The European Proceedings of
Social & Behavioural Sciences
EpSBS

Future Academy

ISSN: 2357-1330

https://dx.doi.org/10.15405/epsbs.2019.03.02.254

SCTCMG 2018
International Scientific Conference "Social and Cultural Transformations in the Context of Modern Globalism"

INFLUENCE OF INSTITUTIONAL STRUCTURES ON THE LABOR DYNAMICS IN THE AGRICULTURAL INDUSTRY

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Abstract

The North Caucasus Federal District agriculture is one of the most advanced in Russia, but at the same time it has a generally low level of labor productivity which was only about 61% and 66% of the average Russian level in 2016 and for 2010-2016 respectively. It is due to a high number of people employed in agriculture. However, in the North Caucasus Federal District, there are regions (Karachay-Cherkessia) with labor productivity of more than 1,3 times higher than the average one for the Russian Federation, and there are regions (Stavropol krai) with productivity which is slightly (95%) lower than the average Russian index. Most of the regions of the North Caucasus Federal District have a level of labor productivity which is below 50%. The structure and output of agricultural enterprises have a great influence on the level and dynamics of labor productivity. The article identifies the influence of the production and institutional structures of agriculture on labor productivity. Analysis of labor productivity has been carried out, the dynamics has been described, and main dynamic and structural trends in labor productivity have been identified. Measures to increase the level of labor productivity in agriculture of the North Caucasus Federal District were suggested.

Keywords: Agriculture of the North Caucasus, labor productivity, structure of products, institutional structure of agriculture.

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1. Introduction

In the North Caucasus which occupies less than 1,0% of the total territory of the Russian Federation (RF) within the borders of the North Caucasus Federal District (NCFD), about 6.7% of the Russian population live. The share of the rural population is almost 51%, while in the RF it is about 26%. In 2016, the region produced 8.2% of Russian agricultural products. In comparison with 2010, an increase was about 0.3%. In 2010-2016, the volume of agricultural production increased 2.2 times, while in the RF it increased only 2.1 times. Agriculture is a traditional backbone sector of regional farms of the North Caucasus. The share of agricultural products in the GRP varies from 13% (in the Chechen Republic) to 44% (in Karachay-Cherkessia). On average, in the NCFD, the share of agricultural products in GRP is 25%. While in the RF, the share of people employed in agriculture was 7% in 2016, in the NCFD it was 19.1%. For 2010-2016, this figure was 8.9% for the RF and 20.2% – for the NCFD. The largest share of people employed in agriculture was in the Republic of Dagestan (26.4), and the lowest share was in the Republic of Ingushetia (12.5%). Other regions have higher shares of people employed in agriculture in comparison with the RF. In the Republic of North Ossetia-Alania, they exceed Russian values 1.6 times, and in Kabardino-Balkaria – 2.4 times. Thus, if we compare both parameters – the volume of agricultural production and the number of people employed in agriculture, their dynamics and territorial share in the NCFD are correlated but do not eliminate other factors. All this requires a more detailed study of the dynamics of labor productivity in the agriculture of the NCFD with regard to main factors influencing this dynamics.

2. Problem Statement

The low level of labor productivity in agriculture of many regions of the NCFD is often associated with a high number of people employed in the industry which is the highest in Russia. However, the level and dynamics of labor productivity in agriculture is due to the structure of agricultural products rather than due to high number of people employed.

3. Research Questions

It is well known that labor productivity is the most important indicator, and its value as a production activity indicator has been studied for a long time. Methodological and theoretical provisions used for description, modeling, formalization and quantification of various aspects of labor productivity were developed. However, a lot of fundamental and applied issues remain unsolved. The study deals with labor productivity in agriculture of the North Caucasus. (Serkov, & Chekalin, 2012)

4. Purpose of the Study

The article aims to study the impact of the product and institutional structures on the dynamics of labor productivity in agriculture of the NCFD in order to develop measures for improving labor productivity. (Savchenko, 2008).

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5. Research Methods

The study uses traditional methods of statistical and economic analysis, including comparative, structural, index, graphic, factor, correlation, regression and other methods of economic statistics.

6. Findings

Labor productivity in the agricultural industry of the NCFD in 2016 was only about 61% of the average for the RF. However, it is noteworthy that this lag is growing. In 2010, the level of labor productivity in agriculture of the NCFD was 310.1 thousand rubles per worker. In the RF, it was 396.1 thousand rubles. In 2011, the level of labor productivity in the NCFD was 78.3% (351.8 thousand rubles per worker), while in the RF it was 491.3 thousand rubles per worker (only 71.6%). The lag is growing. If for 2010-2016, labor productivity in agriculture of the RF grew by almost 260%, in the NCFD, it increased by 201%. Thus, from 2010 to 2016, labor productivity in agriculture of the NCFD was decreasing and became lower than the average Russian index by two thirds.

In the NCFD, there are variations in the dynamics of labor productivity. In Karachay Cherkessia (KC) in 2016, the level of labor productivity exceeded the average Russian indicator more than 1,3 times, whereas in 2010 it was 103%; in the period from 2011 to 2014, it was 4-17% lower than the average Russian index; in 2015, it exceeded the average Russian index more than 1,5 times. In the Chechen Republic in 2016, this index was only 21%, in the Republic of Ingushetia it was 32.3%, in Dagestan – 43.3%, in Kabardino-Balkaria – 57%, in North Ossetia-Alania – 73.4%, and in Stavropol krai – 95% of the national average. In 2010, in all regions of the NCFD, the level of labor productivity was higher than the current one. It was almost equal to the Russian average. (Ozdoeva, 2015) In Ingushetia and Karachay-Cherkessia it was higher than the Russian average, and in Stavropol and North Ossetia Alania, it was equal to the Russian average. For seven years (2010-2016), there was an absolute decrease in the level of labor productivity in agriculture of almost all (except for the KC) regions of the NCFD.

In this regard, it is necessary to identify causes of low growth of labor productivity in agriculture of the NCFD. There are a lot of researches dealing with this issue (Gasiev & Basayev, 2008; Israilov, 2013; Kipkeev & Laypanova, 2017; Soskieva, 2008; Rakhaev, Zhangorazova & Utizhe, 2015; Stotz, 2012). Therefore, we will not consider the aspects touched upon by other researches and focus on some new aspects. We will refer to the studies carried out by other researchers in order to use their results. The present article focuses on two aspects of labor productivity in agriculture of the NCFD: a) the impact of the product structure on the level and dynamics of labor productivity, b) the influence of the institutional structure of agriculture on the level and dynamics of labor productivity in regional agriculture. The calculations were carried out using the materials of the FSSS of Russia for 2010-2016. Koshelev, & Miroshnikov, 2013)

Table 1 shows the ratio of labor productivity (production per worker), crop production and production of agricultural enterprises (AE) in the volume of agricultural production of the NCFD and its regions for 2010-2016.

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Table 01. The ratio of labor productivity (production per worker), crop production and production of agricultural enterprises (AE) in the volume of agricultural production of the NCFD and its regions for 2010-2016.

	Parameters	2010	2011	2012	2013	2014	2015	2016	2010-2016,%
NCFD	Labor productivity	310.1	351.8	367.4	417.3	469.5	568.3	624.0	201.2
	Share of crop production	53.6	54.7	49.7	52.5	53.6	56.2	58.0	108.2
	AEs' product share	32.9	35.8	33.3	34.8	36.7	38.7	40.4	122.6
D	Labor productivity	198.0	215.9	249.0	277.4	315.2	369.5	445.8	225.2
	Share of crop production	49.5	46.3	40.0	38.9	45.3	45.8	46.8	94.5
	AEs' product share	10.2	11.1	11.1	13.7	14.2	14.3	13.3	130.4
I	Labor productivity	502.8	758.6	629.5	682.4	780.6	256.4	332.9	66.2
	Share of crop production	28.9	31.2	32.0	31.7	37.8	32.4	34.6	119.7
	AEs' product share	8.4	7.7	8.1	10.1	6.8	6.5	7.2	85.7
KB	Labor productivity	357.0	420.9	456.8	490.2	526.5	576.0	584.2	163.6
	Share of crop production	56.5	54.2	55.1	56.9	53.2	54.3	57.0	100.9
	AEs' product share	18	20	21	22	23	25	27	150.0
KC	Labor productivity	406.6	474.0	484.6	552.5	617.5	1444.9	1357.1	333.8
	Share of crop production	38.8	42.0	39.2	38.9	40.8	45.1	45.4	117.0
	AEs' product share	27.0	27.2	27.1	26.9	27.3	26.6	28.9	107.0
NOA	Labor productivity	391.2	471.7	517.6	573.8	572.8	862.6	755.7	193.2
	Share of crop production	38.8	38.9	34.1	37.0	30.7	38.0	43.9	113.1
	AEs' product share	19.4	20.9	21.8	23.2	22.9	27.9	26.0	134.0
C	Labor productivity	264.3	210.0	226.8	230.1	190.1	177.0	216.2	81.8
	Share of crop production	21.7	22.6	19.7	25.7	23.5	27.2	29.9	137.8
	AEs' product share	7.5	9.0	7.1	10.8	8.8	11.9	15.6	207.4
Stavropol region	Labor productivity	391.2	478.6	462.2	561.1	701.5	925.2	973.1	248.7
	Share of crop production	66.7	70.3	64.9	56.9	68.3	69.9	71.9	107.7
	AEs' product share	58.6	62.9	59.9	59.1	60.9	61.6	65.4	111.6

Visual comparison of the level of labor productivity and the sectoral structure of product shows that (a) the higher the proportion of crop production in gross agricultural output, the higher the level of labor productivity. This feature is typical of Dagestan, Kabardino-Balkaria and Stavropol krai. Secondly, with an increase in the share of crop production, labor productivity increases. This trend is typical of Stavropol krai, the Republic of Dagestan, North Ossetia-Alania and Kabardino-Balkaria. It was not identified that with a decrease in the share of crop production in gross agricultural output, labor productivity grows. Within the sectoral structure, these correlations are also observed, but they cannot be considered as a stable trend. Thirdly, the higher the share of products of AEs in the total volume of agricultural products, the higher the level of labor productivity. This trend is typical of all the NCFD regions except for Ingushetia and the NCFD as a whole. On the other hand, the existing dependence (with an increase in the share of products of AEs in gross agricultural output, labor productivity increases) is typical only of Stavropol krai, North-Ossetia-Alania, Kabardino-Balkaria, Karachay-Cherkessia, and partly of the Chechen Republic. These contradictions need to be explained.

First of all, we should point out the presence of synchronism between the dynamics of labor productivity and both structures at the level of the NCFD: growth and decline, their changes coincide in all three parameters. Although it should be noted that the institutional structure (the share of AEs in the total volume of agricultural production) is more synchronous with labor productivity than the product structure (the share of crop production). However, the shares are not identical. The growth in the share of crop production in the total volume of agricultural production should stimulate a higher growth in labor

https://dx.doi.org/10.15405/epsbs.2019.03.02.254
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eISSN: 2357-1330

productivity. In reality, the situation is different. In particular, in 2012, the share of crop production in the total volume of agricultural production decreased by 11.2%, and labor productivity decreased by 9.0%. But next year (2013), the share of crop production increased by 14.7%, while labor productivity grew by 9.2%. In 2014, the product structure decreased by 3.5%, and productivity decreased by 1.1%, etc.

Thus, proportions of growth / decline between the product (sectoral) structure and labor productivity at the level of the NCFD are not respected. The proportions under growing production are higher than under decreasing one. Similar trends are observed at the regional level. It is impossible to identify relations between labor productivity and influencing factors by comparing growth rates and changes in compared indicators. Different factors in different regions of the NCFD show different dynamics. There is a different relationship between the dynamics of the level of labor productivity and influencing factors. Therefore, comparison of trends of labor productivity and influencing factors can be used only for descriptive studies.

The task can be solved by calculating and comparing proportions and calculating indices. These features can be found in a number of studies. However, elasticity coefficients can be also used for these purposes.

The fact that relations between labor productivity, number of employees, cost of fixed assets, their structure are elastic is discussed by a number of researchers. Elastic relations between labor productivity and influencing are systematized in Table 2.

Table 02. The value of elasticity coefficients for labor productivity in the NCFD and its regions

Parameter	NCFD	D	I	KB	KC	NOA	C	Stavropol region
Number of people employed in agriculture; K people	8.3	26.8	–0.2	4.4	–2.7	–1.9	–0.3	–74.6
Capital-labor ratio in agriculture; K rubles per person	1.4	1.6	0.4	0.6	1.6	0.7	0.8	1.4
Share of crop production in the total volume of agricultural production, %	8.7	– 13.9	–1.7	51.6	7.8	4.5	–0.7	11.7
Share of products produced by agricultural enterprises in the total volume of agricultural products, %	3.4	3.4	2.0	1.2	17.9	2.2	–0.3	8.2

Elasticity coefficients for labor productivity and influencing factors show that the number of people employed in agriculture is elastic to labor productivity in the NCFD as a whole, Dagestan and Kabardino-Balkaria. Dagestan has the highest value of elasticity coefficient (26.8). If we compare the value of elasticity of labor productivity in agriculture of Dagestan with other factors by "labor" factor, labor productivity has the greatest increase. With the number of people employed in agriculture per 1 thousand people, labor productivity will increase by 26.8%, whereas with a growing share of crop production – by 1%. Growth in labor productivity is reduced by almost 14%. This is the highest negative indicator of labor productivity elasticity with this factor. In all other NCFD regions, elasticity between labor productivity and the number of people employed in agriculture is negative (the highest negative elasticity in Stavropol Region is 74.6 and the lowest one in the Chechen Republic is 0.3). Secondly, labor productivity showed moderate positive elasticity with the capital-labor ratio in all NCFD regions. However, one should point out the presence of "zero" elasticity in Ingushetia, Kabardino-Balkaria, North Ossetia and Chechnya. The highest value is observed in Dagestan, Karachay-Cherkessia and Stavropol Region (1.6-1.4). Thus, the capital-labor ratio

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has not yet become decisive in shaping the trajectory of productivity growth in agriculture of the NCFD and its regions. Thirdly, the elasticity between labor productivity in agriculture of the NCFD regions and the structure of production (expressed as a share of crop production) is ambiguous and heterogeneous within the NCFD. The highest value of this parameter is observed in Kabardino-Balkaria (51.6), and the smallest one – in Dagestan (–13.9). A high positive level is observed in Stavropol Region (11.7), Karachay-Cherkessia (7.8), and North Ossetia (4.5). A negative value is typical of Dagestan (–13.9), Ingushetia (–1.7) and Chechnya (–0.7). It speaks for ambiguity and disproportionate effects of this factor on the growth of labor productivity in agriculture of the NCFD regions. Fourth, elasticity of labor productivity and the share of output of agricultural organizations in the total volume of agricultural output in the NCFD and its regions (except for the Chechen Republic) has a positive value. The highest value is observed in KC (17.9) and Stavropol Region (8.2), and the lowest one is observed in KB (1.2). That means that an increasing share of agricultural organizations in agricultural products stimulates an increase in labor productivity. Chechnya with a value of the elasticity coefficient is –0.3 is an exception.

In addition, we calculated correlation coefficients for labor productivity, the share of crop production in the total agricultural output, and the share of output of agricultural organizations in agricultural output. Calculation was carried out for each individual factor, and for all factors. The results are presented in Table 3.

Table 03. Matrix of correlation and elasticity of labor productivity, shares of crop production and output of the agricultural enterprise in the NCFD and its regions for 2010-2016

Region of the NCFD	Crop production in the volume of agricultural production; %	Products produced by agricultural enterprises in the total agricultural output; %	Value of the total correlation coefficient
NCFD	0.722/8.7	0.944/3.4	0.960
The Republic of Dagestan	0.068/–13.5	0.738/3.4	0.777
The Republic of Ingushetia	0.153/–1.7	0.373/2.0	0.547
Kabardino-Balkaria	–0.106/51.6	0.976/1.2	0.986
Karachay-Cherkessia	0.915/7.8	0.378/17.9	0.917
North Ossetia-Alania	0.282/4.5	0.998/2.2	0.998
Chechnya	–0.396/–0.7	–0.349/–0.3	0.428
Stavropol Region	0.466/11.7	0.688/8.2	0.690

∗ Correlation and elasticity coefficients are represented after the slash.

The results confirm the earlier ones obtained earlier using different tools. In particular, there is high correlation of labor productivity in the NCFD and both structures, although the the share of agricultural production in the gross output of agriculture turned out to be more significant than the share of crop production. In terms of elasticity, there is an inverse proportion. In other regions, there is no high correlation of labor productivity and both structures. In particular, in Dagestan, high correlation with the share of AEs' products corresponds with low correlation with the share of crop production. (Zinchenko, 2007) The same trend is observed in North Ossetia-Alania, Ingushetia. In Kabardino-Balkaria, this trend is negative. Moreover, if we compare the values of correlation coefficients with elasticity coefficients, we can see that at insignificant values of correlation coefficients, the value of elasticity coefficient is negative. Another trend is typical of Kabardino-Balkaria and the Chechen Republic. In Kabardino-Balkaria, correlation of

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labor productivity with the share of crop production is stronger than with the share of AEs' products (the higher the correlation, the lower elasticity is). In the Chechen Republic, the level of labor productivity was negatively correlated with both parameters.

7. Conclusion

The research allowed for the following conclusions There is a lack of new jobs rather than a surplus of agricultural workers. Since the 1990s, the structure of employment in agriculture of the NCFD has not changed fundamentally, i.e. no new jobs have not been created. Therefore, in conditions of favorable demography, there is an excess of supply over demand. In addition, in the agricultural sector of the NCFD regions (except for Stavropol krai), there is no market mechanism in which competition, material incentives, employment, and unemployment dominated. One can speak about the excess and shortage of workers only when the market model is based on the market mechanism. Under current conditions, an increase in agricultural productivity can be achieved through changes in the institutional structure of agriculture. It is required to increase the share of AEs. It is necessary to carry out co-operation in agriculture, create large agricultural enterprises instead small private farms. The resources of farms are limited. To ensure the growth of agricultural production, innovative models should be applied. For this purpose, it is necessary to create modern highly efficient AEs.

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