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MANAGEMENT OF ENHANCING THE EFFICIENCY OF INVESTMENT USE IN THE AGRICULTURAL SECTOR FROM THE REPUBLIC OF MOLDOVA

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Abstract

The need for funding of the agricultural sector in recent years is growing in the situation when agricultural enterprises are consolidating in order to sell the produced products on domestic and international markets. On the one hand, there is a trend of land consolidation, and on the other hand, farmers want to buy all the tools and equipment necessary for carrying out their business. Heavy investments are made in inputs (quality seeds, fertilizers, animal varieties and breeds with high efficiency, etc.) and how these are mostly imported at world prices, the need for further funding increases. All these lead to the continuous growth of the need for financial resources. Another problem lies in the inefficient management of funding sources. With increasing investment in agriculture, Republic of Moldova faces constraints of implementation capacity. The research purpose is to analyze the efficiency of investment in agriculture and to determine the optimal level of investment for 1 ha of agricultural land.

Key words**:** *development, economic growth, agricultural sector, investment, productivity*

INTRODUCTION

The role of investments is very complex in the economic development of a country, because they influence ownership structures, economic structures on branches and sub-branches, technological structures, employment structures, influencing the pace of development of the country.

In this respect, P. Drucker, mentions on the relationship between innovation, production and market demand; specifically it is that innovation will lead to changes in the production structure which, in turn, lead to changes in the structure of demand for goods and services, and these in turn, draw after them changes in the market structure in the sense of the emergence of new markets, new products [Drucker, 1993] [3].

Formation of the first principles of the theory of investment is related to mercantilist school: Tomas Mun, J.B. Colbert, J. Behera, F. Gorniga. They examined the capital as an outstanding source of investment resources, which improves production volume. Mercantilist school argued the need for regulation by the state of conditions that ensure inflow of foreign investments in the country. In their view, only an active protectionist policy in international trade can provide the state with an active trade balance and a surplus of money in the country. This surplus, in their view, reduces the interest rates and stimulates capital investment [Moldovanu, 1992] [4].

The first essential parameters of the investment model were formulated by representatives of the classical school - A. Smith, D. Ricardo, T. Malthus, I. B. Say. Economists of this school have clearly defined concepts of money and capital; they have clarified the role of capital accumulation in the formation of investment resources and examined the role of the credit in developing investment [Blank, 2001] [2].

In agriculture, priority efforts should be directed towards improving successfully the adaptability and management capacity of the agricultural system. Thus, if we use effective management practices, resilience against vulnerabilities that the sector is subject to will increase, including those related to difficult

financing. There are of course key obstacles to be overcome, including the adaptation of legislation, clarifying the roles of public / private sector, developing solutions for poor infrastructure and sufficient awareness of the importance of this financing instrument among farmers.

MATERIALS AND METHODS

The investigations were focused on the statistical yearbooks NBS data, the Ministry of Agriculture, data from statistical reports and financial statements of agricultural enterprises. The research used several methods and processes: observation, grouping, comparison, the table and graphs method, analytical time series leveling, time series, Cob-Douglas production function, marginal analysis.

RESULTS AND DISCUSSIONS

It is difficult to list, in order of importance, all factors that contribute to the economic growth. However, by aggregating factors on categories it can be mentioned that there are three factors: production funds (K); labor (L) and technical progress. The role of production factors evolves, changes over time, but for a relatively small period of time, the factor of technical progress can be omitted. Economic growth in this case depends solely on capital (K) and labor (L). Frequently, in the study of economic growth, there is used a function $Y=A^{K^{\alpha}L^{\beta}}$, called Cobb-Douglas production function. By using this function, paths of economic growth can be determined. [Dinu și Socol, 2006] [5].

With the function $Y=AK^{\alpha}L^{\beta}$ the elasticity of the final product (Y) can be determined in relation to the means of production (K) and labor (W). Means for producing (K), while „are worn" are consumed in the process of operation. Growth rate of the volume of productive capital can be written as:

$$\frac{dK(t)}{dt} \qquad (1)$$

Physical wear in a unit of time is getting greater together with the increasing of capital volume. Between decreasing the capital volume in a unit of time $\frac{dK(t)}{dt}$ and the volume of physical wear and tear (aK (t)), the dependence is reversed, ie:

$$\frac{dK(t)}{dt} = -aK(t) \qquad (2)$$

The dynamics of physical depreciation of capital means of production $K(t) = K_0 \ell^{-at}$ is introduced in the Cobb-Douglas function $Y=AK^{\alpha}L^{\beta}$ and we obtain the function:

$$Y_1 = A(K_0 \ell^{-at})^{\alpha} L^{\beta} = AK_0^{\alpha} \cdot \ell^{a\alpha t} \cdot L^{\beta} \qquad (3)$$

So, in the initial period, till the supplementation of productive capital with investments (I) efficiency is $e = \frac{Y}{aK_0}$. The volume of effect (E_{fct}) and the volume of investments (I) are in direct dependence: additional investments generate growth of the effect, but to a certain level, further increasing investment leads to a decreasing effect on one leu. [Cataranciuc și Maximilian, 2013] [6].

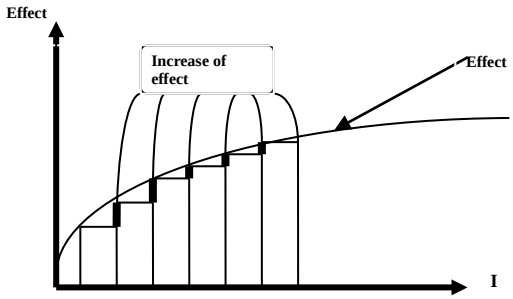

Fig. 1. The link between the level of investment and the volume of effect.

Increase of investment generates the diminish of efficiency and increase of effect. Ie: the effect after supplementation of productive capital with investments (I) increases; however, „increased effect" being divided to a growing number, to the amount of additional investment, it will decrease per unit of

investment, so the efficiency of investment will reduce. Supplementation of investment can not continue permanently.

Increase the volume of investments should be restricted by the value of ratio:

$$e = \frac{E_{fct}}{I} \quad (4)$$

If the ratio (efficiency) $e = \frac{E_{fct}}{I} > 1$, then $E_{fct} > 1$; investment costs can be covered with $E_{fct} - 1 > 0$;

If the ratio (efficiency) $e = \frac{E_{fct}}{I} = 1$, then $E_{fct} = I$; investment costs are equal with „effect" and further supplementation of the investment volume, is not economically justified. In this case the volume (I) will be the maximum acceptable volume, called marginal investments. We note the volume of investments by I_{max}. So, $I \leq I_{max}$, otherwise these economic activities will generate only losses.

If the ratio (efficiency) $e = \frac{E_{fct}}{I} < 1$, then $E_{fct} < I$; investment costs will continually generate only losses.

In other words, the volume of additional investments must satisfy the condition: $e = \frac{E_{fct}}{I} \geq 1$.

So, *investment restriction will be satisfied if* $\frac{Y}{\alpha K_0} \geq 1$; $Y \geq \alpha K_0$.

Otherwise the final product, expressed in value, will not cover any costs of productive capital. From the ratio there result: effectiveness depends directly on the volume of the final product (Y) and is in inverse depending on the volume of productive capital (K_0). The increase of investment volume generates the growth of volume of final products, but the specific effect per unit of investment is reduced.

Table 1. Dynamics and analysis of marginal efficiency of investment in agricultural sector from the Republic of Moldova in the period 2004 -2014

Year	**Value of investment in agriculture, mil. lei**	**The value of global agricultural output (in comparable prices), mln. lei**	**Agricultural production value per 1 leu invested, lei**	**Increase (+), decrease (-) in absolute measures in comparison with the previous year**		**Additional agricultural production value to 1 leu of additional investment, lei**
				of value of investment, mil lei	of value of agricultural production, mil. lei	
Conventional values	V_i	V_p		ΔV_i	ΔV_p	$\Delta_p \div \Delta_i$
2004	317.9	12,301.3	38.8	-	-	-
2005	455.9	12,402.2	27.01	138	100.9	0.73
2006	489.2	12,266.7	25.08	33.3	-135.5	-4.07
2007	731.6	9,432.5	13.0	242.4	-2,834.2	-11.69
2008	1,020.2	12,460.3	12.2	289.0	3,027.8	10.77
2009	923.3	11,259.5	12.9	-97.2	-1,200.8	-12.35
2010	1,045.6	12,146.7	11.6	122.3	887.2	7.25
2011	1,808.2	12,757.8	7.06	763.2	611.1	0.80
2012	1,641.8	9,908.5	6.0	-166.2	-2,849.3	-17.14
2013	1,785.1	13,772.8	7.7	-143.3	3,864.3	26.9
2014	2,298.5	14,902.18	6.48	509.4	1,129.4	2.22
Total in average	9,834	133,610.5	13.5	+1,690.9	+2,600.9	1.54
R_c, %	119.3	102.0	84.0	x	x	x

Source: developed based on data of NBS, for years investigated [Anuarul statistic 2005-2015] [1]

For the argumentation of the obtained conclusion in the mathematical model developed by using the Cobb-Douglas function, analysis of marginal efficiency of

investment in agriculture in the Republic of Moldova was made and there were grouped data of agribusinesses after grouping feature - the value of investments per 1ha of agricultural land (Table 1).

Analysis made based on data from Table 1 demonstrates a dynamic growth both in investments and the value of agricultural production, ie effect grows with increasing of effort, but in the average, annual value of investment (119.3%) is higher than the value of production (102.0%) by 17.3 pp.

This disproportion has a negative impact on investment performance [Timofti, 2010] [9].

So, for example, in 2014, investments being 7.2 times higher compared with 2004, the value of agricultural output per investment was decreased from 38.8 lei to 6.48 lei. The annual average reduction is for about 16%.

Marginal efficiency of investment analysis attests that additional investment returning at first glance, seems to be growing only in 2008, 2010 and 2013. It should be noted that the increase in additional investment performance is obtained immediately after the unfavorable years for the country's agriculture, and during the rest of periods it is decreasing. [Timofti, 2009, 2015] [7, 8].

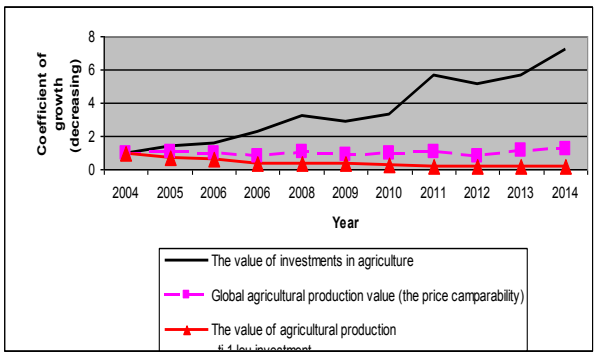

Fig. 2. Dynamic of growth (decrease) rate of the overall production value, investment value and return on investment

Source: calculated based on data from table 1

Note: $\overline{Rc}_1 = 1.193$; $\overline{Rc}_2 = 1.02$; $\overline{Rc}_3 = 0.836$

In the average of years 2004-2014, for 13.5 lei of the production value at 1 leu total investment return only 1.54 lei or 11.4% (1.54 lei: 13.5 lei) to production value at 1 leu of additional investment.

So, the return on investment in agriculture is decreasing although investments for agricultural development have an innovative character. Management of efficient use of investment is the basic condition for agricultural enterprises. [Sargo, 2015] [10].

Investments should be used for promoting technical progress designed to ensure the improvement of production, technologies, forms of organizing production and ensure economic development and restructuring of the economy of agricultural sector. Promoting technical progress through investment provides:

-improvement of material and technical base of enterprises;

-application of scientific and technological research results;

-increasing the productivity of crops and livestock, volume of qualitative products to ensure

-food security and the need to satisfy internal and external market, as well as international economic cooperation.

In order to identify the optimal level of investment that allow to obtain higher yields, grouping of agribusinesses was performed according to the level of investment at 1ha of agricultural land (Table 2).

Analysis of data from Table 2 shows that increasing investments at 1 ha of agricultural land, leads to increase of the effect, ie the value of agricultural production at 1ha of agricultural land. In group III of enterprises this indicator contains 12,996 lei / ha, ie 36.2% higher than in group I and 16.5% compared with companies from group II.

But the return on investment is higher in group II of enterprises – 15.6 lei. This demonstrates that:

-the optimal level of investment at 1ha of agricultural land is 1,655.6 lei or within the limit of 1,000-3,000 lei / ha. Its increase further diminishes the return on investments, ie economic efficiency by 32%.

-investments applied on averaged of 557.2 lei at 1ha of agricultural land are not sufficient and do not generate high results – yields of agricultural land and investment are low.

-investments applied on average at 1ha of agricultural land of 8,664.8 lei contribute to the increase of global production at 1ha of agricultural land, but the efficiency of

investments decreases, ie investments in high volume are not effectively used.

Further calculations show that if enterprises from group III would have used investments at 1 ha at the level of group II, they would have saved money sources amounted to 93,488.7 thousand lei, and return on investment would have been bigger – 5 lei / ha confirmed below:

-Difference of investments at 1ha of agricultural land between group III and group II:

8,664.8 lei – 1,655.6 lei = 7,009.2 lei/ha

-Amount of over-consumed investments throughout the agricultural land in group III:

13,338 ha * 7,009.2 lei/ha = 93,488.7 thousand lei

-The difference in yield per 1ha:

15.6 lei – 10.6 lei = 5 lei/ha

Table 2. The influence of investment levels at 1 ha in selected enterprises in the Republic of Moldova, on the growth of economic effect and investment efficiency in the average of years 2012-2014

Indicator	**Groups of enterprises according to the level of investments at 1 ha of agricultural land, lei**			
	I Less than 1,000	II 1,001-3,000	III Over 3,000	Total/in average
Number of enterprises, units	17	19	19	55
Value of investments at 1 ha of agricultural land, lei	557.2	1655.6	8664.8	2993
Agricultural land surface on which the investment was made, ha in average at 1 enterprise	1193	1022	702	972.3
Mineral fertilizers at 1 ha, kg	16.5	29.6	99.2	48.4
Energetic potential at 1 ha of agricultural land, c.p	0.91	1.19	3.15	1.74
The average annual value of fixed assets at 1 ha, lei	6547	12243	22297	13696
The number of workers at 100 ha, people	10.7	9.7	9.5	9.9
Costs at 1 ha of agricultural land, lei	9061.4	10089	7876	9743
Value of global production la 1 ha, lei	9538	11154	12996	11229
Value of agricultural production at 1 leu of investment, lei	3.0	15.6	10.6	9.74

Source: developed by the authors based on data from agricultural enterprises in 2012-2014

CONCLUSIONS

Based on the carried out analysis, it was found that in 2004-2014, investment and agricultural production value increased, ie by the increase of the effort, the effect also growths, but the average annual value of investment growth (119.3%) is higher than the value of production (102.0%) with 17.3 p.p. This disproportion influences negatively on efficiency of investments use.

In 2014 the investment being 7.2 times higher compared with 2004, the value of agricultural output per investment declined from 38.8 lei to 6.48 lei up. The annual average reduction is 16%.

Return on investment in agriculture during 2004 to 2016 is decreasing. From 13.5 lei of production value at 1 leu total investment return only 1.54 lei or 11.4% of production value at 1 leu additional investment.

The optimal investment level at 1 ha of agricultural land is 1,655,6 lei or within the limit of 1,000-3,000 lei per hectare. Its increase further diminishes the return on investments, ie economic efficiency by 32%.

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