THE USV ANNALS OF ECONOMICS AND PUBLIC ADMINISTRATION | VOLUME 13, ISSUE 2(18), 2013

ANALYSIS OF THE FACTORS AFFECTING THE AVERAGE LABOUR PRODUCTIVITY VARIATION IN AGRICULTURE, FORESTRY AND FISHING IN ROMANIA

Lecturer PhD **Carmen BOGHEAN**
Ștefan cel Mare University of Suceava, Romania
carmenb@seap.usv.ro

Assistant PhD Student **Mihaela STATE**
Ștefan cel Mare University of Suceava, Romania
mihaelas@seap.usv.ro

Abstract:
Productivity in agriculture most relevantly and concisely expresses the economic efficiency of using the factors of production. Labour productivity is affected by a considerable number of variables (including the relationship system and interdependence between factors), which differ in each economic sector and influence it, giving rise to a series of technical, economic and organizational idiosyncrasies.

The purpose of this paper is to analyse the underlying factors of the average work productivity in agriculture, forestry and fishing. The analysis will take into account the data concerning the economically active population and the gross added value in agriculture, forestry and fishing in Romania during 2008-2011. The distribution of the average work productivity per factors affecting it is conducted by means of the u-substitution method.

Key words: gross added value, economically active population, average labour productivity.

JEL classification: J24

1. INTRODUCTION

Rural development is of foremost concern, since 9.2 million people live in the townships and villages of Romania, accounting for about 46% of the total settled population, according to the final results issued by the National Institute of Statistics after the 2011 census of population and dwellings.

More than 90% of the land fund in Romania consists of arable land, forests and areas covered in woodland, waters and ponds, and thus agriculture, forestry and fishing activities are crucial in natural resource extraction. An increased efficiency of the activities developed in these sectors can lead to a visible alleviation of the effects of the economic crisis. The structural changes in the organisation and development of these activities in farms throughout Romania are, however, not very visible.

Resources can be grouped into four main categories: land, capital, labour and entrepreneurship. Since land is a type of capital and as entrepreneurship is a result of human activity, only capital and labour are the two major factors of production.

Labour is the active factor of production that influences all economic activities and thus remains the main factor of welfare and development of any human community.

The identification of the sources of economic growth consists in measuring the volume of a factor or in assessing the extent to which its efficiency may lead to increased productivity. Economic growth generally results from an augmentation of these factors, from their amassment, from the technical progress they incorporate and which is defined as the main catalyst of economic growth. The volume and efficiency of the factors generally combine in variable proportions in order to boost development.

Labour force in agriculture is one of the three fundamental resources (apart from arable land and production equipment) that most decisively influence production output.

Many agrarian economists acknowledge the economic importance of agricultural activities

by taking into account the high weighing of labour force costs in the structure of production costs. This ratio is estimated to amount to 30-60% of the total costs, depending on the type of exploitation or on the existing intensive or extensive production systems.

2. THE ROLE OF LABOUR PRODUCTIVITY IN RURAL DEVELOPMENT

Productivity establishes a qualitative relationship between production and the factors of production employed. It can be most broadly defined as a relation between the output resulting from the production process and the factor(s) used:

Productivity can be calculated either by taking into account all the production factors (multifactor productivity) or just one factor of production (partial productivity). Multifactor productivity stands for the aggregated efficiency of using all factors of production. Partial productivity expresses the efficiency of using each factor of production separately (labour, capital) and is measured for each economic sector.

As a consequence of the active and fundamental role of the labour factor for productivity, an important part is played by labour productivity. This is why labour productivity is one of the synthetic indicators of the economic activity developed in agriculture. Such an indicator measures the effectiveness of labour costs in the production process, influencing the size of the productive labour force and the ability of the labour force to produce an amount of goods or services in a given amount of time.

The average labour productivity per economically active person is calculated as the ratio of gross added value to the number of economically active individuals. The per-hour labour productivity is measured as the ratio of gross added value to the number of working hours.

The factors influencing the size of productivity are as follows: natural (climate and fertility, volume, structure and quality of natural resources); technical (scientific, technical and technological progress); economic (organisation and management of the economic activities, employee training, entrepreneurship, material incentives, etc); social (working and living conditions, the individual's economic freedom, legislation and law observance, etc); psychological (employee results and behaviour, degree of adjustment to the working conditions and climate, etc); structural (changes in the product structure or in the structure of the national economy, etc); integration of the national economy in the international division of labour (types of technical and economic training, product performance, etc.).

As Tofan Al. (2005) points out, the activity developed in agriculture is defined by a series of particular features:

- It is influenced by natural conditions to a greater extent than other economic sectors, which can eventually lead to greater variations of agricultural output each year;
- The results of the labour only become visible at the time of harvesting, which makes it rather difficult to measure results at any time of the year;
- The agricultural output depends on the technology employed, on the skill of the labourers as well as on the quality of the soil and the animals;

Agriculture is a paramount sector in Romania, both for its contribution to the national economy and for its vital social role. Accounting for a 6.7% of the national gross added value in 2010, agriculture has always played an important part in the Romanian economy.

The weight of agriculture in the Gross Domestic Product of Romania has always been considerable. However, the recorded weight has dropped in the past decade, but the fluctuations of the agricultural output still cause significant variations of the GDP. Thus, if the weight of Romanian agriculture in the GAV (gross added value of agriculture, forestry and fishing related to the total gross added value) was of almost 12% at the beginning of the 2000's, its evolution is now on a descending slope, dropping to under 10% for the first time in 2005, and reaching the minimum levels of 6.5% in 2007 and 6.7% in 2010 (Luca, L., Cionga, C., Giurcă, D., 2012).

The Romanian agricultural and rural sector in Romania still has a considerable growth potential, but one which is insufficiently exploited, as the restructuring of agriculture and the resuscitation of rural economy are important levers in the economic development of Romania.

Romania exhibits significant differences from the EU-28 in terms of agricultural sector productivity. The economic potential of agriculture and of the Romanian rural areas is poorly managed, as shown by relevant data according to which, even during prolific agricultural years, the level of productivity does not exceed 50% of the average EU-28, which is rather disappointing, given the existing potential of this area. This state may be due to certain fundamental factors, such as:

- The internal structure of Romanian farms (small size, deep segmentation),
- Inappropriate or ill use of the factors of production (including human capital),
- Existing organisational framework and dysfunctional infrastructure,
- Particularly the lack of agricultural product marketing/capitalization infrastructure, which is a critical aspect for small farmers.

In light of the above presented aspects, one can argue that the restructuring of agriculture will have a major impact on rural economy as a whole, since agriculture is and will always be the most important activity developed in rural areas as well as an essential source of income for households (Ministry of agriculture and rural development, 2012).

In terms of the labour force employed in agriculture, it can be defined as largely oversized as compared to the EU standards, as the economically active population in rural areas and in the agricultural sector remains at a constantly high level during 2007-2011 (National Institute of Statistics, 2012).

In 2012, the economically active population employed in agriculture and forestry accounted for about 19% of the total economically active population in Romania, deviating rather highly from the EU/27 average (4.7%) and even from the new member states (for instance, Poland: 10.1%; Hungary: 5.5%; Bulgaria: 14.7%), not to mention countries like France (with 2.6%), the United Kingdom (1.9%) or Germany (1.8%) (Luca, L., Cionga, C., Giurcă, D., 2012). The large number of the population employed in agriculture and forestry activities is a first indicator of the low level of labour productivity and hidden unemployment in this sector.

Apart from the structural aspects of the exploitation (low level) and of the human capital (age, training), low productivity is also caused by the lack or reduced access to other factors of production (equipment and capital).

The Romanian rural economy is currently mainly primary, the weight of agriculture accounting for about 60% of its structure (as compared to about 14-15% in the EU), thus having negative effects on the employment of the rural economically active population. Most farmers are self-employed and maintain a form of subsistence agriculture, as they need to supplement their income with additional earnings from non-agricultural activities.

All this information shows that the Romanian rural economy is still little integrated in the market economy and that its restructuring is rather slow.

3. THE DYNAMICS OF THE MACROECONOMIC INDICATORS IN AGRICULTURE, FORESTRY AND FISHING

The gross added value in agriculture, forestry and fishing in 2011 only accounted for 13.03% of the gross added value of the total national economy, rising from the previous year value of 11.35%.

The dynamic analysis of the Gross added value indicator in agriculture, forestry and fishing reveals a decreasing slope of this indicator during 2008-2010 and a come-back in 2011.

Table no.1 The gross added value in agriculture, forestry and fishing in Romania, during 2008-2011

YEARS	TOTAL GROSS ADDED	GROSS ADDED VALUE	ABSOLUTE CHANGE		EVOLUTION INDICATORS (%)	
			Year 2008	Previous	Year 2008	Previous

	VALUE (MIL.LEI)	(mil. lei)	% of total	(mil. lei)	year		year
2008	514700.04	34126.4	13.19	-	-	100	
2009	501139.37	32297.8	12.83	-1.828.60	-1828.60	96.7	96.7
2010	523693.30	29874.2	11.35	-4252.20	-2423.60	87.49	94.5
2011	556708.40	36438.6	13.03	2312.20	6564.40	106.71	112.4

Source: Authors' own calculations, based on the Statistical Yearbook of Romania, NSI, Bucharest 2012

Romania is the country with the highest number of individuals employed in agriculture, forestry and fishing in the European Union. The evolution of the population currently employed in agriculture is rather opposed to the trend recorded in economically developed countries. Thus, there are countries like the UK, the USA, Germany and Sweden that have about 3% of their economically active population employed in agriculture, forestry and fishing. Moreover, the percentage of the population employed in this sector is constantly decreasing.

Table 2 presents the dynamics of the population employed in agriculture, forestry and fishing during 2008 - 2010.

Table no. 2. Population employed in agriculture, forestry and fishing in Romania, during 2008-2011.

YEARS	TOTAL EMPLOYED POPULATION (THOUSAND INDIVIDUALS)	POPULATION EMPLOYED IN AGRICULTURE, FORESTRY AND FISHING		ABSOLUTE CHANGE (THOUSAND INDIVIDUALS)		EVOLUTION INDICATORS (%)	
		(thousand individuals)	% of total	Year 2008	Previous year	Year 2008	Previous year
2008	9944	2767.8	27.83	-	-	100	-
2009	9924	2764.2	27.85	-3.6	-3.60	99.87	99.87
2010	9965	2896.2	29.06	128.4	132.00	104.64	104.78
2011	9868	2612.5	26.47	-155.3	-283.70	94.39	90.20

Source: Authors' own calculations, based on the Statistical Yearbook of Romania, NSI, Bucharest 2012

According to the data provided by the Household labour force survey in 2011, about 2612,5 people were employed in agriculture, forestry and fishing, decreasing by 155,3 individuals from the year 2008.

The average labour productivity in the national economy in 2011 is rising, as compared to the year 2008, but is still under the EU recorded average, according to the data provided by Eurostat.

Table 3 presents the average labour productivity in agriculture, forestry and fishing in relation to the value recorded in the national economy.

Table no.3 Average labour productivity in agriculture, forestry and fishing, as well as per total of the national economy

Years	Total (Lei/ employed person)	Agriculture, forestry and fishing		Absolute change (thousand individuals)		Evolution indicators (%)	
		(Lei/ employed person)	% in relation to total average	year 2008	Previous year	Year 2008	Previous year
2008	48958.0	12329.8	25.18	-	-	100	-
2009	49120.9	11684.3	23.79	-645.50	-645.50	94.76	94.76

2010	50938.4	10315.0	20.25	-2014.80	-1.369.30	83.66	88.28
2011	58250.9	13947.9	23.94	1618.10	3.632.90	113.12	135.22

Source: Authors' own calculations, based on the Statistical Yearbook of Romania, NSI, Bucharest 2012

The average labour productivity in agriculture, forestry and fishing in 2011 was rising by 1618.1 lei/person employed as opposed to the year 2008. The average labour productivity in this economic sector accounted for 23.94% of the average recorded for the national economy, lower than the one recorded in 2008 when in accounted for 25.18%.

4. ANALYSIS PER FACTORS AFFECTING THE VARIATION OF LABOUR PRODUCTIVITY

In order to draw thorough and strongly founded conclusions about the labour productivity in agriculture, forestry and fishing, we must first conduct the analysis per factor affecting labour productivity.

The role of this analysis per factor of influence explains the changes affecting this indicator in 2010, as opposed to the previous year, in order to identify the internal reserves that can subsequently cause this indicator to increase in the future.

The model employed in the factorial analysis of labour productivity is based on the mathematical formula used to calculate this indicator, which practically allows one to explain the variation of the economic efficiency of the labour factor in terms of the influence of the specific factors of such an efficiency correlation: gross added value – expressing the useful economic effect and the employed population and number of working hours, respectively, for the population employed in agriculture as a reflection of the human effort put into achieving this effect.

The formula for calculating the average labour productivity is:

$$W = \frac{VAB}{PO}$$

where:

VAB- gross added value in agriculture, forestry and fishing

PO-population employed in agriculture, forestry and fishing

The average labour productivity is directly proportional to the gross added value and inversely proportional to the number of employed individuals.

The analysis per factors affecting labour productivity is conducted based on the substitution method or the iterative method that entails the following stages:

- Identifying the total change of the average labour productivity

$$\Delta W = \frac{VAB_{2011}}{PO_{2011}} - \frac{VAB_{2010}}{PO_{2010}} = 13947.9 - 10315.0 = 3632.9 \text{ lei/employed person}$$

- Identifying the influence of the change in the gross added value

$$\Delta W(VAB) = \frac{VAB_{2011}}{PO_{2010}} - \frac{VAB_{2010}}{PO_{2010}} = \frac{36438.6 \text{ mil.lei}}{2896.20 \text{mil lei}} - 10315.0 = 12581.52 - 10315.0$$
$$= 2266.32 \text{ lei/employed person}$$

$$\Delta W(VAB)\% = \frac{2266.52 \text{ lei/employed person}}{3632.9 \text{lei/person}} \times 100 = 62.39\%$$

- Identifying the influence of the change in the employed population

$$\Delta W(PO) = \frac{VAB_{2011}}{PO_{2011}} - \frac{VAB_{2011}}{PO_{2010}} = 13947.9 - 12581.52 = 1366.38 \text{ lei/employed person}$$

$$\Delta W(PO)\% = \frac{1366.38 \text{ lei/employed persoană}}{3632.9 \text{lei/employed persoană}} \times 100 = 37.61\%$$

$$\Delta W = \Delta W(VAB) + \Delta W(PO) = 2266.52\text{lei/employed person} + 1366.38\text{lei/employed person} = 3632.9 \text{ lei/employed person}$$

The analysis of the change in the labour productivity per factors affecting it underlines the fact that both factors have had a positive influence, thus leading to the increase of the average labour productivity in agriculture, forestry and fishing by 3632.9 lei/employed person

The increase recorded by the gross added value indicator in agriculture, forestry and fishing by 6564.3mil. lei in 2011 as opposed to 2010, would have led to an increase in the average labour productivity by only 2266.52 lei/person if the number of the population employed in this sector had remained the same. The weight of the increase of this factor in the global increase of the average labour productivity in agriculture, forestry and fishing is of 62.39%

The change in the number of the population employed in agriculture, forestry and fishing, by the decrease of 283.7 thousand people in 2011, as compared to 2010, has triggered an increase in the average labour productivity by 1366.38 lei/person. The weight of this factor in the global increase of the average labour productivity is of 37.61% of the total recorded growth.

Based on the data analysed above and as a consequence of the research conducted on labour productivity in agriculture on a European level, we shall see that labour productivity in Romania is much lower that the one recorded in the European Union. Among the causes of this disparity, we can mention: much lower technical endowment in Romanian agriculture, lower work motivation, lower professional training levels, higher ration of women and more advanced age of Romanian agriculture workers, a generally lower level of Romanian exploitation in agriculture as compared to the EU level and especially the excessive allotment of the arable land, as well as the poorer quality of the biological material used in Romanian agriculture and outdated production technologies.

The choice for a higher productive agriculture not only brings about advantages, but also certain drawbacks, the latter consisting in the limitation of labour productivity. Depending on their nature, these limitations derive either from the specific production processes in agriculture or from the labour productivity mechanism itself.

5. CONCLUSIONS

Romania used to be the most important agricultural producer in Central and Eastern Europe, but, in the past few years, imports account for a significant part of the agricultural produce needed for consumption.

Even though agriculture, forestry and fishing account for 13.03% of the gross added value in the national economy and encompass 26.47% of the economically active population, the actual performance of this branch is far from the soil and climate potential of the country and far from the experience accumulated by the Romanian people in this sector throughout centuries. The low level of the average labour productivity in this economic sector shows that there is a waste of labour force in Romania. This may be mainly due to the presence of a significant surplus of individuals especially in those highly agricultural areas. If the developed countries of the EU have reduced the number of people employed in agriculture during several decades and have even managed to lower it below the necessary, thus determining them to resort to immigrants during specific times of the year, the opposite is true for Romania, where, during the past decade, we have had an atypical movement of the labour force from non/agricultural sectors towards agriculture (mainly due to the massive lay-offs from other non/agricultural activities and early retirements), when an exceeding number of individuals were already employed in agriculture. Therefore, the marginal productivity of these individuals amounted almost to zero. Secondly, the size of most agricultural exploitations does not meet the necessary economic and physical standards to ensure the full use of the labour force and the related revenues.

The success of any rural development policy, and particularly in the case of Romania, consists in diversifying the rural economy and in developing and promoting alternative economic activities. This objective is closely related to the education and training level of the labour force.

The transfer of the labour force from non-agricultural to agriculture related activities calls for a reassessment of the training, qualifications and skills, as well as of the lifelong training needs. The creation and development of new economic activities in the form of new exploitations, new enterprises or new investments in activities unrelated to agriculture are essential measures for the development and competitiveness of the Romanian rural areas.

Even though it hasn't benefited from much attention lately, labour productivity is an important indicator of economic activity efficiency. The past few years have been rather significant in this respect, since greater attention has been given to the resizing of the agrarian policies and to the adjustment of one of the main boosters of labour productivity in the agriculture of developed countries.

REFERENCES:

1. Luca, L., Cionga, C., Giurcă, D. (2012) *Studiul Consolidarea Exploataţiilor agricole,* Editura Economică, Bucureşti, http://facultateademanagement.ro/wp-content/uploads/01_Studiu-Consolidarea-exploatatiilor-agricole.pdf;

2. Popescu Marin (2009) *Labour employment in Romania' s agriculture and labour productivity increase. Gaps between Romania and European Union*, Agricultural Economics and Rural Development, New Series, Year VI, no. 2, p. 181–197, ftp://www.ipe.ro/RePEc/iag/iag_pdf/AERD0902_181-198.pdf;

3. Popescu, Gabriel (2001) *Probleme de politică agrară*, ASE, Bucharest, http://www.ase.ro/biblioteca/carte2.asp?id=157&idb=;

4. Vâlceanu, Gh., Robu, V., Georgescu, N. (2005) *Analiză economico-financiară*, Economica,Bucharest;

5. Tofan, Al. (2004) *Productivitatea muncii în agricultură*, Scientific Annals of the University "Alexandru Ioan Cuza" of Iasi, Economic Sciences;

6. ***(2013) *Agriculture, forestry and fishery statistics, Eurostat,* http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-FK-13-001/EN/KS-FK-13-001-EN.PDF;

7. *** (2012) *Anuarul Statistic al României*, National Institute of Statistics, Bucharest;

8. ***(2012) *Forţa de muncă în România: ocupare şi somaj (2003-2011),* National Institute of Statistics;

9. ***(2010) *Productivitatea muncii în agricultură*, Romanian Statistics Journal nr. 4 / 2010 http://www.revistadestatistica.ro/Articole/2010/A3_ro_4_2010.pdf;

10. ***(2013) *Recensământul populaţiei şi al locuinţelor din 20-31 octombrie 2011* http://www.recensamantromania.ro/wp-content/uploads/2013/07/REZULTATE-DEFINITIVE-RPL_2011.pdf;

11. ***(2012) *Raport anual de progrese privind implementarea Programului Naţional de Dezvoltare Rurală în România în anul 2011*, Ministry of agriculture and rural development, http://old.madr.ro/pages/dezvoltare_rurala/Raport_anual_PNDR-2011.pdf.