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Application of Factor Analysis to Study the Labour Capacity of Stavropol Krai.

Irina Vladimirovna Zaitseva[1], Elena Nikholaevna Kruilina[1], Anna Nicolaevna Ermakova[1], Evgeny Aleksandrovich Shevchenko[1], and Yana Vitalievna Vorokhobina[2]

[1]Stavropol State Agrarian University, Zootekhnicheskiy lane 12, Stavropol 355017, Russia.
[2]Nevinnomyssk State Humanitarian-Technical Institute, Boulevard Mira 17, Nevinnomyssk 357108, Russia.

ABSTRACT

The article presents research on the state of labor potential for the calculation of targets of socio-economic development of the Stavropol Territory. The results of the qualitative and quantitative evaluation of manpower. By using mathematical modeling techniques made the forecast impact of manpower in the performance of the agricultural sector in the region.

Keywords: agriculture, labor potential, Stavropol Territory

Corresponding author

INTRODUCTION

In recent years there has been until the unsustainable growth of agricultural production. This is due to the intensification of production in a small number of the most advanced enterprises in Russia, as well as by the inclusion medium-sized farms in new agro-industrial associations. This is clearly a trend in the hiring of farm mechanization personnel, livestock and other working professions, which have become more demanding than with simpler technologies. More significantly increased demands on farm managers and specialists, providing decision management issues [**Error! Reference source not found.**].

On labor supply of the Stavropol Territory influence demographic factors, the birth rate, the rate of change in population, its age and sex structure, migration mobility, the degree of economic activity of different socio-demographic groups, professional mobility of workers, and others.

The quantitative aspect manpower analysis includes indicators not only of their total number, but also placement density, natural increase, sex ratio, age and various demographic groups.

The quality of manpower is characterized by sex and age structure, education, qualifications, skills, labor, health, life expectancy and employment, social and economic mobility, the ratio between the employed mental and manual labor in the manufacturing and industrial sector and other features. Taken together, these figures express the potential of this economic category, correlation economy with the demographic, sociological and statistical aspects of the manpower.

The problems addressed in this article attracted the attention of many researchers. Questions of management by labor potential of the region, identifying the main management principles, as well as the use of mathematical modeling techniques discussed in articles [*Error! Reference source not found.*, 6]. The study of the state of social and labor sphere of the village Stavropol Territory described in the article [5].

MATERIALS AND METHODS

To study the state of the labor potential of the Stavropol Territory, the analysis of the causal relationships between the different characteristics were used methods of correlation and regression analysis as described [**Error! Reference source not found.** The characteristic features, which is a factorial, between the labor potential and the socio-economic development of the Stavropol Territory, it should include the growth rate of employment in the economy and the rate of growth of labor productivity, as an effective parameter determine the rate of growth of gross regional product in comparable prices.

RESULTS AND DISCUSSION

The table presents data in dynamics in% to the previous year, for the period from 2000 to 2014 [**Error! Reference source not found.**].

Table 1: Baseline data for the regression analysis of the Stavropol Region (% to previous year)

Parameters	Years					
	2000	2005	2009	2010	2011	2014
Y - dynamics of growth gross regional product	106,5	108,3	107,7	97,7	104,5	106,7
X_1 - dynamics of growth employment in the economy	101,5	103,1	100,9	99,9	101,6	100,7
X_2 - dynamics of growth labor productivity	0	0	106,9	98	101,9	105,9

Analysis of the data in Table 2 shows that the correlation between the growth rate of the number of employed in the economy and the rate of growth of the gross regional product is 0.67. This indicator shows the presence of a linear relationship between the parameters and the correlation between the growth of the gross regional product and labor productivity growth is 0.89. So we can talk about the great degree of linear relationship.

Table 2: The coefficients of pair correlation

Parameters	Dynamics of growth gross regional product	Dynamics of growth employment in the economy	Dynamics of growth labor productivity
Dynamics of growth gross regional product, %	1		
Dynamics of growth employment in the economy, %	0,6727679	1	
Dynamics of growth labor productivity, %	0,8922307	0,4032902	1

The correlation coefficient between the growth rate of labor productivity growth and the rate of growth of the number of employed in the economy is equal to 0.40. One can argue about the presence of a linear relationship between parameters. It should be borne in mind that the lower values may indicate a lack of correlation between parameters. Thus, between the growth of labor productivity and the growth of gross regional product the most close relationship exists.

The performed analysis of variance to evaluate the overall quality of compiled models, namely, the accuracy of the model by the level of importance of criterion Fisher - p. In our case p = 0,0256 therefore, the model is S. The degree of accuracy of the description of the process model is estimated coefficient of determination R^2, for this model R^2 = 0,913. As $R^2 > 0,9$ is possible to talk about the high accuracy of approximation, which means that the model describes well the phenomenon. In this model, the coefficient p = 0,170 it can be removed from the equation, since the corresponding independent variable X has virtually no effect on the dependent variable Y.

Multiple linear regression analysis model is as follows:

$$Y = -113,66 + 1,352X_1 + 0,781X_2$$

where Y - the dynamics of growth of gross regional product; X_1 - dynamics of growth of employment in the economy; X_2 - dynamics of growth of labor productivity (all values are set as% of previous year).

The resulting model with high accuracy allows to determine the rate of growth of gross regional product (R^2 = 91,3%). This equation allows us to calculate the expected value of the gross regional product, depending on the growth rate of employment in the economy and productivity.

The change in the region's labor potential is influenced by various socio-economic processes in the region, which, for example, include the emigration and immigration of population of the province. As a factor variables add statistical data characterizing the dynamics of emigration and immigration in the Stavropol region. The analysis results are presented in table 3.

Table 3: The coefficients of pair correlation

Parameters	Y - dynamics of growth gross regional product	X_1 - dynamics of growth employment in the economy	X_2 - dynamics of growth labor productivity	X_3 - dynamics of growth emigration	X_4 - dynamics of growth immigration
Y - dynamics of growth gross regional product	1				
X_1 - dynamics of growth employment in the economy	0,672768	1			
X_2 dynamics of growth labor productivity	0,892231	0,40329	1		
X_3 - dynamics of growth emigration	0,274736	-0,18875	0,193481	1	
X_4 - dynamics of growth	0,17635	-0,30267	0,069982	0,954186	1

immigration					

Table shows what of the correlation between the available factors and re-introduced, into the absolute value is less than 0.4, indicating no linear relationship between parameters.

The results of the analysis indicate the following, as p=0,155, then the level of importance of criterion Fisher model is significant. The degree of accuracy of the description of the process model is $R^2 = 0,99$. As $R^2 > 0,99$, is possible to talk about the high accuracy of approximation, which means that the model describes well the phenomenon.

Multiple linear regression analysis model will be as follows:

$$Y = -162,448 + 1,835X_1 + 0,756X_2 - 0,051X_3 + 0,083X_4$$

where Y - the growth rate of the gross regional product, in% to the previous year; X_1 - population growth dynamics of employment in the economy, in% to the previous year; X_2 - the dynamics of growth labor productivity , in% to the previous year; X_3 - growth dynamics of emigration, in% to the previous year; X_4 - dynamics of growth of immigration, in% to the previous year.

Thus, the selected factors can be used for the calculation of the targets of the socio-economic development of the Stavropol Territory.

CONCLUSION

Development of the rural labor market in the Stavropol region is possible only on the basis of objective economic conditions: widespread development of production on the basis of improving the material and technical base, improvement of the financial condition of agricultural enterprises and the improvement of wages, development of social sphere, increasing the quality of human resources and personnel for agroindustrial complex Stavropol Territory Human Resources, professional mobility etc. Priority implementation of measures aimed at improving the provision of labor resources is not in doubt. The decision in the first place of this problem, will allow in the short term to stabilize the situation in the agricultural sector and to start up production of domestic agricultural products.

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