Multifactor development of agrarian production potential under sustainable development

A V Kuchumov, S E Terentyev and A V Belokopytov

Smolensk State Agricultural Academy, 10/22, Bolshaya Sovetskaya street, Smolensk, 214000, Russia

E-mail: sgsha@sgsha.ru

Abstract. The article deals with the problems of development and reproduction of production potential in the agricultural sphere of activity. The multifactor nature of the functioning of the production potential, taking into account the reproduction processes and the sustainability of the development of agricultural organizations, has been determined. The authors proposed methodological recommendations for assessing the development of production potential, taking into account its fundamental elements, taking into account the indicators of reproduction and the integral nature of the components of the resource potential. Recommendations are proposed for creating optimal conditions for the expanded reproduction of resource potential, taking into account government support, innovative development and investment activities in the industry. The proposed recommendations will make it possible, according to forecast calculations, to increase the increase in the volume of gross agricultural production in the region by 60-75%, and the level of efficiency in using the production potential will increase by 1.4-1.5 times.

1. Introduction
Sanctions from the West constantly put pressure on the Russian economy, including the agricultural sector [1-3]. In the context of such a press, the competitiveness and development of the priority sector of the country as agriculture is of particular importance [4-5]. The import substitution policy and a number of incentive measures allowed the manufacturing sectors to partially adapt to the prevailing conditions. At the same time, some negative factors continue to operate in modern realities [6-8].

Currently, the formation and effective use of the existing production potential of the agro-industrial sphere is required, taking into account the growth of its competitiveness, expanded reproduction and the development of scientific technologies and innovations.

It is necessary to create an effective production potential using modern technologies and equipment, as well as create acceptable conditions for its reproduction. In the context of the uncertainty of the external environment, due to the constant threat of political and economic sanctions, the problem of sustainable agricultural development, which is an indicator of food security, is becoming more and more important.

2. Materials and methods
The study was carried out using economic and statistical data characterizing the state of the production potential of the agrarian sphere of activity in the Smolensk region. The object of the research is the level of reproduction and development of the production potential of the agro-industrial complex. In the course of the study, an integral assessment was given because of the author's methodological
approach to the development of production potential in the context of natural-economic zones; multifactor and efficiency of application were assessed.

The work used the data of statistical reporting of agricultural organizations of the Smolensk region and the Federal State Statistics Service for the Smolensk region, applied methods of econometric modeling, economic, and statistical.

3. Results and Discussion

From a theoretical standpoint, the production potential of the agricultural sector of the economy can be defined as a set of interrelated resources of agricultural production with various integration properties that determine the complex nature of its formation and development. However, at the same time, it is a complex, continuously reproducing system that contributes to the sustainable functioning of both the enterprise itself and the entire socio-economic system of the rural area (figure 1). The main subsystem elements can be identified technical and technological, labor and personnel, information potential, land resources.

Analysis of the state of regional agriculture in the period 2005-2019 revealed some positive trends in its development: the volume of agricultural production for the study period increased almost 3 times and amounted to 26.6 billion rubles, grain production increased 2.4 times (280.7 thousand tons), meat in live weight - 5.2 times (77.9 thousand tons). If it speaks about trends in the physical volume of production, then over the past three years the production index in relation to the previous year is always higher than 100%. In 2019, the growth in agricultural production in a comparable estimate to 2018 amounted to 103.8%. Taking into account that in general in Russia this figure was about 1.5%, it should be noted that the rate of development of agricultural production in recent years is quite high in the Smolensk region.

Among the positive trends in modern conditions should be attributed to the decrease in the share of unprofitable farms in the total number by almost two times to 32%, although this is still a high level in comparison with other industries (in the manufacturing industry - 25%). Among the regions of the Central Federal District, this is also a high indicator. Thus, the minimum share of unprofitable organizations in the Central Federal District in the Belgorod Region is 18.5%.

At the same time, it should be noted that the state and level of development of the production potential of the agricultural sector of the region is insufficient for the sustainable development of the industry and the conduct of expanded reproduction [9-11].

The modern development of agriculture is based on the stable socio-economic development of rural areas, ensuring the maximum employment of the population and a decent increase in their standard of living, increasing the efficiency of agricultural production, creating conditions for the formation and successful functioning of production potential. The conducted research suggests that, in our opinion, the production potential is inextricably linked with all stages of reproduction and contributes to the achievement of the most effective level of sustainable development of the organization. Its main components are material, land and labor resources.

The level of its development can be determined using private indices as the size of the corresponding element of production potential (fixed assets, number of employees, potential of land resources), referred to the value of these components for the entire set of objects under study. Because of particular indicators, it is possible to determine the integral index of the functioning of the production potential of an agricultural enterprise. In our opinion, it can be calculated using the following formula:

\[ I_{pp} = \sqrt[3]{I_M \cdot d_M + I_Z \cdot d_Z + I_T \cdot d_T} \]  \hspace{1cm} (1)

Where \( I_M, I_Z, I_T \) - the value of private indices of the provision with elements of production potential (material, land, labor);
\( d_M, d_Z, d_T \) - the share of costs for the corresponding resource in the total costs of agricultural production;
$I_{pp}$ is an integral indicator of the development of production potential in an agricultural organization.

![Diagram](image.png)

**Figure 1.** Multifactor development of the production potential of the agricultural sector of the economy.
On the one hand, this indicator reflects the main elements that form the production potential, and on the other hand, it shows trends in the characteristics of the reproduction process of the corresponding components.

Studies show that in the pre-reform period, agricultural producers almost fully used the potential of agricultural land, and since 2015, it has been constantly decreasing, reaching less than 60%. In recent years, the situation in the structure of reproduction processes has remained almost unchanged: the share of material, labor and land resources in the materialized production costs of agriculture in the Smolensk region is determined by the following characteristics: \( dm = 0.68, dz = 0.12, dt = 0.20 \).

Determination of production potential according to our proposed methodology allows us to differentiate all regions of the region according to the level of development of production activities. The integral assessment of the resource potential of agricultural producers is also interconnected with the efficiency of using the production potential and production in general (table 1).

**Table 1.** Assessment of the functioning of the production potential of agricultural enterprises in the Smolensk region in the context of natural and economic zones.

| Agricultural zone | Private indices of production potential | Integral level of development of production potential (Ipp) | Efficiency of using production potential |
|-------------------|----------------------------------------|----------------------------------------------------------|----------------------------------------|
|                   | Material funds | Labor resources | Land holdings |                                      |                                      |
| Northeastern      | 2.01          | 1.32           | 1.89         | 1.88                                  | 1.07                                 |
| Northwest         | 0.32          | 0.41           | 0.55         | 0.37                                  | 0.59                                 |
| Central           | 1.02          | 1.39           | 0.91         | 1.07                                  | 0.67                                 |
| South             | 0.61          | 0.76           | 0.65         | 0.64                                  | 0.88                                 |

The northeastern and southern zones are distinguished by a high level of development of resource potential. Here the integral indicator was 1.88 and 1.07, respectively. Areas with a high level of provision and reproduction of production resources also have good performance indicators. Therefore, in the southern zone, with a development level of 0.64, the efficiency indicator was 0.88, and in the northwestern zone, with a lower level of security, the efficiency of using production potential is 0.59.

However, it should be noted that in most areas of the region, the efficiency of using production resources is low. Only in the northeastern zone is the efficiency index higher than one, which to a certain extent is due to the proximity to Moscow and the existing large investment and technical potential.

The proposed assessment method can be used in the development of target programs for sustainable development of the region, with a detailed assessment of the results of economic activities of agricultural producers. The conducted studies indicate the direct impact of the functioning production potential on economic results and determine the vectors of development of industries.

The quality and level of reproduction processes in the industry remain rather low. This is largely due to the low level of profitability of agricultural products and its investment attractiveness. In 2019, the indicator of profitability of products for agricultural organizations of the Smolensk region was only 9.1%, in 2018 it is even less - 6.4%. This is insufficient for the expanded reproduction of the existing production and technical potential.

If it speaks about the degree of wear of the active part (machinery, equipment, transport) of fixed assets, then here the indicator is even higher - almost 50%. The technical and energy security of agricultural production has worsened. All this requires the expansion of the machine and tractor fleet, the formation of which has a negative direction (table 2). So, for the period 2000-2018. in Russia, the load of arable land per tractor increased 2.5 times (337 ha), the load of grain crops per 1 combine harvester increased 1.5 times (424 ha).
Table 2. Assessment of the functioning of the production potential of agricultural enterprises in the Smolensk region in the context of natural and economic zones.

| Name          | Load of arable land per 1 tractor, ha | Load of grain crops per 1 combine, ha |
|---------------|-------------------------------------|--------------------------------------|
|               | 2000 2010 2013 2018 | 2000 2011 2013 2018 |
| Smolensk region | 153 277 351 586 | 117 156 269 314 |
| Russia        | 135 236 258 337 | 286 327 369 424 |
| USA           | 39 39 40 38 | no data 67 70 63 |
| Canada        | 63 61 68 62 | 232 252 262 257 |
| Germany       | 13 16 19 18 | 51 36 49 48 |

For international comparison, it can be noted that the load per 1 tractor in the USA is 38, Canada - 62, Germany - 18 hectares, while the standard value is 73 hectares. In our country, we not only fall short of the indicator of developed countries, but also exceed the standard value of this indicator. The situation is similar with the load on one-grain harvester. The indicator in Russia is 1.7 times higher than in Canada and 6.7 times higher than in the United States. In terms of the availability of tractors and combines, we are several times lagging behind not only the Western countries, but also the countries of the EAEU Economic Union. In Belarus, more than nine tractors are used for 1 thousand hectares of arable land, in Kazakhstan - six.

4. Conclusion

В заключение описываются результаты проведенного исследования. The assessment of the state of the production potential of the agrarian sphere of the region's activity made it possible to identify the dominant development factors. The growth of the innovative component of production potential enables it to develop dynamically. To support this economic effect, it is advisable to increase the size of investments in the base capital, which to a certain extent is a protective function against economic sanctions, and on the other hand, increases the competitiveness of the industry's products. In addition, under the conditions of the WTO, government support remains significant as a system of direct and indirect measures to stimulate such a type of activity as agricultural production. Studies indicate a low level of reproduction processes in the agricultural sector of the region and the need to develop an effective economic mechanism that can overcome existing problems in the agricultural sphere. Econometric modeling and calculations show that the level of reproduction of production potential can be increased by strengthening investment and innovation activities with government support and optimal monetary policy. The systemic measures that contribute to the dynamic development of production potential include tax incentives, creation of conditions for increasing the profitability of agricultural organizations, optimization of the system of interventions and public procurement, development of agricultural consumer cooperation, digitalization of the economy.

The proposed recommendations will make it possible, according to forecast calculations, to increase the increase in the volume of gross agricultural production in the region by 60-75%, and the level of efficiency in using the production potential will increase by 1.4-1.5 times. At the same time, the situation with reproduction will improve, which, under conditions of economic sanctions, will give a tangible stimulus to the development of the agrarian sphere of activity.

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