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The Impact of Investments on Gross Value Added in Romanian Agriculture

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Abstract: Investments are one of the key development elements of any sector of activity in the entire economy. In this paper we want to establish the influence of investments in Romanian agriculture on the processing sector, given that it is quite under developed. Thus, this processing sector was represented by the gross value added in agriculture, thus, in this research will be analyzed quantitatively and qualitatively the dynamics of the two variables, and then determine the correlation coefficient and the equation of the regression model. linear, to determine the intensity with which investments can influence the value added belly of Romanian agriculture.

Keywords: Gross value added, impact of investments, investments, processing of agricultural products, Romanian agriculture.

I. Introduction

Limited investment in agriculture in developing countries is a key constraint in expanding its production. For most of these countries, domestic investment in agriculture is limited by the limited availability of domestic economies and the heavy reliance on aid financing [1].

The foreign direct investment contains an investment that involves a long-term relationship and reflects a long-term interest and control by an entity resident in an economy of a company resident in a different economy. Numerous papers have investigated the relationship between foreign direct investment and domestic investment at the national and regional level as a whole. However, the evidence for this relationship was contradictory. Gameli Djokoto[2], investigated the effects of foreign direct investment in agriculture in Ghana. The authors concluded that, in the short term, foreign direct investment in agriculture does not significantly affect domestic investment in agriculture. Governments should be stepped up to reduce the time it takes to register businesses and other start-up costs. However, in the long run, the authors argue that there is a complementary relationship between the two variables.

Another research, conducted by Lv [3] show that attracting foreign direct investment in agriculture is now a major policy concern for the Chinese government, and it is necessary to develop benchmarks of the domestic performance of foreign direct investment. The results indicate that the size of the agricultural market has a significant positive effect, but agricultural imports have a negative effect on the flow of foreign investment to Chinese agriculture.

Saritas and Kuzminov [4] developed a paper that analyzes the mainstream and emerging global challenges and trends in the global agricultural sector. The analysis leads to a discussion about the current state of Russian agro-industry and possible future adaptation strategies in the context of the rapidly changing global environment. The study of these authors develops two adaptive strategies for the development of Russian agro-industry. The first strategy includes replacing radical imports (of goods, as well as high-tech machinery and components) to ensure food security at national level, with an inevitable temporary reversal of labor efficiency and productivity. The second strategy envisages the reintegration of Russia into the agri-food chains and the expansion of commodity exports based on large-scale technological modernization with the use of international capital. These two strategies can also be adapted for Romanian agriculture, especially the second strategy for the reintegration of agri-food chains, involves the significant development of processing and marketing [5], [6].

II. Material and Method

The aim of this paper is to test the hypothesis that investments in the agricultural sector influence the processing branch of this sector. The investment level in the entire Romanian economy, as well as in the agricultural sector will be analyzed from a quantitative and qualitative point of view with the help of statistical data provided by the National Institute of Statistics. At the same time, a similar analysis will be performed in the processing branch of the agricultural sector, this will be determined using the indicator of gross value added in agriculture, this indicator is also taken from national data bases.

In order to perform the influence analysis of these two variables, the Pearson correlation coefficient will be determined with the help of the Data Analysis package of MS Excel, in order to establish if there is a

connection relationship between these two variables. Following the determination of the correlation coefficient, a simple linear regression econometric model will be made in order to determine the intensity of the link between the dependent variable (gross value added in Romanian agriculture) and the independent variable (investment level in Romanian agriculture).

III. Results and Discussions

In this paper we want to analyze the level of investment in Romanian agriculture, so, for this, we will analyze a series of statistical data to determine exactly its current situation.

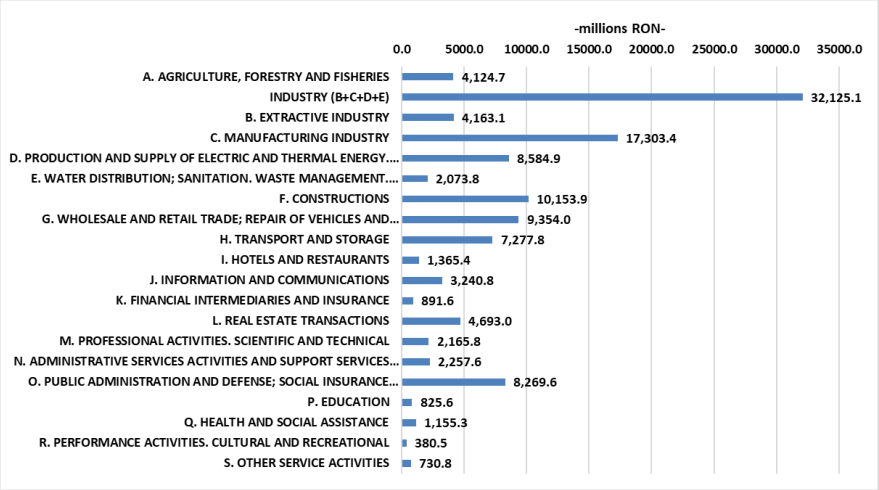

Fig. 1 The average level of investments in the Romanian economy in the period 2008-2018
Source: own processing based on NIS data

The average level of total net investments during the second revision of the CANE code (2008-2018) was 89 billion RON. Figure 1 shows how this value of total investment is distributed to national economic activities. Thus, the Industry occupies the first place with a cumulative value of 32.125 billion RON (this being formed by the extractive industry, the processing industry, the production and supply of electricity and heat and water distribution, sanitation and waste management). In second place is the construction sector with 10.15 billion, followed by wholesale and retail trade with 9.53 billion RON, public administration and defense, with 8.3 billion RON, transport and storage with 7.3 billion RON, real estate transactions with 4.7 billion RON and on the 7th place in the hierarchy of net investments by sectors of the economy are agriculture, forestry and fishing with 4.125 billion RON.

Analyzing the share of investments in all sectors of activity within the Romanian economy, the following weights can be determined, in the following figure.

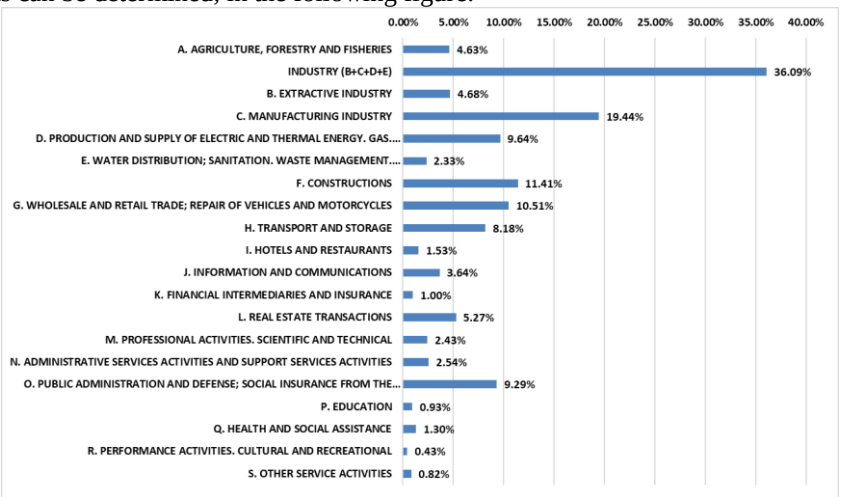

Fig. 2 The average share of investments according to the economic activity in Romania in the period 2008-2018
Source: own processing based on NIS data

Of the average total investments, in the analyzed period, of 89 billion RON, about 36% are held by investments made in industry, followed by those in construction with 11.5%, those in trade with 10.5%, those with administration also publishes defense with 9.3%, those with transport and storage with 8.1%, real estate transactions with 5.2% and agriculture with 4.63%.

Analyzing the agriculture, forestry and fisheries sector from national economic activities, it will be possible to observe differences in the evolution of net investments in this sector and the total at national level, in figure 3.

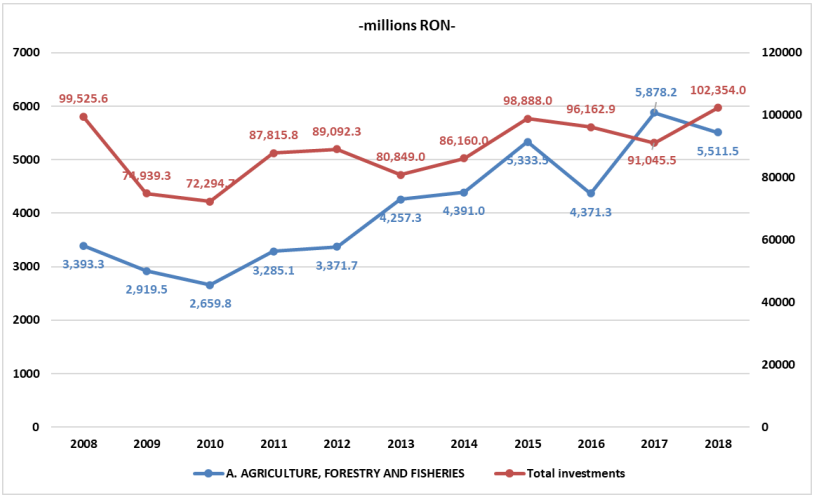

Fig. 3 The dynamics of investments in agriculture compared to the total investments in Romania
Source: own processing based on NIS data

As can be seen from the figure, the evolution of investments in agriculture does not keep the general trend of total investments, thus, if the total ones register an increasing evolution, with an average annual growth rate of 0.28% (almost constant), investments in agriculture it is also growing, but with an average growth rate of more than 4.97% per year, being the second highest growth rate among the sectors of economic activity, after that of public administration and defense.

Thus, if in 2008, investments in agriculture were about 3.4 billion RON, decreasing to 2.66 billion RON in 2010 (along with the financial recession), it recorded increases in the next period reaching the maximum of 5.88 billion RON in 2017, and in 2018. decreasing to 5.5 billion RON.

Next, the dynamics of the dependent variable will be determined.

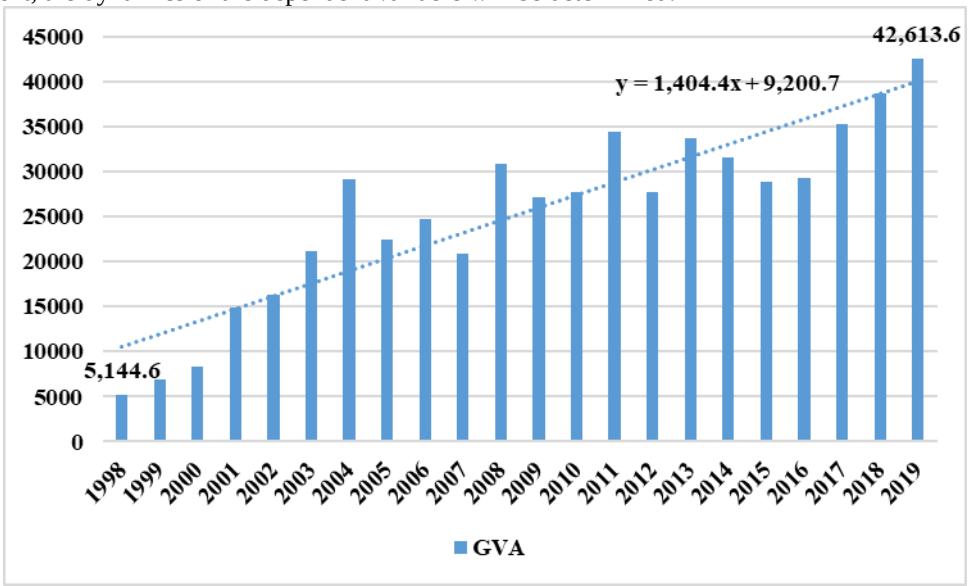

Fig. 4 Evolution of gross value added for the agricultural sector in Romania
Source: own processing based on NIS data

For a more concrete picture of the economic structure of agriculture, the GVA indicator (gross value added) will be further analyzed. In figure 3.2.5. the GVA value of agriculture for the period 1988-2019 is presented. It can be observed that this value registers an increasing general trend, so that if in 1988 a value of 5.14 billion RON was registered, in 2019, the GVA in the agricultural sector reached the maximum value of the period of 42.6 billion RON, an increase of 8.3 times. The average value of GVA for the period under study was 25.35 billion RON, registering a deviation from the average of 10.06 billion RON, which determined a high coefficient of variation of 39.7% . This coefficient indicates that the analyzed data series is inhomogeneous, this being due to the oscillations of the GVA value recorded in recent years. On average, the GVA in the agricultural sector registered an average annual growth rate of 10.6%. Analyzing the equation of the evolution trend, it is observed that the level of the coefficient of x is high, respectively of 1,404.4 million RON, which indicates that on average every year the GVA in agriculture has increased with this. value.

In order to be able to determine if there is a relationship between the variables, the Pearson-type correlation coefficients will be calculated between them. This coefficient is calculated to determine whether there is a directly proportional or inversely proportional relationship between the changes in the variables.

Table 1. Determination of Pearson correlation coefficients between investments and gross value added

	Investments in agriculture
Investments in agriculture	1
Gross Value Added	0,872

Source: own calculations using Data Analysis of MS Excel

It can be seen from Table 1 that the Perason correlation coefficient between the variables is quite high, respectively between the investments in agriculture and the gross value added there is a correlation coefficient of 0.872. The high level of this coefficient determines that a close link is established between investments and gross value added, when one variable changes in one direction and the other variable changes in that direction.

Table 2. The simple linear regression model between investment and GVA in agriculture

Regression Statistics	
Multiple R	0,872113953
R Square	0,760582747
Adjusted R Square	0,747981839
Standard Error	4782,317731
Observations	21

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1380452541	1380452541	60,35936011	0,00000026
Residual	19	434540694,6	22870562,88		
Total	20	1814993235			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	5694,206817	2639,377749	2,157405024	0,043988348	169,9256995	11218,48793
Inv. AgroAlim	3,772378381	0,485560035	7,769128659	0,00000026	2,756089548	4,788667213

Source: own calculations using Data Analysis of MS Excel

For this model, a correlation coefficient (Multiple R) of 0.872 was registered, which determined a relationship between investments in the agri-food sector and GVA, close and positive, respectively when one variable increases, the other increases.

At the same time, the coefficient of determination (R Square) was calculated, which has a value of 0.76, which indicates that the dependent variable (GVA) is explained by the independent variable (investments in the agri-food sector) in proportion of 76%.

In the ANOVA table that involves the analysis of variance, the following indicators can be observed that establish the validity of the model. The value of the statistical parameter F may or may not reject the null hypothesis, respectively the validity of the model, comparing it with the value of the critical F. Thus, in the case of our model the value of F is 60.36, and the critical value of F is also for our model, where the level of significance of 0.05 and the degrees of freedom between groups and within groups were taken into account. 4.38, thus, it is estimated that the value of F compared to critical F is significantly higher, and corroborated with the fact that the level of significance recorded by F (Significance F) is less than 0.05 it can be stated that the model is valid.

In the table of coefficients again it will be analyzed if the null hypothesis can be rejected, respectively if the coefficients of the function will be different from 0 for the model to be valid. To test this, the statistical parameter t (t State) will be analyzed, which will again be compared with the critical value t in order to exclude the null hypothesis. For a significance level of 0.05 and with 20 degrees of freedom, it was determined that the citrus value of the parameter t is 2.086. As can be seen, both coefficients of the regression equation have a t value higher than the critical value, and the significance level (P-value) is below the threshold of 0.05, and at the same time the confidence intervals do not contain the zero value, so no there is no chance that these coefficients of the equation will take the value 0 and refute the model, thus rejecting the null hypothesis.

Finally, the residual values will be tested to eliminate the possible first-order autocorrelation, this being done with the help of the Durbin-Watson test. Calculating with the formula presented at the beginning of this subchapter was determined a DW value of 1,184, and depending on the decision rules, also presented above, it is estimated that we are in the situation of positive autocorrelation, so it can be said that there is a correlation between residual values.

However, the null hypothesis is rejected and the validity of the regression model is accepted, and the regression function can be written, respectively the gross value added from agriculture depending on the agri-food investments:

$$GVA = 3.772 * Investments + 5,694.2$$

From this function, it can be seen that the value of the coefficient x (investments) is 3.772, respectively when the value of investments increases by one unit (one million), the GVA in agriculture will increase by 3.772 units (millions).

IV. Conclusion

In Romanian agriculture, the processing sector is under developed, in terms of value this sector represents about 8% of the total agricultural branch. This paper proposed the analysis of investments in this processing sector, represented by the gross value added in agriculture.

Regarding the investment level, in the total branches of the Romanian economy, investments in agriculture represent on average 4.6% in the analyzed period. During the analyzed period, the investments in agriculture registered an increasing trend, increasing by 60% in the period under study. This increase can occur either due to the development of the sector and at the same time to the increase of investments in it, but it can be appreciated that inflation can also determine a part of this significant increase of investments.

At the same time, it can be concluded that the gross value added increased during the analyzed period, and the hypothesis according to which investments would influence the gross value added was tested in this paper by the simple linear regression model.

Determining the Pearson correlation coefficient, it was positive, being over 0.8, which indicates that a close and directly proportional relationship can be demonstrated between investments and gross value added, respectively when one variable increase and the other changes in the same sense.

Running the econometric model, it was established by the tests performed within it that the model is statistically valid, passing all the tests applied, being determined the equation of the model, respectively the expression of gross value added depending on investments. The coefficient of the independent variable, respectively of the investments was of 3.772, respectively when the investments increase by one unit (one million), the gross added value from agriculture will increase by 3.77 units (millions).

V. Acknowledgements

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