

Cost Management to Realize the Innovative Potential of Food Production and Ensure Economic Security

Hvostikova V.A.*
Voronezh State Technical University
Voronezh, Russia
vahvostikova@yandex.ru

Elfimova I.F.
Voronezh State Technical University
Voronezh, Russia

Rodionova V.N.
Voronezh State Technical University
Voronezh, Russia

Lavrenova G.A.
Voronezh State Technical University
Voronezh, Russia

Shishkin I.A.
Voronezh State Technical University
Voronezh, Russia

Karuna S.N.
Voronezh State Technical University
Voronezh, Russia

Abstract — Reducing the cost of production makes it possible to sell at lower prices, which is one of the main factors in the growth of sales. In turn, the increase in sales determines the positive dynamics of the volume of production, which entails a decrease in specific fixed and variable costs. The costs increase if the resources are used inefficiently. It is necessary to raise prices, which will negatively affect sales volumes. To get beyond the conditionally closed circle indicated above, it is necessary to ensure exponential development, which in the short term leads to deterioration of financial results compared to the linear development model, but strategically creates opportunities for a significant increase in production and financial results. For this purpose, the composition and cost structure of food industry enterprises should ensure the creation and use of innovative potential in the direction of technological, organizational, marketing and environmental innovations. Resource-saving technologies, lean manufacturing, the production of eco-products, the active promotion of Russian competitive products in foreign markets are relevant innovations, but there are also ways to ensure food security and, based on this, they increase the economic security of enterprises, regions, and the country. It is important to strive to increase indicators of profit and profitability along with an increase in value added by reducing the material consumption of production while increasing the share of depreciation of fixed assets and intangible assets, as well as wages in the cost of food production. The seasonality of food production and short storage time are the reason for the increase in the cost of using logistics infrastructure facilities. Management of a food production enterprise requires a comparative analysis of the costs of outsourcing or storing and lending stocks. The current cost structure for innovation is unbalanced. The acquisition of machinery and equipment without appropriate investments in technology and personnel does not provide the desired market effect.

Keywords — *cost management, innovative potential, economic security, value added.*

I. INTRODUCTION

In the literature, there is some opinion about the secondary importance of cost management functions concerning the

implementation of production management functions is expressed. However, the competitive environment requires constant changes, lower costs allow the manufacturer to maintain sales and ensure profits. The above item brings cost management tasks to the forefront. The choice of cost management strategy of the food production needs to be made in the context of a “cost leadership” market strategy or diversification strategy. The structure of production should reflect the needs of the population of the Russian Federation and export opportunities.

Growth in sales reduces unit fixed costs and allows reducing unit variables by developing ways to save resources and standardize costs, and also increases profit and profitability.

The efficient use of resources provides economic security of the enterprise, region, country which is ensuring sustainable dynamics in the direction of the set goals, in the face of the negative impact of internal and external threats.

According to the Food Security Doctrine of the Russian Federation, the domestic food industry must produce the necessary amount of products that are healthy for human health and sell such products at affordable prices. It is necessary to ensure the delivery of food products to all regions, subject to the requirements for quality and shelf life, paying attention to the scale of the country, climatic zones, population density and the location of industrial enterprises.

The internal competition of food industry enterprises in Russia has territorial nature. It is arising from the unequal distribution of food production. Food industry enterprises are mainly located in regions with developed agriculture (material-intensive production) and high consumer demand (production of perishable goods).

A factor reducing domestic competition is the restriction or prohibition of the import in the territory of Russia, dated August 7, 2014, of certain types of food products from the

countries of the European Union (EU), USA, Canada, Australia, Norway.

Concentrated competition and low profitability, along with limited periods of consumption of manufactured products, require rational use of resources, which can be ensured by the introduction of technological, organizational and marketing innovations. However, statistics show that the food industry is not an innovatively active sector of the economy, as well as agriculture which is a supplier of material resources [8]. It should be noted that in terms of technological level in Russia, in the EU countries and members of the Organization for Economic Cooperation and Development (OECD), the food industry belongs to the low-tech manufacturing industries. The level of technological development is determined by the relative size of research and development costs [10].

On the foreign market, some types of products of Russian enterprises are in demand. Traditionally, fat-and-oil products (vegetable oils and margarine), sugar, chocolate, sugar confectionery, fish fillet, and flour products constitute a large share of the export of the food industry in Russia.

Factors of costs management of food production at the macro- and meso-levels were briefly identified. In this regard, we believe it is relevant to consider the main provisions of this subject area of the economy at the micro-level. In this work, it is not intended to consider sources of financing costs (domestic or foreign investment, own funds of enterprises, attracted or borrowed under various conditions).

We are considering the possibility of ensuring the competitiveness of enterprises in the domestic and foreign markets, taking into account food security, the growth in the quantity and quality of food production. There is a need for a separate comprehensive study of cost management in the production of healthy food. The connection between the production and sale of food products and medicines, the consumption of various combinations of food production and indicators of demography and health should be established.

II. METHODOLOGY AND ANALYSIS

This work aims to make structural and logical research of the cost management of food industry enterprises of the Russian Federation to establish the characteristics of the resources of food industry enterprises that provide innovative potential. And also, the possibility of the development of the main provision of the cost management of food production for the effective use of innovative potential and the growth of added value of products of Russian enterprises.

The main hypothesis is the relevance and feasibility of the exponential increase in income and profitability of food production with a strategic approach to managing the costs of innovation.

We believe that at present, the main tasks in the field of cost management are the establishment of tight financial control over current costs and the establishment of clear priorities in the implementation of innovative projects.

First of all, it is necessary to ensure the economically feasible amount of material costs and the reasonableness of

labor costs to motivate employees to develop and introduce new organizational and technological innovations. The development of resource-saving and environment-saving processes will reduce material costs and payments for the pollution of natural resources.

Food industry sectors that ensure food security and export products should be supported by targeted financing of capital expenditures at the state and regional levels.

The multidimensional nature of the subject area, due to the integration of Russia into the world, traditions of food consumption, the geographical concentration of food production and environmental problems, must be limited in this study. It is necessary to establish priorities and the main factors of cost management of food industry enterprises of the Russian Federation in general, and Voronezh region in particular, contributing to an increase in the profitability of food production.

Information support is necessary for cost management. At the enterprise level, the necessary data is extracted by specialists from accounting registers and collected in the process of functioning of the internal control system.

At the regional and country level, the mass collection of information is carried out by the Federal State Statistics Service (FSSS), the Ministry of Economic Development of the Russian Federation and the Higher School of Economics.

For interstate comparisons, it is also necessary to study the reports of the World Bank and the United Nations Industrial Development Organization (UNIDO), the materials of the World Economic Forums and international research organizations.

The use of various methods of analysis (horizontal, vertical, comparative), visualization and the integrated approach allowed us to identify causal relationships, explicit and implicit dependencies

III. DISCUSSION AND RESULTS

The research of the state statistics of the Russian Federation made it possible to conclude the opacity of information on the activities of food industry enterprises since these statistics are summarized in the article processing industries. It should be noted that there is no food production among the most important types of industrial products [12].

A comparative analysis of the share of food production (including drinks and tobacco) in the structure of manufacturing in Russia and other countries is not informative due to the lack of data for certain periods, differences in cost estimates and, most importantly, the use of indicators that do not take into account differences in the material consumption of production.

State statistics made it possible to collect data on Russia from 2010 to 2017 – the share of the food industry in the indicator “Shipped goods of domestic production, performed domestic work and services” in actual prices were varied in different directions from 15.7 % (2013) up to 17.7 % (2015).

In foreign countries, the indicator “Output of manufacturing activities” in producer prices revealed:

- USA – in 2010 the share was 13.2 %, and in 2015 – 16.8 %;
- China – in 2011 the share was 10.5 %, and in 2014 – 11.0 %;
- in Germany in 2012 and 2014, respectively, 10.4 % and 10.6 %;
- in Canada – 15.2 % in 2012;
- Great Britain – in 2012, 17.8 %, and already in 2013, 14.7 %.

It is noted that the indicators are not intrinsically different.

The comparative efficiency and competitiveness of food production in Russia is evident by the value added indicator and, based on this basis, the specific gravity in the world volume of value added (fig. 1).

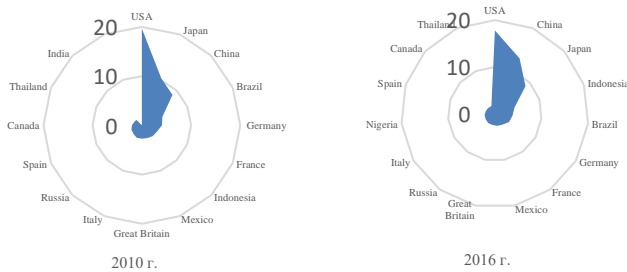


Fig. 1. The share of value added to the global food system

At the industry level, value added is calculated as the difference between the output of goods and services and its intermediate consumption. The gross value added includes the following current costs: labor and social security contributions, taxes paid for the use of production factors, depreciation and capital repair costs, which are reduced by the amount of the difference between the interest received and the interest paid.

Value added characterizes the contribution of the enterprise to the country's gross domestic product (GDP) and, therefore, an efficient business will have higher growth rates of value added compared to the growth rate of production volumes. It should be noted that an increase in food production meets the needs of the population of the Russian Federation and since 2000 we have seen an increase in the export of food products (fig. 2) and a decrease in the share of food products and agricultural raw materials in the import structure of 21.8 % (2000) up to 12.7 (2017).

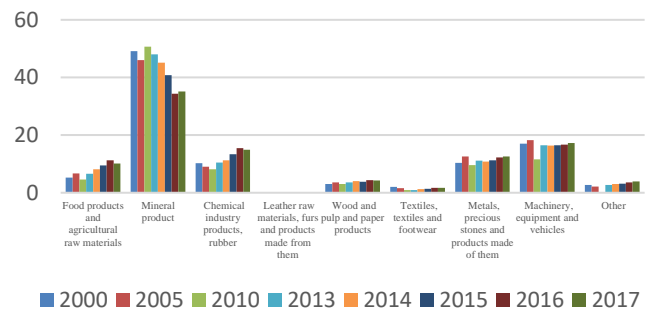


Fig. 2. Dynamics of the export structure of the Russian Federation in 2000–2017

One of the tasks of food security is the physical and economic accessibility of food products in volumes not lower than rational consumption standards necessary for an active healthy lifestyle of the country's population.

Table 1 presents a sample of the production and consumption of basic food products.

Meat consumption and production are not provided by domestic manufacturers. Exceeding the norm of consumption requires a separate study to identify the consequences for health and performance. The production of vegetable oil exceeds the rational consumption rate almost three times and makes the possibility of export. The consumption of vegetable oil does not reach the norm.

A resident of the Russian Federation consumes butter, sour cream, cottage cheese, yogurt, and other dairy products. Based on the foregoing, production is 4 times less than required.

The rational consumption of sugar in 24 kg is exceeded by 62.5 %. In 2016, production fully ensures the consumption of sugar and creates the possibility of export. Experts note that in the world market, there is a seasonal overproduction in September, October and November with falling and rising sugar prices in the long run.

TABLE I. THE RATE OF FOOD CONSUMPTION AND ITS IMPLEMENTATION IN THE RUSSIAN FEDERATION FOR 2016.

Food products	Rate of food consumption (Order No. 614 of the Ministry of Health of the Russian Federation dated August 19, 2016), kg / year / person	Production, kg / year / person	Consumption kg / year / person
Meat and meat products	73	54.3	88.2
Unrefined vegetable oil	12	35.5	10.2
Whole-milk products	325	81.5	272.6
White sugar	24	41.3	39

Based on table 1 and research by other authors, it can be concluded that the production capacities of food production satisfy the needs of the country and provide export.

It should be noted that beyond the scope of the research there were questions of increasing the use of production capacities of food industry enterprises.

Thus, the level of utilization of production capacities of sausage production enterprises was 56 % in 2015–2016; vegetable oil production capacities were used by 68 %. These indicators negatively affect the cost and profitability of products, as well as return on investment in technological innovation.

It should be noted that the predominant share in the structure of costs for technological innovations in food production is capital investments for the purchase of machinery and equipment.

Fig. 3 shows the largest funds invested in technological innovation for the production of oils and fats. One of the areas of innovation is the introduction of technologies to reduce the level of trans-unsaturated fatty acids.

Seasonal production is common to all sectors of the food industry, which makes it important to improve the infrastructure for the storage and transportation of food products.

The reduction of the volume of production is observed in the period between January – February. The increase in the volume of production is observed in the period between September – December.

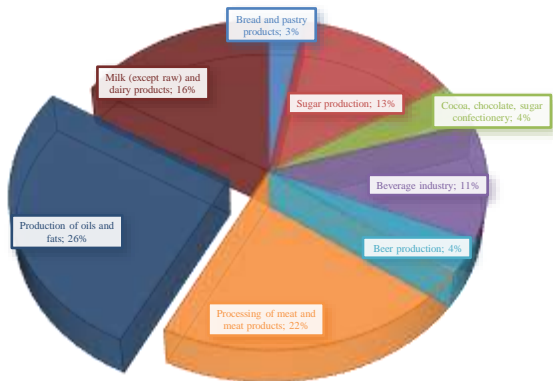


Fig. 3. Distribution of costs for technological innovations of food production enterprises by the industry in 2017 [15]

According to the report “Development of a master plan for the deployment of productive forces of Voronezh region”, experts consider that the meat processing, production of vegetable oil and fats, sugar production, milk processing are the most promising areas of food production in Voronezh region [13].

Table 2 shows that the special value of production is more than 5 percent in the total volume of processing production of Voronezh region.

The share of meat production in Voronezh region in 2018 (source: Voronezh region in numbers 2019) in the Russian economy was 3.4 and 9.4 % in the Central Federal District (CFD). Milk production is 3 % of the total Russian and 15.7 % in the Central Federal District.

TABLE II. THE SPECIAL VALUE OF PRODUCTION IS MORE THAN 5 PERCENT IN THE TOTAL VOLUME OF PROCESSING PRODUCTION OF VORONEZH REGION [13]

Type of activity	2013, %	The growth rate in 2013, by 2012, %
Production of meat	5.24	108.94
Production of oils and fats	11.29	86.14
Treatment and processing of milk, production of cheese and ice cream	8.8	111.9
Production of sugar	5.81	155.94

Experts think that the low level of resource conservation in the country is the external threat to the enterprise [7].

In the conditions of material-intensive production and food production waste caused by the production technology, cost management should primarily be aimed at reducing the cost of raw materials and materials (provided that the quality of the products is ensured), the cost of fuel and energy, water and other material resources.

According to experts, the share of fuel and energy costs in the food industry of developed countries is 1.7 %, in developing countries – 2.5 %, in Russia – 3.1 % [16].

Internal threats include the increase in the cost of production as the result of the inefficient organization of production and management processes, significant managerial costs as a result of the lack of budget management systems, management accounting policies, financial planning, control and analysis at the enterprise.

As regards the sources of threats, the most significant and eliminated are the imperfection or lack of a control mechanism in the enterprise.

We believe that experts in the field of economic security are fully aware of the importance of cost management in the economic security system.

However, the influence is considered not direct, but indirect, through several components: effective management of corporate resources in an unstable internal environment; management of the effectiveness of the use of enterprise resources; ensuring the safety of property and employees of the enterprise; financial activity and financial policy.

Threats and the very definition of economic security are closely linked to the efficient use of resources since to calculate the efficiency of an enterprise, it is necessary to correlate the results obtained and the costs of achieving it.

The development of new products and technologies for the rational use of resources allows us to talk about the realization of the innovative potential of the enterprise.

The concept of innovative potential was first introduced into the scientific circulation by K. Freeman.

According to the scientist, the innovative potential represents opportunities, means, and reserves that can be put into action and used to solve problems related to the creation of innovations in order to ensure the growth of the economic system [11].

The practical aspect of the concept of “innovative potential” was reflected in the works of P. Drucker, where he explores the sources of development of the modern industry.

Table 3 shows the analysis of the existing potential and its effective use of food industry enterprises in the Russian Federation [11].

TABLE III. THE CONTENT OF THE STRUCTURAL COMPONENTS OF THE INNOVATIVE POTENTIAL OF FOOD INDUSTRY ENTERPRISES BASED ON THE RESOURCE APPROACH

Resource name	Qualitative and quantitative assessment
Intellectual	<p>Fig. 4. Dynamics of the average monthly nominal accrued salary of workers in the food industry, rub.</p> <p>The trends in the food industry personnel market in Russia are such that in almost all of its specialties there is a shortage of professional workers with higher technical education and sufficient work experience</p>
Scientific research	<p>The food industry is one of the most active areas of the invention in Russia. Despite the economic instability, the number of patent registrations for foodstuffs is growing steadily. The most popular objects of patenting are meat products (sausages, etc.), dairy products (cheeses, cottage cheese, etc.) confectionery products (cakes, sweets, chocolate, and other sweets), sauces (mayonnaise, ketchups, etc.), alcoholic beverages (beer, vodka, cognac) and soft drinks (kvass, juices, fruit drinks, etc.).</p> <p>In 2017, the food and agriculture industry has taken third place in the ranking of Rospatent in the number of registered patents. The main suppliers of patents are universities and research institutes</p>
Production and technical	<p>In 2017, the industry average value of labor productivity in the food industry amounted to 4.73 million rubles per person in a year. The leaders in labor productivity of the food industry in Russia were St. Petersburg Mill Plant (20.03 million rubles per person/year), Pavlovsky Dairy Plant (Nizhny Novgorod) (19.44 million rubles per person/year), ORIMI (Orimi Trade Group of Companies) (18.05 million rubles per person/year), Orelmaslo (17.42 million rubles per person/year), Voronezh Dairy Plant (15.88 million per person/year).</p> <p>The level of utilization of the average annual production capacity in the food industry in 2017 had been changed in the range from 33 % “Other non-alcoholic drinks” to 95 % “White beet sugar in solid form without flavoring or coloring additives,” for example, “Vegetable oils and its unrefined fractions” – 59 %, “Milk (except raw)” – 50 %, “Butter” – 38 %, “Cheeses” – 48 %</p>
Financial	<p>Fig. 5. Revenue and profitability of the food industry in Russia in 2014-2017</p>
Marketing	<p>In 2018, the share of goods shipped to the 50 largest manufacturers in the total volume of goods shipped from food production amounted to 35.62 %. The most stable competitive positions are among the 50 largest enterprises that process and preserve fruits and vegetables (99.15 %) and produce vegetable and animal oils and fats (94.06 %). The lowest concentration of production in 2018 on the dairy market (62.43 % at 50 enterprises) and bakery and flour confectionery products (60.69 % at 50 enterprises)</p>
Organizational – administrative	<p>The enterprises producing food products, operating on the food market of Russia, can be divided into the following main groups: large vertically integrated holdings focused on the development of production on the basis of its own raw material base; multinational corporations having production in the regions of the country; holding enterprises with foreign capital; regional processing enterprises; small production workshops, entrepreneurs without a legal entity, usually producing and selling their products in the same region</p>

IV. CONCLUSION

In accordance with consumption standards and in order to enter foreign markets with competitive prices, it is necessary to reduce current production costs and increase one-time costs

of innovation to ensure the physical and economic availability of food products for citizens.

The main areas of cost management in the implementation of technological, marketing and organizational innovations in food production are the implementation of capital costs for the

purchase of modern equipment; development of resource-saving (water, electricity) technologies; creation of a logistics infrastructure for food products along with the improvement of technologies for freezing, drying, canning; investments in environmental equipment and events; an increase in the volume of waste processing into by-products, which in the long term should ensure an increase in the added value of food production.

Strategic cost management in order to optimize the composition and structure of costs based on the rational use of resources initiates the exponential development of food production and creates a technological and organizational basis for the economic security of an enterprise, region, country.

References

- [1] P. Isaias, L.C. Carvalho, *User Innovation and the Entrepreneurship Phenomenon in the Digital Economy*. Hershey: IGI Global, 2017.
- [2] V. Kruglyakova, M. Meshcheryakova, V. Hvosnikova, M. Titova, E. Sereda, "Challenges and opportunities in breakthrough development in global markets", pp. 8984–8990, 2019 [33rd International Business Information Management Association Conference], Granada: IBIMA.
- [3] G.A. Lavrenva, S.I. Sysoev, "Specifics of managing innovation and investment development at the macro, meso and micro levels", In: *Organizational, economic and managerial aspects of the functioning and development of socio-economic systems in an innovative economy*, Voronezh: Federal State Budgetary Educational Institut. of Higher Ed. Voronezh State Techn. Univer., 2019, pp. 49–53.
- [4] A.V. Shchutskaya, "Modern state of innovative activity of enterprises in Russia's food industry", *Ekon. trendy*, no. 2, pp. 22–27, 2017.
- [5] N.N. Parasockaya, I.V. Urasova, "Features of cost accounting in enterprises producing quick-frozen products", *Manag. Account.*, vol. 11, no. 179, pp. 27–31, 2006.
- [6] V.V. Rusanov, V.I. Perov, M.A. Samoilov, "Automation of catering enterprises using modern digital technologies: Arduino IDE, OPC Modbus and Master Scada programs", *Bull. of Voronezh State Univer. of Engineer. Technol.*, vol. 80, no. 2, pp. 38–44, 2018.
- [7] O.V. Islamova, A.Z. Tokov, F.A. Ataeva, "Energy efficiency is the most important indicator of the quality of food choppers", *Bull. of Voronezh State Univer. of Engineer. Technol.*, vol. 81, no. 2, pp. 56–62, 2019.
- [8] L.M. Gohberg, K.A. Ditkovsky, I.A. Kuznecova et al., *Indicators of Innovation: Statistical Digest*. Moscow: National Res. Univer. Higher School of Econ., 2019.
- [9] E.V. Berezina, A.V. Kolcov, K.V. Lebedev, N.A. Pluzhnova, L.V. Prohorova, A.V. Fedin, *Innovative activity in the Russian Federation*. Moscow: Federal Res. Centre for Projects Evaluat. and Consult. Services, 2016.
- [10] V.A. Kolubinsky, "Methodological approaches for comparing development indicators of high-tech sectors of Russia and OECD countries", *Innovat.*, vol. 4, no. 198, pp. 27–32, 2015.
- [11] O.I. Imaikin, "Analysis of the innovative potential of the enterprise as a tool for determining its internal capabilities", *News of higher ed. institut. Volga region soc. sci.*, vol. 3, no. 31, pp. 211–223, 2014.
- [12] Federal State Statistics Service, *Russian Statistical Yearbook*, Moscow: Rosstat, 2018.
- [13] I.P. Kondratyev, S.S. Kalashnikova, A.A. Zaycev, "Research on the spatial development of the food industry in the Voronezh region" *Bull. of Voronezh State Univer. Ser. Econ. and Manag.*, vol. 2, pp. 129–136, 2015.
- [14] T.V. Kasaev, "The value added indicator in assessing the effectiveness of the organization", *Bull. of Vitebsk State Technol. Univer.*, vol. 2, no. 35, pp. 123–134, 2018.
- [15] L.L. Hinkis, "The innovative process in the food industry: structure and dynamics", *Econ.: Yesterday, Today and Tomorrow*, no. 8, pp. 480–491, 2018.
- [16] *Information and Technical Handbook of the Best Available Technologies Food production*. Moscow: Bureau of Best Available and Safest Technologies, 2017.