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METHODOLOGY ELABORATION OF INTEGRAL APPRECIATION OF ECONOMIC EFFICIENCY OF WINE GROWING SECTOR'S PRODUCTION IN THE REPUBLIC OF MOLDOVA

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Abstract

This paper presents an analysis to estimate the economic efficiency of grapes and wine production obtained from processing the grapes in agricultural enterprises. There was determined the system of partial indicators of economic efficiency of grapes and wine in the dynamics of the years 2005-2011. Along with the traditional indicators the author has developed a methodology for calculating of the synthetic (integral) indicator of efficiency which can take into consideration the basic indicators of grape production and the results of their processing.

Key words**:** *economic efficiency, integral appreciation, system of indicators, wine sector*

INTRODUCTION

As a scientific term, the term "efficiency" is of Latin origin and it means result. Although most researchers are mentioning in their work researches the evolution of the term "efficiency", they affirmed that researches in this area began to be made in the last century, evidences that were met in some indirect references of researchers W. Petty and A. Smith. Adam Smith addresses the issue of efficiency in terms of maximizing the results without referring to minimize consumption. One of economists with important contributions in the definition of economic efficiency was undoubtedly the Italian researcher Wilfred Pareto, whose findings were identified with the equilibrium conditions of a market economy with perfect competition.

Research conducted permitted to state that the essence of efficiency of agricultural production is the formation of a complex of requirements and conditions necessary to ensure extended reproduction in the competitive economy, enabling industry to meet society's needs not only food, but also to develop in harmony under the conditions of functioning some links and economic, organizational, legal, social, moral relations, and not lately, in terms of ensuring a sustainable agriculture. Increasing useful effects should be the aim of all economic activities, but with the condition to maintain ecological balance. Organization extended reproduction depends on the level of economic efficiency as profit creates prerequisites and conditions for expanded reproduction processes.

MATERIALS AND METHODS

In the research the author utilized data of the Statistic Annuary, specialized formularies of agricultural enterprises.

On researching the issues addressed in this work were: method of comparison, economic indices, stochastic frontier (SFA) and enveloping (DEA).

RESULTS AND DISCUSSIONS

Currently addressing the problematic economic efficiency is based on econometric techniques, which is based on the method of least squares. In the context of measuring efficiency, the regression models with a new random variable - i.e. "inefficiency". Thus, there can be made different assumptions about the distribution of inefficiency, resulting efficiency scores for both point estimates and estimates by confidence intervals. It is about

the *efficient frontier*. The latest research studies in the research domain of efficiency production refer to stochastic frontier method, which is a method to estimate the production frontier and, therefore, a method of measuring the efficiency of production.

We tend to mention that the results obtained from producing the farm products are reported to every type (factor) of resource separately. But it is remarkably noticed the fact that when obtaining the results, then there are participating a totality of resources (agricultural land, productive fixed resources with agricultural destination), material consumptions, labor work, etc.), as well as market's conditions (demand, offer, competition, etc.)

Changing business conditions in the agricultural enterprises with diverse legal forms of ownership and of organization requires a new and complex attitude of analytical research. Its results should determine not only changes in the dynamic, the connections between phenomena, but also to serve as a basis for making good decisions in planning and forecasting future production development. The existent practice of comparative analysis production efficiency is represented by very different indicators, which often characterize various aspects of the production process and does not reflect the full extent conditions of the operation objectives, the link between production results and means of obtaining them.

For efficiency characteristic of any production sector is used a system of indicators expressing special factors influencing the final results of production. These indicators reflect the level of use of agricultural land, means of production; indicate the consumption materials, labour etc.

Production efficiency effect is characterized by results that always exceed production consumption.

A high economic efficiency (Table 1) was achieved in 2005 and 2011, when grape productivity and high levels recorded in the period when the correlation between the sales price and the cost of finished products sold was the largest. Every 1 lei is an average profit of 31.02 and 36.53 liquid cash.

Table 1 – Dynamics of economic efficiency of grape production in agricultural enterprises in the Republic of Moldova

Years	Productivity of bearing vine plantations, q/ha	Unit cost of finite sold production, lei	Selling average price of 1 q of grape, lei	Calculated (lei) per: 1 q of sold product	Efficiency level, %
2005	31,5	238,95	314,37	74,44	31,02
2006	25,1	234,76	272,0	37,27	15,88
2007	30,8	219,93	268,38	48,45	22,03
2008	37,1	224,50	246,04	21,54	9,60
2009	41,1	1717,19	181,41	10,22	5,97
2010	20,9	313,98	340,95	26,96	8,59
2011	42,6	237,17	323,81	86,64	35,53
	35,5	236,5	273,0	363	15,5

Source: author's calculations on the basis of specialized blanks of agricultural enterprises given period of time

Vine plantation productivity is the main indicator which characterizes economic efficiency in viticulture, which increase, in the conditions of intensification and difficult financing, remains a problem for agricultural enterprises. Increase or decrease of productivity of plantations and the change of their quality determines the efficiency of production of grapes. But only on the basis of the partial indicators is not possible to assess the integral economic efficiency.

These indicators reflect the partial economic efficiency, because some of them only refer to a certain category of resource.

We believe that in order to determine the integral economic efficiency of production is necessary to calculate, along with traditional indicators, a synthetic (integral) indicator of efficiency, such as multi-criteria weighted average calculated from each agricultural enterprise of the total set based on main indicators that are characterizing the efficiency.

For each combination of resources to achieve maximum results, but data results may actually coincides with this maximum level or may be lower. Undertaking achieve maximum results in relation to a unit of resources is taken as a yardstick with which to compare all companies studied by the use of resources. Efficient firms form "efficient production frontier." Therefore, the efficiency is calculated by estimating the distance between the enterprises studied the efficiency frontier.

The proposed methodology is based on the principles of the method, which is called analysis - envelope (eng. Data Envelopment Analysis, DEA).

On the basis of coparing partial indicators of eficiency of using resources are obtained enveloped data.

These enveloped data make the frontier of production posibilities, which is maximal posibilty of results by different combinations of resources.

Method of analysis - envelope belongs Farrell [p.253-281], according to which efficiency is determined as the ratio of agricultural enterprises in productivity maximum productivity.

Maximum efficiency is often called "advanced practice", (eng. best practice), which is always at the frontier of the production possibilities, and, therefore, the change of efficiency means changing the distance from the border. When selecting features it is necessary to meet the requirements of qualitative homogeneity of the non-existence of contradictions between them. This condition can be considered fulfilled if the lot is changing characteristics usually in one direction and strength of their bond is high.

At product level is proposed to compute the average multi-criteria according to the following mathematical relationship that results from the methodology developed:

$$\overline{C}_i = \frac{\frac{p_i}{p_{opt}} + \frac{Cp_{opt}}{Cp_i} + \frac{Pm.v_i}{Pm.v_{opt}} + \frac{Pq_i}{Pq_{opt}} + \frac{Nr_i}{Nr_{opt}}}{n} = \frac{\sum_{n=1}^{n}\left(\frac{x_{i_n}}{x_{opt}}\right) + \frac{x_{opt}}{x_i}}{n}$$

where:

$\overline{C}_i$ - multicriterial average coeficient of economic efficiency for *i* units;

p_i and p_{opt} – productivity of culture culturii per 1 ha, (q) for *i* units per unit with optimal frontier level (sample)[2];

Cp_i and Cp_{opt} unit cost of production, (lei) per *i* units and unit with optimal frontier level;

$Pm.v_i$ and $Pm.v_{opt}$ – selling average price of 1 q, (lei) per *i* unis and unit with optimal frontier level;

Pq_i and Pq_{opt} –calculated profit for q of product, (lei) per *i* units and unit with optimal frontier level;

Nr_i and Nr_{opt} – level of efficiency (%), for *i* units and unit with optimal frontier level;

x_{i_n} - significance of characteristic x_n (for maximized characteristics) for *i* units;

x_i – significance of characteristic (for minimized characteristics) for *i* units.

x_{opt} – significance of characteristic for optimal frontier level (sample) – x_n;

i – number of multitude researched;

n – number of characteristic.

We tend to mention that a part of obtained production in agricultural enterprises is not solt on distibution chanels, but is processed.

Table 2. Dynamics of economic efficiency of grape wine obtained from processing it in the agricultural enterprises of the Republic of Moldova

Year	Production volume, dal	Unit cost of 1 dal, lei	Selling price of 1 dal, lei	Profit in calculation per 1 dal, lei	Level of rentability, %
2005	1051316	70,2	89,75	19,54	27,84
2006	216173	17,59	31,17	13,59	77,25
2007	75697	122,07	116,54	-5,52	-4,52
2008	67125	101,75	101,08	-0,67	-0,66
2009	116328	47,92	64,09	16,17	33,75
2010	91682	50,57	70,55	19,98	39,52
2011	176719	23,07	43,11	20,04	86,88

Source: author's calculations on the basis of blanks specialized of agricultural enterprises of the given period

Data of Table 2 demonstrate that the obtained results from processing grapes in 2007 – 2008 were registered with losses, and in 2007 şi 2011, the vine efficiency level reached the level of 77,2% - 86,8%.

We consider a necessity to expose our opinion and to complete the methodology proposed tsking into consideration and the resluts obtained from selling own products, including also four indicators:

c'_{p_i} and c'_{opt} - unit cost of sold finite production, lei for *i* units and for unit level with optimal frontier;

$p'_{m.v._i}$ and $p'_{m.v.opt}$ - selling price of 1 sold unit (ton, decaliters etc.), lei for *i* units and for unit level of optimal frontier;

[2] As a basis of comparison, depending on the scope of research, can be taken too the data on average level of multitude, on progressive average, etc.

Pq'_i and Pq'_{opt} – calculated profit of one unit of product sold, (lei) for *i* units and for unit level of optimal frontier;

Nr'_i and Nr'_{opt} – productivity efficiency level (%), for *i* units and for unit şi pentru level of optimal frontier;

Then, in the enterprises that process their own production the determinance of economic efficiency of different types of products, with taking the consideration the results obtained from the industrial processing, we suggest to be made the following relation:

$$\overline{C}_i = \frac{\sum_{n=1}^{n}\left(\frac{x_{i_n}}{x_{opt}} + \frac{x'_{i_n}}{x'_{opt}}\right) + \frac{x_{opt}}{x_i} + \frac{x'_{opt}}{x'_i}}{n}$$

where:

x'_{i_n} - significance of characteristic x´n (for maximized characteristics) for *i* units;

x'_i – significance of characteristic (for minimized characteristics) pentru *i* unităţi.

x'_{opt} significance of characteristic for optimal frontier level (sample) – x'_n;

i – units number of researched multitude;

n – number of characteristic.

CONCLUSIONS

Research results allow us to demonstrate the advantages of the proposed methodology for calculating the synthetic (integral) indicator of efficiency, along with traditional indicators used in competitive economy, which are:

• given methodology is based on complex multi-criteria complex approach of evaluation system of economic efficiency of production;

• assessment based on multi-criteria average coeficient is a method of comparison and consider the actual results of all enterprises;

• estimation is made based on public data of specialized forms of companies studied, which are used in traditional practice of assessing the economic efficiency;

• there are no restrictions on the number of indicators years, businesses etc.

• correspond to existent practices of competitive economy, where each producer aims to exceed its competitors in all positions (indicators) that characterize the competitiveness and economic efficiency of production.

• between indicators of economic efficiency calculated in the competitive hierarchy of enterprises there is a reciprocal connection, are harmonized, have a consecutive increase (decrease) and are comparable.

• estimation the integral economic efficiency enables to identify the location of each agricultural unit on the economic efficiency level in the hierarchy studied in comparison with optimal frontier (sample).

• is kept the comparability of indicators in ensemble, because they are standardized optimal frontier level (sample).

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