Analysis of Investment Activities When Introducing Digital Technologies at Small Non-Alcoholic Beer Enterprise

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***Abstract* — Introduction of digital technologies in the production and management processes of food industry enterprises requires transformation of its management system. This transformation is required to implement digitalization functions and justify investment development. The production management system using digital technologies allows performing production tasks more efficiently. The purpose of the article is to identify and justify the need for production digital transformation. It is needed to optimize existing processes and implement new technological automated solutions. The automation stage of a small brewery is implementing the Industry 4.0 strategy. The article describes the need for bottling products' technological lines automation as the main factor in the development of the "smart manufacturing". The necessary investments in the automation of technological equipment at an industrial enterprise are justified in the initial proposal and the calculation of payback time according to static and dynamic estimates. The advantage of introducing an automated process control system is the development of an effective investment development strategy for an enterprise in the face of growing market competition. An analysis of the economic investment assessment was carried out when introducing a new automated line for bottling beer in glass bottles with automatic packaging in pallets. Forecast estimates an increase in labor productivity of digital technologies implementation at a small food enterprise by the natural method by 32 %; increase in productivity by the cost method by 57 %. In order to improve manageability and optimize business processes, increase their transparency and traceability in the fiscal sphere, it is proposed to implement a distributed information system using the Industrial Ethernet computing network. Integration of information processes and digital systems has been implemented using the Enterprise Resources Planning software package "Simatic IT". The introduction of digital technologies has given competitive advantages: operational monitoring of production; ability to analyze and calculate the cost of production in real time; increased production and financial indicators, support for making managerial decisions.**

Keywords — investment project, economic assessment, beer bottling line.

I. INTRODUCTION

Currently, when choosing long-term planning programs, enterprises are guided by the Information Society Development Strategy for 2017–2030, approved by Decree of the President of the Russian Federation dated May 9, 2017 No. 203, and the Digital Economy of the Russian Federation program, adopted by order of the Government of the Russian Federation of July 28 2017 No. 1632-r. Foreign experience in using digital technologies at industrial enterprises has shown significant positive effects [2, 12]. Economic efficiency is achieved mostly by increasing labor productivity. The implementation of effective information solutions allows ensuring:

- comprehensive automation of jobs engineering, technical and managerial personnel potential of the enterprise;
- control over current expenses and incomes, as well as forecasting financial condition;
- improving operational management through the organization of network interaction in a single information space [5, 14].

The course on digitalization is the main task in the areas of management, economics and industry. Transition from the concept of "Industry 3.0" includes an integrated use of information technologies in all business processes of the enterprise, which involves stages of automation of individual machines and technologies for the implementation the fourth industrial revolution. The decisions of the fourth industrial revolution are aimed at the end-to-end digitalization of all physical assets and their integration into the digital ecosystem, together with partners involved in the value chain [1, 2, 4, 7, 9]. World experience shows that measures of digital transformation of an enterprise are successfully implemented through project investment [10, 15].

Attracting investment for Russian small enterprises is a difficult task. This is due to the lack of state support in manufacturing and the disinterest of bank capital in long-term investment loans. At the same time, project lending mechanisms are widespread in the global financial system. The project finance market implies that the main source of loan repayment is the income generated by the invested project. In this case, investments in the implementation of digital technologies in a small food enterprise are productive in nature, providing expanded reproduction of a separate economic entity (brewery). This approach is justified by a number of Russian scientists: Askinadzi V.M., Basovsky L.E., Scherbakov V.N., Mezhov I.S., Lukasevich I.Ya. Makarkin N.P., Charaeva M.V.

The subjects of investment activity in project financing are primarily business owners, such as investors. Lenders are involved by investors to capitalize the project, to satisfy their commercial interests, i.e. a certain fee from the implementation of the project. The project lending mechanism provides for the obligatory targeted use of borrowed capital.

The relevance of the study is determined by the elaboration of the mechanism for introducing digital technologies at a small industrial enterprise, the development of the methodology for organizing investment activities aimed at increasing labor intensity, obtaining operational and forecast technical, economic and statistical data.

A significant advantage for business owners when investing in digitalization of production is increased competitiveness and increased desired economic growth [8, 11].

An analysis of information sources shows that for the small enterprise considered in the work, LLC "TORGOVYI DOM "ZOLOTAYA SOVA", has been operating in the city of Kemerovo for the beer and soft drinks market for more than 48 years. The company has experience in the Soviet economic system (Novokemerovsky Brewery and Non-Alcoholic Plant), experience in the transition period of the 1990s and the gradual evolution to a market image of a developed and developing economy. Currently, there is a situation in the regional market of beer and soft drinks with a highly competitive influence of federal retail chains and global manufacturers. The enterprise in question experienced a drop in demand, stagnation of financial and production indicators. In this regard, there was a need for a comprehensive modernization of technology, equipment and production management systems.

The aim of the work was to identify and justify the need for digital transformation in a small beer and non-alcoholic enterprise to optimize existing processes and implement new technological automated solutions.

II. METHODS AND MATERIALS

The studies were carried out at Kemerovo State University using theoretical methods of scientific knowledge, such as formalization, statistical method, observation method, and interrogation method. A SWOT analysis of the investment project was carried out.

The work was carried out on the basis of a system analysis, this allowed us to consider the investment activity of the enterprise as part of a managerial decision when implementing digital technologies.

The materials of the information base for the study include: regulatory documents of the Russian Federation, open statistical sources, periodicals, scientific and methodological literature, Russian and foreign publications on the digital economy, constituent and local documents of LLC "TORGOVYI DOM "ZOLOTAYA SOVA", its financial statements of economic activity for 2014–2018.

III. RESULTS

Brewing is characterized by complex technological processes on the way from the decoction to the intoxicated drink. The domestic economy of many countries of Europe, China, the USA, the CIS countries and Russia defines the brewing industry as a significant industry across the country [3]. In Russia, the brewing industry is part of the agro-industrial complex, in which they closely interact with agricultural producers of barley and hops, manufacturers of containers for filling finished products: glass, aluminum and plastic. The bulk of taxes from production activities fill the federal budget of the country, since beer is an excisable product. Thus, beer production can be considered as the economic development of a small business producing a local product for the population of the region, which requires an active search for ways and approaches to the development of investment activity of the brewery.

The main activity of LLC "TORGOVYI DOM "ZOLOTAYA SOVA" is the production of beer – the assortment is 12 varieties, as well as soft drinks and drinking water.

The structure of the products of LLC "TORGOVYI DOM "ZOLOTAYA SOVA" is shown in Figure 1.

The share of beer production in the total output in 2018 amounted to 51 % (Figure 1). The population's need for drinking water has increased its production since 2016 by 13 times. For water, the specific gravity in 2018 was 30 %. The assortment complements the production of 6 types of soft drinks; the specific gravity of their production is 19 %.

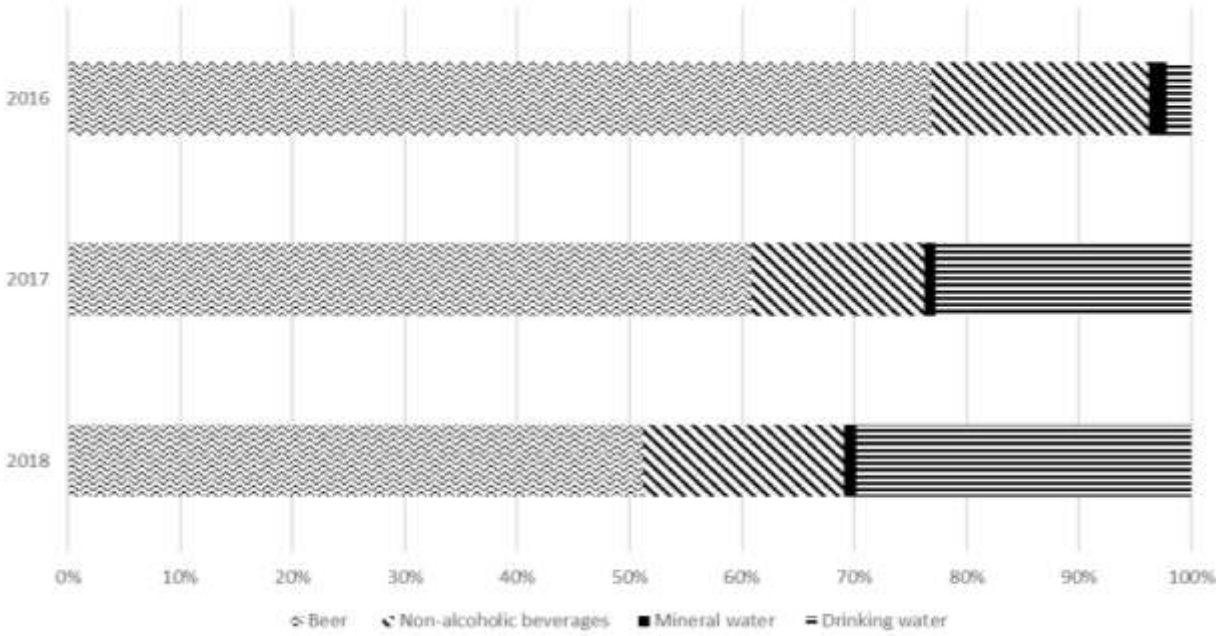

Fig. 1. Production structure in 2016-2018

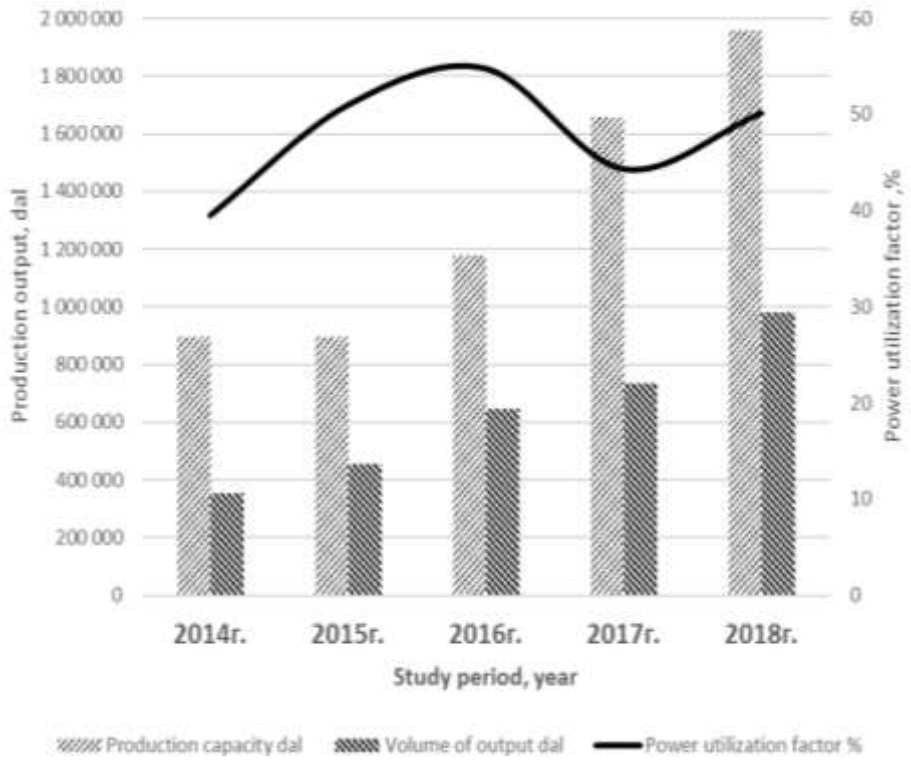

Fig. 2. Analysis of production capacity from 2014–2018

To date, the production capacity of the plant is determined by the capabilities of the bottling plant and amounts to 1956.080 thousand decaliters. During the study period, the capacity increased by 118.31 %. Capacity utilization analysis is presented in Figure 2.

As a result of calculating the balance sheet of the enterprise, incomplete use of the bottling plant capacity was revealed in 2018, which is 50.13 %. The reason for the incomplete use of power is measures taken during the period 2015–2018 to replace equipment in the production workshop (for brewing beer, for fermentation and after-brewing).

Measures for the reconstruction of the production workshop had positive effects in the form of improved consumer qualities of products and increased safety of the product. This has significantly increased sales. The need for modernization to a large extent was due to requirements to reduce the toxicity of beverages and ensure product safety. Automation of brewing processes has solved these problems. In addition, the use of new equipment with an automatic control and monitoring system reduced production costs for raw materials, technological materials and energy resources.

The economic analysis of labor productivity at the enterprise was carried out according to two production indicators: labor productivity in kind; labor productivity, expressed in terms of value (the dynamics are presented in Figure 3).

The calculations used indicators of the average headcount of the entire personnel of the enterprise. For the analyzed period from 2014 to 2018, the average headcount remained stable in the amount of 89.81 people. Since 2016, an increase of this indicator by 5.77 % has been observed. In the same period, labor productivity increased in both physical terms by 161, 88 %, and in value terms by 178, 09 %.

An analysis of the wage fund revealed a positive dynamic of the entire study period – 118.48 % (Figure 3). The average monthly salary for the same period increased by 106.56 %.

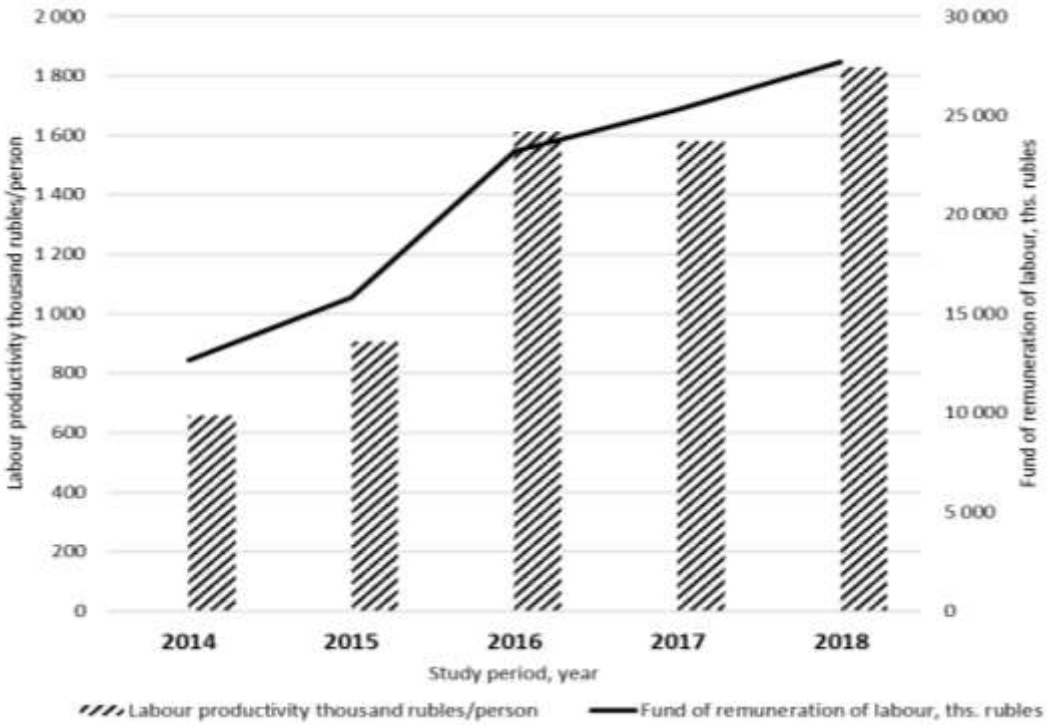

Fig. 3. Dynamics of labor productivity and the wage Fund from 2014–2018

Thus, it was found that in the period under review, the payroll fund of the analyzed enterprise has a positive correlation of average earnings and average headcount.

Comparing the growth rate of the wage fund (218.48 %) and the growth rate of production, as an indicator of labor productivity (278.09 %), it is necessary to note the outstripping growth of labor productivity before the growth of wages. This is a positive trend in the use of human resources of the enterprise, which indicates an effective personnel policy of the enterprise.

The justification of the investment project is affected by the profitability of the enterprise, estimated by indicators:

- return on sales;
- return on equity.

The calculation of return on equity is one of the signs of potential revenue growth for owners and business owners. This indicator is considered good if the value exceeds 10 %. The calculated business performance indicator was 54.72 % in the reporting period at the analyzed enterprise. This confirms future investments in the digital transformation of production at the enterprise.

Figure 4 shows the dynamics of return on sales. There is a development trend of the enterprise, an increase in sales

profitability due to growth in sales and changes in the range of products.

At the same time, analysis of product distribution channels showed a tendency to reduce sales volumes and assortment of draft beer. This is caused by changes in legislation on the circulation of alcohol, which limits the requirements for the production and dispensing of products in containers of more than 1.5 liters. Restrictions on the sale of beer in buildings and structures for specific purposes have been introduced; for example, in residential buildings. Large retail chains also introduced a restriction on the sale of beer mainly in pre-packaged form of a glass bottle and aluminum can.

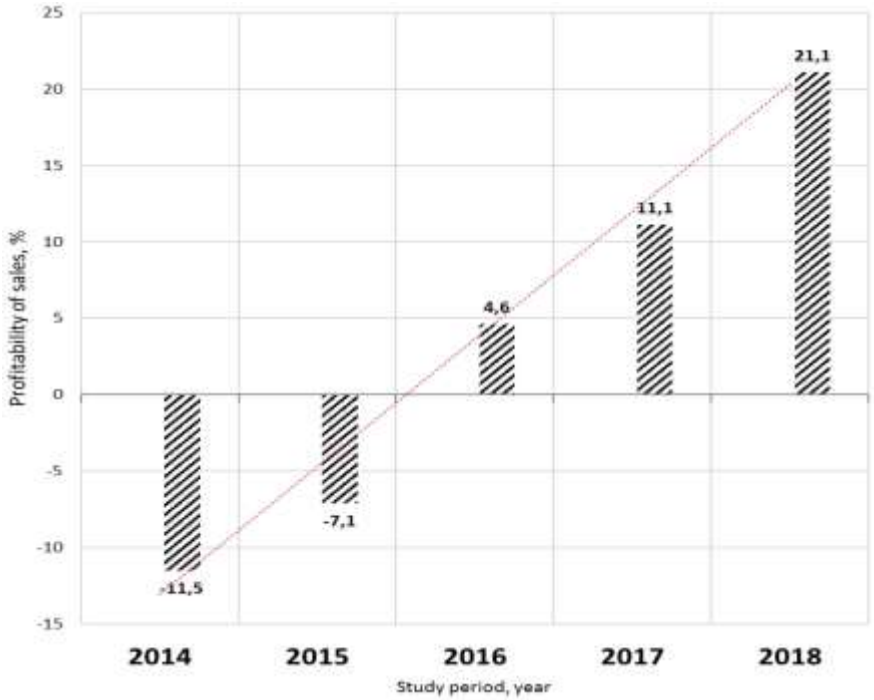

Fig. 4. Dynamics of sales profitability from 2014 to 2018

TABLE I. SWOT-ANALYSIS OF THE PROJECT OF A NEW AUTOMATED BEER FILLING LINE OF LLC "TORGOVYI DOM "ZOLOTAYA SOVA"

Strengths	**Weaknesses**
• fresh beer; • proven factory quality of beer and soft drinks; • An established supply system for raw materials, materials and equipment; • effective production capacity; • availability of proprietary technologies; • low price of products; • beer is brewed in its region (local producer); • many years of experience in the market, 48 years; • the reliability of the organization is high.	• lack of marketing unit in the organization; • significant financial investments in the project; • insufficient information on the quality of products for consumers.
Capabilities	**Threats**
• a gradual increase in capacity and expansion of production; • development of an affiliate network (franchise); • ensuring the reliability of deliveries to retail chains; • entry into the market of other regions; • increase in the number of potential customers.	Competitive activity • strengthening competitors; • strengthening state regulation of the alcohol market in the Russian Federation; • increase in the level of taxation; • decrease in purchasing power; • recession in the economy.

Based on the analysis, it was decided to implement an investment project in the autumn of 2018 in order to reach new sales channels in supermarkets and retail cities. The project is to be performed at the enterprise for the creation and implementation of a new automated beer bottling line with automatic packaging in pallets in a glass bottle.

To obtain an economic assessment of the project and its prospects, a SWOT analysis was used. Table 1 presents the definition of key challenges and gaps in the investment project of LLC "TORGOVYI DOM "ZOLOTAYA SOVA".

The results of the strategic planning of the SWOT analysis of the project (TABLE I.) made it possible to formulate the following decisions:

1. The project has a significant number of strengths. The most significant is the opportunity to purchase fresh beer from a local reliable producer of your region. This allows you to maintain the confidence of your customers, to have consistently low prices.

2. This project has several weaknesses. One of them is low information activity of the enterprise. Potential consumers of beer need to be given more information on the drink quality and production technology. Then the buyer himself will be

able to choose the appropriate beer, depending on his preferences. The information on the Internet (on the company's website, in social networks) about new brands should be made unobtrusive.

3. One of the possibilities of this project is to increase the growth rate of products. Another possibility of this project may be the expansion of sales markets in other regions. There is also the possibility of increasing the number of customers through promotions, sweepstakes and discounts. This trend leads to market growth and thereby to an increase of the enterprise profits.

4. The project has a number of threats. One of the dangers is competition. Strategy: to constantly work on the company's image – to participate in industry competitions, to demonstrate the culture of beer consumption through its own distribution network. This will consolidate the loyalty of existing consumers and win new ones. The threat is the strengthening of state regulation of the alcohol market in the Russian Federation in 2020 through prohibiting selling beer and beer drinks in retail outlets on the ground floors of apartment buildings. It will also be prohibited to sell more than 1.5 liters of alcohol in polyethyleneterephthalate packaging. A significant threat may be a ban on the sale of beer in containers of not more than 0.33 liters. Strategy: to develop a network of its stores where 0.5 liter beer packed in glass containers will become the sales driver. Customers want to shop in a supermarket kind of store – goods are presentably placed on open shelves, stores are clean, staff is friendly, and there is no shortage in fresh goods. Supermarkets usually offer an assortment of beer snacks. They usually establish long-term contracts with large retail chains to sale beer in 0.5 liter glass bottles.

When introducing additional products to the market, there is a need for marketing research in order to substantiate the activities of the company with a general trend in the development of the beer market. Based on a desk study, Figure 5 shows the prospects of the beer market in 2019.

Figure 5 shows large producers in Russia lose to regional market participants that in 2019. A similar situation is observed in the Czech Republic. Studies conducted in Prague by the Czech University of Natural Sciences in 2016 revealed that since the beginning of the economic crisis, the number of microbreweries has grown exponentially. It was revealed that the tendency to increase beer production in microbreweries will increase [13].

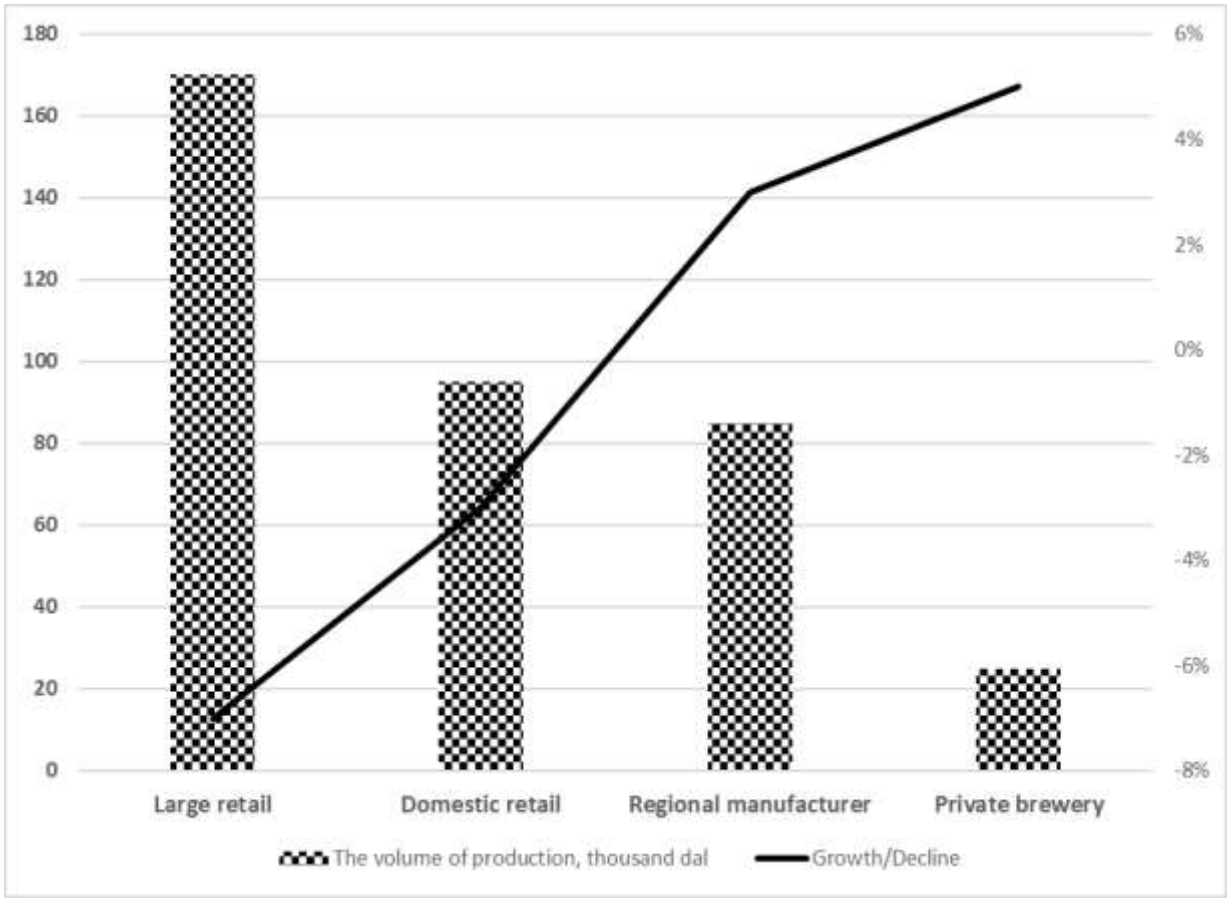

Fig. 5. Prospects of the beer market to 2019 in Russia

Conducted marketing research on the analysis of demand for beer products of LLC “TORGOVYI DOM“ ZOLOTAYA SOVA ”showed:

- 38 % of respondents prefer beer produced by LLC “TORGOVYI DOM“ ZOLOTAYA SOVA ”;
- brand "Golden Owl" takes 4 position among beer producers.

We identified the reasons why customers trust the brand: specialized stores in all city districts; keg drinks in craft beer stores; great goods’ quality; wide range of products.

In order to improve the manageability of the organization and optimize business processes, increase their transparency and traceability in the budget and tax sphere, the company proposed the implementation of a distributed information system using the Industrial Ethernet computing network.

Thanks to a comprehensive engineering and technological project, all equipment in the beer production bottling process is integrated into a single system. In this scheme, the connecting links of the organization of production were belt conveyors. We used an automated process control system from Siemens, type Simatic S7-1200 for the automation of technological equipment of the bottling line for glass bottles. Software used: “Siemens TIA Portal Basic 14”, computer S7 1200, operator panel KTP 700 basik. Integration of workstations and controllers is implemented in workshops and in the whole enterprise using Ethernet networks. In technological processes, we used automated remote monitoring and measures to prevent emergency situations using microprocessor sensors and controllers.

The collection and primary automated processing of the measured signals allows making a forecast of the technological process, quickly eliminating technical problems. To integrate information processes and digital systems, we used the Enterprise Resources Planning software package “Simatic IT”.

The total investment in the project amounted to 65 million rubles. Assessment of the effectiveness of investments in the ongoing project was carried out according to static and dynamic parameters. An economic assessment of the effectiveness of investments in the project was carried out by calculating the discount cash flows. The indicator was calculated by comparing the value of payment flows at different points in time to the current value.

To calculate the discount rate, we used a method based on profitability indicators. For the analyzed enterprise, we calculated discount rates according to the balance sheet and income statement. The return on equity (ROE) ratio was used as the base discount rate, which amounted to 54.72 %. The choice of this calculation method allows you to get estimates of new investment projects within the existing business. The closest alternative rate of return determines the profitability of the current business. According to the results of the calculation, the discounted payback period of the investment project was 2 years 7 months.

It is known that the productivity of a technological line as a whole is determined by the parameters of structural elements. Often the bottleneck is the maintenance system of individual machines [6]. Measures to increase productivity at the small beer and non-alcoholic enterprises under consideration provide for the introduction of a complex for automatic packaging of products in pallets. The packaging complex is controlled by a Siemens information system using control and monitoring modules of the Simatic S7-1200 type. Full automation of the filling line allowed excluding additional jobs of two operators and four loaders, while increasing the productivity of the bottling department. The analysis of changes in labor productivity is carried out according to the average personnel number at the enterprise. The data obtained are presented in TABLE II.

TABLE II. ANALYSIS OF CHANGES IN LABOR PRODUCTIVITY

Indicator	2018	2020 project	Growth rate, % 2020–2018
Average number, person	89.81	89.81	–
Production output, dal	980653.25	1294250	132
Commodity output, thousand rubles/person	164 214.50	257 200	157
Labor productivity, dal/person	10 919.20	14410.98	132
Labor productivity thousand rubles/person	1 828.47	2863.82	157

IV. CONCLUSION

This work contributed to the substantiation of an effective investment development strategy for small beer and non-alcoholic enterprises with the introduction of digital technologies. The use of digital solutions for an automated process control system for a beer bottling line with automatic packaging into pallets made it possible to quickly monitor production, increase production and financial indicators, and ensure the safe operation of equipment. Digitalization of business processes made it possible to optimize the loading and operating modes of technological equipment, to ensure the set values of product parameters. The effect of introducing the technologies of the fourth industrial revolution gave competitive advantages in conditions of market instability and falling consumer demand. As a result of the research, the following conclusions can be drawn:

1. Based on the analysis of regulatory data and an analytical study, the prospects for investment activity in the conditions of LLC “TORGOVYI DOM“ ZOLOTAYA SOVA ”are determined.

2. For a non-primary enterprise, the need for digital transformation of production has been established by optimizing existing processes and implementing new technological automated solutions for the bottling line with automatic packaging in pallets, which will increase labor productivity and production efficiency.

3. When conducting an analysis of the organizational and economic activity of LLC “TORGOVYI DOM“ ZOLOTAYA SOVA”, it was found that the indicators of financial stability of the enterprise can be characterized as stable, in terms of profitability and labor productivity. There is no reason to

record deterioration in financial stability in the future. Identified growth points of the enterprise improve its financial condition.

4. We developed a production investment project for the implementation of digital technologies LLC "TORGOVYI DOM" ZOLOTAYA SOVA". The project was implemented due to the need to enter new sales markets.

5. Static and dynamic estimates of the effectiveness of investments in the ongoing project of an automated bottling line are characterized positively by all conditions of project efficiency. The installation of a bottling line will provide an increase in beer production and sales, and an increase in the company's net profit.

6. The proposed solutions for the introduction of digital technologies in the food enterprise can increase the growth of labor productivity in 2020–2018 by the natural method by 32 %; labor productivity growth in 2020–2018 by the cost method by 57 %.

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