Development of labor potential of the Penza region agricultural sector

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Abstract. An important condition for the country's food independence is the effective use of the labor potential of the agricultural sector. Currently, it is becoming one of the decisive factors in the innovative development of the agro-industrial complex. The article deals with demographic, economic and social factors that determine the development of the labor potential of agricultural organizations. An assessment of the demographic and employment situation in the agrarian sector of the Penza region is given. The age of the population has been determined and the level of responsibilities on the working-age population of rural areas has been estimated. The analysis of labor productivity in agricultural organizations of the region, its increase is a necessary condition for sustainable economic development of agriculture in the region. The authors also touch upon the following questions as motivation of employees in increasing labor productivity, including the level of wages, are considered. Solving the problems of stabilization and achieving high rate indicators in the agro-industrial complex of the region requires an increase in the efficiency of using labor potential with an integrated mechanism.

1. Introduction

The transition of the agro-industrial complex to innovative development increases the role of labor resources as an important element of the production potential of the agricultural. The competitiveness of the agri-food complex of Russia as a whole and of each individual region is increasingly determined by the quality of labor resources, the degree of their mobility, motivation to work and innovations. In this regard, it is necessary to study a wide range of problems, appeared in the development of the labor resources of the village, as well as to analyze the potential of its innovative development [12].

The role of labor resources in the system of resource potential of the agro-industrial complex is determined by a combination of demographic, economic and social conditions and factors. Demographic factors, primarily the birth rate, mortality, and migration determine the size of the population in general and, in particular, the labor force. The economic conditions affecting the state of labor resources are: the level of wages in the industry, the availability of jobs, career possibilities, access to housing and infrastructure in rural areas, the level of prices for food and non-food products in the countryside. Social factors that form favorable social support for employees are living conditions, social support, benefits, and the availability of social infrastructure [3, 4].
2. Materials and methods
The current research was carried out using general scientific methods (dialectical method, analysis and synthesis, comparison and analogies), as well as special methods of economic science (system analysis, comparative analysis, economic and mathematical) based on data from official statistics, the Ministry of Agriculture of the Penza region, agricultural organizations of the region, materials of the authors’ previous researches. The information base was also modern research of domestic and foreign scientists on the development of labor potential.

3. Results
The Penza region is historically an agricultural region of Russia. Agricultural lands account for 70.1% of all land in the region, arable land - 52.2%. In the structure of the gross regional product in 2019, the share of agriculture was 15.1%.

On average, in the Volga Federal District, 29% of population live in rural areas. The Penza region is a region where the share of the rural population is 31.1%, ranking 7th out of 14 subjects of the Volga Federal District for this indicator (Figure 1).

According to the data of the Penza Region Territorial Body of the Federal State Statistics Service, along with the general decline in the population of the Penza region, the gap between the number of rural and urban residents has been increasing over recent years (Figure 2).

In the Penza region, as of January 1, 2020, 405.7 thousand people lived in rural areas. At the same time, the share of the rural population decreased from 37.0% in 1990 to 31.1% in 2020. Despite the implementation of active demographic policy measures and positive changes associated with an increase in the birth rate and a decrease in mortality, the natural population decline is still one of the important problems. In 1990-2020 the population in the region decreased from 1546.1 thousand to 1305.6 thousand. Moreover, the rate of decline in the rural population exceeds the indicators for urban residents by 3.8 times.

One of the most important problems of rural areas in the process of the formation of human resources is the massive migration outflow to the cities and towns of persons aged 18 to 35 years, mostly, young people. Most of them migrate permanently, mainly for the purpose of education or work.

The rationale for the desire to live in cities is both social and economic reasons: the level of employment, housing conditions, medical care, social protection in cities is higher than in rural areas. Thus, the city provides more opportunities for young people. This leads to the degradation of the
countryside, both social and demographic: the population is aging, the birth rate is declining, social infrastructure facilities are being closed, and the number of “ineffective” settlements is decreasing.

![Dynamics of the urban and rural population of the Penza region, thousand people.](image)

**Figure 2.** Dynamics of the urban and rural population of the Penza region, thousand people.

The age structure of the rural population has passed the threshold, which is characterized by a very high level of demographic old age. According to international UN criteria, a population is considered old if the proportion of residents aged 65 and over exceeds 7%. For the Penza region in 2020 this figure was 28.3% (Figure 3).

![Age structure of the population of the Penza region, thousand people.](image)

**Figure 3.** Age structure of the population of the Penza region, thousand people.

During the analyzed period, the replacement rate of the working-age population increased from 26.3% in 2010 to 29.5% in 2020. Thus, there are 30 people under the age of 15 per 100 rural residents of working age, which is insufficient even for simple reproduction of the labor force in rural areas and negatively affects the potential of the labor force.

The number of working-age rural population of the Penza region for the period from 2010 to 2020 decreased by 48.6 thousand people, or 18.5%, and amounted to 214.1 thousand people. The number of
rural residents over working age increased from 125.5 to 128.4 thousand people. This has led to the fact that the overall burden on the working-age rural population has increased. In 2020, there are almost 90 people of nonworking age per 100 rural residents of working age. In connection with the implementation of the pension reform, a decrease in the burden on the working-age population is expected, but these measures would not lead to an increase in the quality characteristics of the labor force.

The region’s agriculture employs both rural and urban population. Average annual number of people employed in agriculture for 2010-2020 constantly changed and in the reporting year reached the lowest value - 53.0 thousand people (according to a sample survey of the labor force) (Table 1).

Table 1. Dynamics of the employed population and agricultural production in the Penza region.

| Index                                      | 2010  | 2015  | 2016  | 2017  | 2018  | 2019  | 2020  |
|--------------------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Average annual number of people employed in agriculture, thousand people | 76.7  | 66.4  | 83.9  | 70.4  | 65.8  | 53.3  | 53.0  |
| Agricultural products in current prices, million rubles | 27868 | 76123 | 85469 | 87359 | 82454 | 100123 | 120250 |
| Agricultural production index (in comparable prices) | 72.9  | 115.5 | 106.1 | 100.1 | 102.3 | 115.1 | 115.7 |
| Agricultural products produced per worker, thousand rubles | 363.3 | 1146.4 | 1018.7 | 1240.9 | 1253.1 | 1878.4 | 2268.9 |
| Average monthly nominal accrued wages of workers engaged in agricultural production, rubles | 9653.4 | 22520.2 | 23172.7 | 25207.7 | 26754.6 | 29532.0 | 30914.5 |

In general, with the state and regional support for the agricultural sector and the implementation of import substitution projects since 2015 in response to the sanctions of the Western countries, a stable growth in agricultural production has been observed in recent years. This is evidenced by the index of agricultural production (in comparable prices), the value of which in the region has exceeded 100% since 2011. In the agricultural sector, labor productivity and wages are increasing, which is the main element of the system for stimulating the economic activity of the rural population. In 2020, the average monthly nominal accrued wages of workers engaged in agricultural production amounted to 30,914.5 rubles, which is 5.7% lower than the wages in the region as a whole.

According to scientists, in Russia, as a result of technical and technological re-equipment of the agricultural sector, employment in it would decrease by 2 times. The developed West countries have overcome this situation on the basis of the implementation of targeted programs for the development of rural areas, which effectively address the development of alternative employment for the rural population in the areas of agritourism, nature protection and others not related to the agricultural sector. There is practically no alternative use of labor resources in the countryside, with the exception of low-income personal subsidiary plots.

An important condition for supporting sustainable economic development of agriculture in the region is to increase the efficiency of production based on the growth of labor productivity.

Agriculture is one of the five non-resource industries and is a highly competitive industry. Therefore, one of the key questions in the development of the entire industry is the issue of increasing labor productivity. Agricultural enterprises could apply for participation in the National Project “Labor Productivity and Employment Support”.

At the moment, about 80 Russian agricultural enterprises, participating in this national project and using the tools of lean production, are already increasing labor productivity and increasing their profits without using additional cash costs. Companies that are the largest producers of dairy products and grain crops, poultry factories and farms show impressive results after six months of work by experts from the Federal Center of Competence at the enterprise.

In the framework of the Federal Project "Targeted support for increasing labor productivity at
enterprises”, the following main directions should be realized:
- implementation of measures to increase labor productivity directly at the enterprises - participants of the current project;
- the formation of supervising materials and handbooks in the field of labor productivity;
- education and training of regional experts and employees of enterprises - participants of the National Project for the subsequent realization of best practices and industry experience;
- collection and dissemination of best practices and accumulated industry experience, including through the IT platform.

Enterprises, that become participants in the project, would be able to receive the following benefits: expert and methodological support for increasing productivity at enterprises; concessional loans (at 1%), subsidizing interest rates on loans to small and medium-sized businesses; training of enterprise managers on increasing labor productivity; retraining and advanced training of employees of enterprises; export support (export accelerators); assistance in participating in international projects; tax incentives (pilot projects in 8 participating regions of the Russian Federation).

As the main disadvantage of the project, it is important to note that only large manufacturers, whose annual revenue exceeds 400 million rubles, could take part in it. In the Penza region, there are no more than 20 such agricultural producers, which is less than 13% of their total number.

Currently, the Penza Region has achieved the target for the involvement of enterprises in the project set for 2021 - 45 participants, including 4 agricultural organizations.

In order to identify the correlation of labor productivity with various factors, 139 agricultural enterprises of the Penza region were surveyed, characterized by different scales of production, specialization and economic conditions (Table 2).

Table 2. Influence of factors on labor productivity in agricultural organizations of the Penza region, 2019.

| Indicators                                      | Groups of farms by proceeds from the sale of agricultural products per 1 employee, thousand rubles | On average in the agricultural organizations |
|------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------|
|                                                | Up to 1000 | 1001-2500 | 2501-4000 | 4001 and more |                                                                 |
| Number of companies in the group               | 41         | 59        | twenty    | 19           | 139                                                                 |
| Received proceeds from the sale of agricultural products per 1 employee, thousand rubles | 606.1      | 1648.3    | 3347.6    | 5434.7       | 2103.0                                                             |
| Average annual number of employees, people     | 29.9       | 83.9      | 239.4     | 278.4        | 116.9                                                              |
| Capital-to-labor ratio per employee, thousand rubles | 1852.1     | 3371.4    | 3353.8    | 6855.7       | 3397.0                                                             |
| Machine-to-machine ratio per employee, thousand rubles | 712.7      | 1477.5    | 1773.9    | 2728.7       | 1465.6                                                             |
| Average monthly wages of employees, rubles     | 24059.9    | 29082.4   | 33826.7   | 38111.3      | 29517.7                                                            |
| Share of bonuses in the wage fund, %           | 1.7        | 5.3       | 10.8      | 9.2          | 5.6                                                                |
| Received proceeds from the sale of agricultural products per person-hour, rubles | 589.2      | 989.7     | 1848.4    | 2900.9       | 1256.4                                                             |
| Gross value added per employee, thousand rubles | 221.3      | 323.5     | 894.9     | 1394.4       | 521.9                                                              |
| Profit from the sale of agricultural products per employee, thousand rubles | 53.2       | 75.4      | 530.8     | 933.6        | 251.7                                                             |
| Average size of subsidies per enterprise, thousand rubles | 3334.7     | 3326.0    | 69278.7   | 40757.5      | 19107.4                                                            |
The examining of the results of the financial and economic activities in agricultural enterprises gives a reason to mention the presence of a direct dependence of labor productivity on technical equipment, capital-labor ratio and the level of remuneration. Higher labor productivity was achieved in the enterprises of the region, where the average number of employees is 278 people per organization. This group includes giants of the regional and federal scale: JSC "Vasilievskaya poultry farm", LLC "Pachelmskoe economy", LLC "Grain company", JSC "Studenetsky flour mill", LLC "AGSEN" and others. The average capital-labor ratio in this group amounted to 6855.7 thousand rubles per 1 worker, or 3.7 times more than in the group with the minimum labor productivity. These results indicate that the focus of the national project on increasing labor productivity at large enterprises has economic feasibility. It is large-scale production that has great potential and the possibility of intensifying production, using high-tech modern technologies.

It is obvious that satisfaction of employees with material conditions, improvement of working conditions is the most effective incentive. This was confirmed by the analysis data. Agricultural organizations included in the fourth group provide their workers with higher wages. The average monthly wage in 2019 was 38111.3 rubles, or 1.6 times more than enterprises in group 1. At the same time, the growth rate of labor productivity was 8.9 times. That is, the additional costs of wages are paid off many times over. It should also be noted that among agricultural organizations included in the third and fourth groups, the share of incentive payments in the wage bill for agricultural workers was about 10% that also increases the interest of workers in the final results of their work and ensures greater efficiency of production as a whole.

An integral part of the institutional factors is state support (through increasing the capital supply of farms) of innovative directions (the introduction of resource-saving units, new varieties of plants, etc.). As a result of support and regulation from the state, it is possible to equalize the economic conditions of farms with different income levels, increase the efficiency of using limited financial resources and, ultimately, increase the economic efficiency of the agro-industrial complex. Enterprises of the third and fourth groups were most active in attracting state support as sources of financing for business processes, which made it possible to obtain higher labor productivity in terms of the output of products sold and profit from sales per employee.

All the factors considered can only in combination solve the problem of increasing labor productivity in agriculture.

Thus, the agrarian labor market of the Penza region is dynamically developing, new jobs are being created. In the agro-industrial complex of the region, investment projects are being actively implemented for the production of turkeys, dairy farming, etc., abandoned lands are being put into circulation.

4. Conclusion
The future of the agricultural market directly depends on regional policy formation of labor potential in agriculture. The mechanism for implementing this policy direction should consist of the following elements: demographic policy, health care for the rural population, ensuring proper working conditions; employment policy in the labor market and elimination of unemployment, education and vocational training activities; legislative and regulatory regulation, measures in the field of income and social protection of the rural population; housing policy and development of the social infrastructure of rural areas.

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