MODELLING OF DEVELOPMENT OF INTEGRATION PROCESSES DIRECTION IN BAKING INDUSTRY

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Abstract: *The characteristics of economic interaction between organizations and enterprises within the system of cluster type is investigated and direction of their investment and innovation transformation through the implementation of the integration processes in the bakery industry is studied in the article.*

INTRODUCTION

The modern period of Ukraine's economic development requires a transition to an innovative type of management, in which high-tech research and production systems are becoming prioritized. Close long-term cooperation of all investment and innovation processes' participants with research centres and organizations of various types creates favourable conditions to accelerate the introduction of science and technology, strengthen the market position of enterprises, and improve their financial and economic situation. The investment and innovation processes become an important part of the enterprises' competitiveness growth, including the baking industry. Improving the performance of bakeries requires a number of priority issues: retrofitting bakeries, increasing investment in the sector, reducing costs and improving product quality. Transformation of investment and innovation processes of bakeries in the contemporary economy should be characterized by the introduction of new approaches to the development of investment sources and priorities for their use.

The development of enterprises through innovation gives systemic idea of the investment and innovation process, its connection with a business, creates a more complex vision of innovative products. In an innovative development designed to create and implement value chain to the end user all parts take part in the investment and innovation process. This chain is represented by the flow of needs (consumers), deliveries (suppliers) and the flow of competitors operating in the market. Thus, the

rate of investment and innovation processes of baking industry affects not only the company-producers of bakery products, asking for investment and innovation, but their customers, suppliers and competitors.

The modern Ukrainian baking industry is characterized by a tendency towards consolidation of production and its concentration in the hands of powerful integrated structures that affect the status and trends of investment and innovation processes bakeries. Because of the structural changes that have occurred among domestic manufacturers of bread are several major forms of combination. First, an association of companies engaged in only baking bread. Second, the integration of enterprise comprising a mill centre, and finally the concentration of businesses that grow grain to their own needs. A typical trend of the modern market bakery products is to build vertically integrated holding companies that have their sown areas, grain elevators, processing plants, bakeries and even the marketing structure.

Integration processes in the baking industry are characterized by clear regional concentration, due to the specifics of bakery products - a limited period of implementation and unprofitable outlets in remote areas. Leading manufacturers of regional bakery products in Ukraine cover up to 60 percent of the national market.

Investigation of region-specific implementation of investment and innovation processes at the enterprises of the baking industry led to the conclusion that their activation should take place towards the integration of the main participants of the bakery products' value chain at the regional level. The development of integration processes in the baking industry (Буряк П.Ю. 2007) due to the possibility of formation of stable production and economic relations between enterprises within the process chain; modernization of production capacity; reduction unit costs by increasing the scale of production and improve the price competitiveness of products; accumulation of capital for investment and innovation development and the achievement of an appropriate position in the market; creation of favourable conditions for the diversification of production; development of manufacture of innovative products based on new productions.

Based on the study of basic forms of investment and innovation activities of enterprises consider it appropriate to carry out the implementation of the integration processes in the field of bakery based on the cluster approach.

It should be noted that significant achievements in the study of the features of formation of cluster models of entrepreneurship have received foreign and domestic researchers Y.M. Bazhay, A.M. Poruchnyk, B.V. Zaremsky, D.G. Lukyanenko, M.P. Voynarenko, A.K. Kins, A. Dlugopolsky, S.I. Sokolenko, M. Porter, E. Dakhma, S. Rosenfeld, C. Ketels, D. Jacobs, E. Leamer, I. Tolenado, D.

Radebe, P. Samuelson, D. Soulier (Бажал Ю.М. 1996;Войнаренко М. 2000;Заремський Б.В. 2010;Гальчинський А.С., Геєць В.М., Кінах А.К., Семиноженко В.П. 2002;Портер М. 2002), etc. However, as we have established, there remain a number of unresolved issues, especially with the possibilities of adapting the cluster approach to national economic conditions, characteristics of economic cooperation between the organizations, businesses and corporations, which are included in the cluster type and forming effective tools for financing investment and innovation processes of enterprises in the cluster.

The aim of our research is to examine characteristics of the economic cooperation between the organizations and the entities within cluster system and the transformation of the directions of their development through the implementation of the integration processes in the baking industry.

Under the cluster, we offer understand a holistic socio-economic and territorial-branch system of enterprises and organizations involved in the generation and implementation of competitive products and services within their value chain. A cluster is formed based on territorial concentration of networks of specialized suppliers, major producers and consumers, the interaction of which is related technological chain (Гальчинський А.С. 2004). The occurrence of clusters provides for the transfer through the same chain of products with high consumer value and other advantages of the high competitiveness of enterprises to the founding of the cluster of allied enterprises.

In order to investigate trends of baking industry clustering in Odessa region we offer the use of economic-mathematical modelling interactions of factors affecting the level of resulting parameters bakeries.

The study of research aspects of economic and financial problems using the unit of economic and mathematical modelling studied by many scientists and economists, among them V.N. Tregubchuk, P.T. Sabluk, A.G. Yankovoy, I.V. Orlova, V.A. Polovnikov (Саблук П.Т. 2002; Трегобчук В.М. 2005).

As part of our analysis, we suggested the use of economic and statistical methods that provide the ability to build models with the analytical expression of the relationship between the main economic indicators. To assess the impact of the factors contributing to the effectiveness of bakeries and justify their further directions clustering consider it appropriate to use regression analysis (CRA). Correlation and regression analysis takes into account the internal relationship and provides a more complete measurement of the impact of each factor on the effective sign to other factors and the impact of all factors on the symptom score.

As a resulting parameter of bakeries activities, suggested the use of the indicator Y - profits from sales of the enterprise. Let us examine the level of impact on the profit from the sale of the enterprise main factor variables such as the cost of the main raw material, marketing expenses, long-term bank loans, and the cost of the active part of fixed assets.

The choice of these factors in the analysis is determined by the specifics of the baking industry and the characteristics of the formation of the value chain bakery products. Here are explanations of each selected factor.

The cost of the main raw material. The high degree of dependence on raw materials inevitably leads to an increase in the cost of production and a fall in profitability bakery manufacturers. The poor state of the domestic agricultural sector, which directly affects the processing enterprise, is complicated by the high cost of energy, fuel and petroleum products, the use of outdated technology equipment, lack of machine-vehicle fleet. Despite significant territorial capabilities, the Odessa region is a zone of risky agriculture; therefore, the level of bakeries basic raw materials is directly dependent upon the quality and affordability.

Marketing expenses. With the continuous reduction of bread and bakery products consumption the public key challenge for manufacturers is to ensure the smooth sales. The marketing consumer market research and trends in consumer tastes, the analysis of the competitive market become important. Only under the condition developed marketing strategy and extensive distribution network it is possible to hold competitive positions in the market.

Long-term bank loans. The development of businesses clustering process is directly related to the development of financial mechanisms and instruments that can provide attraction of investments for the realization of their investment and innovative projects. World practice shows that the decisive role of long-term loans, as the main mechanism for financing of investment and innovation that could significantly improve the efficiency of investment projects and rising funds for the long term. However, the practice of domestic business shows that the use of bank credit is limited considerably high degree of volatility and riskiness of credit, high interest rates. This reduces the investment opportunities of investment and innovation processes of the baking industry, leaving producers completely dependent solely on their own resources.

The cost of the active part of fixed assets. The main problem of the industry is aging of technique of domestic bakeries. This greatly complicates the implementation of modern innovative technology by manufacturers and leads to an increase in production costs. The ability to bakeries to update and modernize the active part of fixed assets determines their competitiveness in the market.

The dependence of the proposed resulting indicator from these factors could be traced with the following multi-functions:

$$Y = f(X_1, X_2, X_3..., X_n)$$

(1.1)

wherein X1, X2, X3, ... Xn - factors affecting the formation of profits from the sale of bakery business.

At the first stage of economic and mathematical modelling based on the analysis and the establishment of cause-effect relationships provide the definition of result indicators, and a multitude of factors that influence them. The study carried out based on activities of JSC "The Odessa Karavaj".

According to the phasing of the regression analysis, we have carried out the construction of the matrix pair correlation coefficients for the estimation of linear and non-linear relationships. The resulting matrix makes it possible to assess the presence of linear and non-linear relationships between the resulting index and factors affecting it.

The correlation coefficient determines the nature and density of relations between the parameters activities the baking enterprise. Correlation coefficient is set in the range from -1 to +1. Its positive value indicates that there is a direct connection, according to which an increase in one-indicator entails an increase in the other, the negative - the reverse, that is, increase in one variable leads to a decrease in the other.

The evaluation of the correlation coefficients, we have carried out using the Chedaka scale that provides qualitative assessment of the closeness of the connection parameters [8]. According to the Chedaka scale correlation between the parameters are interpreted as follows: $0,1 \leq |r| < 0,3$ - a weak correlation; $0,3 \leq |r| < 0,5$ - moderate correlation; $0,5 \leq |r| < 0.7$ - a marked correlation; $0,7 \leq |r| < 0,9$ - strong correlation; $0,9 \leq |r| < 1$ - a very strong correlation.

The results indicate that the equation constructed multifactorial statistical reliability in general F = 0,0002 < 0,05.

According to the correlation matrix of both linear and non-linear relationships, we concluded that there is a strong dependence of the volume of business of all of these factors, with the exception of long-term bank loans. The density of the correlation of this indicator amounted to R = 0,173. Consequently, this factor can be excluded from the simulation process.

The analysis has shown that we are considering the dependence of resulting indicator from factorial signs accurately described by a logarithmic function:

$$Y = -2,2046 + 0,7289 \ln(X_1) + 0,3833 \ln(X_2) + 0,1487 \ln(X_3)$$

(1.2)

where:

X1 - the cost of the main raw material;

X2 - marketing costs;

X3 - the active part of the cost of fixed assets.

According to the conducted CRA the correlation coefficient for the model (1.2) R = 0,9869 indicates the high quality of the model, 97% of the variance resultant variable, profits from the sale of JSC "The Odessa Karavaj" explained regression:

$$Y = -2,2046 + 0,7289 \ln(X_1) + 0,3833 \ln(X_2) + 0,1487 \ln(X_3)$$

The model is statistically reliable, as the P-value F-test was 0.000222, which is much less than 0.05. The coefficients of the first order autocorrelation of the residuals are r (1) = 0.1073 (p-value = 0.132976), indicating the adequacy of the model.

We have constructed a first-order AR model describes the dependence resulting indicator subsequent levels of a number of dynamics from past and has the following form:

$$Y = -1157,94 + 0,851003 Y_{t-1}$$

(1.3)

The above model is able to describe quite well simulated of dynamics series us, and therefore can be used as a tool for predicting the long term.

CONCLUSIONS

Modelling studies of factors relationships affecting the level of profits from the sale of bakeries, indicating the high level of its relationship with factors such as the X1 - the cost of the main raw material (the highest ratio of the degree of the strength of correlation), X2 - marketing costs, X3 - the cost of the active part of fixed assets. Thus, clustering baking industry should be in the direction of establishing sustainable raw relations between the main participants of the cluster structure. Requirements to reduce the cost of production, including through the modernization and automation of production, development of an appropriate pricing and distribution policy and the cost of building an active part of fixed assets through the introduction of new equipment and innovative technologies.

The benefits of cluster foundation over the typical for the baking industry vertically integrated structures include the ability to produce flexible specialization and efficient realization of synergy opportunities of its members. The proposed cluster associations should establish close cooperation between grain producers, baking, milling plants, as well as other related resources on the basis of industrial sectors (cereals, fodder, confectionery, pasta), as well as educational, scientific and research

organizations, investment institutions, government and regional authorities. Clusterization of bakeries will contribute to the development of investment and innovation processes, accelerate the implementation of research and development to production, and innovative products to the market, the growth rate of investment in the industry.

In accordance with the cluster's approach transformation of investment and innovation processes of baking enterprises should be based on an integrated approach to the formation of regional clusters covering the main areas of integration of participants at the regional level. Development and the development of common positions form a cluster of baking industry specific to their operation and the prevailing regional conditions for development is the centre of attention in future research.

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