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MULTIFACTORIAL VECTOR OF REGIONAL AGRICULTURE DEVELOPMENT[1]

The article reveals the agriculture development potential of the Volgograd region enabling to move to the stable type of reproduction as well as its factors: the natural conditions, location, technological types of production, agrarian structure, horizontal and vertical integrations, state support. The methodological approach of the differentiation of green box subsidies is approved, the mechanism of its realization is proposed. The evidence base is substantiated by the long-term research of the soil intensification and soil quality factors influencing the soil productivity in the region.

Within the boundaries of the existing natural areas, the following zones of territorial and economic development are allocated: the zones of competitive and efficient grain production; the zone of commercial sunflower production; the zones of territory and priority development. The criterion signs of their development are formulated. Alongside with the natural factor, the following factors were accepted as a criterion: the level of production adaptability and development of rural areas, the displacement of population, customary lifestyle, the arrangement of production infrastructure, resources, the structure of the agrarian economy. The evolutionary entrance of small agribusiness into the innovation-based economy has been reasoned as well as the creation on this basis of a special sector of agrarian economy—organic agriculture, which is reasonable to develop in the field of dairy cattle-breeding and vegetable-growing.

A strategic analysis of the technological types of production existing in the regional agriculture in the context of organizational units and activities is presented. These are: industrial type with innovative elements, extensive and intensive type with innovative elements, extensive and intensive type, extensive type. They provide modernization as a factor of the evolutionary formation of the innovation-based economy in the agrarian sector.

Considering the global tendencies, the priorities of increasing the availability of agricultural mass producer in the market realized within a cluster, agricultural holding, cooperative are grounded.

Keywords: agriculture, region, factors, potential, location, production type, agrarian structure, development zones, state support, product chains

Introduction

The State Program on agricultural development and regulation of farm produce markets, raw materials and food for 2013–2020 designated the guidelines of the economic growth in Agroindustrial Complex. These guidelines give the priority to the food security of the country and improving the competitiveness of products. It is achieved due to import substitution, defining and stimulating those priority activities, which produce deficient food, forming grocery chains producing and processing agricultural products, which are able to reduce losses and increase the profits of rural producers, modernization, structural breaks and institutional changes[2]. No doubt, these are economic growth engines not only in short term, but also in long-term. However, the changed political and economic situation, sanctions against Russia connected with the events in Ukraine, claimed the accelerated development of agriculture, which is capable to provide the country in the short term with domestic foodstuffs except those which can not be produced in Russia because of natural conditions. At the same time, this is not about production growth at any cost. This is the way Russia worked in the 80s of the last century (the share of agriculture in 1990 amounted to 17–18 % of the state budget expenditures. The parity of prices for agricultural and industrial products consumed by the village almost reached 1, a wage level in the village exceeded the national average). The main reasons for the decline in production during that period can be regarded underutilization of internal capacities of agricultural organizations. It had some reasons, including macroeconomic ones; the reasons have been well covered

in the economic press, so it is needless to dwell on them once again [1,2]. In this regard, the need for the scientific analysis and the agriculture in Russia and regions potential realization increases.

Factors and Criteria for Territorial and Sectoral Distribution of Agriculture in the Region

At present, agriculture in Russia is characterized by multistructure and by market relations not only with economic agents in the market, but also with the state. That is why the whole system of measures on economic growth stimulation should be constructed within the framework of the state regulation of industry development, this regulation being aimed at the increasing economic efficiency. Unfortunately, the latter in the modern sense is associated only with modernization and innovations.

One can hardly argue to the fact that breakthrough technologies, based on high technology, chemicals and fertilizers are the key to highly efficient agricultural production[3]. It was the agricultural production type which allowed the Western European countries and the USA to become the leaders in the world agro-food market and will in future reduce the tension in the food supply of the population in the developing countries [4,5]. However, the agriculture of Russia is geographically dispersed; it has huge rural areas and diverse bioclimatic potential. The agriculture of Russia is unique as for environmental conditions, technological types of industries, agrarian lifestyles and social principles.

A wide range of presented factors should be considered as potentialities. These potentialities can turn weaknesses of domestic agricultural production (low competitiveness of small commodity production, technical equipment, backward technology, etc.) into advantages. The implementation of these capabilities depends primarily on the rational distribution of agricultural production on the country's territory and its regions as well [6]. Among the other factors of steady agricultural development, the territory and industrial distribution is less expensive and it allows making use of the natural background of the competitive advantages of products. However, under the free enterprise conditions, a choice of a field of activity is made by the producer, and the state just stimulates this process using various tools within the framework of the state regulation of agribusiness [7].

Structural changes in distributing the agricultural production in the country's territory are impossible without changes in the organizational and economic mechanism of agriculture [8, 9]. These changes are retreat from the principle of regional self-sufficiency and expanding interregional product and raw material relations; implementation of program-oriented approach in stimulating the development of priority agricultural activities in natural areas and regions having most favorable natural and economic conditions; supporting the income of agricultural producers at the level of expanded reproduction; production quota in the areas of their commodity concentration considering natural and economic advantages.

The zonal principle of distributing agricultural production based on forming the national agricultural market as a system of providing the country's population with the food gives regions a special place [10, 11]. On the one hand, a regional approach to zoning the agricultural production adequate to decentralization of agribusiness management reflects common structural changes in distribution of agricultural production. On the other hand, it enables the development of creativity in business, adapts modern technology and economic models to local conditions. It allows the maximum use of the country's regional potentialities. This aspect predetermined research in this field in one of the largest agroindustrial complexes of the south of Russia — in the Volgograd region. As for the level of agricultural production, it ranks 10th in Russia and the third in Southern Federal District. The fraction of agricultural production accounts for over 15 % of the regional gross domestic product.

The Volgograd region possesses huge land resources (8.3 mln ha of farmland and 5.6 mln ha of arable land). These resources enable both crop products and livestock products. Five zones (steppe zone of black soils, dry-steppe zone of dark-chestnut soils, dry-steppe zone of chestnut soils, the semi-desert zone of light-chestnut soils, Volga-Akhtuba floodland) are allocated within its boundaries. They differ in soil quality, soil structure (quality score ranges from 45.11 to 97.26), in the amount of rainfall (250 to 550 mms), in temperature regime, in the availability of irrigated lands and in other characteristics which predetermined the differentiation of administrative and territorial entities of the region in terms of dynamics and economic development.

One should note the crop production orientation of agricultural activities having been established over the years of transformational changes. As for the revenue structure, the crop production accounts for over 70 %, cereals and sunflower are the main commercial crops, occupying about 90 % of the area

sown. The latter is cultivated in the first three zones, the yield of natural zones ranging from 7.3 dt/ha to 21.3 dt/ha for grain crops and 3.9 dt/ha to 11.4 dt/ha for sunflower (Table 1).

The first two zones have been specialized in the grain production, sunflower production being highly developed. The first zone has almost no animal husbandry, the second zone having negligible part of it (11.7 % of income). As for the third zone, sunflower is grown limitedly, none of sunflower being grown in zones 4 and 5. Herewith, the share of grain production in the income decreases from 47.2 % to 11.3 %. Unfortunately, in these zones, an animal husbandry has no advantages either.

Table 1

Characteristics of Agricultural Activities in the Natural Areas of the Volgograd Region

Index	Natural zones				
	1	**2**	**3**	**4**	**5**
Share of revenue, %					
Grain	50.1	64.7	47.2	31.3	11.3
Sunflower	42.0	20.4	2.9	—	—
Vegetables	—	—	11.8	4.5	11.5
Livestock	2.1	11.7	7.9	9.1	—
Sheep	—	—	2.6	12.7	—
Crop concentration in arable land, %					
Rain crops	33	31	32	25	—
Sunflower	18	12	1	—	—
Yield, dt/ha:					
Grain crops	21.3	17.1	14.7	8.9	7.3
Sunflower	11.4	5.0	3.9	—	—
Vegetables	—	—	258.9	271.7	307.8
Expenses per 1 ha of crops, thousand rubles:					
Grain crops	7.8	6.3	5.3	3.6	3.5
Sunflower	8.9	5.7	4.4	—	—
Employment, person per 100 ha of ploughland	1.0	0.9	1.1	1.0	1.7
Power-supply of labour, kWt/person	75.0	80.0	61.1	62.1	54.4

Grain and sunflower are the "donors" of all agricultural production in the region. Over the last 7 years, the profitability level of sunflower has not fallen below 40 %, in certain years (2007, 2010) it amounted to 80 %. As for grain, (if the poor harvest of 2010 is excluded) the profitability level ranged from 11 % to 50 %. Speaking of agriculture, in general, the recoupment index for unsubsidized main production is at the level of simple reproduction, in the case when it is subsidized, it approaches to 30 %. (Table 2).

Table 2

The Efficiency of Agricultural Production Operation in Volgograd Region (2005–2013)

Years	Production profitability, %		Recoupment coefficient for the main production	
	grain	**sunflower**	**unsubsidized**	**subsidized**
2005	10.9	35.0	1.13	1.17
2006	23.0	21.3	1.14	1.22
2007	50.4	81.9	1.36	144
2008	37.6	64.2	1.26	1.38
2009	10.6	55.2	1.19	1.27
2010	-3.4	86.8	1.17	1.30
2011	18.4	53.1	1.20	1.31
2012	41.5	50.4	1.24	1.32
2013	24.6	40.3	1.18	1.26

The current territorial division of the Volgograd region by zones is determined by the specificity of crop cultivation technologies. The natural factors of competitive advantage in agricultural production are accumulated in these zones, these factors being the basic prerequisites for the natural placement of farm activities within the region. Standard agricultural systems are developed and improved within these zones. At the same time, on the basis of the industrial type of production output of pigs farming and chicken farming existing in the region, the main factors of the distribution of agricultural production, alongside with natural conditions, are price conjuncture of the market, resources, settlement and infrastructure, the level of rural areas development. They predetermined the formation of agroindustrial production zones based on territory and economic grounds.

An agroindustrial production zone is considered to be a part of the rural territory of the region, including a number of municipal districts having common territory boundaries and similar natural and economic conditions of agribusiness operation. Four territory and economic zones suggested to distinguish on the territory of the Volgograd region are as follows: a priority development zone, grain commercial production zone, sunflower commercial production zone, territory development zone (Table 3).

Vegetable growing is concentrated in the areas of the state irrigation system located around the industrial centers (Volgograd and Volzhsky). Employment in this area is 1,5 times higher than that in the third zone, and 1,9 times higher than that in the second zone. A power availability per worker is considerably lower due to the high proportion of manual labor in vegetable cultivation, which has moved completely into a small business sphere.

Stimulating the creation of vegetable products cluster based on the state-private partnership and defining it as a priority development zone were offered in that area. Within its boundaries, mechanisms and tools for economic cooperation between the participants clustered together on the principles of horizontal and vertical integration of primary producers, its processors, logistics centers and retail chains will be developed and tested. Activities in this direction are carried out in the region.

Table 3

Agroindustrial Production Zones of the Volgograd Region

Grain commercial production zone (districts)		
Competitive production subzone		Efficient production subzone
Alexeyevsky Yelansky Kikvidzensky Kumylzhensky Mikhailovsky Nekhayevsky Novoanninsky Novonikolayevsky	Uryupinsky Kletsky Serafimovichsky Kotelnikivsky Oktyabrsky Surovikinsky Chernyshkovsky	Danilovsky Rudnyansky Zhirnovsky Kotovsky Olkhovsky Frolovsky Kalachovsky
Sunflower commercial production zone (districts)		
Alexeyevsky Danilovsky Yelansky Kikvidzensky Kumylzhensky Mikhailovsky		Nekhayevsky Novoanninsky Rudnyansky Zhirnovsky Uryupinsky
Territory development zone (districts)		
Palasovsky Nikolayevsky Staropoltavsky		Bykovsky Kamyshinsky
Priority development zone (districts)		
Gorodishensky Sredneakhtubinsky Leninsky		Dubovsky Svetloyarsky

A price conjuncture of the market, along with natural conditions, contributed to forming zones of commercial production of grain and sunflower. The reasonability of distinguishing them was proven by our long-term research in that field [12].

As a criterion to single out these zones, basic signs were adopted. These signs reflect the dynamics of developing these economic activities and focus on the high technological production type: 5–10 years yield and concentration of crops.

Grain, commercial production zone, comprises 22 districts with the quantity of 1.8 to 2 mln tons, the average yield in the subzone of competitive production exceeding 18.6 dt/ha, profitability being 24 %. It is related to the high share of fallows in plough land structure, ensuring higher yields and decreasing grain planting acreage as well as to state support, aimed at restoration of soil fertility. The distinguished zones are the priority ones to attract investment resources, to create a guaranteed raw-material base for processing industry and also are compatibility standards testing areas.

Structural changes in the regional agrarian production towards the agricultural labor aggravated the social situation in rural areas increased seasonality in resource use and migration phenomena because of job cuts held mostly by women. Animal husbandry, especially dairy cattle husbandry, has moved to small-scale commodity sector using mostly manual labor and extensive technologies. They doom the industry to uncompetitiveness in foreseeable future (as for the volumes of milk, the share of households amounted to 86.7 %).

In order to implement tasks and objectives of social and economic development of the region, the irrigation systems in the Zavolzhsky district of the Volgograd region should be revived. It is necessary to sow irrigated lands with energy-rich protein forage crops for the industrial-type dairy and fattening animal husbandry. This area should be highlighted as a territorial development zone with certain preferences. This will enable to turn the subsidized municipal Zavolzhsky districts into self-sufficient and to solve a lot of social problems of the area and to raise the region's self-sufficiency with milk and dairy products, its level at present being just 58 %. The development of sheep breeding with a high proportion of natural pastures and low settlement remains traditional for these districts. The price conjuncture determined its focusing on meat production. The mutton profitability over years ranges from 33.6 % to 70–80 %, whereas wool is deeply unprofitable (over 80 %).

Thus, within the boundaries of natural zones, four territorial and economic zones are offered. Two subzones—those of competitive and efficient grain production—are allocated within the zone of commercial grain production. The regional approach to the location of agricultural production foremost takes advantages of the given factor.

Technological and Organizational Factors of Small Agribusiness Potential Realization

The location is important, but not the only factor of competitiveness and efficiency. The latter is also determined by technological and organizational factors. The analysis of technological production types was conducted in terms of activities and organizational units. The analysis showed that in the age of scientific and technological advancement of nanotechnologies penetrating into all activities, various technological types of production from the primitive ones to the high technological and innovative coexist in the agriculture of Russia.

They are closely linked to organizational units in the rural areas (Fig. 1).
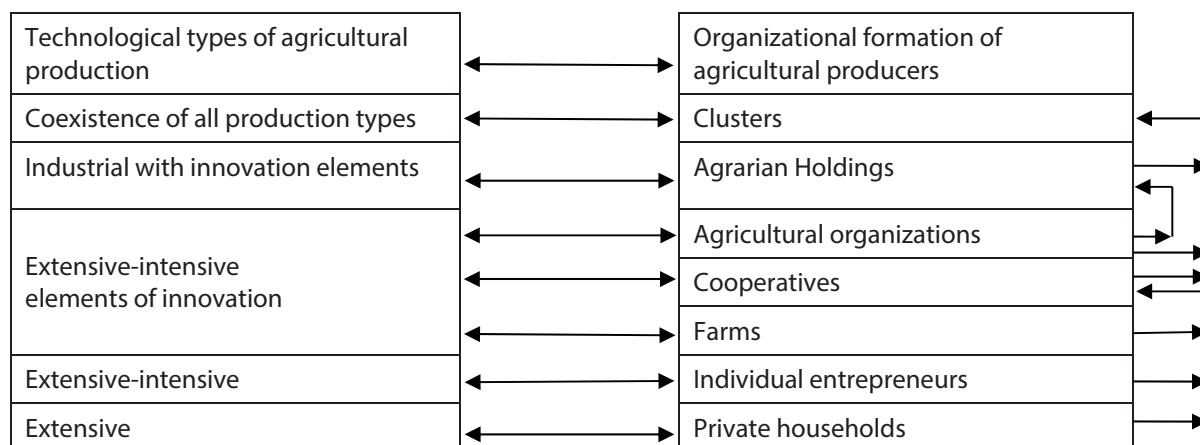

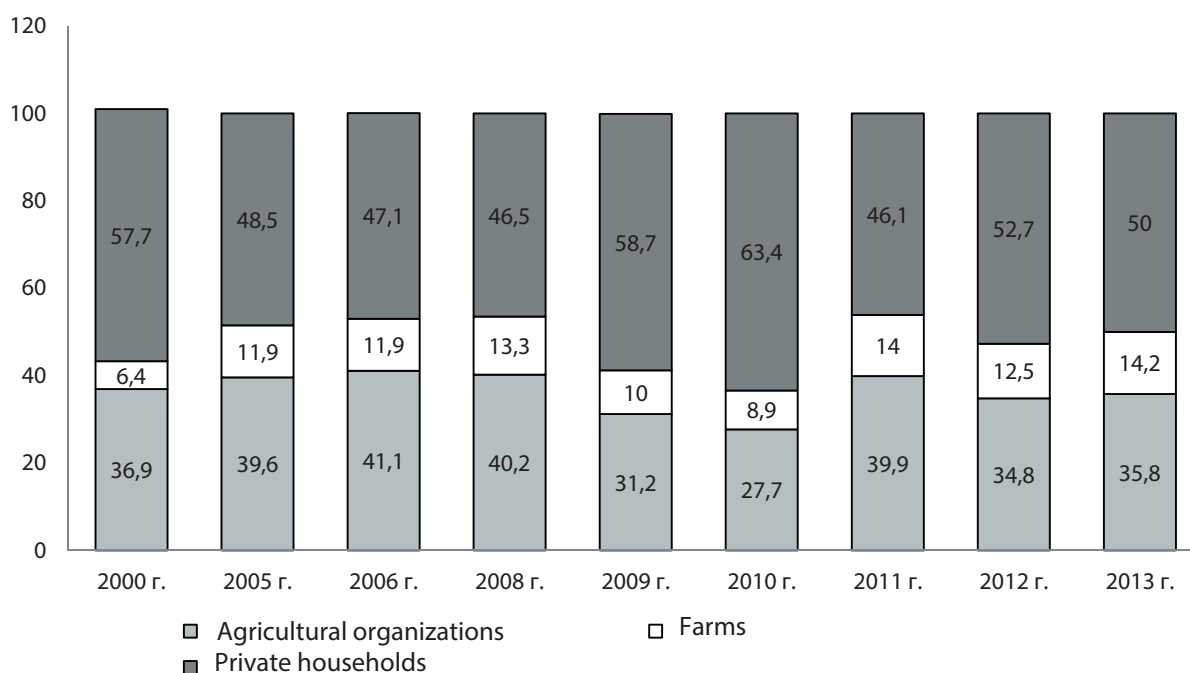**Fig. 1.** *Technological types of industries in modern agriculture*

Fig. 2. *Structure of agricultural output by farm categories in the Volgograd region (at current prices), %. (see: The data of Volgogradstat)*

The agrarian structure of the Volgograd region, as well as that of Russia, is represented by three categories of producers — agricultural organizations (AO), farms (F) and private households (PH). The share of the latter in the structure of regional production is about 50 %, and, on the whole, small forms of business activity in the village produce over 60 % (Fig.2).

"Public" crops are grain, sunflower and to some extent vegetables. They account for 70 % (sunflower) to 80 % (grain) in the structure of production.

Potato-growing and vegetable-growing are concentrated in population households and partially in the farms. It should be noted, that farms reproduce the structure of the economic activity of agricultural organizations (grain, sunflower), adding the structure with vegetable production (Table 4).

Table 4

Structure of Main Products in All Categories of Farms in the Volgograd Region, % (2011–2013)

Product type	Categories of farms		
	Agricultural organizations (AO)	Farms (F)	Private households (PH)
Eggs	48.4	0.3	51.3
Milk	8.1	5.2	86.7
Cattle and poultry	39.8	2.9	57.3
Vegetables	26.1	30.9	43.0
Sunflower	71.7	28.3	—
Grain	71.2	28.8	—

A high proportion of animal husbandry products in private households is a direct prelude to the increase of import and to low competitiveness of milk and meat in the domestic agro-food market. As for poultry meat and pork, their production is aimed at using the industrial-type technologies, as well as eggs.

It is needless to dwell on the benefits of large-scale commercial production, which accumulates investments, high technologies, skilled personnel to assure the innovative type of production. They are well-known. However, the reality is that all categories of producers are functioning in agriculture, all of them are in the same legal and economic field and they perform an important social function — production of agricultural products. It so happened that households in the difficult years of the agrarian reforms assumed another function — reducing the unemployment in rural areas through the self-organization and self-employment, which is performed till the present moment. The adaptation of households into innovation economy is the top priority task of the state, regional authorities which regulate the

development of agriculture. It is reasonable to focus small forms of business on the production of environmentally friendly products. This market segment has been poorly developed yet, and Russia has got every reason to lead in this position on the world agro-food market, the rather that the demand for such products is growing. The implementation of this direction will contribute to forming a special sector of agrarian economy — the organic agriculture with its inherent technologies: without applying fertilizers, agricultural chemicals, pesticides, biological additives, growth stimulators and other achievements of scientific and technological advancement. The organic agriculture applies innovative technologies peculiar to this type of agricultural production. The technologies reproduce soil fertility through crop rotation, green manure, a combination of various technological practices. Perennial and annual grasses, enriching the soil with nutrients and improving its structure, being mostly used in crop rotation will result in the development of dairy farming based on family farms with a high technification level. Creating such farms in the zones of commercial grain and sunflower concentration of the Volgograd region will allow using existing natural grasslands, creating new jobs, increasing the steadiness of small agribusiness through extending activities and regulating seasonality of labor.

The development of large-scale dairy farming in this area is problematic, as the land is owned by the large agricultural holdings engaged in the production of grain and sunflowers. They mastered the high technology of cultivating these crops, which allowed making these activities a sustainable high-tech type of agricultural production. Therefore, based on specialized farms and separate private households, one should initiate the formation of multifunctional units of small agribusiness focused on environmentally friendly products and high costs payback due to the relevant prices. It is enabled by the regional programmes "Support of farmers" [3] and "Development of livestock-growing farms based on peasant farms" [4].

This sector can absorb land shares, which are released because of the aging of owners, bring them into economic circulation and increase the marketability of small businesses in the rural areas. Therefore, a small agricultural business should take its niche in an innovation-based economy, where its functioning is most efficient. Besides the organic agriculture in the broadest sense, it can be rare activities (goose breeding, animal-breeding, beekeeping), traditionally linked to this sector.

One can not help considering the structure of agrarian production, formed as a result of displacing the entire fields of agricultural activities into a small business. Along with dairy farming, such field in the Volgograd region is the growing of vegetables. Thus, the development of dairy farming being based on the combination of livestock complexes and family farms, then in vegetable — growing cooperation is reasonable. This cooperation includes a production cooperation of the high level of an economic independence of its constituent small farms that is cooperation from the bottom. Reserving legal independence, they can delegate a number of powers "upwards". To execute these powers, they can invite professional managers on a competitive basis. This process will go gradually, considering the economic culture of cooperation participants and their preparedness to cooperation in the given format. It will provide for smooth the evolutionary adaptation of the small forms of business to the innovation economy, including adaptation through structural changes to farming by redistributing the land of private households.

The availability of mass producer of agricultural products to sales markets according to the scheme: production-processing-logistics-marketing should also be considered as an important factor of the efficient functioning of regional agricultural production. This approach is mostly realized in the framework of the cluster, agriholding, and cooperative. These units exist in the grain and oil-and-fat sub-complexes of the regional agro-industrial complex. The things that still have to be constructed are a vegetable, dairy and meat clusters based on the autonomous market structures for the production, processing, storage, transport and marketing of raw materials and of processed products. Besides, the mechanism of the interaction of these structures on mutually beneficial cooperation basis should be worked out.

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[3] Vedomstvennaya tselevaya programma "Podderzhka nachinayushchikh fermerov na territorii Volgogradskoy oblasti v 2013–2015 godakh" [Departmental special-purpose programme "Support of the farmers-beginners in the territory of the Volgograd Region in 2013–2015"]. Retrieved from: http://docs.cntd.ru/document/460156905.

[4] Vedomstvennaya tselevaya programma "Razvitie semeynykh zhivotnovodcheskikh ferm na baze krestyanskikh (fermerskikh) khozyaystv Volgogradskoy oblasti v 2013–2015 godakh" [Departmental special-purpose programme "Development of livestock-growing farms based on peasant farms of the Volgograd Region in 2013–2015"]. Retrieved from: http://docs.cntd.ru/document/460157089.

Assessment of Agriculture State Support in the Region

A significant part to ensure the sustainable development of agriculture here is assigned to the state support of agriculture. It is regulated by the State Program for 2013–2020 and by the terms, under which Russia joined the WTO. The consequences are rather tough, not only because of the restricting prohibited support measures, but mostly because of the abolition of export subsidies for agricultural products and foodstuffs, liberalization of customs and tariffs regulation and quota regime.

State support is rendered under the terms of the co-financing of regional and state budgets, thus, it is determined by the economic potential of the regions. For this reason, the federal constituent of the regional budget funds has not fallen below 60 % in recent years.

The Russia's accession to the WTO caused the adjustment of leverage on agriculture. In particular, payments per 1 ha instead of subsidies for the purchase of mineral fertilizers, POL incentives, paying a part of credit interest to execute field activities are introduced as the measures of unrelated support. The share of unrelated support in the Volgograd region in 2013 amounted to 30 % of budgetary funds. It is considerably lower than its alternative having been used in the previous years. The total amount of state support has a steady tendency for the increase, though it remains extremely low and has no significant effect on the operating results. (Fig. 3, 4).
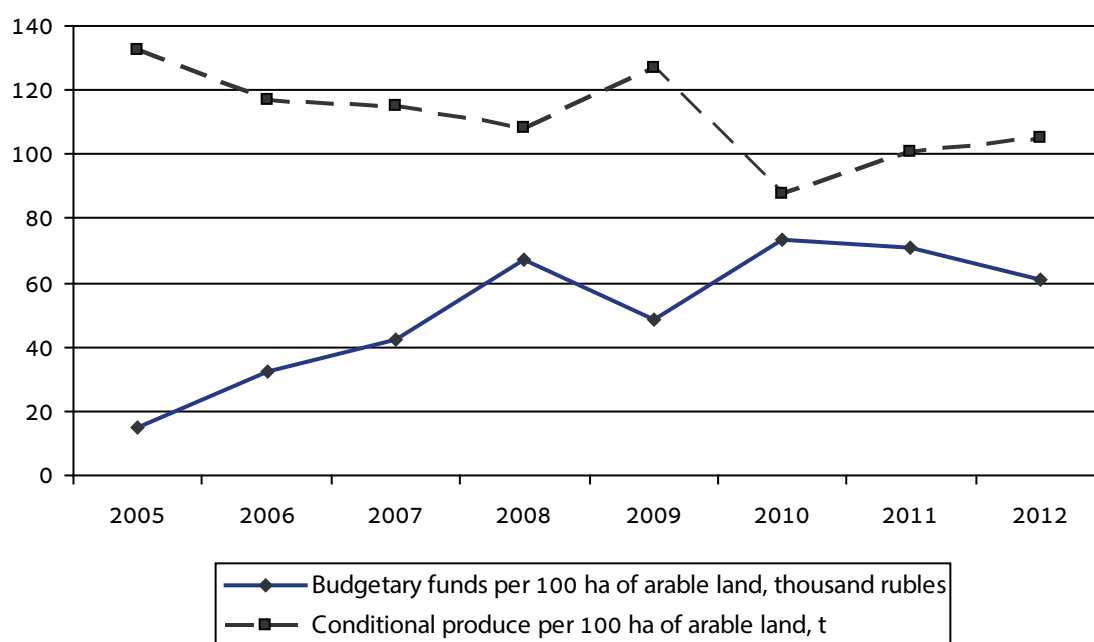

Fig. 3. *Dynamics of budget financing and gross agricultural output of the Volgograd region (2005–2012)*

Moreover, the assets are withdrawn from agriculture not only through the price distortions, but also through the system of taxes and charges. Thus, in 2011, taxes and charges per 1 ruble of state support in the region amounted to 1.24, in 2012, the value reaching 1.54, and in 2013, it being 1.44; whereas the growth of prices for industrial products and services, consumed by agriculture, gets ahead of the growth of prices for agrarian products. Their ratio varied over years from 0.54 in 2006 to 0.65 in 2010 and in the last three years it did not rise above 0.7. This characterizes the price situation in the market as unfavorable. As a result, the share of costs of industrial origin in revenues rose from 36.1 % (2007) to 51.3 % (2013), in the expenses, the share rising from 37.7 % to 48.6 %, respectively. The analysis of the chain index of prices and costs for the various kinds of agricultural products showed a mixed picture of their dynamics. For example, since 2008, the growth of cost price for grain gets ahead of the growth of prices, as for sunflower, on the contrary, the growth of prices relative to costs has been steady since 2000. Only in 2009 and 2011, this tendency was broken. That is not true as for livestock products, costs excess over prices is registered on all kinds of livestock products except mutton.
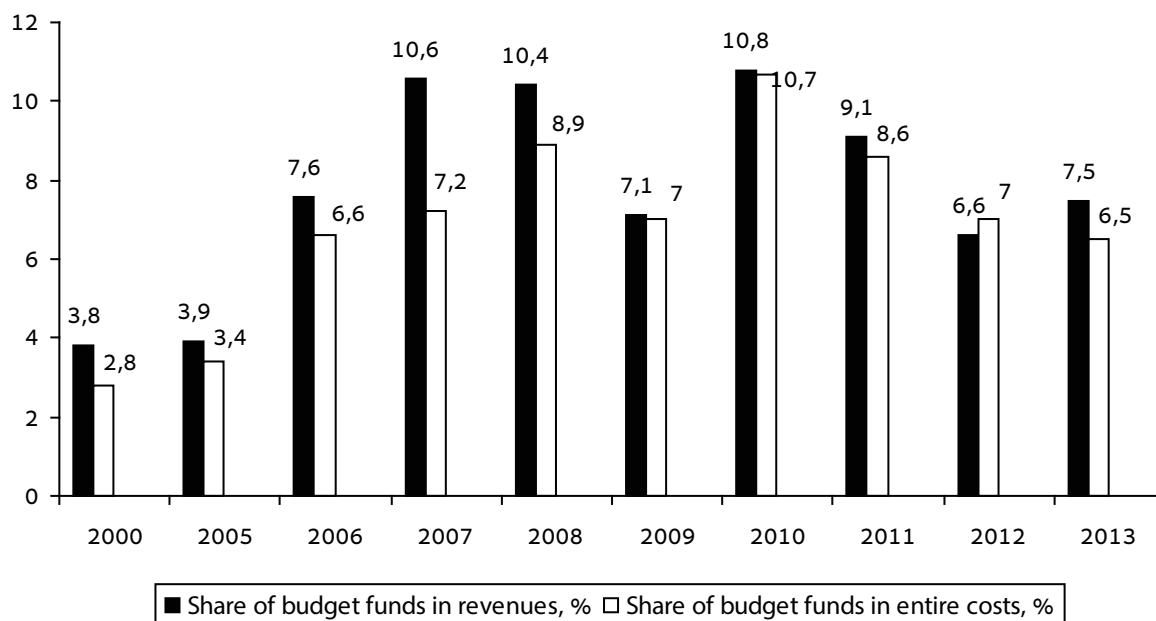
Fig. 4. *Share of budget funds in revenues and costs of agriculture of the Volgograd region, %*

Noting the negative phenomena in changing costs and prices, the inequality of the latter for the various kinds of agricultural products, unsteadiness of market conjuncture, we consider that the state support should be aimed primarily at increasing incomes of agricultural commodity producers to ensure their parity with the other economic sectors, at stimulating the economic efficiency and the use of budget funds.

The importance of price factor in increasing the profitability of agriculture and in creating conditions for expanded reproduction is undeniable, bit it is impossible to balance the prices with costs directly through the increasing prices in the market conditions. It is possible to solve this problem by regulating the relative balance between demand and supply through a government order, quotas, and price support within the maximum and minimum price level.

There are certain practices in the field of government orders and setting quotas in the region [13], their adaptation to modern conditions could stabilize the conjuncture of the market of agricultural products, raw materials, and food. At present, the only regulator is price support of grain, but their amount is inconsiderable, and the prices are market oriented. Therefore, this marketing tool produces no significant effect on grain producers' income. Economic literature offers price insurance as a tool for price support [14]. It assures a compensation of losses from the growing prices for material and technical resources and protects commodity producers' income from conjuncture price unsteadiness. This unconventional approach is associated with the restoration of regulatory system as to the grounding crop yield indicators, livestock productivity and costs as an important element of strategic planning under the conditions of uncertainty.

Substantiation and Methods of Green Box Subsidies in Crop Production Differentiation

To ensure parity of rural commodity producers' income with other spheres of national economy, it is possible to apply the tools of unrelated support—payments per 1 ha and per 1 head, and to aim the mechanism of their implementation at stimulating the productivity of land and livestock. As noted above, the peculiarity of regional agriculture is its cropping orientation, grain and sunflower remaining the main crops in the region. In the existing price situation, these crops are "the donors" of an agrarian economy. The grain production is spread over all natural zones, whereas the sunflower production is spaced only in three zones. So, grain crops are accepted as a grounding base of unrelated support in crop production. It is based on the differentiated approach, considering soil quality and grain production intensity level. The methodological aspect of this approach of unrelated support differentiation in the crop production provides grain crops as the basis of calculation. Its methodological consideration is based on a synergistic effect, manifesting at the complex use of production factors, on the law of

diminishing returns, determining compensation for the exponential growth of resource costs for each subsequent unit of gain and on the law of cumulative effect of the factors on the plant life conditions. The research established the close relation of grain crop yield in the region with intensification, manifesting in costs per 1 ha, as well as with soil quality (Table 5).

Table 5

Expression of Correlation Between Grain Crops and Factorial Parameters of Production

Correlation kind	Correlation equation	Regression coefficient
Linear	$y = 1.857 + 0.002x$	0.767
Polynominal	$y = -1.969 + 0.003x - 0.08x^2$ (−9E)	0.778
Degree	$y = 0.05x^{0.915}$	0.844
Linear	$y = 0.977 + 0.239z$	0.530
Polynominal	$y = -3.418 + 0.374z - 0.001z^2$	0.522
Degree	$y = 0.221z^{1.026}$	0.486

Conventional signs: y — yield of grain crops, dt/ha; x — costs per 1 ha of grain crops, rubles; z — soil quality score.

In all regression equations, the coefficient of variables (x, z) is statistically significant, and the correlation is high. This gives reason to differentiate unrelated support with respect to business entities, using various technological levels in grain production.

The main goal of state support differentiation is increasing the use of budget funds allocated to agriculture and stimulating the increase of soil productivity that is why the state support should perform not supporting but stimulating function. However, grain farming is developed in the Volgograd region everywhere, in all natural zones, varying greatly in soil and climatic conditions. It affects the efficiency of additional investments in the lower quality lands. However, their involvement into economic turnover is due to deficient food sufficiency and the rural population living in these areas. At the same time, additional investments to higher quality lands ensure additional productivity (differential rent II), proved by the calculation of the influence of rent-forming factors on the value of rent income [15] and ground correcting the amount of unrelated support on soil quality.

The analysis of grain yields dependence on soil qualities (soil quality score) according to the data of 2008–2012 determined the average correlation between these features (correlation coefficient 0.53). It should be noted, that in the years of agrarian reforms (1990–2007), this correlation was low (0.2–0.36), whereas in the years preceding, the reforms (1885–1990) natural fertility predetermined arable land productivity (0.8). Only in recent years, due to increasing state support for the restoration of soil fertility, it has become important, shown in the interpretation of the results of regression analysis in 2008–2012 [16]. Therefore, the intensification and soil quality, alongside with existing weather conditions, are determinants of grain crop yield in the region and specify grain crops yield over 5–10 years and soil quality score as criteria of differentiation of per 1 ha payment.

We suggest using the given information to determine a yield coefficient (C_y) and fertility coefficient (C_f) in the districts of the region from the following expression:

$$C_{yi} = Y_d/Y_r; \quad Cf_i = SQS_d/SQS_r \tag{1}$$

where Y_d and Y_r being grain crop yields in the district and in the region, respectively; SQS_d and SQS_r — soil quality score in the district and in the region, respectively.

These coefficients are the basis for adjusting payments per 1 ha, but considering a lower degree of the influence of soil quality on yield at this stage (correlation coefficient 0.53), than costs (correlation coefficient 0.77), the offered position of calculating adjustment coefficient on soil quality becomes acceptable:

$$C_{sqi} = C_{fi} \pm (1 - C_{fi})/2 \tag{2}$$

Anticipating the calculations presented, the following expression can be recommended to ground the rate of unrelated support per 1 ha:

$$P_i = P_r \times C_{yi} /C_{sqi}, \tag{3}$$

where P_i — payments per 1 ha in district i; P_r — payments per 1 ha in the region; C_{yi} — yield coefficient in district i; C_{sqi} — adjustment coefficient on soil quality in district i.

The objectivity of implementing the method offered (in view of payments rate per ha in 2013) was tested in the districts of the Volgograd region. The districts with the lowest (Svetloyarsky), the highest (Novonikolayevsky) and the average (Surovikinsjy) soil quality score were taken as model ones; as for the yield, Palasovsky (9.3 dt/ha), Kikvidzensky (26.2 dt/ha) and Rudnyansky (16.9 dt/ha) were accordingly taken as model ones (Table 6).

Table 6

Computed interest rates of unrelated support per 1 ha in the model districts of the Volgograd region

Districts	Soil quality score	Grain yield, c/ha	Coefficients		Computed interest rate
			Fertility	yield	
Svetloyarsky	46.42	12.7	0.749	0.751	257.50
Novonikolayevsky	97.26	25.9	1.569	1.533	358.17
Palasovsky	46.91	9.3	0.757	0.550	187.71
Kikvidzensky	92.42	26.2	1.491	1.550	373.49
Surovikinsky	61.24	18.7	0.988	1.107	334.10
Rudnyansky	84.66	16.9	1.414	0	248.55

One should note, that the highest rate of payments per ha is marked in the district with the highest yield and corresponding soil quality score (Kikvidzensky). In the Novonikolayevsky district, the rate is 15.32 rubles/ha less though soil yield is just 0.3 c/ha (1.1 %) different. Soil quality is the correcting factor. The third best is the Surovikinsky district (334.1 rubles/ha). It differs from number two in 24.07 rubles (or 7.2 %), the yield decreasing by 38.5 %, soil quality being 58.8 % less.

Of certain interest is the Svetloyarsky district. The yield being 12.7 c/ha the rate of unrelated support is higher than that of the Rudnyansky district with the yield of 16.9 c/ha. The reason for this economic phenomenon is the inefficient land use. The cumulative soil quality score of the Rudnyansky district equals 87.66, that of the Svetloyarsky district being 46.42, that is, almost two times as much, the yield being just 33 % higher. This trend can be observed in all municipalities of rural areas, suggesting that payment differentiation per 1 ha of sowing according to the scheme presented is objective. It expresses the stimulating character of state support and suggests, that the measures of state influence on agriculture should be variable whereas methodological approaches of their implementation should be broad enough.

Conclusion

The presented directions of forming a steady reproduction type in agriculture laid the basis of Strategy of the complex development of rural areas in the Volgograd region and of efficient operation of the agroindustrial complex under the WTO conditions till 2020. A differentiated approach to the allocation of unrelated support was used in the regional economic practice in 2014 within the natural zones, and the proposed workouts on its improvement show the development of state support, adequate to the conditions of agribusiness operation and to external challenges.

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