



## Conditions for Developing Sustainable Growth of Region's Agricultural Industry

**Alexander Vladimirovich Nemchenko<sup>1\*</sup>, Tatiana Aleksandrovna Dugina<sup>2</sup>,  
Evgeniy Aleksandrovich Likholetov<sup>3</sup>, Aleksander Viktorovich Malofeev<sup>4</sup>,  
Aleksander Aleksandrovich Likholetov<sup>5</sup>**

<sup>1</sup>Volgograd State Agriculture University, 26, Universitetskiy Prospect, 400002 Volgograd, Russian Federation, <sup>2</sup>Volgograd State Agriculture University, 26, Universitetskiy Prospect, 400002 Volgograd, Russian Federation, <sup>3</sup>Volgograd State Agriculture University, 26, Universitetskiy Prospect, 400002 Volgograd, Russian Federation, <sup>4</sup>Volgograd State Agriculture University, 26, Universitetskiy Prospect, 400002 Volgograd, Russian Federation, <sup>5</sup>Volgograd Academy of Ministry of Internal Affairs, 130, Istoricheskaya Street, 400089 Volgograd, Russian Federation. \*Email: [volgsnemchenko@mail.ru](mailto:volgsnemchenko@mail.ru)

### ABSTRACT

In the article demonstrated the need for forming sustainable growth of agricultural industry using tools for cost optimization within the business unit. Development of effectively functioning of in-house system of cost management defines the necessity of establishing target price for agricultural products, and wherefore it was approved and suggested to use extrapolation method for the conditions of Volgograd region. Further progress of cost optimization is worthwhile investigating on the basis of classification of costs as fixed and variable costs within operating procedures, at the same time it is necessary to take into account the nominal level of profitability and environment. The proposed ways for forming the reasonable cost value would contribute to forming conditions for development of sustainable growth of agricultural industry.

**Keywords:** Economic Growth, Costs Optimization, Agricultural Industry, Costs of Production, Profitability, Technical Operations

**JEL Classifications:** Q13, R11

### 1. INTRODUCTION

In the conditions of external spottiness of agricultural production, growth of population and increasing of requirements for quality of the consumed foodstuff there arises the necessity of increasing effectiveness of certain branches of agricultural production, as well as whole system in general (Karaulova et al., 2013), that is impossible without presence of stable finance and economic state of direct agricultural producers. Absolute attribute of sustainable growth within the industry is mass use of advanced and well-proven innovations (Nemchenko and Dugina, 2015). Presence of wide range of new technical and organization and technological solutions, improvement of main principles of management (Vasilyev and Sizeneva, 2015), as of specific features of agricultural production, contribute to renewal of processes of reproduction and make additional impulse for economic growth.

Due to that, development of adaptation mechanism and effective use of technological innovations in agricultural industry acquire special applicability (Shepitko et al., 2015).

Value of this line increases due to sanction competition at the food products market that has become sharp, stipulating the necessity of looking for reserve of increasing competitive ability of producing agricultural products (Kashinskaya and Nekhorosheva, 2015a). Among the most perspective lines for development of steady and agricultural production with competitive ability we can classify making of system for optimal depletion of the resources of a business unity. From economic thinking point of view using resources at the production process can be associated with expenses the company has incurred, we should pay more attention to costs optimizations in forming of sustainable growth of agricultural industry production (Nemchenko, 2015).

The necessity for costs optimization is proved also by the fact that their rate of growth is greater than gross output price (Table 1). The calculations are done for crop production products as it has the highest percentage of all output of crop production in Volgograd region (Malofeev, 2015).

Cost of the produced corn, considering deflator index for the period from 2004 to 2014 increased by 231.55%, while the expenses for production increased by 239.42%. Increasing of growth rate and incremental costs for production are traced along the whole investigated period, except for 2007, 2008 and 2012, when there was high crop yield and gross yield of grain due to good weather conditions. Because of that actual increasing of production expenses were not the reason of directly proportional increase in production, which sharpens the necessity for forming their optimal value to arrange of conditions of sustainable growth of agricultural industry.

## 2. METHODS

In exchange future functioning of agriculture industry considering necessity for forming of its innovative basis is able only at arrangement of conditions for innovative and breakthrough way for development (Shepitko and Korabelnikov, 2012), which would certainly be connected with increasing of total sum of expenses, as well as expenses per one unit of product.

Increasing of expenses in this case is defined first of all by the necessity of updating the material and technical base, correction of technological process, buying of modern seeds, increasing use of effective mineral fertilizers and crop-protection agents, as well as expenses for training specialists of agricultural industry (Belyakov and Nekhorosheva, 2015). Nevertheless, even in that circumstances which don't fully meet the requirements of innovative line of arable farming, it should be pointed out that expenses of production and corn crop yield are interdependent (Figure 1).

As it is presented graphically the corn crop yield has the substantial connections with expenses as calculated per 1 ha (correlation coefficient is 0.7788). But influence of expenses for production yielding capacity cannot be unlimited and is limited by decreasing returns law (Shepitko and Dubkova, 2015), which idea for the

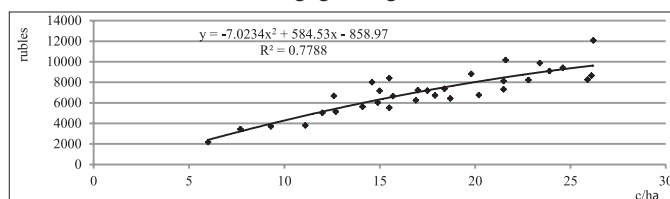
agricultural industry is that, beginning from the certain moment, sequential addition of variable resources (for example, fertilizers and chemical crop-protection agents) to the stable, fixed resource (for example soil, capital) gives the decreasing marginal product calculated for every next unit of variable resource (Karaulova and Sizeneva, 2014). As the marginal product in this case would act increasing of yield per unit.

So, that is effective cost optimization that is able to decrease production costs and increase financial results of the business unit, allowing forming conditions of sustainable growth (Popova et al., 2015). It also should be pointed out, that amount of expenses calculated per 1 ha and crop yield define the production cost of agricultural products, that means the producers of agricultural products face the problem of developing an adequate mechanism for optimization of amount expenses (Egorova and Likholetov, 2015), as well as crop yield to make the necessary value of product cost for the products, that together with price should provide the conditions of sustainable growth of a company as the basic unit of the whole agricultural industry. That is to say that the agricultural products producer should first of all define the expenses calculated per 1 ha, and only after that due to crop yield that have been got define the product cost of products unit. Cost value for production of one unit together with selling price would contribute to forming result of business unit activity and in the result defining the perspectives of its further activity (Shepitko and Dugina, 2015).

## 3. RESULTS

As the main index, defining the efficiency of the agricultural industry company and the ability of its further development we consider it reasonable to use the level of profitability (Shepitko, 2014). As in this situation the sum of income would not give

**Figure 1:** Dependence of corn crop yield on expenses per 1 ha in Volgograd region



**Table 1: Indexes of time series of expenses for production and cost of gross production for grain crop considering deflator index in Volgograd region for 2004...2014**

Year	Basic growth rate, %		Chain growth rate, %		Basic growth rate, %		Chain growth rate, %	
	Expenses	Gross output	Expenses	Gross output	Expenses	Gross output	Expenses	Gross output
2004	-	-	-	-	-	-	-	-
2005	105.48	81.77	105.48	81.77	5.48	-18.23	5.48	-18.23
2006	113.66	97.20	107.75	118.87	13.66	-2.80	7.75	18.87
2007	122.41	170.53	107.70	175.44	22.41	70.53	7.70	75.44
2008	187.43	195.07	153.12	114.39	87.43	95.07	53.12	14.39
2009	157.85	139.13	84.22	71.35	57.85	39.13	-15.78	-28.65
2010	102.56	92.33	64.94	66.34	2.56	-7.67	-35.03	-33.66
2011	153.41	142.59	149.59	154.43	53.41	42.59	49.59	54.43
2012	191.12	237.03	124.57	166.24	91.12	137.03	24.57	66.24
2013	228.55	222.39	119.59	93.82	128.55	122.39	19.59	-6.18
2014	239.42	231.55	115.26	108.65	139.55	131.55	15.26	8.65

objective assessment of the activity as its value depends on scope of commercial activity of a company and doesn't define its efficiency. In its turn, the level of profitability is relative index and compares the result of activity with expenses, incurred for achieving it, which means value would be mostly defined by amount of expenses.

So, producer of agricultural products should form such sum of production expenses, that would provide high crop yield, and at the same time sum of expensed should be offset by profit from selling the produced products and part of funds should be left for development of business activity (Dubkov and Dubkova, 2012), that governs the necessity to define target price for the agricultural products (Kashinskaya and Nekhorosheva, 2015b). For forecasting of price in the agricultural industry it is possible to use the extrapolation method (Torotkina and Shakirova, 2010) (Figure 2).

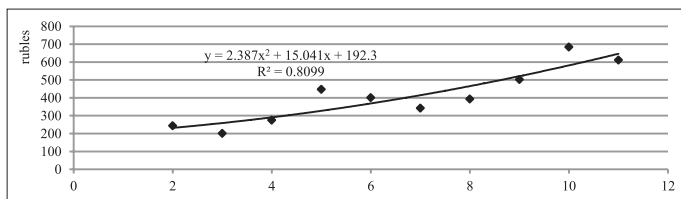
Using of this method for the conditions of Volgograd region as for data of average region prices for corn from 2004 to 2014 is defined by the equation  $y = 2.387x^2 + 15.041x + 192.3$ , describing the forecasting price for the following periods. This equation allows to define the average price per 1 hundred weight of corn in 2016, that is 791.24 rubles. On the basis of the forecasted price it is possible to define different suitable variants of product price of 1 hundred weight of corn that would correspond with nominal levels of profitability (Table 2).

Besides the method of extrapolation in defining the planned price we should also think about the ability to use forecasting deflator index for agricultural products, considering not only forecasted inflation, but also some other economic factors (Likholetov et al., 2015).

#### 4. DISCUSSION

As it was defined earlier, for the business unit the most important factor especially at the preliminary stage (planning stage) is

**Figure 2:** Graphic representation of corn price trend using the extrapolation method in Volgograd region for 2004-2014



**Table 2: Defining of planned value of product price of 1 hundred weight of corn for Volgograd region conditions**

Level of profitability, %	Planned price, rubles	Planned product price, rubles
10	791.24	719.31
20	791.24	659.37
30	791.24	608.65
40	791.24	565.17
50	791.24	527.49
60	791.24	494.53

expenses per 1 ha. There is problem of analyses dependence of product price of 1 hundred weight of corn on amount of expenses per 1 ha of seeding, as the connection in this case could be seen via yield per unit, amount of which depends on besides inner (depending on company's activity) and outer factors (weather conditions, soil productivity).

There is no denying that results of business activity of agricultural products producers and amount of produced products depend on external factors (Likholetov and Luchina, 2013). Rate of correlation dependence for yield per unit on amount of past precipitation is 0.5311, and the equation is as following  $y = 0.5x + 15.5$ . For the last years we cannot definitely say about the influence of soil, expressed by aggregate soil grade. And if for the period since 1985-1994 the bioclimatic factor and natural soil productivity defined the yielding capacity of tilled field, then after 1994 the corn crop yield (the region's basic crop) could not be defined by aggregate soil grade due to extensiveness of production and soil exhaustion. So, equation of yield per unit dependence on aggregate soil grade for the period since 1985-1989 is expressed as following  $y = 3.828 + 0.163x$  and correlation coefficient is 0.808, which proves the high correlation ratio. For the period since 1985-1994, that is for the 14 years period this dependence was proved, though connection becomes weaker, but nevertheless, it remains strong  $-0.63$ , and the variable held constant (x) "aggregate soil grade" is 0.113. After 1993 it becomes statically non-significant. Data for 1993-1997 show that it is 0.006 and for 1997-2001 it is 0.008. Development of corn production after 2001 in the region is described by activity and variable held constant (x) has increased to 0.028. But the regression coefficient shows the instability of relations (0.203). But rates, describing the earlier periods are statically significant, and the connection is described as high. That proves that the effectiveness of innovations can significantly differ in agricultural industry companies with different quality of soil, providing efficiency due to better natural environment (Belyakov et al., 2014), which is economic rent.

Evening-out of this connection in full is impossible due to fact-based dependence of agricultural production on weather conditions, but we can reduce it due to activation of innovative technological processed (Shepitko and Serebryakova, 2015), they cause growth of cost of production per 1 ha, as well as yield per unit. So the forecasted amount of yield per unit should be obligatorily corrected for the possible amount of precipitations and quality of soil, which would allow defining limits of expenses per 1 ha, that would have deviations equal to dependence of yield per unit from these factors.

While production costs optimization within the limits, agricultural industry companies should consider obligatory (constant) technical operations escalation of costs, to which would not influence amount of yield per unit, and refusal to use then would cause procedural violations and inability to get crop (Panov and Malopheev, 2015). These operations include tilling, seeding-down, harvesting operations and so on, so sum of expenses for them is reasonable to be used as constant value. Exclusions in this case can be variants of using of different

machines, allowing changing amount of expenses in the process of its use for the obligatory technological operations due to changing consumption of petroleum, oil and lubricants, expensed for its maintenance, after-sales service and so on. Thus constant expenses are connected with integral part of technological operations and are not corrected following changing of yield per unit of agricultural crops. Variable expenses, in contrast, are directly connected with yield per unit (Nemchenko, 2014). They define its possible value. So agricultural products producers by way of production costs optimization should pay more attention on sum of expenses connected with use of variable resource, which is fertilizers, chemical crop-protection agents, quality of seeds (Belyakov and Luchina, 2014). This line is especially actual for Volgograd region conditions. So the use of mineral fertilizers in the region from 2009 to 2012, for corn cropping reduced by 18%, and only in 2013 it approached the level of 2009 and beginning from 2014 it began to decrease again.

## 5. CONCLUSION

That approach for classification of expenses as fixed and variable suggests different types of their management. Fixed costs optimization are reasonable to do at defining their nominal values as of certain technological procedures calculated per 1 ha and further perform their elements analyses, promptly defining and eliminating reasons of deviation of actual expenses from nominal.

Effective management of variable expenses is possible by their minimization, and we should not consider minimization as searching for variant, oriented solely on minimal value of production expenses, but defining the ability of optimal ratio of amount of expenses and yield per unit due to differentiated approach to quality and quantity of used variable resources. To simplify taking management solutions of production cost optimization objectively great number of technological operation in the control and accountability procedure, they can be united in four main elements of technological process - tilling, seeding-down, crop tending and harvesting operations.

Thus, the presented approach to management of costs on the basis of their optimizations is the basis for analyses of organized processes in arable farming, on the basis of which management solutions connected with necessity of their changing from technological as well as from organization points of view to form the most acceptable level of production costs would be taken. In exchange making of effective system of costs management within the business unit gives it the opportunity of getting stable finance results and as a consequence making of conditions of sustainable growth of the industry in general.

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