared rice goods, cereal, natural and organic teas, juices, berries, prepared goods hemp seeds, bee goods (wax, pollen), prepared goods of pork animal meat (sausage, ham) and natural wine. The common surface of a holding for organic agriculture, for vegetable growth, ranges from around 100 square meters for planting vegetables in greenhouses, around 2000 ha for field crops growth. The standard surface of farm, in 2011, was around 20 to 22 ha.

The market involving organic merchandise is increasing. Desire for organic goods is constantly growing. Organic goods tend to be marketed straight from the farm gate or even through special merchants as well as through grocery stores [5]. As for international trade, a lot of goods harvested from organic farming were meant for exports. Yearly, around 70-80% of organic goods are exported. The international markets are very keen on buying Romanian organic goods. In every Western nation, with higher economic power than Romania, the organic goods are sold at a very expensive price. Imports of organic products are greater each year, due to hypermarkets effort in retail distribution. Hence, in 2011 the worth of imports achieved the value of around seventy five million Euros.

### The situation of organic agriculture in Bulgaria

Most significant issues pertaining to Bulgaria in the act of financial restructuring and setup involving organic manufacturing would be to assure some sort of sense of balance involving ample food processing, to enhance employment and preventative security of the natural environment [16].

According to the official data collected from the Ministry of Agriculture and Food

(Bulgaria), during the analysed period 2010-2012, we can indicate that the areas under organic growth in Bulgaria is substantial raising (Table 3).

Table 3. Dynamics of terrain cultivated with main cultures under organic agriculture in Bulgaria (hectares)

Crop/Culture	2010	2011	2012
1. Area with organic agriculture,			
crop on arable land, of which:			
Cereals	5,339	6,521	7,532
Oil crops	-	5,845	7,909
Vegetables, melons, strawberries, mushrooms	428	670	1,421
2. Area with organic permanent crops: orchards and vineyards, of which:			
Orchards	-	7,898	13,017
Vineyards	-	6,443	10,959
	-	1,455	2,058

Source: Ministry of Agriculture and Food (Republic of Bulgaria) [19]

The data collected from the governmental authorities of Bulgaria indicates that in 2012, the areas under organic farming method was of 40,378 ha. The comparison with the facts from 2010 demonstrates that the areas under organic farming are increasing.

Regarding the livestock sector in 2012, Bulgaria recorded a growth of organic livestock. Sheep and goats registered in 2012 were 12,006 heads, 1,173 heads cattle and 85,346 heads of bees (Table 4).

Table 4. Dynamics of livestock under organic agriculture in Bulgaria (heads)

Species	2010	2011	2012
Cattle	364	976	1,173
Sheep and Goats	9,471	10,045	12,006
Bees	46,429	58,855	85,346

Source: Ministry of Agriculture and Food (Republic of Bulgaria) [19]

During the analysed period (2010-2013), the organic livestock in Bulgaria is increasing, and in this period we can notice the increasing number of sheep and goats, cattle and bees. Because of increasing the number of bee, we

can notice that the organic honey is also increasing (Table 4).

Without a doubt, Bulgaria is a customary maker of different sorts of confirmed organic honey with astounding quality indicators, as a significant part of the production is sent out to be exported to the world business sector [4].

In Bulgaria during the analysed period, we identified that one of the biggest production that this country had was the organic rose oil and the organic cucumbers.

The primary explanation behind the adjustments in organic cultivating is overproduction of sponsored yields, as well as expanded sensitivity of European nations to ensure the earth, biodiversity and creature welfare.

Collecting the data from Ministry of Agriculture and Food (Republic of Bulgaria) we can identify the potential of developing the organic production (Table 5).

Table 5. Organic Production in Bulgaria holds for 2010-2012 Kg/Da

Organic production	Area (da)	Average yield	Total yield
Wheat	20	400	8,000
Sunflower	20	180	3,600
Tomatoes	2	3,500	7,000
Pepper	2	3,900	7,800
Cucumbers	2	2,500	5,000
Apples	10	1,600	16,000
Peaches	10	1,800	18,000

Source: Ministry of Agriculture and Food (Republic of Bulgaria) [19]

In Table 5, we can see that the organic production of apples and pears involves a significant organic farming production. On the other way, peppers and tomatoes, even if involves smaller areas, they have a better average yield. Regarding the organic production, in Bulgaria, is one which has a big potential, because of increasing exports request for organic products.

The negative elements on organic agriculture and promoting are the absence of attention to organic items quality, absence of showcasing system and publicizing, and solid rivalry from imported natural items [1]. Unquestionably, Bulgaria requires vast speculations for

promoting and publicizing. Since the accomplishment of open and focused worldwide business sector can't depend just on the natural items quality [17].

Analysing the organic sector in the two countries, we can see that the area with organic agriculture, crop on arable land is much higher in Romania compared to Bulgaria. In 2012, the area with organic agriculture, crop on arable land in Romania is approximately 4 times higher than Bulgaria.

In terms of organic livestock, Romania had a number of certified organic animal heads much higher than in Bulgaria, during the analysed period.

In Bulgaria the organic production is sustained by the Ministry of Agriculture and Food (Republic of Bulgaria), which has important legal laws regarding this sector, and according to this fact, more and more farmers are swinging to organic manufacturing.

Nowadays, Romanian agriculture and Bulgarian agriculture are one of the most important sectors in their country's economy. Because of the new trends of consumers, farmers are beginning to realize the importance of producing organic products.

The most important thing is that the product is organic and healthy, but also has a very high value added [8]. Both countries that were analysed have a huge potential for development of the organic sector. This follows from the data collected from official institutions of the two countries and further interpretation of these data.

## CONCLUSIONS

The organic sector in Romania is highly increasing from year to year, and is characterized by diversity. This sector has an insignificant weight in agro-food system, regarding agricultural area and livestock production. However, it has a high potential of development due to accelerated growth of indicators. This sector can bring significant contribution to a sustainable development, and can increase the economic activities, thanks to the significant added value of the organic products. The premium price of organic products is paid by people from

countries where there is a sizeable middleclass in the population, and where consumers are more educated and informed of food issues, and they incline to buy organic products, whether for food safety, concern over the environment or health reasons [7]. The organic market is increasing, and is characterized by diversity from year to year and the supply of products on the market. The demand for certified organic products is growing in Europe, because the consumers are more educated. However, consumption of organic products in Romania still remains at a low level compared with other European countries - which is determined mainly by the low purchasing power of the population and additional price difference of about 20-40% compared to conventional products (eco products consumption in Romania, representing about 1% on total consumption of products, while the European average is 3-5%). Even in these circumstances, with the appropriate information and promotion, designed to increase public awareness regarding organic products, Romania could significantly increase market share and attractiveness of the organic products.

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## IS THE PRICE OF RAW MILK, AS SET BY THE ISRAELI GOVERNMENT THE OPTIMAL PRICE?

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### **Abstract**

*This study examines the question of how the price of milk is determined in Israel. As in many countries, the Israeli government intervenes in the raw milk industry. This intervention is expressed as the setting of production quotas as well as the establishing of the price which farmers will receive for the raw milk. According to accepted economic theory, the optimal price is that which is established in the free market, which is to say, the price which is equal to the marginal cost. If the price is set above the marginal cost, then the producers have excess profit at the expense of the consumers. The purpose of this study is to determine if the price of raw milk which has been set by the Israeli government is a reasonable price. A previous study conducted in this field examined this issue using the number of cows the farmers raise. This study examines the same question using a different input, which is the amount of dry matter which is fed to the cows. The results of this study show that the price of raw milk is less than the marginal cost. Therefore, it appears as if the price of raw milk is too low, or that the farmers are not efficiently making use of the feed which is given to the cows.*

**Key words:** dry matter, government intervention, Israel, marginal cost, price, raw milk

### **INTRODUCTION**

According to accepted economic theory, the optimal price for a good or service in any economy, which will bring the maximum social benefit, is the price as reflected in a competitive market. This price should equal the marginal cost. If the price is above the marginal cost, the profit of the producers is greater than the normal profit, which comes at the expense of the consumers and decreases social benefit.

The issue of discrepancy between the price and the marginal cost is usually discussed within the context of monopoly and market power. However, it is also applicable in cases where the government intervenes in determining prices. In this case, the power of the producers doesn't stem from their behavior in the market. Rather, it stems from the public or political power through which the farmers can exercise any influence they have over the government, in order to set the price as high as possible. Stigler wrote an article which dealt with a situation in which a cartel develops due to government involvement. One of Stigler's basic

assumptions is that government intervention in certain industries derives from political considerations, not from economic or social ones. In accordance with this method, the political party in power takes administrative steps (like granting subsidies, rationing production quotas, limiting imports, etc.) which enable the industry to accumulate excess profits. In exchange, the firms which operate in that industry grant the political party support, which is expressed as votes during elections, organizational help, and financial contributions to campaigns [13].

Contrary to Stigler's assumption is the claim that the goal of government intervention, in industries such as the raw milk industry, is the guarantee of the regular availability of essential dairy products. In this case, the government is supposed to set the prices in accordance with what they would be in a free market. Under conditions of market certainty the price will equal marginal cost.

In Israel, as in many countries, the government intervenes in the raw milk<sup>6</sup>

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<sup>6</sup> Raw milk is the milk that comes directly from cows and has yet to undergo any type of processing.

industry. According to the Dairy Farming Planning Law of the Israeli Knesset [9], the dairy farming industry in Israel functions by way of government intervention. There are two aspects of this intervention: one aspect is a determination of production quotas and the second is the determination of the price that the dairy-farmers receive for the raw milk. Therefore the question of how the government of Israel determines the price of raw milk is critical.

The purpose of this study is to examine whether the price of raw milk in Israel is equal to the marginal cost of production. One possible way to examine this question is by looking at "markup." The "markup" is the ratio between the price and the marginal cost. If the price is equal to the marginal cost, as we would expect from a competitive market, the markup will be one. If the price is higher than the marginal cost, the markup will be greater than one. The question this research study seeks to answer is: "what is the size of the markup in the raw milk industry in Israel?" Determining the relationship between the price and marginal cost is done with the assumption of full certainty in the market. In reality, raw milk producers function with uncertainty. When there is uncertainty and producers are risk averse, the price should be higher than the marginal cost (in order to compensate for the uncertainty) [10]. Therefore, we don't expect that the price will be equal to the marginal cost, but we also don't expect that the difference will be too great.

#### Measuring the market power

At first glance, in order to measure the markup it is enough to check how the manufacturer uses one input. The condition for maximum profit is:

$$(1) \quad MC = \frac{p_j}{mp_j}, \quad j=1,2,\dots,N$$

where  $j=1,2,\dots,N$  are the variable inputs,  $p_j$  is the price of input  $j$  and  $mp_j$  is the marginal output of input  $j$ . The desired markup is given by:

$$(2) \quad M = \frac{P}{MC}$$

where  $P$  is the price of one unit of output. From the above equation, the markup is able to be calculated with the help of each one of the variable inputs. In this study we assume that in the dairy farming industry, the most suitable input is the amount of dry matter [12].

#### Dry Matter

According to Jensen L. M. et al. feed intake in dairy cows has a large effect on performance in terms of milk production and body condition. In addition feed is the single most important factor to the economy in the dairy herd and typically constitutes 70% of the variable costs [8] [7]. Measuring the amount of food is a problematic subject because there are many types of food and each one has a different value. Therefore the measurement of a unit of weight or volume isn't relevant. For example, for 100 grams of a concentrated food "mixture" there is more nutrition than 500 grams of hay or 1,000 grams of straw. For this reason, the food was measured by the amount of dry matter, which is the basic part of the feed, which we get after removing from the food the wet matter (mostly water) and other materials which have no nutritional value to the cow. The dry matter is an indicator of the amount of nutrients that are available to the animal in a particular feed. In other words one can say that the nutrients in feeds, required by the animal for maintenance, growth, pregnancy, and lactation, depend on the dry matter portion of the feed.

#### MATERIALS AND METHODS

The study was conducted for the years 2013 and 2014 (each year separate from the other). The sample we were able to work with in this industry consists of data from 40 collective dairy farms in the northern region of the country. The data was gathered from The Organization of the Dairy Farmers of the Valley Agricultural Center, which operates for the instruction and development for the dairy industry in the northern region of the country. Within this framework, the

organization gathers detailed data about the larger collective dairy farms which are in the region. The average number of cows per dairy farm is 436, ranging from 250 cows in the smallest dairy farm to 1,175 cows in the largest dairy farm. The database does not include information about the family dairy farms whose herd size stands at only a few tens of cows. For reasons which will be explained in the section detailing the regression below, in order to run the regression for the years 2013 and 2014, data from the two previous years (2011 and 2012) are also required.

### Calculating the markup

Many studies have attempted to measure market power with the help of the markup. Hall calculated the markup by dividing the elasticity of production with respect to work by the labor share [6]. Eden & Griliches added the utilization rate of labor to the regression which estimated the elasticity of production with respect to work [4]. Domowitz, Hubbard & Petersen repeated the technique of Hall by using the raw materials inputs instead of labor inputs [3]. In all of these studies there is the problem of having to estimate the production function.

A different group of researchers tried to avoid the need to estimate the production function using available data about the state of the market (such as prices and amounts), as well as data on exogenous variables that can influence the firms' expenditures. Bresnahan pored over studies that were done according to the above conditions, with no need to estimate the production function, whereby the required data is known [2]. An interesting development in the aforementioned technique appears in a study by Finkelstein & Kachel. They used data on the marketing of agricultural products for two separate markets in order to estimate the market power of the agricultural industry in Israel [5]. In this study we will estimate the ratio between the price of the raw milk and the marginal cost by estimating the markup using a technique based on Hall, whereby the markup is:

$$(3) \quad M = \frac{P}{MC}$$

We will see that the markup can be estimated by dividing the production elasticity with respect to any factor by the share of this factor in the final sale [6].

In a previous study by Shahor & Drori the input which was used in calculating the markup was the number of cows [11]. In this study the production factor that we will use in order to calculate the market power is the amount of dry matter. In this study the dry matter will be denoted by F (for "feed"). Specifically, we will define the production elasticity with respect to the amount of dry matter as:

$$(4) \quad \beta_F = \frac{\Delta V/V}{\Delta F/F},$$

where V is the output (which will be defined more precisely later). In addition, we will use  $S_F$  to denote the share of the dry matter in the revenue, which constitutes the ratio between the cost of food and the economic revenue of the farm, which is calculated as follows:

$$(5) \quad S_F = \frac{P_F * F}{P * V},$$

whereby  $P_F$  is the price of one kg of dry matter and P is the price of one liter of raw milk. This calculation will also be further defined later. With the help of the above definition we can see that:

$$(6) \quad \frac{\beta_F}{S_F} = \frac{\frac{\Delta V/V}{\Delta F/F}}{\frac{P_F * F}{P * V}} = \frac{P}{\frac{P_F}{\Delta V/\Delta F}}.$$

The expression  $\frac{\Delta V}{\Delta F}$  is the marginal output.

Therefore

$$(7) \quad \frac{P_F}{\Delta V/\Delta F} = MC.$$

If we substitute (7) into (6) we get

$$(8) \quad \frac{\beta_F}{S_F} = \frac{P}{MC} = M.$$

**The production function of raw milk:**

The dependent variable – the value of the raw milk (denoted as V): The output of the dairy farming industry is not measured only by the amount of milk, but also by the percent of fat and amount of protein it contains. The higher the fat percentage and protein content are, the better the price the farmer gets for the milk. However, there is a trade-off between the percentage of fat and the amount of milk: the more the dairy farmer increases the percentage of fat in the milk (by way of altering the diet), the less milk there is. Therefore we need find the appropriate weighted average for the amount of milk that is produced with a certain amount of fat. The best way to do this is by using the price of milk since, from the perspective of the producer, the effect of the fat percentage on his income is what matters. In order to calculate this weighted average we divide the price that each producer receives in each year by the average price of milk for that year. If  $\bar{p}_t$  is the average price of the whole industry in year  $t$ , and  $p_t^n$  is the average price of producer  $n$  in year  $t$ , then by multiplying  $p_t^n / \bar{p}_t$  by the amount of milk that farmer  $n$  in year  $t$  produced, we get the weighted amount of raw milk, in terms of its price.

The inputs

- A. Dry matter per cow (denoted as F): Dry matter is what remains after all of the water is evaporated out of a feed. It is an indicator of the amount of nutrients that are available to the animal in a particular feed. This variable is measured in kg
- B. The number of cows (denoted as K): includes the cows which gave milk in the same period (and therefore does not include calves and cows about to give birth).
- C. Labor costs per cow (denoted as L): If the cow is managed in an efficient manner, a larger amount of labor and labor cost is considered to result in better care for the cows, which should increase the amount

of milk.

- D. The fertility rate of the previous year (denoted as Z): This variable shows the rate at which the cows became impregnated during the course of the previous year. Immediately after the birth, cows give their maximum amount of milk, and after a few months the amount of milk begins to fall. Therefore, the dairy farmers try to impregnate the cow (that is, to cause them to become pregnant), as soon as possible. During the pregnancy the cow continues to give milk until a few weeks before the birth, so the dairy farmers “dry out the cow” by not milking her in order to allow her to rest. After the birth the regular process resumes. Impregnating the cows is no simple matter and requires taking a few steps, which has a cost. Therefore, we can address the issue of fertilization (which is the percentage of cows that were impregnated in the same year) as a type of input. It takes nine months from the time of impregnation until birth, and therefore the fertilization affects the output of the next year. For this reason, last year’s fertility rate appears in the production function.
- E. Breeding (denoted by  $e^\tau$ ): One of the characteristics which stand out in the Israeli raw milk industry is the cultivation of the genetic material of the cowherds. The cultivation is done in two steps:
  - (1) Strict selection of the fathers: since most of the cow inseminations in Israel are artificial, a few tens of bulls are enough to inseminate all the cows in the country. Therefore, it is possible (and highly recommended) to invest great effort in order to ensure that the bulls are the best available. These bulls are chosen, firstly, according to the quality of their mothers, and then there is an additional selection process according to the quality of their daughters.
  - (2) Choosing the calves: not all calves which are born in a dairy farm are raised to be dairy cows. Those which are not are raised for meat. When the

dairy farmers choose the calves which they intend to raise, they consider the quality of their mothers.

As a result of both of these actions, there is a process which improves the quality of the cows which is expressed as an increase in the quantity of milk. This increase occurs at a fixed rate, and therefore we can express the trend using the variable  $e^\tau$  where  $\tau$  takes a value of 1 for the first period, a 2 for the second, etc.

Conclusion: The production function for the dairy farm industry is:

$$(9) V = e^\alpha (e^\tau)^{\beta_\tau} F^{\beta_F} K^{\beta_K} L^{\beta_L} Z^{\beta_Z}$$

A logarithmic transformation of the production function yields the following equation:

$$(10) \ln(v) = \alpha_n + \beta_\tau \ln(\tau) + \beta_F \ln(F) + \beta_K \ln(K) + \beta_L \ln(L) + \beta_Z \ln(Z)$$

If we take the first differences of  $\ln$  over time, we get:

$$(11) dv = \beta_\tau + \beta_F df + \beta_K dk + \beta_L dl + \beta_Z dz + \varepsilon$$

where  $dx = \ln(X_t) - \ln(X_{t-1})$ . The reason for using the differences across time is to eliminate  $\alpha_n$ . In addition, as we previously defined, the variable  $\tau$  increases in value each year by 1. Therefore, if we take the difference between the years, this variable disappears and we are left with its coefficient  $\beta_\tau$ .

In order to perform the check, we will recall, that from equation (8) we get:

$$(12) \beta_f = M \cdot S_F$$

If we substitute  $\beta_f$  into equation (11) we get:

$$(13) dv = \beta_\tau + M \cdot (S_F \cdot df) + \beta_K dk + \beta_L dl + \beta_Z dz$$

In this equation, the second independent variable is the product of  $S_F$  and  $df$ , and the coefficient  $M$  is the required markup.

Noise in the regression: The cows are,

perhaps surprisingly, very sensitive as a production factor. Therefore, each “malfunction” in care has the possibility of causing significant damage. For example, the cows are fed a number of times each day at fixed hours. A delay in feeding time has an immediate, negative impact on the amount of milk the cow will produce. Improper care at the time of milking also results in an immediate loss of milk, as well as long term damage. During the day to day operations there are many setbacks, some of which are caused by external factors. These factors include problems with the tractors, problems with the milking machines, and human error. Since we are unable to put these setbacks into our production function, they appear as noise in the regression. These setbacks are not connected to any of the independent variables in the regression and therefore we can assume that the noise of the regression and the independent variables are independent of one another.

## RESULTS AND DISCUSSIONS

The results of the regression of equation (13) appear in the table below:

Table1. Regression results

Variable	Coefficient 2014	Coefficient 2013
Intercept	***	-0.03
$S_F \cdot df$	<b>0.48</b>	<b>0.53</b>
The number of cows	***	***
Labor costs per cow	0.1	0.10**
The fertility rate	0.09	***
Adjusted R-squared	0.28	0.27

\*\*\* The degree of statistical significance was greater than 0.1 and therefore the variable was removed from the regression.

\*\* The level of statistical significance is between 0.01 – 0.05.

The important (and surprising) result is the coefficient of  $S_F \cdot df$ , which shows the ratio between the price and marginal cost. As we can see, this ratio is less than 1, which means that the marginal cost is greater than the price of the raw milk. There may be a few explanations for such a surprising result.

The first explanation is economic. If the assumption that the marginal production of the food is decreasing, the implication is that the amount of food that each cow receives is too much. In this case, the expected reaction would be that the farmers reduce the amount of food, and therefore the amount of milk. If this explanation is correct, within a relatively short period of time there will be a shortage of milk and in order to prevent this, the price of milk must be increased. However, it does not appear that this explanation in and of itself is enough to explain the relatively large difference between the price and the marginal cost. In fact, it seems like the farmers would very quickly reduce the amount of milk they produce, given the difference between price and marginal cost.

The second explanation is agricultural. The ability of each cow to process the food given to it varies from cow to cow. Therefore, the marginal production and the marginal cost to make a liter of raw milk is not the same for each cow. As a result, the amount of food which will cause the marginal cost to equal the price is different for each cow. In such a situation, we can only reach equality between price and marginal cost if we give each cow the specific amount of food that it needs. There are two obstacles standing in the way of a farmer who wants to operate in this way.

(i) The technology available to the farmers does not allow them to track how much food each cow eats. Therefore, it is impossible to check exactly the amount of food eaten against the amount of milk produced [14].

(ii) The farmers don't have control over the amount of food cows eat. Usually the stronger cows eat first and the weaker cows eat what is left. Therefore, even if the farmers were to limit the amount of food available, the stronger cows would still eat too much (that is, they will still be in the range where the marginal cost is above the price), and the weak cows will still get too little food. In the short run, the weaker cows will give very little milk, while in the long run their health will suffer, such that their ability to reproduce could be at risk. Therefore, the farmers must give the cows very large amounts of food so that each cow has enough to eat. According to

Ber, on most of the dairy farms in Israel, the farmers try to give the cows as much food as possible [1]. If this explanation is correct, it seems that the farmers in Israel ought to invest in technology that is better able to monitor the amount of food the cows receive and to strive to give each cow the proper amount of food, according to its individual dietary needs.

An additional interesting result that came out of the regression is that the fact that the coefficient of  $K$ , the number of cows, is not statistically significant. This means that any increase in the number of cows does not affect the average production. This means that for the dairy farms in this study, the marginal production of the number of cows is fixed. In competitive markets, producers will increase the amount of inputs to the point where marginal production decreases. Therefore, the fact that the dairy farms produce in the range where marginal production is fixed, might mean that the dairy farms are too small. A situation where the farms are too small seems to occur as a result of the market being controlled: there are production quotas placed on each farmer, such that the farmers cannot choose for themselves the optimally sized farm. The results of the study might show that for the quotas given out to farms which are too small, it might be better to consolidate them into one (or more) large dairy farm.

## CONCLUSIONS

In this study we examined the ratio between the marginal cost of feed and the price of raw milk in Israel. The raw milk industry is particularly interesting since the price of raw milk that the farmers receive is set by the government. There are two types of policies the government can choose from in order to achieve its policy goals. If the main goal is to maximize the efficiency of the markets, according to accepted economic theory, the government must set the price at a point where it equals the marginal cost. If the goal of the government is to help the farmers (because they live in rural areas, or because they want to guarantee a supply of dairy products, or because of other political

reasons) then the price will be set above the marginal cost of feed.

The results of this study show that against all expectations, the price of raw milk is significantly below the marginal cost of the feed. Determining why this situation arises requires further research, but there are two possible explanations. One explanation is that the price of milk is too low and therefore if the government won't raise the price, there could be a shortage of milk in the future. The second explanation is that because of technological constraints, the farmers are not able to make the most efficient use of the feed. In this case, it is important for the farmers (with the help of the government) to invest time and resources in the improvement of controls for the feeding process, or to invest time, effort and creativity thinking in other directions in order to solve the problem of inefficiency in the feeding process.

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## ASPECTS OF AGRICULTURAL REFORMS IN CHINA AND ROMANIA

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### *Abstract*

*The purpose of this study is to compare agricultural reforms in China and Romania with respect to their similarities and differences in order to identify the best solutions and future challenges of each approach. Both countries underwent important structural reforms in order to modernize agriculture and develop their rural areas. Development policies were analysed in relation with the data regarding shifts in agricultural output and farm size. Reforms in China began in the '80s, while Romania followed in the '90s. Trying to address similar problems, the two countries adopted different strategies. Romania chose fast shock-type reforms, characteristic to most of the East European countries, while China opted for a slower, step-by-step solution. Romania adopted all the reforms needed for a shift towards a free-market economy at once, while China focused on market liberalization only after the decollectivization process was complete. The smooth path China has chosen allowed the farmers to adapt to the new demands. Still, the negative outcome in both countries was land fragmentation, preventing an important part of the rural area to join the newly formed efficient agriculture. Cooperative should not be imposed, as in the past, but promoted with long-term policies and funding incentives, as being the best way for small farmers to meet the quantitative and qualitative demands of the market and gain negotiation power in the product chain. In China's case, enforcing property rights for agricultural land and allowing their free trade will be very important for future development. For Romania, one of the most important challenges will be to increase the agricultural land utilised by medium size farms, together with better absorption of EU funds.*

*Key words:* agriculture, China, development, reform, Romania

### INTRODUCTION

The end of the twentieth century brought important reforms in the whole world, in all aspects of society and all economic sectors. In some cases, the focus on industrial development led to a diminished, or even neglected, role of agriculture. However, experience showed us the strong ties between the two of them, given the important roles rural development has in providing the basis for industrial development: supplying labour to industry, producing low-cost food (to keep industrial workers' wages down), producing crops as inputs in other parts of the economy, supplying exports and raising rural incomes, as a necessary aspect of society stability and sustainable development.

Thus, countries ignoring the important roles of agriculture in development failed to achieve healthy growth and to escape the middle-income-trap. Best examples are Argentina, Mexico, Nigeria and the Soviet Union. On the other hand, countries heavily

investing in agriculture, like Japan and South Korea, built up a strong base for sustainable development, escaping the middle-income-trap and becoming models to follow regarding development strategies in the contemporary world.

The second role of agriculture in industrial development, providing cheap food for the workers in various industries, to maintain their wages low, should be fulfilled by high productivity that would keep unitary costs down. This implies, at least to some extent, free market rules, in order to promote competition and incentives for raising productivity. Contrary to that, in China and Romania, food prices were kept down only by governmental decisions, ruling the prices in the planned centralized economy. Without higher productivity, low prices translated into low income for farmers.

In both countries, the '50s collectivization created an inefficient agriculture, providing insufficient products, disconnected from the market demands and run by an unmotivated

workforce. Agriculture was failing to fulfil its roles as a cheap food provider and a basis for social stability and industrial development.

## MATERIALS AND METHODS

The data used for calculations was collected from China Statistical Yearbook [2] and Eurostat [3], covering data sets starting with 1980 until 2010. Calculations aimed to relate changes in agricultural output with their corresponding shift in China's development policies, while in Romania agricultural land fragmentation was analysed compared with the rest of European Union.

## RESULTS AND DISCUSSIONS

### Aspects of Agricultural reform in China

The land reform in China at the beginning of '50, redistributed agricultural land, taken from landlords and rich farmers, to all rural households. Soon, cooperatives' establishment and the shift to communes completely eliminated household farming.

Later on, development policies focused only on industrialization and urban areas widened the gap between rural and urban population, while the existence of Hukou system, preventing people to freely move in search for economic opportunities and trapped significant parts of the rural population in poverty. The system itself designated rural dwellers as being second-class citizens, with limited, if any, access to investment, services and opportunities.

Rural areas in general and agriculture in particular, were left behind and at some point it was clear that the country's further development will not be possible unless agricultural reforms would be taken. Slowly, and step by step, each problem of the existing system was addressed separately.

The reforms started at the end of '70s by the abolition of communes and establishment of the household responsibility system. Agricultural land, even if still collectively owned, was contracted to households, on the basis of family size and labour force. This is what has driven the growth of agricultural output and productivity at the early stages of

the reform.

One of the first steps taken for reform, was raising incentives for above-quota sales. The raised incentives translated into higher prices (still controlled), with an immediate effect on increasing farm outputs.

Table 1. Increase in agricultural output value between 1980 and 2010

No.	Period	Total agriculture	Farming	Animal Husbandry	Fishery	Forestry
1	1980-1985	88%	72%	125%	294%	132%
2	1985-1990	112%	98%	146%	225%	76%
3	1990-1995	165%	140%	207%	315%	115%
4	1995-2000	22%	17%	22%	59%	32%
5	2000-2005	58%	41%	80%	48%	52%
6	2005-2010	76%	88%	56%	60%	82%

Source: own calculations

Farm inputs' prices were kept low, but insufficient availability raised the prices for additional inputs (mostly fertilizers) even beyond international prices. Private ownership of wells, pumps and irrigation equipment led to the establishment of private water markets.

Decisions that preceded the establishment of free market allowed farmers to sell some specific products within limited boundaries, like their counties. But real market liberalization for agricultural inputs and outputs started only in mid '80s and continued until late '90s. As a result, the number of private trading companies rose more than 20 times between 1980 and 1990. Also international trade was encouraged by lowering tariff and nontariff barriers and licensing of private companies to engage in such activities [1].

The results were spectacular right from the beginning, with increases of over 70% in farming, over 100% in animal husbandry and forestry and almost 300% in fishery, over the first 5 years (1980-1985). The rate of growth even speeded up in the following years, until mid '90s, as new reforms were enacted (Table 1).

High incentives and market liberalization determined farmers to naturally shift their production in a way that satisfied China's

comparative advantage, from land-intensive low value towards labour-intensive high value products. Most of the farmers benefited from the reforms, except the ones in poorer areas, where the specific conditions made shifting to high value crops hard. Thus, a fraction of Chinese farmers were unable to seize the new opportunities and were affected by the general demand for competitiveness, being left behind.

Overall, rural incomes have steadily increased during the reform era and farms, and even villages, became more and more specialized in one type of product, usually a high value product. This shift towards high value products can be easily observed by comparing the values of increase rates in agricultural output between 1980 and 2010: the sectors producing high value products, like animal husbandry and fishery, have increased at a higher rate than land intensive farming (Figure 1).

Agricultural research was also reformed starting in mid '80. Competitive grants were introduced and research units were encouraged to fund themselves by selling the results of their research. Overall, the reform weakened the system. Competitive grants may have had good results, but reliance on self-funding by free market failed [1].

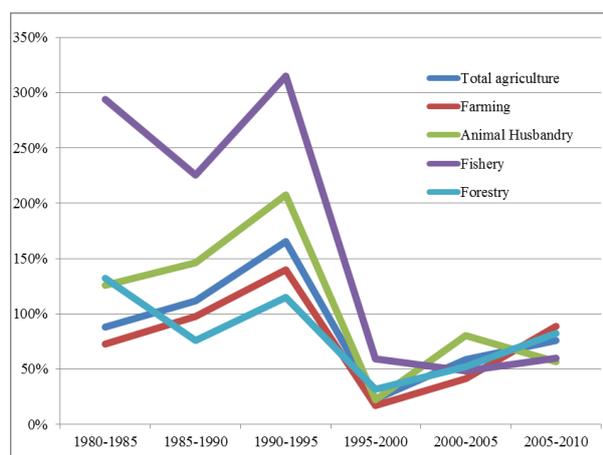


Fig. 1. Increase rates in agricultural output value 1980-2010

After reforms begun, agriculture was the first sector to connect China to the world, by international trade. Both imports and exports have constantly grown.

Trading companies have grown, both for

international and domestic markets. Nowadays, most of the farm production is bought by small private traders and even farmers in remote poor villages are integrated that way in the national market. Product chains are developed, but the power is shifted towards traders and retailers.

Regarding land fragmentation, between 1980 and 2000, the land controlled by the average farm household has fallen from 0.71 to 0.55 hectare. Even so, the cooperatives are extremely rare, with only 2% of farmers belonging to one. By other developed countries' experience, participation of most of the farmers in cooperatives was an important step in development; examples are the Western European countries, Japan, South Korea and even U.S.

#### Aspects of agricultural reforms in Romania

Between 1949 and 1962, forced collectivization transformed Romanian rural area; agricultural production cooperatives were formed, following the Soviet model, alongside the already established state farms.

Between 1962 and mid-'80s, restructuring, modernization and investments had positive effects on agricultural production, especially in the case of the more specialized state farms, closer in many aspects to the American farms. Unfortunately, in the '80s, investments for modernization were halted and the incentives system for farm workers was abolished. The quantity and quality of production decreased and agriculture became even more disconnected from the market.

The beginning of '90s brought radical reforms, not only to the agricultural sector, but to all parts of Romanian economy and society.

Agricultural reforms during the '90s, in the East-European countries, were focused on establishing competition and free market trade. In Romania, the first step was shifting the land ownership from state to private, by restoration of private ownership and privatization. This was done too fast and not connected to the privatization of other agricultural assets, nor to the necessary reshaping process of agricultural structures. The 4,260 Romanian agricultural cooperatives, owning over 60% of the

agricultural land and over 70% of the arable land, were dissolved in a random manner and the result was excessive land fragmentation, unsuitable for any type of efficient farming. The cattle sector, for example, suffered a dramatic decrease, from 5.38 million heads in 1990, to only 2.07 million in 2014, with a minimum of 1.99 million heads reached in 2011 [5].

Negative experiences and memories of the '50s forced collectivization process caused strong reluctance in establishing cooperatives after 1990, even if they are the best way for small and medium farmers to meet the quantitative and qualitative demands of the industry and gain negotiation power, as seen from the experience of the Western European countries.

Even for the developed countries, agriculture was, and to some extent still is, strongly influenced by state's policies and intervention mechanisms. In Romania, after 1989, agriculture was not truly considered to be a priority for the country's development and the whole sector was thrown into the free market pit without any consideration or clear strategy [7].

Maybe the most important problem was the lack of investments needed to support the reforms.

In the absence of a coherent development strategy and proper structural adjustment, the distribution channels were distorted and eventually destroyed. The reforms privatized agriculture and freed the market, but disconnected one from the other.

Agricultural production decreased and food imports increased, to cover the country's necessities.

The industry delivering inputs for agriculture was also affected, both by shock-type reforms and lack of demand from the, now weakened, agricultural sector.

As it was seen, from other countries' experiences, sufficient investment in agriculture and adequate rural development policies are necessary for the development of the country as a whole, including industry and services. Thus, Romanian agriculture's downfall, after the early '90s reforms, constituted also an important brake in the

development of the other economic sectors [6].

After 2000, new strategies, also in the framework of EU accession, started to correct the mistakes and reshape Romanian agriculture in a more adapted way to modern markets, but this is still a long process.

Unlike the agriculture of the most other European countries, Romanian agriculture developed in a very different way: subsistence and small farms, as well as large farms, are predominant (Table 2).

Table 2. Utilised agricultural area by farm size in Romania and EU (2007)

No.	Farm size	Romania		European Union	
		ha.	% from total	ha.	% from total
1	0 to 9.9 ha.	6,846,950	49.78%	25,314,680	14.68%
2	10 to 99.9 ha.	1,733,730	12.61%	66,784,950	38.72%
3	100 ha. or over	5,172,370	37.61%	80,385,420	46.60%
<b>Total</b>		<b>13,753,050</b>	<b>100%</b>	<b>172,485,050</b>	<b>100%</b>

Source: own calculations

Romania developed a strong sector of large farms, some of them even bigger than their other European counterparts, but medium size farms utilise only a small fraction of the available agricultural land, more than three times lower than the European average, as subsistence and small farms control the rest of it (Figure 2).

Of all EU Member States, Romania has the highest number of farms and labour involved in agriculture (29% of all EU farms and 19% of total workforce), while Romanian small farms (less than 1 European Size Unit) account for more than half of the small farms in all EU.

After Romania's accession as a full EU member in 2007, Romanian agriculture continued its development in the framework of the Common Agricultural Policy. This brought both new competition and new opportunities for Romanian farmers. The direct payments system was established and new institutions were created to manage the European Agricultural Fund for Rural Development (EAFRD), in order to partly finance investment projects for the private sector. Large farms were the ones to benefit the most out of both systems, widening the

gap between them and the medium farms, let alone the small ones.

High bureaucracy and inefficient management of European funds are the most important problems Romania still has to overcome [4].

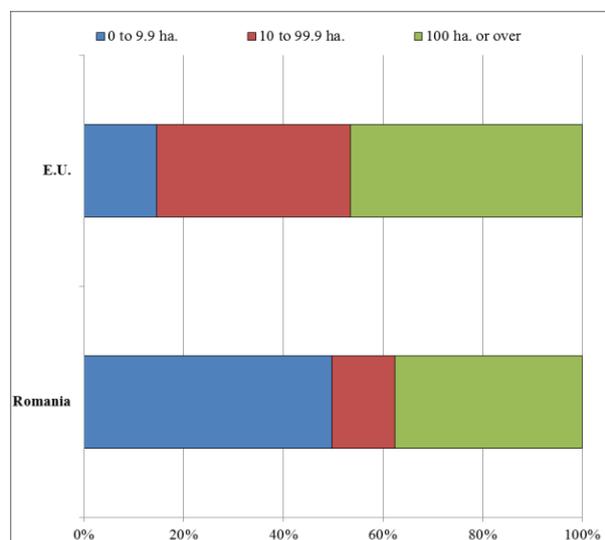


Fig. 2. Utilised agricultural area by farm size in UE and Romania (2007)

## CONCLUSIONS

In both countries, Romania and China, the agricultural reforms had the same objective: increasing the agriculture's efficiency by connecting it to the free market, raising farmers' incomes and providing the base for development for the other economic sectors.

Unlike Romania, in China the reforms were taken at a slow pace, step by step and with much caution. Firstly, the household responsibility system was established, farmers taking full responsibility of the land they were working. Then, incentives for above-quota sales were increased, followed by permission to free trade minor products in very specific conditions. Only after those preliminary steps were completed, free market trade for the important products was allowed.

If in China, and almost everywhere else in the world, one of the most important roles of agriculture after the reform was to supply labour force for industry, in Romania things were quite different. After intensive industrialization in the '80s, the '90s brutal reforms dismantled the newly formed industry, leaving an important part of the

labour force unemployed. As agriculture was more resilient to shocks, it was able to absorb a part of the labour force and ease the pressure on the labour market.

This is also one of the reasons Chinese government is so reluctant to allow free trade of land property rights; if any downfalls are to appear in the rest of the economy, at least part of the labour force will be able to return to their farms and survive on agricultural activities.

The future challenges Chinese rural areas are facing are related to urbanization and farms modernization. The two are strongly connected, as the necessary investments in the human resource needed in the cities relies on higher rural incomes, provided by more efficient farming. Increasing farms' sizes is crucial in this development and promotion of agricultural joint operations might also serve this purpose. Another important aspect is education, which needs to become a priority in rural development. More educated and skilled people leads to higher wages and more opportunities for migrants, but also to better and more efficient land usage by those remaining in the villages. New rural land laws and regulations aim to encourage farmers to invest and increase their farms sizes, but the difficulties they are facing in finding funding for that, are connected with the volatility of property rights. Enforcing property rights is also very important for future development, enabling farm owners to design medium and long term strategies, get access to credit and make investments. Also, the free trade of property rights will provide the smaller and poorer households with the necessary funding for migration, in search for better opportunities.

One of the most important challenges for Romanian agriculture will be to increase the agricultural land utilised by medium size farms. EU development funding should be directed to medium size farms. Small subsistence farms should not be promoted, but care has to be given to the social problems poor rural households are facing.

Collective actions between small farmers should be promoted in both countries, through cooperative structures for inputs acquisition,

farming, distribution and even joint processing.

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## FINANCING PROGRAMS: HORIZON 2020

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### *Abstract*

*The paper aimed to present the financing program called Horizon 2020 and the importance of financing programs in agriculture. Agriculture and forestry have always had and maintain an important role for EU's society. Horizon 2020 has the political backing of Europe's leaders and the Members of the European Parliament. Horizon 2020 seeks to improve simultaneously the productivity and sustainability of agriculture and forestry while strengthening related food and non-food industries. It also seeks to empower rural communities to boost economic diversification and delivery of ecosystem services.*

**Key words:** agriculture, innovation, rural development, sustainable

### INTRODUCTION

Agriculture and forestry have always had and maintain an important role for EU's society: they supply reliable, healthy and nutritious food as well as feed and non-food products for a wide range of industries, shape and take care of our landscapes, provide public goods, and keep the countryside alive by providing jobs.

To ensure the sustainable development of rural areas, it is necessary to focus on a limited number of core priorities relating to knowledge transfer and innovation in agriculture, forestry and rural areas, to farm viability, to the competitiveness of all types of agriculture in all regions and promoting innovative farm technologies and the sustainable management of forests, to the organisation of the food chain, including the processing and marketing of agricultural products, to animal welfare, to risk management in agriculture, restoring, preserving and enhancing ecosystems that are related to agriculture and forestry, to the promotion of resource efficiency and the shift towards a low carbon economy in the agricultural, food and forestry sectors, and to promoting social inclusion, poverty reduction in and the economic development of rural areas. In doing so, account should be taken of

the diversity of the situations that affect rural areas with different characteristics or different categories of potential beneficiaries and of the cross-cutting objectives of innovation, environment and climate change mitigation and adaptation. [4]

Horizon 2020 is the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market. [1]

### MATERIALS AND METHODS

Seen as a means to drive economic growth and create jobs, Horizon 2020 has the political backing of Europe's leaders and the Members of the European Parliament. They agreed that research is an investment in our future and so put it at the heart of the EU's blueprint for smart, sustainable and inclusive growth and jobs.

By coupling research and innovation, Horizon 2020 is helping to achieve this with its emphasis on excellent science, industrial leadership and tackling societal challenges. The goal is to ensure Europe produces world-class science, removes barriers to innovation

and makes it easier for the public and private sectors to work together in delivering innovation.

Horizon 2020 seeks to improve simultaneously the productivity and sustainability of agriculture and forestry while strengthening related food and non-food industries. It also seeks to empower rural communities to boost economic diversification and delivery of ecosystem services.

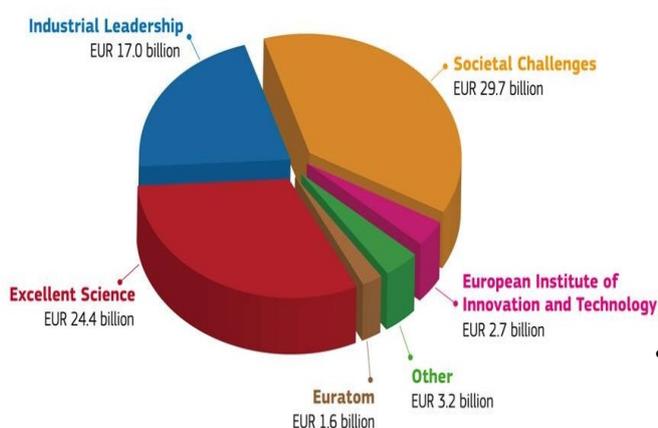


Fig.1. Horizon 2020 Budget

The challenges that the EU aims to address through Horizon 2020 are described in the Horizon 2020 [2]. According to this programme, research activities will:

- Improve production efficiency, sustainability and resilience. Enhancing productivity as well as the capacity of plants, animals and production systems to adapt to a rapidly changing environment and climate with increasingly scarce natural resources. The resulting innovations will help to move towards a resource-efficient agriculture and food and feed supply chains which consume fewer resources.
- Deliver more public goods and ecosystem services. Contributing to a better understanding of the complex interactions between primary production systems and ecosystems services. Supporting the provision of these public goods and services through the delivery of management solutions, decision-support tools and the assessment of their market and non-market value.

- Empower rural people and develop better policies. Strengthening rural communities' capacities for production and for delivery of ecosystems services. Fostering economic diversification, ensuring appropriate relations between rural and urban areas, as well as facilitating knowledge exchange, demonstration, innovation and dissemination. They will support policy makers in defining relevant strategies.
- Create more sustainable forestry. Promoting multi-functional forests which deliver a variety of ecological, economic, and social benefits. Focusing on the further development of sustainable forestry systems which can address societal challenges and demands, including forest owners' needs, by putting in place multifunctional approaches taking into account climate change.
- Build a sustainable and competitive agri-food industry. Addressing the needs for the food and feed industry to cope with social, environmental, climate and economic change from local to global. Projects will consider all stages of the food and feed production chain, including food design, processing, packaging, process control, waste reduction, by-product valorisation and the safe use or disposal of animal by-products.
- Support market development for bio-based products and processes. Opening new markets for biotechnology innovation, through in particular demand-side measures. Standardisation and certification at Union and international levels are needed for, amongst others, determination of bio-based content, product functionalities and biodegradability. Methodologies and approaches to life-cycle analysis will be further developed.

Horizon 2020 it is structured in three main pillars:

- Excellent science;
- Industrial leadership;
- Societal challenges.

Horizon 2020 is structured under three main pillars. There are opportunities for individual

researchers and groups of researchers to apply for funding in each of these pillars. The choice of pillar and underlying programme depends on what a researcher is looking for in terms of the size of project, whether it is basic or applied research, or whether someone is interested in moving to another country.

The three pillars are:

**Pillar 1: Excellent Science.** Excellence is the only criterion in this mostly bottom-up pillar. Under this pillar four different schemes are available:

**-European Research Council (ERC).** Excellent researchers with outstanding track records can apply to the ERC to carry out the frontier research project of their choice. Grants are available to researchers of any nationality, any age and at any stage of their career. The ERC is particularly keen to encourage excellent proposals from investigators of any nationality based outside Europe that wish to carry out a project with a host institution in the EU or Associated Countries. Projects may also involve team members from outside Europe.

-Future Emerging Technologies (FET) is a funding mechanism for collaborative 'high risk' research. It is geared specifically towards turning new ideas into new technology in a short time scale. FET will operate under three different streams:

- FET Open, a bottom-up up scheme open to all sciences.
- FET Proactive where topics are prescribed by a biannual work programmes.
- FET Flagships, multibillion programmes with a defined roadmap. Currently there are two flagships running: the Graphene and the Human Brain projects. These flagship projects issue their own calls.

-Marie Skłodowska Curie Actions (MSCA) fund mobility, training and career development in academia, industry and other non-academic sectors through individual

mobility grants (individual fellowships) and projects. Fellowships are open to individual researchers of all nationalities with at least four years research experience or a PhD. To be eligible applicants should not have been in the host country for more than 12 months in the previous three years [3].

-Research Infrastructures: funding for e-infrastructures and access to infrastructures for researchers.

**Pillar 2: Industrial Leadership.** This is the Enterprise and Innovation Fund for collaborative research and innovation projects. Here the focus is on industrial involvement and applied research.

**Pillar 3: Societal Challenges.** Funding here is predominantly for collaborative projects, following a top-down approach with two-year work programmes of defined, challenge-based topics. Usually, a minimum of three legal entities from three EU Member States participate in these projects. There is no maximum number of partners. Project partners can be from any part of the world.

Under pillar 3, seven Societal Challenges have been identified:

1. Health, demographic change and wellbeing
2. Food security, sustainable agriculture, marine and maritime research and the bio-economy
3. Secure, clean and efficient energy
4. Smart, green and integrated transport
5. Climate action, resources and raw materials
6. Inclusive, innovative and reflective societies
7. Secure societies

There are mainly two EU instruments supporting specifically agriculture and forestry research and innovation: Horizon 2020 and Rural development policy. Many other EU policies addressing innovation and skills development in general can also contribute to agricultural research and innovation.

There are also opportunities for agriculture

and forestry in other parts of Horizon 2020, such as Climate action, SMEs, cross-cutting activities like Internet of Things and Circular Economy and parts dedicated to the bottom-up initiative Marie Skłodowska-Curie actions or research infrastructures.

## RESULTS AND DISCUSSIONS

Alongside the bottom-up funding schemes within the Excellent Science pillar, the Commission will produce biannual Strategic Programmes specifying the focus areas for that particular period. These strategic roadmaps will form the basis of biannual work programmes under the three different pillars.

The work programmes will define the topics, challenges and the expected outcomes. They will also give details of call dates and deadlines, budgets, funding rates, and any other project-specific requirement. Calls will open every year.

To ensure the sustainable development of rural areas, it is necessary to focus on a limited number of core priorities relating to knowledge transfer and innovation in agriculture, forestry and rural areas, to farm viability, to the competitiveness of all types of agriculture in all regions and promoting innovative farm technologies and the sustainable management of forests, to the organization of the food chain, including the processing and marketing of agricultural products, to animal welfare, to risk management in agriculture, restoring, preserving and enhancing ecosystems that are related to agriculture and forestry, to the promotion of resource efficiency and the shift towards a low carbon economy in the agricultural, food and forestry sectors, and to promoting social inclusion, poverty reduction in and the economic development of rural areas. In doing so, account should be taken of the diversity of the situations that affect rural areas with different characteristics or different categories of potential beneficiaries and of the cross-cutting objectives of innovation, environment and climate change mitigation and adaptation. Mitigation action should relate both to limiting emissions in agriculture

and forestry from key activities such as livestock production, fertilizer use and to preserving carbon sinks and enhancing carbon sequestration with regard to land use, land use change and the forestry sector. The Union priority for rural development relating to knowledge transfer and innovation in agriculture, forestry and rural areas should apply horizontally in relation to the other Union priorities for rural development.

## CONCLUSIONS

The financing program called Horizon 2020 and the financing programs for agriculture are very important for the next sustainable development of agriculture and rural space. They prove that agriculture and forestry have always had and maintain an important role for EU's society.

Horizon 2020 has the political backing of Europe's leaders and the Members of the European Parliament.

Horizon 2020 seeks to improve simultaneously the productivity and sustainability of agriculture and forestry while strengthening related food and non-food industries. It also seeks to empower rural communities to boost economic diversification and delivery of ecosystem services.

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## RESEARCH ON THE ROMANIAN WHEAT MARKET

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### **Abstract**

*The theme approached in this article aims knowledge of the evolution of the wheat market in Romania, from 2010 until 2015. To highlight the trends on this market, a number of specific indicators have been analyzed, such as total production of wheat; average production; prices; import; export. The following analysis was based on the empirical data provided by the National Institute of Statistics and Ministry of Agriculture and Rural Development. The analysis of the Romanian wheat market was performed especially from the quantitative perspective, capturing the changes recorded in the given interval. The wheat production increased in 2014 compared to the base year, contributing directly to the economic growth. A significant aspect is the growth of wheat exports compared to the imports. In conclusion, the wheat market is an important segment of our country's economy as it ensures the production needed to satisfy the human needs, but it also provides significant quantities for export.*

*Key words:* export, import, Romania, total production, wheat

### **INTRODUCTION**

According to the official data, worldwide, the wheat crop occupies the largest areas. Over time world wheat production registered a significant increase. This growth has been possible due to representative factors such as: cultivated areas and technological progress. [3]

An important characteristic for wheat is represented by its adaptability.

This allows the cultivation of wheat and obtaining favorable productions for farmers in different climate conditions. Wheat is on the one hand, the main raw material for the manufacture of bakery products, and on the other hand, it is used as animal feed. [5, 6]

It is appropriate to remind here the main nutrients that can be found in wheat: 65-70 % carbohydrates; 12-15% protein; 2-3% fat. Wheat is a basic product for consumption in Romania due to the food consumption model of the population and because of the low incomes. In our country the consumption of cereals and cereal products is higher compared to the EU average. [4]

Wheat holds a key place in the strategy of assuring the food security. This place is ensured by the fact that wheat has certain features such as contributing at obtaining

different bakery products; can be preserved for a long time; can be carried long distances without deteriorating. [8]

### **MATERIALS AND METHODS**

The statistical data underlying the realization of this research were provided by the National Institute of Statistics and Ministry of Agriculture and Rural Development. The main indicators considered in order to achieve the wheat market analysis were: the wheat acreage nationally and by region; total wheat production achieved; average production per hectare; average purchase prices on the domestic market, import and export. To highlight the essential aspects of the wheat market in Romania studies, journals and specialty books were consulted.

### **RESULTS AND DISCUSSIONS**

Wheat acreage nationwide is an important factor that directly influences the production realized by farmers. The evolution of the wheat cultivated area in Romania by development regions is presented in Table 1. It can be seen that in the period 2010-2014 wheat acreage recorded oscillations from one period to another.

Nationally the largest area cultivated was in 2010 (2,162,388 ha). According to data provided by the United Nations for Food and Agriculture, in 2010, in terms of wheat acreages, Romania took the sixth place at European level. This year, Romania has held a share of 3.9 % of the total of European wheat culture surfaces. The first places in the top of European countries with wheat cultivators in 2010, were the following countries: Russia, Ukraine, France, Germany, Poland. [9]

The smallest wheat acreage nationwide was recorded in 2011 (1,947,008 ha). In 2014, in Romania was recorded a decrease in wheat acreage (-2.3%), compared to 2010. In 2011, the surface cultivated with wheat nationwide occupied 36.8% of the total areas cultivated with cereal grains. In 2011, our country occupied the fifth place of all the Member States, in terms of cultured surface.

In the European Union it has been cultivated

an area of 25,596.6 thousand hectares. The first places in the ranking were occupied by: France (5,425.7 thousand ha); Germany (3,226.0 thousand ha); Poland (2,406.1 thousand ha); Spain (1,948.1 thousand ha). [13]

In 2013, our country was positioned in fourth place, in terms of cultivated area. This year the countries that have occupied the top places are: France; Germany; Poland. [7]

In 2014, Romania occupied the fifth position in the European Union regarding the wheat acreage. In terms of development regions it is found that South-Muntenia region owns the first place for wheat acreages. The largest area cultivated with wheat was recorded in 2012 (637,568 ha). [14]

At the opposite pole, the lowest wheat acreage was Bucharest-Ilfov region. In 2014, wheat crops in this region occupied an area of 18,359 ha. [2]

Table 1. Area cultivated with wheat nationwide and by development regions, 2010-2014 (ha)

SPECIFICATION	2010	2011	2012	2013	2014	2014/2010 (%)
ROMANIA	2,162,388	1,947,008	1,997,633	2,103,985	2,112,866	97.7
North-West Region	116,226	120,130	118,220	119,514	122,922	105.7
Center Region	92,715	99,074	76,299	90,046	91,308	93.9
North-East Region	156,158	137,276	182,914	152,736	158,401	101.4
South -East Region	528,222	421,563	466,165	515,020	507,013	95.9
South Muntenia Region	628,723	600,021	637,568	597,630	590,583	93.9
Bucharest –Ilfov Region	17,351	15,354	18,290	19,358	18,359	105.8
South-West Oltenia Region	403,705	350,049	311,349	387,170	382,036	94.6
West Region	219,288	203,541	186,828	222,511	242,244	110.4

Source: [12]; own calculations

Wheat production achieved nationally represents an important segment for cereals, because it contributes directly in providing the consumption needs for the population, and it is also used for animal feed. Wheat production has influenced the evolution of the selling price obtained on the internal plan.

The evolution of the wheat production for the period 2010-2014 is presented in Table 2. It must be remarked that although our country has favorable conditions for growing cereals grains respectively wheat, the production realized during the analyzed period recorded oscillations. In Romania, the production increased in 2014 by 30.5% compared to 2010. [1]

This increase in production is due to

increasing yields per hectare. It finds that most of the wheat production in the analyzed period was 7,584,814 tons (2014), and the lowest production was 5,297,748 tons (2012). In 2013, Romania was ranked sixth in the top of producing countries from the European Union after: France, Germany, UK, Poland and Spain. [3]

Romania was placed fifth in terms of production achieved in the year 2014. In this year it was given a more favorable rank compared to 2013. The most significant productions were obtained from: France, Germany, the United Kingdom and Poland. [14]

Regarding the production realized by region, it is found that South-Muntenia obtained the

highest production of wheat during 2010-2014. It got a maximum of production in 2011 (2,293,514 tons). In this region, in 2011, it was achieved 31.5 % of the total production of wheat in Romania. The lowest production was achieved in 2010 (1,647,875 tons). In

2014, the wheat production in South-Muntenia increased by 34.2 % compared to 2010. The lower productions are found in Bucharest-Ilfov region. In 2014, this region had an increase of 41.9 % compared to 2010.

Table 2. Production of wheat nationwide and by development regions, 2010-2014 (tons)

SPECIFICATION	2010	2011	2012	2013	2014	2014/2010 (%)
ROMANIA	5,811,810	7,131,590	5,297,748	7,296,373	7,584,814	130.5
North-West Region	339,408	434,917	350,895	455,524	472,422	139.1
Center Region	255,240	362,235	201,988	298,193	337,776	132.3
North-East Region	421,021	462,060	423,787	484,599	529,045	125.6
South -East Region	1,439,392	1,573,168	1,097,107	1,660,490	1,767,518	122.7
South Muntenia Region	1,647,875	2,293,514	1,701,501	2,254,405	2,212,388	134.2
Bucharest –Ilfov Region	52,186	58,209	52,046	80,805	74,085	141.9
South-West Oltenia Region	1,000,332	1,126,897	745,916	1,096,190	1,221,507	122.1
West Region	656,356	820,590	724,508	966,167	970,073	147.7

Source: [12]; own calculations

In Romania, according to data from the Ministry of Agriculture and Rural Development, wheat production is maintained through various forms of support, as it follows:

-*Direct payment schemes* (single area payment scheme, redistributive payment, payment for agricultural practices beneficial for the climate and the environment, payment for young farmers, simplified scheme for small farmers);

-*National transitional aids* - granted for the vegetal domain, in accordance with the annual budget allocated to the Ministry of Agriculture and Rural Development;

-State aid for the gas used in agriculture. [16]

The evolution of the average production per hectare of wheat nationally and by regions of development is presented in Table 3. A representative aspect of the wheat manufacturing sector is the yield increase per hectare. Nationally, in 2014, the average production of wheat increased by 33.5 % compared to 2010. The lowest yield was recorded in 2012 (2,652 kg/ha) and the highest yield was achieved in 2011 (3,663 kg/ha). Obtaining superior yields depends on many factors including: climate conditions; soil fertility; allocation of fertilizers; realization of agricultural works in the optimal periods; technical equipment of farmers, etc.

In 2014, in terms of average production per hectare of wheat, Romania is ranked at the bottom of the table. The first places were occupied by Germany (8,630 kg/hectare); United Kingdom (8,616 kg/hectare); Denmark (7,461 kg/hectare); France (7,361 kg/hectare); Sweden (6,803 kg/hectare); Czech Republic (6,498 kg/hectare), etc. [14] In 2014, our country achieved only 41.5% of the average production per hectare of wheat in Germany.

Price is an important indicator both for the producer and for the purchaser. In Romania, the prices of agricultural products do not provide manufacturers a reasonable profit.

The evolution of average purchase prices for wheat nationally and by regions of development is presented in Table 4. In the period 2010-2015, average prices of acquisition have evolved differently from one period to another.

Lowest price of the acquisition was recorded in 2010 (0.59 euro/kg), and the highest acquisition price was recorded in 2012 (0.91 euro/kg).

In 2013, wheat prices were lower than in 2012. This is partly due to the favorable conditions that determined the realization of a significant internal production and the declination of the international prices.

Table 3. Average production per hectare of wheat nationally and by regions of development, 2010-2014 (kg/hectare)

SPECIFICATION	2010	2011	2012	2013	2014	2014/2010 (%)
ROMANIA	2,688	3,663	2,652	3,468	3,590	133.5
North-West Region	2,920	3,620	2,968	3,811	3,843	131.6
Center Region	2,753	3,656	2,647	3,312	3,699	134.3
North-East Region	2,696	3,366	2,317	3,173	3,340	123.8
South -East Region	2,725	3,732	2,353	3,224	3,486	127.9
South Muntenia Region	2,621	3,822	2,669	3,772	3,746	142.9
Bucharest –Ilfov Region	3,008	3,791	2,846	4,174	4,035	134.1
South-West Oltenia Region	2,478	3,219	2,396	2,831	3,197	129.0
West Region	2,993	4032	3,878	4,342	4,005	133.8

Source: [12]; own calculations

At the Chicago Commodities Exchange the trading price for wheat was over 22 percent lower in 2013 compared to 2012. [10]

From 2012 to 2015 the price for wheat is on a

downtrend. By regions of development it appears an oscillation of prices from one period to another.

Table 4. Average purchase prices for wheat nationally and by regions of development (lei/kg)

SPECIFICATION	2010	2011	2012	2013	2014	2015	2015/2010 (%)
ROMANIA	0.59	0.88	0.91	0.85	0.76	0.74	125.4
North-West Region	0.63	0.94	0.95	0.82	0.72	0.73	115.8
Center Region	0.60	1.03	0.99	0.91	0.79	0.79	131.6
North-East Region	0.67	1.07	1.05	1.06	0.93	0.80	119.4
South -East Region	0.55	0.76	0.88	0.83	0.76	0.74	134.5
South Muntenia Region	0.74	0.99	1.02	0.89	0.81	0.81	109.4
Bucharest –Ilfov Region	0.60	0.83	0.92	0.86	0.79	0.76	126.6
South-West Oltenia Region	0.56	0.90	0.90	0.87	0.74	0.74	132.1
West Region	0.57	0.93	0.90	0.83	0.68	0.73	128.0

Source: [12]; own calculations

Foreign trade with wheat for 2010-2014 is presented in Table 5. It can be easily observed that Romania exported a superior net amount of wheat compared to the imports. The amount of wheat exported by Romania was placed on the markets of the European Union countries and also on the market of third countries. The main destinations of wheat exports from our country in season 2012/2013 were Spain (242,000 tons), Italy (194,000 tons) and Greece (102,000 tons). [15]

In 2013, Romania exported 9.6% of the total production of wheat outside the European Union. The average export price for this quantity was 183 euro/ton. It should be noticed that Egypt is a constant partner of Romania. Egypt has imported wheat in August 2013 (181 thousand tons), and in November 2013 the quantity imported in August was supplemented by an additional 60 tons. This amount was imported at a price of

224 euros/ton. [10]

We can observe an increase of the price due to higher prices on the domestic market in our country. Egypt has expressed interest in Romanian wheat also in the season 2014-2015, according to the official data published by the competent authorities. The largest amount was exported in 2014 (4,965,442.7 tons), while the smallest quantity exported was recorded in 2011 (1,568,734.0 tons). In 2014, the amount of wheat exported has doubled compared to 2010. According to official data, Romania is ranked tenth in the top for the wheat exporters worldwide, in season 2014-2015.

This season our country has exported 4 million tons of wheat. The quantity exported was lower compared to the one in the 2013-2014 season (4.9 million tons of wheat). Although Romania was in the top ten exporters of wheat in the world, it can't exert

influence in order to determine the selling price. This is due to the fact that our country exports a small amount of wheat compared with the United States (over 25 million tons), Russia (19.5 million tons), France (18.6 million tons), Germany (8.7 million tons). [17]  
 Regarding imports is noted that these are

smaller than the exports, which is a positive aspect for the Romanian economy. The smallest amount of wheat was imported in 2012 (531,827.0 tons), and the largest amount was in 2010 (719,954.0 tons). In 2014, the wheat imports decreased by 6.9 % compared to 2010.

Table 5. Foreign trade of wheat in the period 2010-2014 (tons)

SPECIFICATION	2010	2011	2012	2013	2014	2014/2010 (%)
Export	2,480,143.0	1,568,734.0	2,314,888.2	4,773,293.8	4,965,442.7	200.2
Import	719,954.0	559,138.5	531,827.0	679,827.7	670,919.4	93.1

Source: [16]; own calculations

The evolution of the value of wheat exports and imports is presented in Table 6. According to data from the Ministry of Agriculture and Rural Development, the total earnings from exports of wheat in 2014 increased by 152.8 % compared to 2010. The highest earnings from the wheat exports were made in 2013 (977,679.5 thousand Euros).

This is explained by the increase of the exported amount and also by the increase of the price for exports. The lowest earnings from exports of wheat were obtained in 2011 (309,768.9 thousand Euros). In 2014, these have been 116,079.9 thousand euros. The costs for the wheat imports rose by 3 % in 2014 compared with 2010.

Table 6. Export and import of wheat in the period 2010-2014 (thousand Euros)

SPECIFICATION	2010	2011	2012	2013	2014	2014/2010 (%)
Export	379,446.1	309,768.9	544,095.9	977,679.5	959,356.8	252.8
Import	112,444.4	124,235.5	118,663.4	122,897.1	116,079.9	103.2

Source: [16]; own calculations

In Romania, a great importance is granted for the growth of the grain production, given that the share for agriculture in GDP is 5-6 %. Cereal production directly influences the economic growth in our country. In these conditions, certain measures are imposed to increase the competitiveness of this sector:  
 -the development of the infrastructure for processing, storage and marketing of grain products;  
 -upgrade the processing of grain production by implementing new technologies;  
 -better utilization of cereal products regionally by creating opportunities for processing, storage and marketing cereal products;

-attracting local and foreign investments in order to process higher quality cereal products;  
 -efficient use of human resources and factors of production, etc. [11]

## CONCLUSIONS

After analyzing the wheat market in Romania have resulted the following:  
 -wheat acreage has reduced in 2014 (2.3%) compared to 2010;  
 -the total of wheat production increased by 30.5 % in 2014 compared to 2010;  
 -the average production per hectare of wheat

increased by 33.5 % in 2014, compared to the base year;

-the average purchase prices have evolved differently from one period to another . This was influenced by the achieved production and consumer demand;

-wheat exports were higher than imports, both in terms of quantity and value. In the period 2010-2014, Romania has achieved a positive trade balance for wheat, which is a positive aspect for the economy.

[14][http://www.insse.ro/cms/files/statistici/comunicate/com\\_anuale/Prod\\_veg/prod\\_veg\\_r14.pdf](http://www.insse.ro/cms/files/statistici/comunicate/com_anuale/Prod_veg/prod_veg_r14.pdf)

[15][www.iem.ro/rem/index.php/REM/article/download/128/134](http://www.iem.ro/rem/index.php/REM/article/download/128/134)

[16]<http://www.madr.ro/culturi-de-camp/cereale/grau.html>

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## RESEARCH ON IMPROVING THE WORKING CAPACITY OF THE STUDENTS FROM UNIVERSITY OF AGRONOMIC SCIENCES AND VETERINARY MEDICINE BUCHAREST ACCORDING TO THE SPECIALIZED EXERCISES IN THEIR PHYSICAL TRAINING

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### **Abstract**

*Between the physical education and sports education there are both elements of similarity and distinction. The similarity lies in the fact that the main working tool is both physical exercise and also common results that we find in the two activities. Although these two activities have common points they are not identified. The physical exercise, is the resemblance point between the two activities and it is used in recovery from activity in different jobs: animal husbandry, agriculture, veterinary medicine, horticulture. Systematic approach of physical education and sports lesson involves concern for the simultaneous achievement of the mental-motor, affective and cognitive objectives,. The purpose of this paper is to highlight and emphasize the efficiency of physical exercises specific to different specializations in University of Agronomic Sciences and Veterinary Medicine Bucharest to raising the training level of students, reflected in Verification and Evaluation Unitary System " (SUVA). The research was conducted on a total of 77 first year students, attending day courses at University of Agronomic Sciences and Veterinary Medicine. The researches were conducted during one academic year period, comprising first and second semester. The results were analyzed statistically and Fisher's exact test was used to compare the dates.*

**Key words:** physical education, specialized physical exercises, student

### **INTRODUCTION**

In terms of technical-scientific revolution period, in professional and everyday activity life, physical exercises and movement are greatly reduced, claiming the society increasing concerns in order to establish a rational balance to the body requests allowing preservation of health and work capacity, combating degenerative phenomenon due to limitation of sport activities and those occurring in profession enforcement.

Systemic approach of physical education lesson involves concern for the simultaneous achievement of the psycho-motor, affective and cognitive objectives [3].

The primary means of achieving the cognitive objectives is theoretical training [1].

In the educational system, physical education must solve „the bio-psycho-motor skills development and training students the ability to act on them in order to maintain permanent health, to ensure a harmonious physical

development and to reveal a favorable kinetic capacity for present and future professional" [2].

Concerns that follow improvement and modernization of contemporary physical education can be grouped into two categories, namely:

- concerns which seek to value the physical education and sport influences in health, combat and reduce sedentary effects and unilateral demands.

- concerns which aims at valorization of educational influences of physical education and sports, directly related to the preparation and training of the workforce, with the objectives of education.

Graduates of the University of Agronomical Sciences and Veterinary Medicine must have higher indexes for correct and harmonious physical development, knowledge and basic and specific motor skills for favorite game. They also must possess higher development indexes for fundamental and specific qualities

required in their profession in order to exercise that at an appropriate level. The graduates must possess physical education techniques to neutralize the negative influences of professional effort on maintaining and physical development. Also graduates from U.S.A.M.V. Bucharest, must be able to practice a favorite sport and other sport activities, with hygienic nature, in college and independent activity.

## MATERIALS AND METHODS

The aim of this study derives from its very title: the impact of exercise specific to the specialization, in support of sustainability state of wellbeing in the activity of University of Agronomical Sciences and Veterinary Medicine students and graduates. In conducting the research we formulated the hypothesis that through specific exercises can be register the relevant results for expression of specific motor capacity demands required in future profession, for preventing the attitudinal deficiencies specific to certain labor and for realization of an efficient objectives.

Compared to physical education in secondary and high schools, in establishing the model of physical education of students in higher education, it has to be taken into consideration besides the general factors (age, sex, level of development and physical training) specific factors of the career for which they are preparing.

All these are basics for establishing the objectives of physical education and sport activities in agricultural higher education, each faculty with its own specializations.

1.Objectives with health and nutritional functions, aimed at strengthening the body, proper and harmonious development, strengthening health and increasing the effort capacity.

2.Objectives with educational functions, which determine the volume and quality of knowledge, skills and motor dexterity (speed, strength, endurance, ability) contribute to development of motivation and character personality, feelings, moral and aesthetic habits (perseverance, boldness, courage,

modesty, honesty, respect for the adversary, spirit of solidarity and cooperation, love for work).

3. Objectives with social functions, aimed at educating habit to practice physical training in systematic and organized manner, building up skills and skills related to the profession for which the student is prepared.

These objectives are achieved through binding activity, included in the curriculum for students in the first and second year and through sport activities organized for all the years of study.

4. Objectives with objectives for continuation of performance sports training.

The present research is based on the objectives at point three. Depending on the specialization and professions (animal husbandry engineer, veterinarian and agricultural engineer) which addresses the present paper, we can draw three specific characteristics of different types of movement:

Features 1 – addressed particularly for veterinarians

Position during work: standing (orthostatic) or sitting, torso leaning forward with the spine slightly arched and sometimes tense, favoring the installation of kyphosis and scoliosis, chest stuck with reduced amplitude for respiratory act (inspiration-exhalation). This specifics position produces some circulatory disorders especially in the legs and consequently an insufficient oxygenation of those tissues in question.

Movements performed during work are uniform and are limited in most cases to the upper limbs, some only in hands.

The reduced physical effort and manual operations performed during the work process, requires a lot of attention and straining sight.

Features 2 – addressed particularly to animal husbandry engineers

During work the position is mostly orthostatic or is derived from it.

Movements' specifics and effort characteristics: complex movement ensuring interconnecting the whole body, involving major muscle groups and especially muscle of the arms and trunk. The physical effort is

intense and sustained, requiring large expenditure of energy. Static effort alternate with dynamic effort.

Features 3 – addressed particularly to agricultural engineers

The position during work is orthostatic or is derived from it.

The movements performed engages entire body, physical effort is higher involving alternation of static effort with dynamic effort. The movements and effort type thrives overall strength and endurance as well as joint and muscle stiffness. Supporting these efforts without prior and careful preparation can negatively influence growth and development of the organism, favoring the installation of deficiencies as: round back, kyphosis, shoulders low, scoliosis, etc.

The research was conducted on a total of 77 students from first year, attending courses at University of Agronomic Sciences and Veterinary Medicine. The period, in which the research was conducted, was around an academic year, comprising first and second semester.

Students were trained according to specific exercises for each specialization and at the end of each semester passed their evaluation through the verification and assessment unit (SUVA).

There were taken into account the results of students, boys and girls, to assess the first semester and second semester. The evaluation was made for: the force of abdominal muscles (number of repetitions in 30 seconds), the strength of the back muscles (number of repetitions in 30"), jump length on the spot (meters), pushups in arms (number of repetitions).

The results were statistically analyzed and Fisher's exact test was applied.

## RESULTS AND DISCUSSIONS

In table 1 and table 2 there are presented the results to verification and assessment unit system (SUVA) after the preparation of boy students, according to specialization of each group of students

Table 1. Average values at first semester final testing, for boys, depending on specializations and Fisher test values (critical values – 3.28)

Evaluation system	Animal Husbandry	Agriculture	CEPA	Fisher
Abdomens	22.38	22.46	22.14	0.05
Back Extensions	25.07	24.73	24.28	1.38
Jump length on the spot	2.29	2.27	2.27	0.32
Pushups	26.84	27.80	28.71	1.78

Table 2. Average values at second semester final testing, for boys, depending on specializations and Fisher test values (critical values – 3.28)

Evaluation system	Animal Husbandry	Agriculture	CEPA	Fisher
Abdomens	25.46	25.13	25	0.26
Back Extensions	28.23	27.13	27.14	2.20
Jump length on the spot	2.35	2.38	2.41	2.56
Pushups	31.53	31.33	32.57	0.82

At final test, the average values for the three groups are represented in figure 1, 2, 3 and 4. Variation analyze revealed an insignificant difference between boys groups, with 95% probability. Also it can be observed that the trial results have better average from first semester to second semester

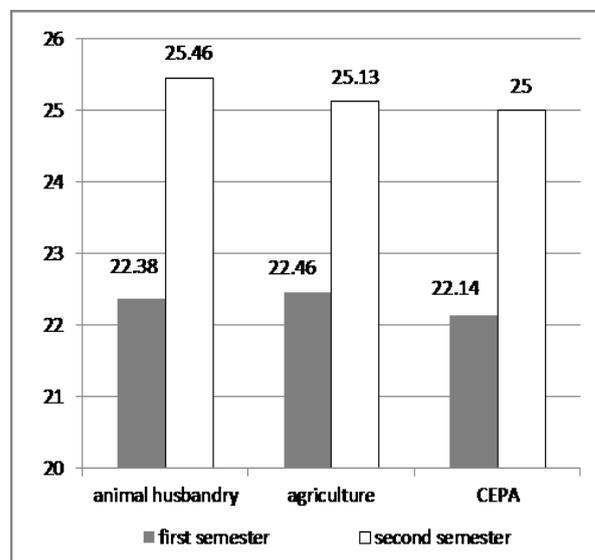


Fig. 1. Average values at first and second semester for boys abdomens final testing, depending on specializations

In table 3 and table 4 there are presented the results to verification and assessment unit system (SUVA) after the preparation of girl students, according to specialization of each group of students.

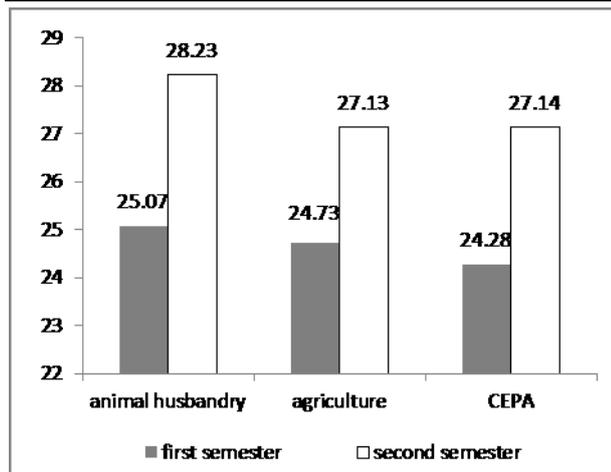


Fig. 2. Average values at first and second semester for boys back extensions final testing, depending on specializations

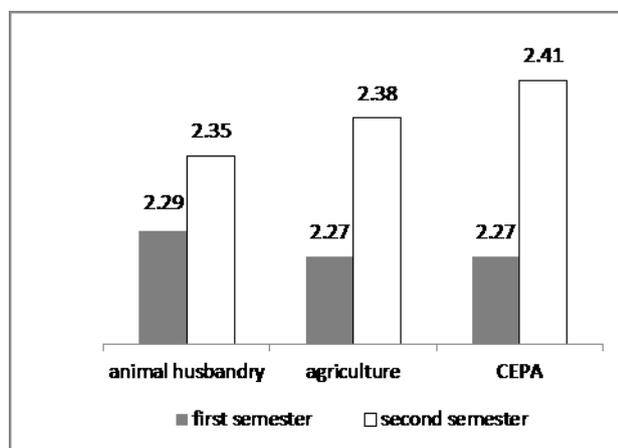


Fig. 3. Average values at first and second semester for boys jumping final testing, depending on specializations

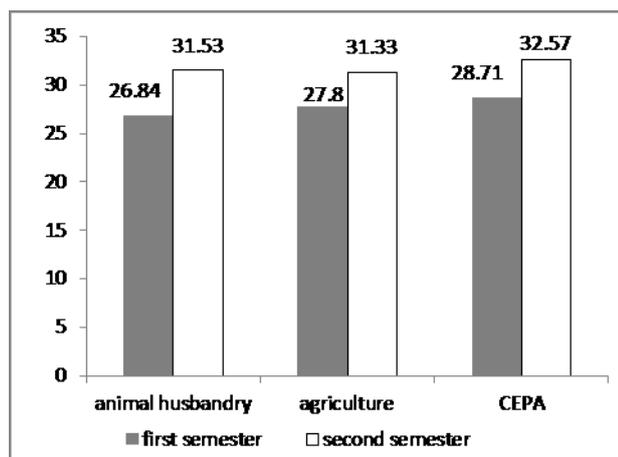


Fig. 4. Average values at first and second semester for boys pushups final testing, depending on specializations

At final test, the average values for the three groups are represented in figure 5, 6, 7 and 8.

Table 3. Average values at first semester final testing, for girls, depending on specializations and Fisher test values (critical values 0.05 – 3.23; 0.01 – 5.18)

Evaluation system	Animal Husbandry	Agriculture	CEPA	Fisher
Abdomens	18	17.9	18.77	2.26
Back Extensions	21	22.2	19.55	17.06
Jump length on the spot	1.69	1.71	1.62	4.75
Pushups	18.07	20.04	20.6	9.77

Table 4. Average values at second semester final testing, for girls, depending on specializations and Fisher test values (critical values 0.05 – 3.23; 0.01 – 5.18)

Evaluation system	Animal Husbandry	Agriculture	CEPA	Fisher
Abdomens	20.85	21.4	21.22	0.70
Back Extensions	23.92	24.5	22.66	9.14
Jump length on the spot	1.86	1.85	1.78	3.08
Pushups	22.57	23.60	23.66	1.94

Variation analyze revealed an insignificant difference between girls groups, with 95% probability, for abdomen in first and second semester and for pushups in second semester.

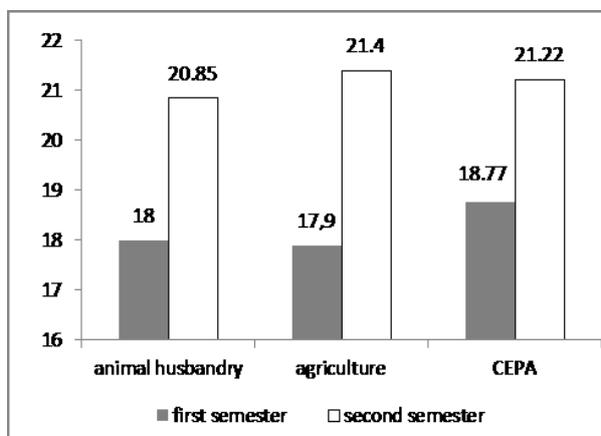


Fig. 5. Average values at first and second semester for girls abdomens final testing, depending on specializations

For jumping in first semester, there were registered significant statistical results between girls groups. In back extensions trial in first and second semester and pushups in first semester, the registered results were statistical very significant. Also, in girls groups, it can be observed that the trial results have better average from first semester to second semester.

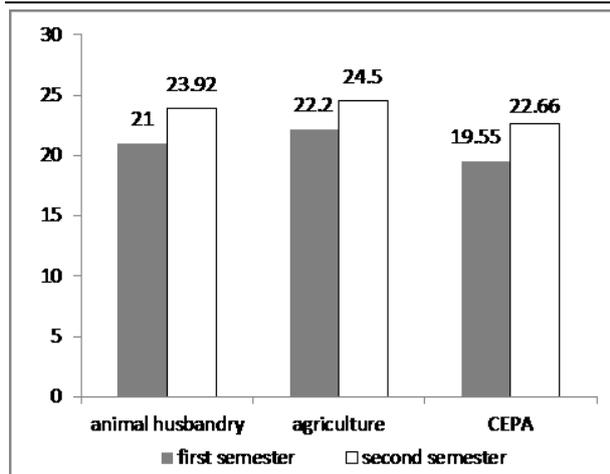


Fig. 6. Average values at first and second semester for girls back extensions final testing, depending on specializations

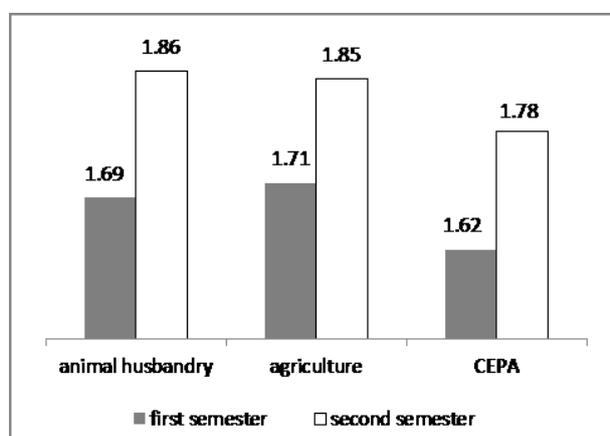


Fig. 7. Average values at first and second semester for girls jumping final testing, depending on specializations

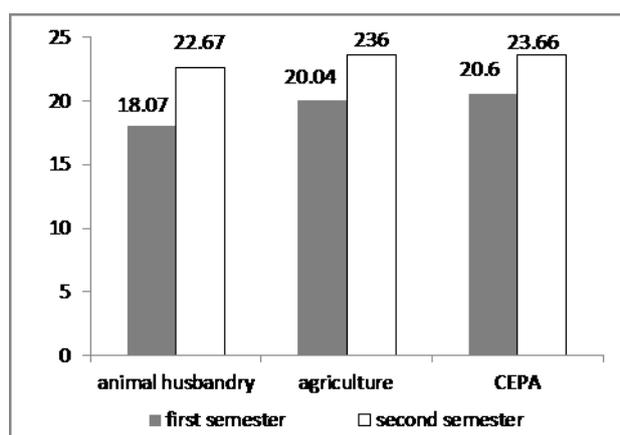


Fig. 8. Average values at first and second semester for girls pushups final testing, depending on specializations

## CONCLUSIONS

The research led to the conclusion that the analyzed groups of boys and girls students from three specializations had an

improvement in the average values for first semester compared to the averages of the second semester at all three analyzed specialization.

In groups of girls students, the statistical results showed that for jumping test in first semester, there were registered significant statistical results between girls groups and for back extensions trial in first and second semester and pushups in first semester, the registered results were statistical very significant.

This could be explained by the fact that girls were less physically prepared at the beginning of the research, and during physical training (one year), specialized training put its marks on fundamental motric skills specific to the job and showed in the results of the verification system.

Each group (specialization) realized training with exercises specific to the typical activity of the concerned specialization and the fact that in second semester training continued with these exercises relative to this specialization makes students taken in analysis to improve their physical condition, such as results of the second semester final examinations showed insignificant differences (jumping second semester compared to first semester and pushups second semester compared to first semester).

Exception was made in back extensions were the average results have improved, statistical value for calculated Fisher dropped, but still exceeded the critical Fisher value, differences being very significant.

The insignificant statistical differences found at evaluation tests in boys groups in all three specializations, compared with the statistical results obtained for girls groups in some tests can be explained due to a initial best physical condition of the boys from all three specializations.

It can be said that is relevant in this research that training the students in physical education and sport classes, with specific exercises for each specialization and future professions, can lead to mastery of a physical education techniques to neutralize the negative influences of professional effort on maintaining and physical development.

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## PERFORMANCE OF PEOPLE'S BUSINESS CREDIT

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### **Abstract**

*People's Business Credit program launched by the government of the Republic of Indonesia aims to accelerate the development of primary sectors and the empowerment of small-scale enterprises, to improve accessibility to credit and institutions financial, reducing poverty and expanding employment opportunities. Every year the People's Business Credit (it's called as KUR) disbursed by the government is constantly increasing. This study aimed to analyze: (1) Decrease in performance of people's business credit at PT. Bank Rakyat Indonesia (Persero) Tbk, Branch of Samarinda, Unit of Sungai Pinang Dalam from year 2012 to 2014 when measured by Loan To Equity, Credit Risk Ratio, and Provisison for Losses; (2) The cause of a decrease in performance of people's business credit at PT. Bank Rakyat Indonesia (Persero) Tbk, Branch of Samarinda, Unit of Sungai Pinang Dalam from year 2012 until 2014. The results showed that the performance of business credit at PT. Bank Rakyat Indonesia (Persero) Tbk, Branch of Samarinda, Unit of Sungai Pinang Dalam from year 2012 to 2014 has decreased measured from the Loan To Equity, Credit Risk Ratio and Provisison for Loan Losses. The decline in the performance of the business credit is due to the non-performing loans / bad credit. The cause of problem loans, originated from the two parties namely: (a) Banking sector need to maximize the credit analysis of customers' predictions. (b) The customer, that is the element of intent to delay or do not pay their obligations to the Bank, and there is an element inadvertently means that the debtor is willing to pay but is unable / their business Bankrupt.*

**Key words:** credit, performance, people's business

### **INTRODUCTION**

Economic development in a country heavily dependent on the dynamic development and the contribution of the Banking sector. Post economic and monetary crisis in Indonesia illustrates that the role of the Banking sector is very important. When the Banking sector collapsed, the national economy also slumped. And vice versa, when the economy stagnated, the Banking sector also affected where intermediation is normal [12].

When the economic crisis hit Indonesia, the government is relying on the role of Micro-Small-Medium Business (it's called as UMKM) to minimize the negative impact of the economic crisis. When the economic crisis occurred many sectors that experienced output growth is declining. At least two factors that play a very important role at the time to reduce the negative effects on poverty. First, the growth of economic activities in the informal sector to absorb many workers who are laid off as a result of layoffs (Termination of Employment) of the formal sector and it

provides an additional source of income for workers. Second, many existing government programs to reduce poverty. Some government programs are the National Program for Family which focuses on education and health, the National Program for Community Strengthening which put an emphasis on business development [16].

Micro, Small and Medium Business (UMKM) constitute the largest segment of national economic actors. UMKM also a strong effort to face a difficult economic situation, when the economic crisis hit Indonesia, UMKM still able to survive, even UMKM were able to provide a contribution to the healing process of the national economy (national economic recovery) [11].

Micro, Small and Medium Business are activity that is able to expand employment and provide economic services to the wider community, and may play a role in the process of equalization and improvement of people's income, stimulate economic growth, and play a role in realizing national stability. In addition, the Micro, Small and Medium

Business is one of the main pillars of the national economy should gain opportunity, support, protection and development of the broadest as a form of partisanship that firm to the groups economic activities of the people, without neglecting the role of Big Business and Enterprises State Property [2].

Micro, Small and Medium Business (UMKM) have some role in Indonesia, which is a major player in economic activity in Indonesia, as a provider of employment opportunities, as actors in local economic development and community development, as a market maker and innovation through the flexibility and sensitivity as well as their relationship with the company's activities, in addition to UMKM can contribute to an increase in non-oil exports, and can reduce the inequality of income [8].

The Government of the Republic of Indonesia issued Presidential Instruction No. 6 dated March 8, 2007 on the Acceleration of riel sector and Empowerment UMKM in order to improve the economic growth in Indonesia. Then the Presidential Instruction No. 5 of 2008 on Economic Program 2008-2009 dated 5 November 2007, President of the Republic of Indonesia launched a credit for UMKM with the pattern of the guarantor under the name of People's Credit Business (It's called as KUR) through the Ministry of Cooperatives and Small and Medium Enterprises (KUKM), with a credit guarantee facility from the Government of Indonesia through PT. Askrido and Perum Sarana Business Development and supported by Presidential Instruction No. 5 of 2008 on Focus Economic Program 2008-2009 to ensure the implementation or acceleration of the implementation of these small loans.

People's Business Credit (KUR) (Decision No. Kep-01 / DIMEkon / 01/2010 Date: January 25, 2010) is a credit / financing for working capital and or investment to MSME in the business productive and viable but not Bankable with a ceiling credit up to IDR 500,000,000, - (five hundred million) guaranteed by Guarantee Company. Distribution KUR is expected to help the development of productive activities in agriculture, fisheries, forestry, and industrial

sectors. Source of funds KUR is 100% (one hundred percent) funded by the Implementing Bank. KUR distributed by the Implementing Bank granted automatically (automatic cover) by Guarantee Company with a guarantee amount equal to 70% (seventy percent) of ceiling KUR.

The purpose of business credit program launched by the government of the Republic of Indonesia is to accelerate the development of primary sectors and the empowerment of small-scale enterprises, to improve accessibility to credit and financial institutions, reducing poverty and expanding employment opportunities. Every year the People's Business Credit (It's called as KUR) disbursed by the government is constantly increasing. Hopefully this program will improve and flourish as experienced by the Program SP3 is not only satisfy customers but also use strategies, businesses, and Banking institutions alike.

PT. Bank Rakyat Indonesia (Persero) Tbk, Branch of Samarinda, Unit of Sungai Pinang Dalam (It's called as Bank BRI) is central government-owned Bank, doing activities such as collecting funds from the public (funding), to channel funds to the public (lending) and gave other Bank services (service). Major capital of Bank BRI today comes from the owners of capital and customers.

Bank BRI always perform a variety of strategies to improve the company's ability to generate profits, one of which came from people's business credit. The company's profit is managed effectively and efficiently, through the assessment of the performance of people's business credit. People's business credit at Bank BRI started running in early 2008. Performance of people's business credit is a feat achieved by Bank BRI from 2012 until 2014.

People's business credit of Bank BRI showed a decrease in the ability of customers for credit repayment. It can be seen from nonperforming loans (loans that are not current) tends to increase from year 2012 to 2014 a number of 5.83%, 7.00% and 6.42 of the total loans disbursed amounting to IDR228,812 billion (in 2012), IDR240,251

billion (in 2013), and IDR249,864 billion (2014). Current credit has increased during the three-year average a number of 93.58%, while the non-performing loans or non-performing loans (loans under special mention, substandard loans and doubtful loans) decreased from year 2012 to 2013 by an average of 6.42%.

KUR problematic is a condition that often occurs in Banking, namely as the risk of Bank lending is concerned. Although non-performing loans is often difficult to be avoided but the Bank must still manage it carefully and the risk is minimized as much as possible so as to provide a profit for the Bank. Management of KUR problematic must be anticipatory, proactive and disciplined thus problematic KUR starts with early recognition and immediate corrective action. KUR problematic is credit classified as substandard (KL), doubtful (D), and loss [14].

Non performing loans are classified according to criteria provided by Bank Indonesia, which pursuant to Article 4 Decree of the Director of Bank Indonesia Number 30/267 / KEP / DIR, dated February 27, 1998, as follows: (1) Current credit; (2) Special Mention (Special Mention); (3) Credit substandard (Substandard); (4) Doubtful Loans (Doubtful); (5) Credit Loss.

Criteria for Non performing loans (Decree of Directors of Bank Indonesia Number 30/267/KEP/DIR, dated February 27, 1998, article 4) including: (1) Credit Current has the installment payments of principal and / or interest; (2) Credit Special Mention (Special Mention); ie credits have arrears of principal repayment and / or interest, that exceed 90 days, or sometimes happens overdraft; (3) credit substandard (substandard), ie loans are delinquent installment of principal and / or interest has exceeded 90 days, and frequent overdrafts, (4) Loans Doubtful (Doubtful), loans are arrears installment of principal and / or interest has exceeded 180 days, and going on overdraft is permanent, (5) Bad Debt namely credit are arrears principal and / or interest that has been exceed 270 days, and operational losses covered by new loans.

Based on the background described, the principal problems in this study as follows: 1)

How many the performance decline of people's business credit at Bank BRI from year 2012 until 2014 when measured by Loan To Equity, Credit Risk Ratio, and Provision for Losses? 2) Is the cause of a decrease in performance of people's business credit at Bank BRI In from year 2012 until 2014.

The purpose of this study was to determine and analyze the following: 1) the performance decline of people's business credit at Bank BRI from year 2012 until 2014 when measured by Loan To Equity, Credit Risk Ratio, and Provision for Losses? 2) the cause of a decrease in performance of people's business credit at Bank BRI In from year 2012 until 2014.

## MATERIALS AND METHODS

Study was conducted on Bank BRI. This study focused on the performance of people's business credit from year 2012 to 2014.

This research was conducted in October 2015 through January 2016, the data obtained through a preliminary survey, interviews with officials and employees, and customers of Bank BRI. Efforts to determine the performance of Banks in the granting of credit which is advantageous in the sense can contribute maximum revenue for a Bank with degree of small risk, then credit performance is very noteworthy. Credit performance can be seen from the financial statements of Banks

The data required to complete the purpose of this paper as follows: (1) Report of Earning Assets for the year ended December 31, 2012 As per December 31, 2014; (2) The report on reserves for uncollectible accounts for the year ended December 31, 2012 until per December 31, 2014; (3) Capital of business loans for the year ended December 31, 2012 until per December 31, 2014; (4) Total loans disbursed, non-performing loans, the total capital, Total Loan Loss, Total Loans for the year ended December 31, 2012 until per December 31, 2014.

The credit performance [7] can be seen from the following ratios: (1) Loan To Equity (LTE) or Equity ratio; (2) Credit Risk Ratio (CRR) or the ratio of credit risk; (3) Provision for Loan Losses (PLL) or the ratio

of allowance to total loans.

Credit performance ratios and the category collectibility of asset quality of Banking as follows:

1) *Loan To Equity (LTE)*, is the ratio used to determine whether the activities of Banks have used the appropriate funding source, the smaller the ratio is the worse the quality of the loan or the Bank's ability to manage credit in this case reduce the number of problem loans. Loan To Equity (LTE) is obtained by comparing the difference in total loans (outstanding) with non-performing loans (bad debts) to the overall owned (equity). Calculation Loan To Equity (LTE) according to [7] as follows:

$$LTE = \frac{\text{Total loans disbursed} - \text{nonperforming loans}}{\text{Total capital}} \times 100\%$$

2) *Credit Risk Ratio (CRR)* are the ability of Bank management in minimizing the risk incurred, in that it can show the failure rate of Bank loans, where the higher this ratio, the more unhealthy the Bank credit. The ratio of credit will occur when a customer fails to restore some or all of the loan obtained from a Bank which in turn will be classified as nonperforming loans. Credit Risk Ratio (CRR) is obtained by comparing the non-performing loans (bad debt) to total loans. Calculation of Credit Risk Ratio (CRR) as follows [7]:

$$CRR = \frac{\text{Non performing loans}}{\text{Total loans disbursed}} \times 100\%$$

3) *Provision for Loan Losses (PLL)*, The ratio is used to measure the effectiveness of the management of Bank credit is a lot to experience credit crunch or not, in other words are used to determine the percentage of earning assets losses expense incurred compared to the amount of credit granted, if the ratio of the smaller the better the performance of the Banks' credit. Provision for Loan Losses (PLL) is obtained by comparing the allowance for Uncollectible Accounts with total loans. Calculation Provision for Loan Losses (PLL) according to [7] are as follows:

$$PLL = \frac{\text{Reserves For Uncollectible Accounts}}{\text{Total Loans Disbursed}} \times 100\%$$

4) *Non-Performing Loans / Loans Loss (NPL)*

The Bank provides credit facilities can not be separated from delinquent loans, it is because the debtor does not pay, or pay but passing of a predetermined time period. This credit is in addition to reducing income also showed a loss of no return in the form of Bank loan principal that has been granted, while the loan principal is a third party funds received by Banks. Loans in arrears in the assessment of the quality of earning assets are Credit Special Mention (Special Mention), credit substandard (substandard), Loans Doubtful (Doubtful), Bad Debt. Credit shows the quality of Bank assets that greatly affect the soundness of the Bank based on the level of problem loans, the smaller the rate of non-performing loans, the more healthy the Bank anyway. Credits (debts) troubled by [6] loans for which the principal and interest has been past 90 days or more after the due date.

Nonperforming loans / bad credit can be known through the total non-performing loans and total loans. Here is calculated the percentage of bad loans [15].

$$NPL = \frac{\text{Total Loan Loss}}{\text{Total Loans}} \times 100\%$$

5) Category collectibility of earning asset quality of Banking [15], among others: (a) Category Current Credit is no credit in arrears; (b) Category credit Special Mention is credit in arrears one day after falling the entire period of 90 days; (c) Category Substandard loans are loans that are delinquent 90-180 days; (d) Category Doubtful loans are loans in arrears above 180-270 days; (e) Category Jammed Debt (M) are loans overdue for more than 270-360 days (1 year).

## RESULTS AND DISCUSSIONS

### Results

Based on the research results that have been obtained, in the form of quantitative and qualitative data that is supported by research methods, then is done the analysis and discussion of the performance of people's business credit at Bank BRI from year 2012 until 2014.

Bank balance sheets, there are two elements of the allocation of funds, namely the use of Bank funds based on the nature of productive assets and non-productive assets.

Table 1. Earning Assets and Reserves for Uncollectible Accounts, Year 2012-2014.

Category of Earning Assets	Bobot (%)	Earning Assets			Reserves for Uncollectible Accounts		
		Year 2012	Year 2013	Year 2014	Year 2012	Year 2013	Year 2014
(1)	(2)	(3)	(4)	(5)	(6)=(2)x(3)	(7)=(2)x(4)	(8)=(2)x(5)
Current (G1)	0.50	215,471.00	223,433.00	233,833.00	1,077.36	1,117.17	1,169.17
Special Mention (G2)	1.00	9,169.00	9,610.00	10,004.00	91.69	96.10	100.04
Substandard (G3)	3.00	46.00	721.00	400.00	1.38	21.63	12.00
Doubtful (G4)	50.00	1,834.00	2,403.00	2,251.00	917.00	1,201.50	1,125.50
Jammed (G5)	100.00	2,292.00	4,084.00	3,376.00	2,292.00	4,084.00	3,376.00
<b>Total (G) = G1+...+G5</b>		<b>228,812.00</b>	<b>240,251.00</b>	<b>249,864.00</b>	<b>4,379.43</b>	<b>6,520.40</b>	<b>5,782.71</b>

The management of productive assets is what can give results for the Banks.

Earning assets [15] are all investment of funds in IDR and foreign currency is meant to earn income according to their function.

The definition of productive assets [6] is an investment of Bank, both in IDR and foreign currency, in the form of loans, securities (securities), securities purchased under resale agreements (reserve Respo), derivative receivables, acceptance receivables, placement of funds of other Banks, investments and others.

Productive assets function [13] to obtain a return on the funds disbursed by the Bank. However, the placement of funds in productive assets is also at risk, namely the risk that funds can not be re-routed. The risk of placement in this form can result in losses the Bank. Banks need to establish loss reserves of productive assets, that is the reserves for uncollectible accounts (It's called as PPAP).

Formation of PPAP is based on the decision of Bank Indonesia No. 30/268 / KEP / DIR dated February 27, 1998 on the establishment and provision for doubtful accounts and BI directors decision No. 30/267 / KEP / DIR dated February 27 about the quality of earning assets. In forming PPAP, the calculation is a certain percentage multiplied by the number of outstanding each asset quality. The quality of earning assets classified as current, special mention, substandard, doubtful, and jammed.

Nonperforming loans [15] can be seen from the report earning assets, namely loans overdue principal or interest credit the passing of 90 days since the date of maturity up to 360 days, or in other words the problem loans are

loans which fall into the category of credit Substandard, loans Doubtful and credit jammed.

Table 2. People's Business Credit Based Non-Performing Loans, Year 2012-2014 (in millions IDR).

Elements of Non Performing Loans	Year 2012		Year 2013		Year 2014	
	(IDR)	(%)	(IDR)	(%)	(IDR)	(%)
Substandard Loans	46.00	1.10	721.00	10.00	400.00	6.64
Doubtful Loans	1,834.00	43.96	2,403.00	33.34	2,251.00	37.35
Jammed Loans	2,292.00	54.94	4,084.00	56.66	3,376.00	56.01
<b>Amount</b>	<b>4,172.00</b>	<b>100.00</b>	<b>7,208.00</b>	<b>100.00</b>	<b>6,027.00</b>	<b>100.00</b>

Table 3. Data of Performance People's Business Credit, Year 2012-2014 (in millions IDR).

No	Year	Total Loans Disbursed	Nonperforming Loans	Total Capital	Total Jammed Loan	Total Loans	Reserves For Uncollectible Accounts
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	2012	207,265.00	4,172.00	91,690.00	2,292.00	228,812.00	4,379.43
2	2013	217,908.00	7,208.00	114,590.00	4,084.00	240,251.00	6,520.40
3	2014	226,481.00	6,027.00	137,480.00	3,376.00	249,864.00	5,782.71

Table 3 presents the calculus of the performance of People's Business Credit, as follows:

- (1) Loan To Equity (LTE), to total capital through loans, nonperforming loans, and total capital;
- (2) Credit Risk Ratio (CRR) is obtained by nonperforming loans and total loans;
- (3) Provision for Loan Losses (PLL) or the ratio of allowance to total loans through the allowance for uncollectible accounts total loans;
- (4) Non-Performing Loans/Jammed Loans can be known through the total non-performing loans and total loans.

The results of the performance of people's business credit Bank BRI from 2012 to 2014 can be seen in Table 4.

Table 4. Performance Result of People's Business Credits, Year 2012 – 2014

No	Indicator	Results Analysis (%)			Description
		Year			
		2012	2013	2014	
1	Loan To equity	221.50	183.87	160.35	Decline
2	Credit Risk Ratio	2.01	3.31	2.66	Decline
3	Provision for Loan Losses	2.11	2.99	2.55	Decline
4	Non Performing Loans / Jammed Loans	1.00	1.7	1.35	Decline

Based on the results of the analysis shown in Table 4, it is known that the performance of people's business credit Bank BRI, Loan To Equity (LTE), Credit Risk Ratio (CRR),

Provision for Loan Losses (PLL), and non-performing loans/jammed credit has decreased. It shows an increase in the collection of credit by Bank BRI, and increase people's ability to restore its Banking credit.

### Discussion

Discussion of research directed to analyzing the performance of people's business credit on Bank BRI from 2012 until 2014, so it can be used as a basis for decision making in order to determine the policy of small loans in the future.

#### 1) Loan To Equity

Loan To Equity (LTE) is a ratio used to measure the Bank's ability to use the resources appropriately, the ability of Banks to manage credit in this case reduce the number of non-performing loans. LTE uses total loans (outstanding) and loans (jammed loans) to measure the performance capabilities of Bank credit.

The amount of decline Loan To Equity (LTE) from 2012 to 2014 are as follows:

(a) Loan To Equity (Table 4.) in 2013 against the 2012 People's Business Credit decreased by 37.63%. Loan To Equity in 2014 to the year 2013 decreased by 23.52%; (b) Decrease in Loan To Equity is due to total capital continues to increase. The increase in total capital in 2014 and 2013 to 2012, accompanied by the increase in total loans and a rise in problem loans led to a decrease in the Bank's ability to use the resources appropriately and manage non-performing loans. Ratio decreased in Loan To Equity indicated that the Bank is able to manage the credit or reduce the number of non-performing loans.

#### 2) Credit Risk Ratio

Credit Risk Ratio (CRR) is a ratio used to determine the ability of Bank management to minimize the risk incurred. This illustrates the failure rate of Bank credit, the higher this ratio, the more unhealthy the Bank credit. The ratio of credit will occur when a customer fails to repay loans partially or completely that obtained from a Bank, which in turn will be classified as nonperforming loans. Credit Risk Ratio is obtained by comparing non-performing loans (jammed debts) to total loans.

Changes Credit Risk Ratio is the people's business credit disbursed decreased in 2012 until 2014. Changes disbursed the people's business credit can be described as follows:

(a) People's business credit who distributed in 2013 to the year 2012 increased by IDR10,643,000,000. This is due to the increase in total loans, followed by the increase in problem loans in 2013, thus increasing credit risk ratio; (b) People's business credit is IDR8,573,000,000, but non-performing loans decreased in 2014 compared to 2013. This has affected the decrease in credit risk ratio decreased by 2.66% in 2014.

Based on Table 4 in 2013 the Ratio Credit Risk Ratio was increased by 1.29% compared to the year 2012, but it has decreased by 0.65% in 2014. Credit Risk Ratio in 2014 means getting smaller of performance people's business credit in minimizing credit risk of Bank failures. This means that the failure rate of People's Business Credit at Bank BRI in 2014 has recovered.

#### 3) Provision for Loan Losses

Provision for Loan Losses (PLL) is a ratio to measure the effectiveness of the management of Bank credit that has non-performant loans. The ratio to determine the percentage of uncollectible accounts expense incurred compared to the amount of credit granted, the smaller this ratio, the better the performance of the Bank credit. Provision for Loan Losses is obtained by comparing the allowance for uncollectible accounts with total loans.

Provision for Loan Losses in 2014 to the year 2013 decreased by 2.55%. This is due to Allowance for Earning Assets and disbursed people's business credit increased in 2013 compared to 2012. This means that the cost of Earning Assets happened to people's business credit Bank BRI decline. It shows the management of Bank credit to the credit crunch should be improved effectiveness.

#### 4) Non Performing Loans / Jammed Loans.

Nonperforming loans are small loans that are in arrears over 90 days from the maturity up to 360 days from the due date from 2012 to 2014 at Bank BRI. Nonperforming loans/nonperforming loans decreased by 1.35% a span of 2013 and 2014 was accompanied by the increase in lending in

2014 and a decline in bad loans in 2014. The causes of non-performing loans / bad credit as follows:

(a) From the Banks, that in conducting its analysis, the analysis is less accurately so that what was supposed to happen, not predicted earlier; (b) From the customer side, namely the element of intent in this case the customer does not intend deliberately to pay its obligations to the Bank, and there is an element inadvertently means that the debtor is willing to pay but is unable/businesses in their management has gone Bankrupt.

## CONCLUSIONS

Based on the results of research and discussion, the conclusions of this study as follows:

1) Performance of people's business credit at Bank BRI from 2012 to 2014 decreased measured from the Loan To Equity. Credit Risk Ratio and Provision for Loan Losses.

2) Performance of people's business credit at Bank BRI decline due to: (a) the Decrease in Loan To Equity (LTE) caused by total capital continued to rise in 2014 and 2013 against 2012, accompanied by the increase in total loans and a rise in non-performing loans. Loan To Equity decrease in the ratio indicated that the smaller the loan means the Bank is able to manage or reduce the number of non-performing loans; (b)

Decrease in Credit Risk Ratio (CRR) in the year 2014 against the year 2013 caused by the increase in total loans, followed by the increase in non-performing loans in 2013, thus increasing credit risk ratio. Credit Risk Ratio in 2014 had a smaller ratio, which means healthy people's business credit performance in the ability of Bank management to minimizing credit risk of Bank failures; (c) Provision for Loan Losses (PLL) decreased in 2014 against 2013, caused by Allowance for Earning Assets and disbursed people's business credit increased in 2013 compared to 2012. This means that the cost of Earning Assets happened to people's business credit Bank BRI decline. Decrease Provision for Loan Losses indicate that the smaller the ratio of Bank credit good

performance means that the effectiveness of bank credit management did not experience congestion.

3) Cause of non-performing loans, originated from the two parties namely: (a) the Banks to perform credit analysis, Banks not yet maximized customer predictions; (b) The customer, that is the element of intent to delay or do not pay their obligations to the Bank, and there is an element inadvertently means that the debtor is willing to pay but is unable / businesses in governance have been Bankrupt.

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## THE FORECASTS OF PIG MEAT PRICES IN THE EU - THE USE OF ADAPTIVE WINTER'S MODEL

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### *Abstract*

*Prices and factors which influence them are measurable thus it is appropriate to apply in this case a method of time series analysis for predicting the pig meat prices in the purchasing centre. In this paper adaptive models, which adjust to the changeable conditions, have been analysed including the changes in the trend level, accidental variations and seasonal variation. On the basis of estimated models the forecast of pig meat prices has been calculated. The ex post measurement of forecasts were used to assess a quality of models.*

*Key words:* EU, forecasts, pig meat prices, Winters model

### INTRODUCTION

The meat sector is one of the most important in European Union (EU) agriculture. Together the four main meat types — beef and veal, pig meat, poultry meat, and sheep meat / goat meat — account for one quarter of the total value of agricultural production. Half of all EU farms have livestock. Some 90 % of farmers with ruminant animals (cattle, sheep and goats) are specialist livestock producers. Meat is a major source of protein and constitutes an important part of the European diet. EU policies in the meat sector are designed to encourage the production of safe, nutritious and affordable meats. Recent changes to the common agricultural policy (CAP) underline these aims. Policies are geared increasingly towards meeting the needs of consumers, livestock producers and the environment in a balanced way [3,8,14].

Pig farmers in the EU have been complaining for several years about low pork prices, leading many to refer to the persistent low EU prices as a “pork crisis.” In 2015, EU pork prices decreased 15 percent compared to the previous year. However, this reflects a range of price drops: while prices in some Member States (MS) like Belgium and The Netherlands are down 20 percent, prices in Sweden decreased only by 4 percent. The bottom of

the EU pork price curve was reached in January 2015 after which prices slowly increased again. Price gaps between MS are large with Class E carcass prices varying from €121-122 in Belgium and The Netherlands to €145-147 in Germany and France, and from €154-155 in Spain and Romania up to €175 in Sweden and €186 in the United Kingdom [1, 5, 6, 14].

The blame for the pork price “crisis” is usually put on the Russian import ban, which began in January 2014. However, the perceived crisis also results from major production increases in some MS (Spain, Poland, Netherlands, and Germany) at a time when domestic consumption was under pressure from decreased consumer confidence due to the economic crisis and the Greek financial crisis. While the Russian trade embargo meant lost pork exports of 750,000 MT to Russia, these losses were mostly compensated by increased exports to Asia. Additionally, EU pig slaughter actually increased 2.8 percent in the first five months of 2015 as compared to 2014, compared to a 1.8 percent increase for 2014 compared to 2013. Combined with increased carcass weights, the 2015 increase in pork output is 3.7 percent compared to 2014. However, the outlook for EU pig markets is improving again as abundant 2015 grain and soybean crops are expected to lead to lower feed

prices, which should result in better margins for pig farmers [1, 2, 3, 5, 7].

## MATERIALS AND METHODS

The characteristic feature of adaptive models is a fact that they show great flexibility and ability to adjust in case of irregular changes in trends or distortions and movements of seasonal variations. This fact makes an adaptive model a short-term prediction tool. In these models a big role is played by information from the past which include the predicted variable and prediction errors. This information allows for a choice of appropriate model and variables ensuring the most exact prediction. In adaptive models there is no set analytic figure, it is presumed that for each period the evaluation of trend and variations is built as a certain average of this kind of prices in previous periods. Adaptive models depend on the amount of information from the past used in determining current evaluations of a trend. More important is the latest information rather than farther past information which means that current signals are more important than outdated events [Nowak 1998]. These models gain more and more meaning as far as prediction of economic phenomena is concerned and are a good tool for prediction of agricultural processing. The group of adaptive models which are known as Winter's model deserve attention. Winter's model is used in case of time series including developing tendency, seasonal variations and accidental variations.

Due to the over fitting of seasonal variations there are two types of Winters model: additive model and multiplicative model. They are presented as follows:

Additive Winter's model:

$$F_{t-1} = \alpha(y_{t-1} - C_{t-1-r}) + (1 - \alpha)(F_{t-2} - S_{t-2})$$

$$S_{t-1} = \beta(F_{t-1} - F_{t-2}) + (1 - \beta)S_{t-2}$$

$$C_{t-1} = \gamma(y_{t-1} - F_{t-1}) + (1 - \gamma)C_{t-1-r}$$

Multiplicative Winter's model:

$$F_{t-1} = \frac{\alpha \cdot y_{t-1}}{C_{t-1-r}} + (1 - \alpha)(F_{t-2} + S_{t-2})$$

$$S_{t-1} = \beta(F_{t-1} - F_{t-2}) + (1 - \beta)S_{t-2}$$

$$C_{t-1} = \frac{\gamma \cdot y_{t-1}}{F_{t-1}} + (1 - \gamma)C_{t-1-r}$$

Where:

$F_{t-1}$  – smoothed value of the variable predicted in moment  $t-1$ ,

$S_{t-1}$  – evaluation of the trend growth for moment  $t-1$ ,

$C_{t-1}$  – evaluation of the seasonality factor for moment  $t-1$ ,

$r$  – the length of season cycle (the number of cycle phases),

$\alpha$  – constant of the smoothness of the trend level ,

$\beta$  – constant of the smoothness for trend changes

$\gamma$  – constant of the smoothness for seasonal variations,

$y_t^*$  - forecast for moment  $t > n$ .

Parameters  $\alpha$ ,  $\beta$ ,  $\gamma$  have their values set within the  $<0, 1>$  limit. In literature there are different suggestions concerning the estimation of  $F_1$ ,  $S_1$ ,  $C_1$  starting values thus it is suggested to accept as follows:

$F_1$  – the first value of forecasted variable, which is  $y_1$ , or the average of changeable variable in the first cycle,

$S_1$  – the difference of first and second value of the predicted variable that is  $y_2 - y_1$ , or the difference of the average values of the changeable variable set in the first and second cycles.

$C_1$  – the average of differences on the basis of time sequence, (for additive model) or quotient (for multiplicative model) referring to the same phase of the season cycle of the values of the predicted variable as well as the smoothed values of the trend.

The estimation of  $\alpha$ ,  $\beta$ ,  $\gamma$  parameters is based on experiments dealing with the minimisation of the average error in the past forecast, for the forecast with one-cycle advance. The forecast for each model is estimated according to the formulas:

Additive Winter's model:

$$y_t^* = F_n + S_n(t - n) + C_{t-r}$$

Multiplicative Winter's model:

$$y_t^* = [F_n + S_n(t - n)] \cdot C_{t-r}$$

Where  $n$  is the number of items in time sequence of the forecast variable [2,7,13,15].

The quality of forecast is linked to the forecast accuracy on the basis of ex post errors. The aim of this measurements is a h synthetic description of the empirical distribution of the deviation of the forecasted variable realisation reached in the past in the period of time from which the statistic data was collected. To measure the quality of the forecast the following measurements have been used: the prediction load ( $u$ ), standard deviation of the forecast errors ( $S_p$ ), relative forecast error ( $w^*$ ) and Thiel factor ( $I^2$ ):

$$u = \frac{1}{m} \sum_{t \in I_p} (y_t - y_t^*) \quad w^* = \frac{S_p}{\bar{y}_{t \in I_p}}$$

$$S_p = \sqrt{\frac{1}{m} \sum_{t \in I_p} (y_t - y_t^*)^2} \quad I^2 = \frac{m S_p^2}{\sum_{t \in I_p} y_t^2}$$

where:  $I_p$  –the period of empirical verification of the forecast

These measurements allow for deciding whether the forecast is acceptable and establish the rate of the deviation of the forecasted variable in comparison with ready formed forecast [13].

## RESULTS AND DISCUSSIONS

In this paper the average pig meat prices in UE-27, Poland and Romania were considered, the data were taken from Polish Ministry of Agriculture and Rural Development.

In the analysed period, from January 2012 to December 2015, the average pig meat prices in UE-27 was 160.54 euros/100kg. Prices in Romania were a little bit higher then prices in UE-27 and Poland. It does not mean that while farmer's income in Romania were also higher. The relationships between farmer's income and costs of produce weren't taken under consideration by author in this paper (research).

Analysing price volatility in time the fluctuation can be easily observed, which are related to the pig cycle (Fig.1). It is well

known that pig production is closely linked to the pig cycle, which determines pig meat prices pigs and pig population. From 2014 growth of pig population can be observed, the results of this situation is a decrease while pork prices in procurement. In May and June 2015 pig population in the EU amounted to 138.8 million units, an increase of 2.4 million or 1.8 percent more than last year. In the 2014 an increase in population was 1.4 million, or 1 percent. Compared the first half of 2015 to the first half of 2014 slaughter of pigs in the EU rose by 4.9 million units, or about 4.1 percent. to 126.6 million animals. At the same time, pig meat production in the EU increased by 560 thousand. tons, or about 5.2 percent. to 11.4 million tonnes. According to the European Commission in the third quarter it increased by 1.7 percent compared with the first quarter and in the fourth quarter by 1.8 percent.

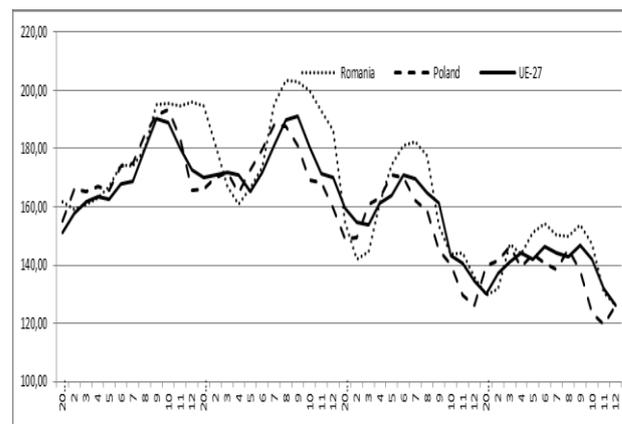


Fig.1. Pig meat prices in UE-27, Romania and Poland in period January 2012 – December 2015.

Source: Polish Ministry of Agriculture and Rural Development, <http://www.minrol.gov.pl/Rynki-rolne/Zintegrowany-System-Rolniczej-Informacji-Rynkowej/Biuletyny-Informacyjne/Rynek-wieprzowiny>, 11.02.2016

To predict the pig meat prices the Winter's additive and multiplicative model have been used. Model's parameters  $\alpha$ ,  $\beta$ ,  $\gamma$  were chosen by the method which deals with the minimisation of the value of the  $\sum_{t=1}^n (y_t - y_t^*)^2$ . The values of model's parameters as well the value of  $\sum_{t=1}^n (y_t - y_t^*)^2$  (which was used as a tool of evaluation of the quality of model's) are

presented in Table 1.

Table 1. The parameters of Winter's model for pig meat prices.

	UE (a)	UE (m)	Romania (a)	Romania (m)	Poland (a)	Poland (m)
A	0.915	0.672	1	0	1	0.164
B	0.289	1	0.196	1	0.259	1
$\Gamma$	1	0.281	0	0.281	0	0.281
$\sum_{t=1}^n (y_t - y_t^*)^2$	1,817.31	1,935.34	4,737.536	2,232.26	2,924.228	2,962.46

a – additive, m – multiplicative.

Source: Own calculations

On the basis of estimated models the forecasts of pig meat prices were calculated for the first half of 2016 years (Tab.2). The obtained values of forecasts suggest further declines in

the pig meat prices in the EU-27, Romania and the slight increase of prices in Poland (based on the additive model).

Table 2. The forecasts of the pig meat prices for period January 2016 – June 2016.

	I	II	III	IV	V	VI	average
UE-27 (a)	123.48	120.73	117.98	115.23	112.48	109.73	116.61
Poland (a)	129.10	131.97	134.85	137.73	140.60	143.48	136.29
Romania (a)	120.00	113.79	107.57	101.35	95.13	88.91	104.46
UE-27 (m)	119.86	126.22	119.86	113.50	107.14	100.78	114.56
Poland (m)	124.73	126.22	124.73	123.24	121.75	120.27	123.49
Romania (m)	125.08	126.22	125.08	123.93	122.79	121.64	124.12

a – additive, m – multiplicative.

Source: Own calculation.

To determine the quality of forecasts, the standard deviation of the forecast errors ( $S_p$ ), relative forecast error ( $w^*$ ), load of prediction ( $u$ ) and Thiel factor ( $I_2$ ) has been calculated. The results for are presented in table 3.

Table 3. The measurements of the forecast accuracy according to Winter's model.

	UE (a)	UE (m)	Romania (a)	Romania (m)	Poland (a)	Poland (m)
$u$	-0.23	-0.58	0.36	0.48	-0.45	-1.54
$S_p$	6.22	6.49	10.04	9.97	7.89	8.03
$w^*$	4%	4%	5%	5%	5%	5%
$I^2$	0.00	0.00	0.00	0.00	0.00	0.00

Source: Own calculation.

Comparing the values of each measurements for each model we can conclude:

1. In UE-27 and Poland the predicted prices of pig meat in period January 2012-December 2015 were slightly higher than the real (the negative value of  $u$  parameter), forecasts of pig meat prices calculated on the basis of each model can be accepted due to the fact that the

maximum value of relative forecast error do not exceed 5%

2. The value of Thiel factors ( $I_2$ ) equal 0 and it allows for the recognition of the forecast as a very accurate.

## CONCLUSIONS

Adaptive models presented in this article are a good tool for short-term forecast of agricultural prices.

These models can be applied to the description of monthly pig meat prices and the predicted values which are obtained on the basis of Winter's model are characterized by a great accuracy.

Due to slight differences between the chosen measurements of the accuracy of the forecast of the choice of the model depends on the person preparing the forecast.

The main aim of the research was to determine the forecasts of pig meat prices for the first half of 2016 in the EU, Romania and Poland. It should also be remembered that the general level the pig meat prices are also

affected by prices of means of production, weather conditions, pig cycle and the currently realized instruments of the Common Agricultural Policy.

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## TECHNOLOGY TRANSFERS FOR DEVELOPMENT AND OPERATION OF MESOPHILIC BIODIGESTERS WITH MANUAL AGITATION

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### *Abstract*

*According to the needs of small farmers and indigenous population in their communities, a study was conducted to determine the best alternative applicable to this people; the study is based on the production of renewable energy in the form of biogas produced by mesophilic biodigesters. They were compared between different types of digesters used throughout the history of the production of biogas and determined to be the best choice in the field of biogas production to the areas mentioned above is that of innovation digesters having a system of manual agitation, which enables durability of the bacterial mass provided by the even greater biomass in a digester without agitation, which in turn increases the service life of the digester, and also takes into account the needs of the population of interest and resources.*

**Key words:** *biodigester, biomass, indigenous population, manual shaking system, small farmers*

### INTRODUCTION

The importance resides in creating a technology for the production of biogas as a renewable energy source through biodigesters in which to benefit indigenous people and small farmers in their communities where they do not have electricity to operating a digester with power agitation.

This is accomplished by creating a digester with shaking, which can be operated by a person in the community.

A digester about seizing all organic waste currently not utilized and otherwise represents a constant danger of environmental pollution.

In the vast majority of indigenous villages of our country, there are breeding farms and there is no means for the rational use of waste so that there are countless landfills where these wastes are dumped polluting the environment and wasting energy source It's very important.

It can be subjected to this waste as is the case of manure and other organic wastes, a process of anaerobic fermentation (without oxygen) as this process is available to any producer or organized community that wants do this, including indigenous communities.

The energy obtained is in the form of gas, which is called biogas or methane gas, since it

is similar to swamp gas obtained by decomposition of all organic matter deposited therein.

This gas can be put into operation from kitchens and household lighting, motors to generate more electricity. (Kern and Siepenkothen, 2014) [8].

This type of bio-energy projects have a feasibility in various fields, as they are human, where diseases and pests are avoided, economic jobs, small and medium enterprises and development have been created, and socially not involve the transformation of foods from the basic food basket, this do not affect food security as well, the main objective of the research, which is that indigenous people and small farmers can use these tools to survive self-sufficiently, and the tools given are the most optimal. (Belhadj et al., 2013) [6].

**Investigation's main objective:** Develop mesophilic digesters with manual agitation, which can be used by both indigenous people as by small farmers, in the production of biogas as a renewable energy source.

**Specific objectives:** (i) To demonstrate the superiority of biodigesters with stirring over biodigesters without agitation. (ii) To demonstrate the efficiency of biogas production by having a stirring system either

mechanical or manual.(iii)To provide tools to small farmers and indigenous peoples to enable them to develop in the energy field as well as in humans.(iv)To discuss the different methods for the preparation of biodigesters so that they can transfer technologies for people with certain disadvantages.

## MATERIALS AND METHODS

**Procedure.**The research was conducted in the Agricultural Experimental Station Baudrit Fabio Moreno (EEAFBM) in La Garita de Alajuela, Costa Rica.

The EEAFBM is located at 850 meters above sea level, has an area of 53.6 hectares; The average annual rainfall is 1,940 mm, distributed from May to November, while the annual average ambient temperature of 22 ° C. The soil consists of sandy clay loam and sandy-clay loam. The region has a humid tropical climate, with rainfall ranging between 3,000 and 4,000 mm per year (Table 1, Fig. 1, 2 and 3).

Table 1. Maximum and minimum temperature, precipitation and light hours per month in Costa Rica.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Max. temp. (°C)	27	27	28	28	27	27	27	27	26	26	26	26
Min. temp. (°C)	17	18	18	18	18	18	18	18	17	18	18	18
Precipitation (mm)	6.3	10.2	13.8	79.9	267.6	280.1	181.5	276.9	355.1	330.6	135.5	33.5
Light hours (%)	40	37	39	33	25	20	21	22	20	22	25	34

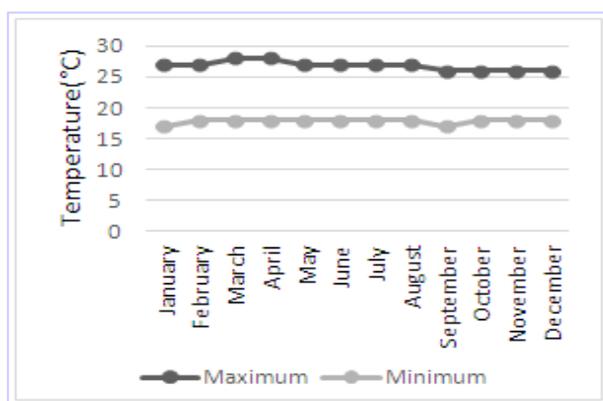


Fig. 1. Maximum and minimum temperatures per month in Costa Rica.

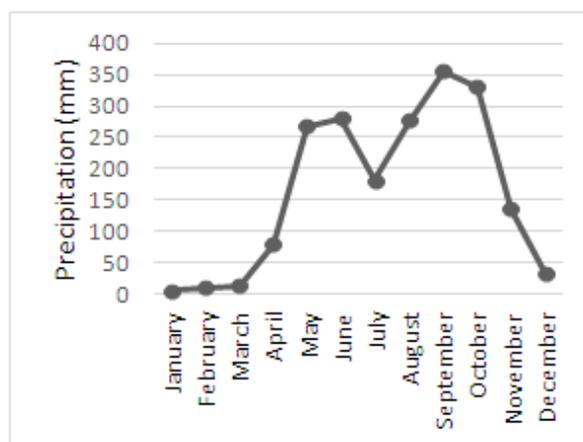


Fig. 2. Annual precipitation per month in Costa Rica.

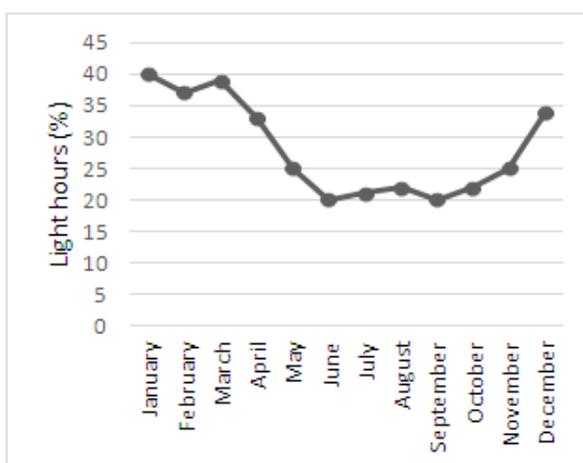


Fig. 3. Annual light hours received percentage in Costa Rica, per month.

### History and origin of the biodigesters:

It was in the eighteenth century when the presence of methane gas was detected in the decomposition of biogas, and later in the century XIX isolated experiments conducted by L. Pasteur demonstrated the feasibility of using the capacity of combustion of methane for energy purposes.(Coker, 2012) [7].

In the late nineteenth century and the first decades of this century in several cities in Europe, India and the US plants for sewage treatment, where sewage sludge were subjected to anaerobic digestion were installed. The gas produced is used for lighting public or as part of fuel needed to operate the plant. (Coker, 2012) [7].

During and immediately after World War II, the fuel crisis made the research in this area will increase, forcing the development to small and large scale, then in several European countries were developed and

disseminated plants for the production of biogas in the middle rural, in order to operate tractors and automobiles, due to the scarcity of fossil fuels such as oil.(Li, 2011) [9].

During the 1950s, in Asia and particularly in India, simple models proofers better known as digesters to produce biogas and appropriate for villagers homes and fed manure and plant waste fertilizers are developed.(Li, 2011) [9].

In China, India and South Africa, due to the shortage of funds these methods were spreading and developing so that today at present these countries have more than 30 million Biodigestores functioning properly, and developed techniques of gas generation small and large scale. (Moriarty, 2013) [10].

#### **Types of digesters:**

To conduct the investigation, were tested different types of biodigesters, which are detailed below.

- **Septic tanks:**

It is the oldest and simple anaerobic digester is known, normally used for the disposal of domestic sewage. It is believed that this derives from the potential of the gases produced by the anaerobic fermentation, for household use. For proper operation of these wells is a prerequisite to isolate sewage falling on it, from those containing soap or detergent. The effect of soaps and detergents especially inhibits the metabolic action of bacteria, and therefore clog the wells quickly and become inoperative, often necessitating uncover to restart the operation. When it is not possible to separate the soapy sewage, and urban sewage, it is necessary to make a chemical treatment with testers that this water in order to solve the problem before starting the anaerobic fermentation. (Ruiz, 2010) [14].



Photo 1. Installing biodigester septic tank.(Taken from Eternit.com)

- **Floating dome or Indian biodigester:**

This digester consists of a drum, originally made of steel but later replaced by fiberglass reinforced plastic to overcome the problem of corrosion. Normally the reactor wall and background are constructed of brick, although sometimes used reinforcing concrete. The gas produced under a floating cover that rises and falls in a central guide is trapped. The gas pressure available depends on the weight of the gas holder unit area and usually varies between 4-8 cm of water pressure. The reactor is fed semi-continuous manner through an inlet pipe.(Pandey and Soupir, 2012) [12].



Photo 2. Floating dome or Indian Biodigester fully operational.(Taken fromASOBIOGAS.com).

- **Fixed dome or Chinese biodigester:**

This reactor consists of a strong gas chamber constructed of bricks, stone or concrete. The top and the funds are hemispherical and are joined by straight sides. The inner surface is sealed by many thin layers of mortar to make it strong. The feed line is straight and flush ends. There is a cap inspection on top of the digester for easy cleaning. The gas produced during digestion is stored under the dome switches and some of the volumes site digester effluent in the chamber, the dome pressures between 1 and 1.5 m of water. This creates quite high structural strength and is the reason for hemispheric top and bottom. High quality materials and expensive human resources are needed to build this type of digester.

This installation has the advantage of its long service life (can reach on average 20 years), provided that a systematic maintenance is performed.(Rajendran et al., 2012) [13].



Photo 3. Fixed dome or Chinese biodigester fully operational. (Taken from AEBIG.com) .

- **Flexible structure biodigester:**

The high investment required to build the digester fixed structure was a limiting factor for the low income of small farmers. This motivated engineers in Taiwan Province in the sixties to do biodigesters with flexible and cheaper materials. Initially nylon and neoprene are used but they proved to be relatively expensive. Further development in the seventies was to combine PVC with the residue of aluminium refineries product called "red mud PVC."

This was later replaced by less expensive polyethylene which is now the most commonly used material in Latin America, Asia and Africa. Since 1986, the Centre for Research on Sustainable Agricultural Production Systems (CIPAV) has been recommending inexpensive plastic biodigesters as appropriate technology for making better use of livestock waste, lowering blood pressure and other natural resources.

In this digester gas accumulates at the top of the bag, partially filled with biomass during fermentation; the bag is inflated slowly with a low operating pressure, because they cannot exceed the pressure of it. (Ocaña, 2011) [11].

Advantages of plastic biodigesters economic:

i) This type of biodigester is very economical and easy to carry because of its low weight, especially in places with difficult access.

ii) Being sealed losses are reduced.

Biogas plants can provide several benefits to rural communities, including a reduction of physical labor, especially of women, reducing the pressure on natural resources such as fuel and charcoal, production of cheap energy, improves culture system recycling manure

through biodigesters, production of cooking gas and fertilizer (manure once gone through a digester becomes an excellent organic fertilizer and reducing pollution, especially in urban areas. (Ocaña, 2011) [11].

Among the disadvantages of plastic biodigester is its low lifetime, making it necessary to set up a new facility every three years. It is also vulnerable to breakage due to adverse weather conditions, the actions of man and animals. (Ocaña, 2011) [11].



Photo 4. Flexible structure biodigester fully operational. (Taken from Carlos Saborio's investigation)

### **Biodigesters by type of bacteria involved in the decomposition of organic matter.**

The proper management of organic waste is achieved through different treatments involving a recycling of these organic materials, transforming them into value-added products. The recycling of organic matter has received a major boost with the high cost of chemical fertilizers, the search for non-traditional energy alternatives, as well as the need for decontamination pathways and disposal. (Belhadj et al., 2013) [6].

The microbial population plays an important role in the transformation of the organic soils especially if it is deemed to have a range of responses to the oxygen molecule, universal component of cells. This allows for processes based on the presence or absence of oxygen, in order to adequately treat various organic wastes. (Zhu and Kumar, 2013) [16].

- **Psychrophilic biodigesters:**

It is also recognized that there bacteria growing in a range of 6.0 ° C to 20.0 ° C, referred psychrophile; but the degradation kinetics determined that this type of plant has

no practical interest for the design of biogas digesters. But for bacteria to work optimally, it is necessary to keep the temperature as constant as possible, that is to say, without sudden jumps in temperature during the day. Anaerobic fermentation process does not generate a significant amount of heat, thus the temperature above be achieved from outside. (Sathish and Vivekanandan, 2014) [15].

- **Mesophilic biogas digesters:**

A mesophilic digester in particular, operates at a temperature between 30 and 37 ° C, therefore the temperature of the melt is more important to control and monitor, with the inflow of daily broth and the flow of gas generated parameter. (Aremu and Agarry, 2012) [4].

In addition to measuring the aforementioned parameters, the system must control different devices vital for optimum performance and safety as the pump inlet, the engine produces stirring the broth, closed circuit pump water through the heat exchanger heats broth, gas compressor and all necessary measures to maintain the dynamics of the system valves. Another vital function to be performed by the system is to ensure the safety of both people and mechanical and electrical elements that are part of the biogas digester, monitoring and controlling all necessary variables. (BaniHani et al., 2015) [5].

- **Thermophilic biogas digesters:**

It is a digester operating at a temperature above ambient, operating between 60 ° C and 80 ° C. The main disadvantage of this type of digester is that the raw material is required at high temperature. For this, the use of it is lower than conventional digesters, operating at lower temperatures. However, this type of digester is used for example in the tributaries of the production of alcohol from sugar cane.

For a given volume of a digester, it produces ten times more biogas, while a digester operating at room temperature. Also, the construction cost is lower. Given that the thermal insulation is of higher cost, this type of digester is cheaper to build, since methane production and digestion are equal.

Conventional digesters do require a large

mechanical type, such as agitation of the dispensing system of the digester and a great job for this natural convection mechanical agitation, in this type of digester completely replaces mechanical agitation. (Anisiji, et al., 2014) [3].

- **Biomass sources:**

Biomass sources that can be used for energy production cover a wide range of materials and sources waste forestry and aquaculture, urban waste and energy plantations, they are generally used for modern processes of conversion involving power generation on a large scale, focused on replacing fossil fuels. (Al-Rousan and Zyadin, 2014) [2].

**Agricultural residues such as firewood and charcoal** have been used in traditional processes in developing country and primary uses small-scale, for example, cooking food or small productive activities such as bakeries, boilers, drying grains, etc. (Al-Rousan and Zyadin, 2014) [2].

**Energy plantations:** these are large plantations of trees or plants grown specifically to produce energy. To do trees or fast growing plants are selected and low maintenance, which usually are grown on land with low production value. (Al-Rousan and Zyadin, 2014) [2].

**Forest waste:** wastes from forestry processes are a major source of biomass that is currently under-exploited. It is considered that each tree removed for timber production, only commercially advantage from a nearly 20% share. It is estimated that 40% is left in him, in the branches and roots, even though the energy potential is far and another 40% in the sawmilling process, in the form of chips, bark and sawdust. (Aguayo and Ojeda, 2009) [1].

**Agricultural waste:** agriculture generates significant quantities of waste, is estimated that, in terms of debris field, the percentage is over 60%, and process waste, between 20% and 40%. On the other hand, the farms produce a high volume of wet waste in the form of animal manure. The common way to treat this waste is scattering in the fields, with double interest to dispose of them and benefit from their nutritional value. (Al-Rousan and Zyadin, 2014) [2].

**Industrial waste:** the food industry generates

a lot of waste and by-products, which can be used as sources of energy, from all kinds of meat (poultry, beef, pork), and vegetables (peel, pulp) whose treatment as wastes represent considerable cost to the industry. These residues are solids and liquids with a high content of sugars and carbohydrates, which can be converted to gaseous fuels. (Aguayo and Ojeda, 2009) [1].

**Urban waste:** urban centers generate a large amount of biomass in many forms, e.g. food waste, paper, cardboard, wood and sewage. The lack of adequate systems for processing the waste generated great problems of contamination of soils and watersheds, particularly by improper waste disposal and collection and treatment systems with high operating costs. (Al-Rousan and Zyadin, 2014) [2].

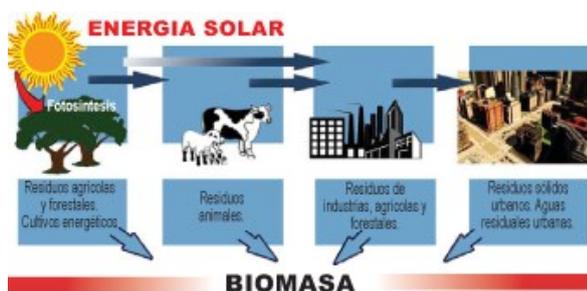


Fig. 4. Various sources of biomass that can feed a digester. (Taken from Elpais.com.).

### Preparation of biomass:

As part of the work in order to obtain a better biodigestate efficiency from the point of view of the growth of bacteria, it is recommended and essential, that there is adequate anaerobic fermentation; besides the stirring process, the biomass of agricultural origin must be previously subjected to a hydrolysis process (fermentation), by which over the course of about 15 days, the biomass of plant origin below the decomposition process, which in turn advance the anaerobic fermentation process once introduced into the digester, which in turn, produce biogas more quickly and efficiently.

### Methodology:

To conduct research experiments with different types of digesters were performed, as well as modifications to these to analyze the

optimal potential that can offer in terms of biogas production and ease of handling.

Variables such as building materials and design of the digester, reaching more favorable results with mesophilic digester model, sustained by external membrane structure were analyzed with stirring.

It is noteworthy that the agitation system, can be hybrid, in areas that do not have electricity, it can start with a manual stirring, which will be mentioned later; and when it begins production of biogas, this may be used in transforming the biogas produced from electricity and thus can power an engine that was later responsible for the agitation, so the digester may be placed on up either manually or by means of a motor that works with the same biogas produced by the digester.

The stirring system is carried by a horizontal bar moved by a motor (motoreductor), which is explained in Figure 6.



Photo 5. Geared motor for mesophilic digester agitation in the form of horizontal bar. (Taken from Carlos Saborio's investigation).

## RESULTS AND DISCUSSIONS

### Mesophilic biodigesters with manual stirring:

#### Construction:

The sizes of these digesters may vary depending on the needs of both the available biomass and the energy requirements fully flexible type of manual stirring. It performs better in both digesters with concrete base structure as a structure in which the agitation system comes not affect the membrane of the digester, can cause damage to its which can cause poor digestion of organic material or even a leak of biogas. The following figure

shows the design that arises based on a flexible structure with a stirring system shown manually built.

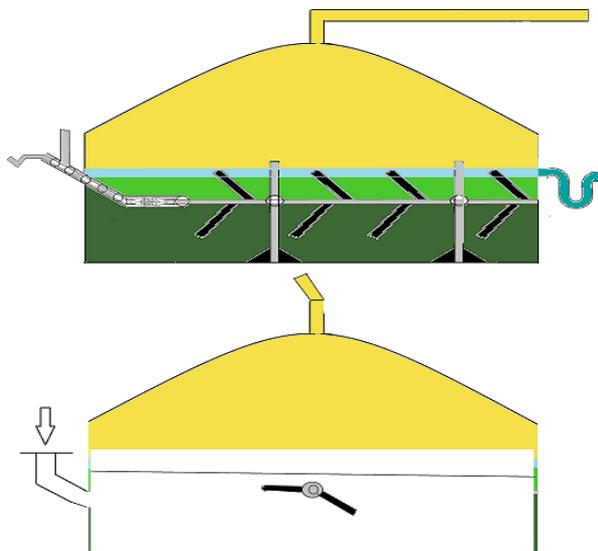


Fig. 5. Proposed model for the mesophilic digester with manual stirring up in a front view, side view in down. (Taken from Carlos Saborio's investigation)

Biomass inside the digester is compacted in the absence of agitation, resulting in the deterioration of the biodigestate and digester life is shortened. Here the importance of the turmoil in the implementation of a mesophilic digester. This is especially relevant when the digester is in a remote or difficult to access area in which the support from trained personnel may be zero or at distant periods, such as in indigenous areas or rural areas.

If the case of biodigesters based in concrete and sustained external membrane structure, have the advantage that the membrane can expand or contract according to the volume of filling the same need, if the membrane is sufficiently full, thanks their support tubes, this will be able to move up in order to not be broken, even if in a situation where the volume down on the membrane.

Through a system of vertical rail, the structure that supports the membrane can move according to the increase that has biogas within the digester. Being umbrella type this structure outside the membrane, it has the advantage that without opening the membrane and thus lose biogas; you can do any work from the outside of this membrane. The automatic coupling of the membrane shown in Photo 6.

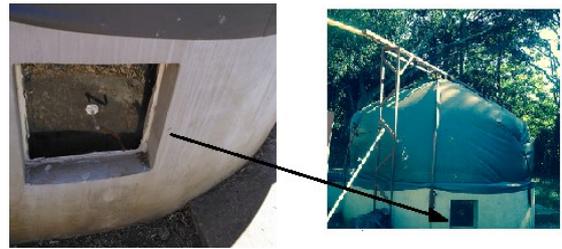


Photo 6. System coupling membrane with slide rail. (Taken from Carlos Saborio's investigation).

Mesophilic biodigester model with manual agitation also has a window system which allows visually monitor the biomass into the digester. This system external window incorporated in the wall of the digester can observe the inside biodigestate. In order to maintain the cleanliness of the window, has a built-type windshield washer system, which through a simple and inexpensive construction, allows optimum cleaning by clearly see the biodigestate inside. This system shown in Photo 7.

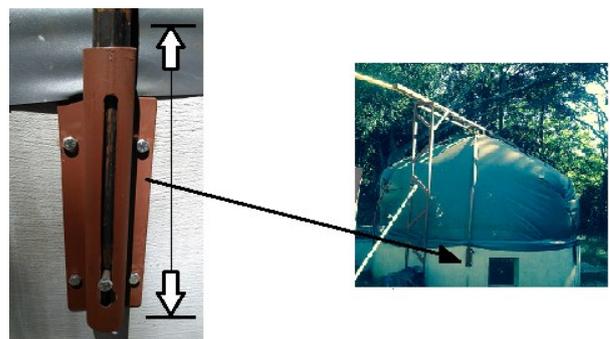


Photo 7. System window wiper to visualize the inside of the digester. (Taken from Carlos Saborio's investigation)

There are different ways to set the gas outlet of the membrane that covers the digester, however, so far the best results have been placing it at the top of the digester. This system is shown in Photo 10.

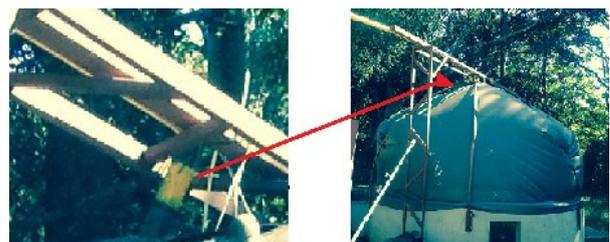


Photo 8. System output of the biogas produced. (Taken from Carlos Saborio's investigation)

The most important aspects regarding the mesophilic digester shaking, it is precisely the presence of this type of agitation to allow the biomass in the digester constant mixing, avoiding accumulations which may potentially damage the digestate and digester. Yet another aspect is the ease of assembly and disassembly of the membrane of the digester. The installation of the membrane is the most important highlights, it has a system of coupling of the membrane to the concrete at the bottom of the digester, which uses an inflated hose is placed in a small canal at the end higher but at its other end adapted to accommodate the hose and inflated; the membrane is introduced into this channel and is pressed so that there is no escape of biogas. This system is shown in Fig.6.

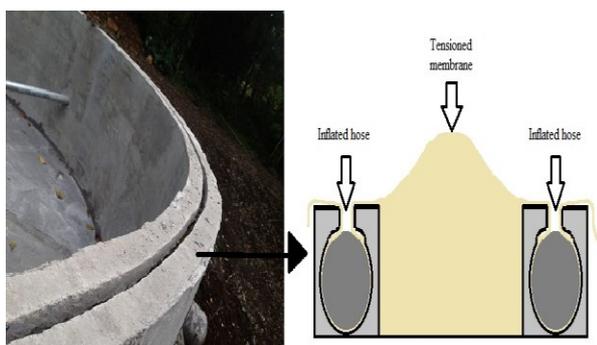


Fig.6. System coupling membrane on the concrete digester through a hose. (Taken from Carlos Saborio's investigation)

On the other hand there is an internal piping system that keeps the temperature of the digester, it is essential that the mesophilic digester with manual stirring is maintained at temperatures between 30 and 36 ° C, this system allows that in the event of a decrease, thanks to provides heat water that is incorporated into the pipes and is heated previously with the same energy produced by the digester, the temperature matches the required, and thus the process of biogas production is not reduced. This system is shown in Photo 9.

The system manual stirring, unlike conventional digesters is performed horizontally, through a bar along the inner diameter of the digester with at least three mixer turbines take charge of moving the

biomass into the digester.



Photo 9. Internal cooling system of the digester. (Taken from Carlos Saborio's investigation).

The system described above is shown in Photo 10.



Photo 10. Stirring system using bar horizontally. (Taken from Carlos Saborio's investigation).

### Results:

It has been found that the durability of a bacterial mass is less in a conventional digester without stirring, because the decomposition of organic matter is not uniform and is consumed rapidly. This sets a disadvantage to this type of digester, because it requires more biomass to feed, consuming a large amount of organic matter, and in turn, producing fewer biogas. This problem is solved by incorporating into the digester a stirrer, which increases the service life thereof and at last the organic matter a longer period of decomposing time, will produce a greater amount of energy is being sought, as is the case biogas.



Photo 11. Stirring system used in conventional digesters and Germany. (Taken from AEBIG.com).

As can be found through a comparison of photos 10 and 11, the system proposed in this research consists of an agitator easier and cheaper suitable for developing country; This system also allows horizontal bar optimum agitation of biomass for this is beaten uniformly and constantly, achieving efficient production of biogas.

If it is true, given the results obtained in the investigation, biodigesters with stirring of the biomass are more effective, because of its durability and lifespan, in indigenous areas is hard to find facilities that are in an urban area, such in the case of electricity, many of these places are in reserve area and do not have electric power, therefore, cannot operate a digester with stirring, and would be wasting the benefits they bring. Same case is the small entrepreneurs who want to start with the implementation of systems for biogas production and clean energy, but do not have a lot of resources to invest in an electric stirrer.

The solution to these problems is presented to the system manual stirring in biodigesters. A digester with manual stirring can be easily manipulated by a person responsible for handling an external lever in the digester internally mix the organic matter in it, this without the need for an electricity system or an electric motor having to perform agitation. In addition to simplifying the cost of the operation, the system can reduce hand shaking costs, because energy that would be spent with an electric stirring save, and secondly, the profit margin in terms of biogas produced is greater.

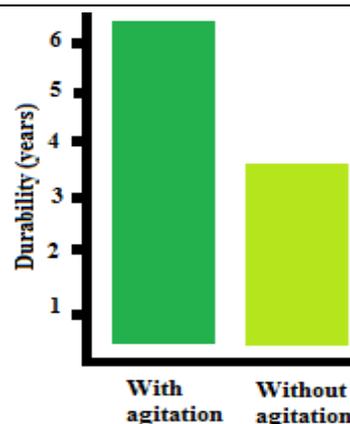


Fig.7. The lifespan of a biodigester with stirring and one without stirring. (Taken from Carlos Saborio's investigation).

## CONCLUSIONS

In conclusion in this research it may include the important and innovative technology that represents the creation of mesophilic digesters with manual stirring for alleged inaccessible areas where it does not have any power as areas with indigenous populations ... This will provide an opportunity to venture to the aforementioned population in which the economic and logistical investments will be lower, and also in which can implement projects of clean energy production with the best choice of environmental conservation and a increased energy production, this added to the unnecessary expense in the future of electric power to stir the digesters, due to the implementation of the system of hand shaking.

Sources of biomass can be obtained directly from the debris of their communities and can be incorporated into the biodigesters by the same people who handle it, then undertake a process of shaking, which will allow small farmers to produce more biogas, and do for a longer period of time due to the increase in the life of the digester.

It will also allow use certain wastes which feeds the digester and thus not polluting the environment.

Innovation aimed at population either way are marginalized small farmers or indigenous people, should be present more and more, with the intention to provide them with tools enabling them to function equally in terms of technologies and search of new knowledge.

This study opens the door to research in indigenous areas and in turn, calls for future research will continue to take into account this population, which has been sidelined for most of the time.

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## COMPARATIVE ADVANTAGE AND PROTECTION OF GUM ARABIC PRODUCTION IN WEST KORDOFAN STATE, SUDAN (2010-2015)

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### Abstract

*This study aimed to measure the level of protection and comparative advantage of producing gum Arabic in West Kordofan State, Sudan during the period 2010-2015. It employed the Policy Analysis Matrix (PAM) technique as a quantitative tool of analysis. The secondary data used were obtained from different sources. The finding indicated that gum Arabic production in West Kordofan State is profitable and has a comparative advantage. Despite that, the government policies have been taxing gum and discouraging its production during the period under the deterioration in the exchange rate. The study recommended that reducing direct and indirect taxes is the essential issue.*

**Key words:** comparative advantage, gum Arabic, Sudan

### INTRODUCTION

Forestry in Sudan includes wood products in form of firewood, charcoal and timber and non-wood products in form of wild fruits and gum products, particularly gum Arabic. Forestry also provides protection of watershed, fodder for domestic animals and wildlife.

Sudan is considered as a key supplier of raw gum Arabic in the world as it used to provide more than 80% of high quality gum Arabic in the world market [7], [8] and [9], gum Arabic is defined as the gummy exudates from the trunks and branches of *Acacia senegal* and *Acacia seyal* in the family leguminosae [6] and [10], produced in which known as gum Arabic belt, that extend through tropical areas of Sudan as well as in Chad, Nigeria, Senegal, Ethiopia, and other African countries (Fig. 1).

Gum Arabic production from *Acacia senegal* and *Acacia seyal*, is one of the most important activities of the savanna forests of Sudan. It does not only offer an opportunity to work and indemnity to the producers against fluctuations of seasons, but is also considered as an important source of country's hard currency, it is used in many manufacturing industries such as pharmaceutical, cosmetic, lithography, textile, pastries and sweets industries.



Fig. 1. Gum Arabic Belt through Sudan.

Gum Arabic Belt passes through Sudan in a wide areas from west to east, and gum Arabic is produced intensively in three ecological regions namely Kordofan, which contributed more than 50% (on average) of the total production, followed by Darfur and Eastern states. West Kordofan State was selected to conduct the study as most parts of it situated

in gum Arabic belt which have high productivity of gum Arabic (Fig. 2).



Fig. 2. West Kordofan State situation

The main importing countries of Sudan gum Arabic were France, India, USA, Germany, Italy and Japan during (2010-2015), on average France imported about 30% of total Sudan gum Arabic exports (Fig. 3).

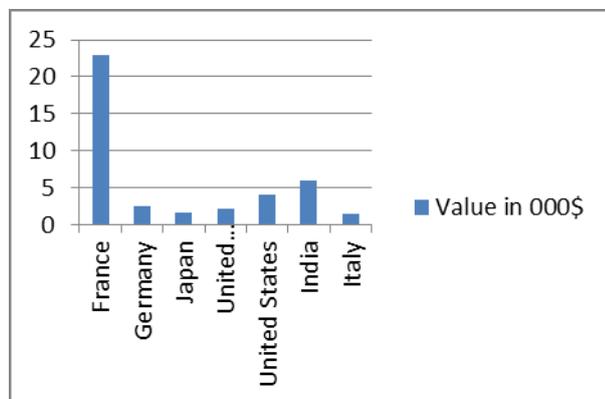


Fig. 3. Average value of Gum Arabic exports by major importing countries (2010-2015)

Source: [1]

Historically Sudan is the leader gum Arabic producer and exporter in the world, but in 1990s and early 2000 Sudan exports fluctuated due to unstable production and unstable policy of Gum Arabic Company that had a monopoly of Sudan gum Arabic trade, beside the competition from other exporting countries as well as synthetics. As a result of poor performance of exports of this strategic commodity in the world market and the need for improving in the future, the exclusive

export concession granted to the Gum Arabic Company (GAC) has been removed in 2009, in an effort to revitalize the external gum Arabic trade.

The government established Gum Arabic Council for free gum and trade in domestic and export markets.

This policy is expected to rearrange Sudan gum Arabic production and trade based on its comparative advantage.

The challenge that Sudan will face, is how to reduce the cost of gum Arabic production and increase its competitiveness in the world market.

So this study aimed to study the effects of various government policies on gum Arabic production in one of the essential area (West Kordofan State).

-Evaluate the profitability of gum Arabic in West Kordofan State Sudan.

-Evaluate the comparative advantage of gum Arabic.

-Estimate the protection measures of gum Arabic that may limit its production and export.

## MATERIALS AND METHODS

**Study Area:** The study was carried out in west Kordofan state. Geographically, the state is in Semi-Arid zone with annual rain fall and temperature suitable and promotes the production of gum Arabic.

**Data collection:** secondary data used were obtained from different formal sources, and primary data from direct interview.

The study employed the Policy Analysis Matrix (PAM) technique that developed by [5] and augmented by [4], for measuring input use efficiency in production, comparative advantage, and the degree of government interventions.

The basic format of the PAM as shown in (Table 1) is a matrix of two-way accounting identities.

This study used the following calculations of policy analysis matrix:

1. Private profitability: ( $D=A-B-C$ )

2. Social profitability: ( $H=E-F-G$ )

3. Nominal Protection Coefficient (NPC) =  $A / E$

4.Domestic Resource cost (DRC) =  $G / (E - F)$  (in the local currency)

Table 1. Policy Analysis Matrix

Item	Total Revenue	Total Cost Tradable inputs	Domestic inputs	Profit
Private Prices	A	B	C	D=(A-B-C)
Social prices	E	F	G	H=(E-F-G)
Policy Transfer	I=(A-E)	J=(B-F)	K=(C-G)	L=(I-J-K)=(D-H)

Source: [5].

The data in the first row provide a measure of private profitability (PP), defined as the difference between observed revenue (A) and costs (B+C). Private profitability demonstrates the competitiveness of the agricultural system, given current technologies, prices for inputs and outputs, and policy. The second row of the matrix calculates the social or Economic profitability (EP) that reflects social opportunity costs. Social profits measure efficiency and provide a measure of comparative advantage. In addition, comparison of private and social profits provides a measure of efficiency. A positive social profit indicates that the country uses scarce resources efficiently and has a static comparative advantage in the production of that commodity at the margin. Similarly, negative social profits suggest that the sector is wasting resources, which could have been utilized more efficiently in some other sector. In other words, the cost of domestic production exceeds the cost of imports suggesting that the sector cannot survive without government support at the margin. The third row of the matrix estimates the difference between the first and second rows. The difference between private and social values of revenues, costs and profits can be explained by policy interventions. The nominal protection coefficient NPC is a ratio of commodity revenue at market prices to its world value. This ratio indicates the impacts of the policy that causes a divergence between the two prices, NPC can be calculated for both output (NPCO)=A/E and input (NPCI)=B/F.

Since the inputs cost in gum Arabic production is minimal, only NPCO is dealt with here considered as just NPC.

If  $NPC > 1$ , it indicates that the private price of output is greater than its parity price, which means protection measures provide positive incentives to produce the commodity, If  $NPC < 1$ , it indicates that the product returns to the producer are less than the social returns that means the product implicitly taxed.

If  $NPC = 1$ , it indicates a neutral situation, means returns to producers are the same as returns from selling in a free market system using international prices .

Domestic Resource cost (DRC) has been widely used in developing countries to measure efficiency, comparative advantage and guide policy reforms.

The DRC is the tool to measure comparative advantage of different scales of broiler production, it is defined as the  $(G/ (E-F))$  and it indicates whether the use of domestic factor is socially profitable ( $DRC < 1$ ) or otherwise ( $DRC > 1$ ).

If  $DRC > 1$ , it means that the opportunity cost of using domestic resources exceeds the value added at social prices, and the product will not be internationally competitive. It is better in this case to reallocate resources to an alternative product.

The reverse hold for  $DRC < 1$  indicates that the economy saves foreign exchange from local production, because the opportunity cost of using domestic resources is less than the net foreign exchange it gains (in export) or saves (in substituting for imports).

$DRC < 1$  also indicates efficiency and international competitiveness.

If the DRC is above 1, the system has no comparative advantage; if it is below 1, the system has a comparative advantage.

## RESULTS AND DISCUSSIONS

### Private and Economic Profitability

Table 2 shows the private profitability and the economic profitability for gum Arabic production in West Kordofan State, in Sudanese pounds per ton, for the period 2010/15.

Table 2. Gum Arabic private profitability and economic profitability in West Kordofan State, in Sudanese pounds per ton during 2010/15

Season	Private profitability	Economic profitability	Profitability coefficient
2010	5,459.4	14,435.5	0.38
2011	1,620	5,151.6	0.31
2012	2,745	12,489.8	0.22
2013	5,468	32,479.9	0.17
2014	5,085	36,103.5	0.14
2015	4,117.5	38,457.5	0.11

Source: calculations from [2].

As the numbers read, both private and economic profitability were positive and economic profitability is more than private profitability throughout the period, which indicates gum Arabic has been taxed in form of direct fees or indirect taxation in form of overvalued exchange rate. This result indicates that government policy packages to gum Arabic production do not provide any incentives to producers during the period. The PP and EP, showed increasing trend during the period whereas EP exceeded PP, accusing government policies of being discouraging to producers.

Table 3. Nominal Protection Coefficient and Domestic Resources Cost

Season	NPC	DRC
2010	0.38	0.33
2011	0.31	0.82
2012	0.22	0.77
2013	0.17	0.69
2014	0.14	0.73
2015	0.11	0.8

Source: calculations from [2]

Table 3 shows the **Nominal Protection Coefficient (NPC) and Domestic Resources Cost (DRC)**. The NPC used to measure the level of protection to gum Arabic in West Kordofan State, the results of  $NPC < 1$ , it indicates that the returns to the producer are less than the social returns that means gum Arabic implicitly taxed during the period, as the values of NPC in decreasing trend, indicate that the level of taxation proved to be high. This could be attributed to the overvaluation of the exchange rate. Domestic Resources Cost (DRC), the values of DRC demonstrated the opportunity cost of using

domestic resources less than value added at social prices, so the product will be internationally competitive, the increasing trend in DRC values indicate the decreasing in comparative advantage of gum Arabic.

## CONCLUSIONS

The Policy Analysis Matrix (PAM) was employed in this study as a technique to study the effects of different policies on gum Arabic profitability, level of protection and comparative advantage in West Kordofan State, Sudan. PP and EP were used to represent the profitability, NPC used to measure level of protection accorded to producers and DRC used to measure the comparative advantage. The results indicated that gum Arabic production in West Kordofan State has profitable. Although this profitability, the government policies have been discouraging its production by direct fees or indirect taxation in form of overvalued exchange rate.

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