

# Innovation Management of Enterprises: Legal Provision and Analytical Tools for Evaluating Business Strategies

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## Abstract

The article investigates the peculiarities of the enterprise's innovation activity and its legal regulation, conducts the evaluation of the business strategy for chemical companies according to the manufacturer's principles of innovation management. The purpose of the paper is to evaluate the business strategy of chemical companies according to the manufacturer's principles of innovation management. According to the evaluation results it is determined that the business strategy is unstable and needs to be improved. Also there are negative trends in the enterprise's development and decrease in the efficiency. The complex of recommendations to improve the business strategy which forms the basis for the methodology of the selection the most objective strategic alternative in the chemical companies is proposed. To improve the strategy the authors suggested to expand enterprise's market share and to implement intensity of product sale for different types of products; to consider the peculiarities of legal regulation for chemical industry in the field of innovative goods production; to keep the trend of production costs reduction; to seek ways to increase the profit of the enterprise by cost control and increasing sales.

**Keywords:** Business strategy, Chemical industry, Evaluation, Innovative perspective, Legal Aspects of innovation, Manufacture.

## 1. Introduction

Nowadays, companies face difficulties in supporting their own competitiveness. It's connected with growing competition and consumer demand, reforming the financial service market which allows to improve its functioning and increase its positive impact on the development of the national economy (Shkarlet *et al.*, 2016; Shkarlet *et al.*, 2019). It is not enough for companies to offer high-quality products in the market, they also need to make it be available to consumers as widely as possible considering availability of appropriate production resources of the companies, financial capabilities, competitiveness of goods and environmental conditions, including compliance with legal requirements. Also it means to bring to the consumers the best business strategy and marketing channels. Thus, to provide the efficiency and viability of the management system in the enterprise, it should be a part of the strategy chosen by the enterprise. Accordingly, it can be noted that the formation of business strategies is an important stage of the enterprise functioning. But equally important is the evaluation stage of the chosen strategy, because of the mistakes in its formation can become one of the reasons for the decrease in the enterprise's efficiency as a whole. Formalization of the methodology evaluation the strategy is an actual problem since it is necessary to take into account different groups of indicators so that the evaluation is objective.

Scientific and technical renewal of the economy is a

priority direction of development of any state, including Ukraine. Innovations are a key factor in business success and one of the megatrends of the chemical industry. On this basis, the innovative development of the chemical industry requires the formation of favorable economic, legal and organizational conditions for the functioning of economic entities in the domestic and international markets. It requires the implementation of EU technical legislation for the development of the chemical industry, regulation of competitive relations between countries, production of mineral fertilizers and chemical products from domestic raw materials. Thus, an effective strategy should be consistent with the principles of innovation management (realization of value, exploiting insights, future-focused leaders, strategic direction, system approach, adaptable structures, innovation culture, and managing uncertainty). These principles should be the basis for the concept of evaluating the business strategy of an innovative enterprise.

Numerous studies explore the essence of the concept of "strategy". In particular, according to Kudenko (2006), a strategy is a coordinating, unifying factor between the goals and resources of the firm. Shershnyova (2004) notes that "strategy" should be considered as "a specific management plan of action aimed at achieving the set goals. It defines how the organization functions and develops at present moment and will do it in the future, as well as what business, competitive and functional measures and actions will be carried out to ensure that the

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organization has achieved the desired state.” Goldstein (2000) determines strategy as a system of actions and management approaches used to achieve organizational goals and objectives of the organization.

Nickols (2016) investigates the definitions and meanings of strategy and cites scientific works Mintzberg (1994) and Steiner (1979). Thus Mintzberg (1994) proposes the following definitions of “strategy”. It is “a plan, a “how”, a means of getting from here to there”, “a pattern in actions over time; for example, a company that regularly markets very expensive products is using a “high end” strategy”, “position; that is, it reflects decisions to offer particular products or services in particular markets”, “perspective, that is, vision and direction”. Steiner (1979) proposes the following definitions of “strategy”. It is “that which top management does that is of great importance to the organization, “basic directional decisions, that is, to purposes and missions”, “important actions necessary to realize these directions”. Strategy answers the questions “What should the organization be doing?”, “What are the ends we seek and how should we achieve them?”

Porter (1996) defines “competitive strategy” as “being different”. Also, he mentioned that “strategy is the creation of a unique and valuable position, involving a different set of activities. Couple more of Porter’s definitions of “strategy” are: “making trade-offs in competing”; “creating fit among a company’s activities”. A “business strategy” is an integrated strategy that combines the functional strategies of an enterprise at different levels of management to achieve a general goal.

A sufficiently thorough study of theoretical and applied questions regarding the evaluation of business strategies is reflected in the works of foreign and domestic scientists. In particular, Persaud, Woodhouse-Jackson, Scriven (2016) analyze “two models for evaluating business strategies: Michael Scriven’s Key Evaluation Checklist (KEC) and David’s SMM and highlight similarities and differences between each other”.

Rivera, Becker, Papa, Olsina (2016) develop “a holistic quality multilevel and multipurpose evaluation approach. It ties multilevel goals, projects, and integrated strategies together”.

Norton, Milat, Edwards, Giffin (2016) identify evaluated strategies used by “organizations and program developers to build the program evaluation capacity of their workforce and to describe success factors and lessons learned”.

Rintanen (n.d.) investigates “different evaluation strategies for planning problems represented as constraint satisfaction or satisfiability problems and present evaluation strategies based on parallel or interleaved evaluation of several formulae and show that with many problems this leads to substantially improved runtimes, sometimes several orders of magnitude”.

Kara (2016) dedicates to problems of “estimation of the external environment influence the activity of an enterprise”.

Savytska, Chmil, Hrabynikova, Pushkina, Vakulich (2019) study “the factors of perception of management styles in order to ensure the security of functioning of the

enterprise in the context of the transformation of the social system when implementing strategies aimed at its development”.

Seredynska, Zahorodna (2016) analyze “the necessity of using innovative management tools and ways of integrating them to develop the strategic direction of the enterprise, systematize methods of strategic management tools and their implementation”.

Babenko (2013, 2019) investigates “the process of formalization of management of technological innovations”. This author and Romanenkov, Yakymova & Nakisko (2017) develop “the detailed model of multicriteria optimization of innovative process management at an enterprise in the face of risks, which describes dynamics of the studied process to the full”. Shorikov, Babenko (2014) offer “to use the determined approach for the modeling and solution of an initial problems in the form of dynamic problem of program minimax control (optimization of the guaranteed result) IPP on the set time point taking into account risks”.

However, the problems of evaluating business strategies, taking into account the manufactures’ innovative perspectives based on the legal aspects, are unresolved. So the purpose of the paper is to evaluate the strategies of managing the business activity according to the peculiarities of the enterprise’s innovation activity and its legal regulation.

## 2. Materials and Methods

Innovative activity is governed by a number of legislative and regulatory documents in Ukraine. Legal prerequisites for providing innovative activity are defined in Art. 54 of the Ukrainian Constitution and it guarantees the freedom of scientific, technical and other creative activities, protection of intellectual property, copyrights to the citizens (The Constitution, 1996). The legislation of Ukraine defines and regulates: the economic, legal and organizational principles of state regulation for innovative activity in various industries, including chemical (The Law, 2002); the legal, organizational and financial foundations of functioning and developing in the field of scientific and technical activities, conditions for conducting scientific and technical activities, fulfilling the needs of society and the state in technological development through the interaction of education, science, business and government (The Law, 2015); the strategic and medium-term priority areas of innovation activity in Ukraine (The Law, 2011); the principles of state policy in the field of regulating the relations in standardization activities (The Law, 2014); the relations in the development and adoption of technical regulations and the relevant evaluation procedures (The Law, 2015), etc.

Because the business strategy is one of the main indicators of the effectiveness of the entire management system, we will evaluate the business strategy of a particular chemical enterprise. The evaluation of the product business strategy is suggested to provide using the approach presented by Gryshchenko, Chubukova, Bilovodska, Gryshchenko, Melnyk (2020). The approach involves seven stages (see Fig. 1).

It should be noted that this approach is universal and can be used to evaluate the strategies of various companies functioning in different industries. However, it is important to take into account the specifics of the functioning conditions of companies and the characteristics of their products since the products manufactured by the enterprise can have different period of “intellectual aging”, shelf life, etc.

For comprehensiveness of the data obtained during the research and a comprehensive review of the strategy, it is advisable to evaluate strategy from the innovative perspective of manufacturer. This is explained by the fact, that the evaluation from the perspective of the manufacturer involves the inclusion of quantitative indicators that characterize its financial state, the level of financial stability, etc., i.e., the correspondence of the strategy to the internal environment is determined.

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The research base was PJSC “Sumykhimprom” – the Ukrainian chemical enterprise. The research of the enterprise’s business strategy was delivered from manufacturer’s innovative perspectives. To determine the level of risk during the implementation of business strategy the Altman Z-score model was used.

### 3. Results and Discussion

The chemical industry is one of the key industries at the world level. It is the basis of economic development and growth in many countries, which creates innovative substances and materials. Besides, the chemical industry is the basis for many other industries, as well as agriculture. Today, the chemical industry is one of the most innovative ones and contributes to the solution of social problems, in particular, those that relate to climate change, health, and nutrition.

We have chosen PJSC “Sumykhimprom” as an object of the research. This enterprise is a chemical industry

company. It produces mineral fertilizers, coagulants and additives to cement, acid, titanium dioxide and pigments and other types of chemical products. According to the previous researches (Bilovodska et al., 2017; Bilovodska et al., 2018; Bilovodska et al., 2019; Gryshchenko et al., 2020) let’s evaluate the strategies of managing the business activity according to manufacturer’s innovative perspectives of chemical enterprise.

The results of the evaluation of growth indicators for PJSC “Sumykhimprom” for 7 years (from 2012 to 2018) are in Table 1.

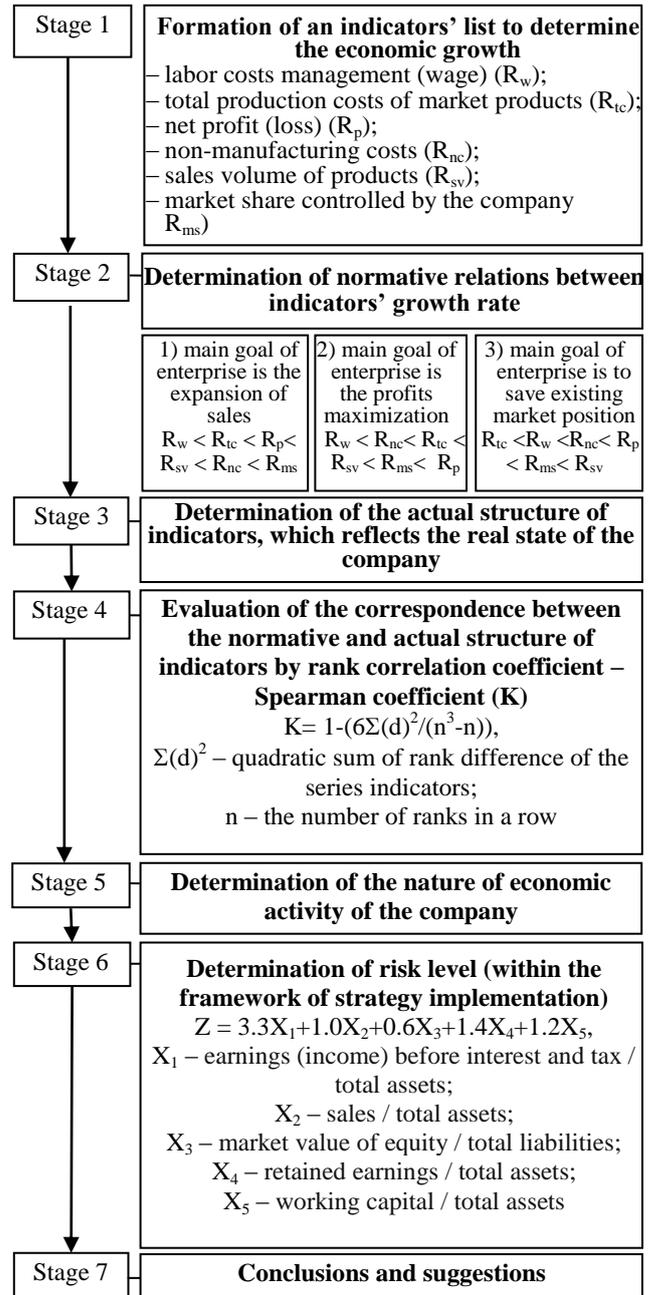


Fig. 1. The approach for evaluating the business strategy

Table 1  
 Dynamics of indicators for the evaluation of economic growth

from the perspective of manufacturer PJSC “Sumykhimprom” during the period 2012-2018

Indicator	Growth rate, %						
	2012	2013	2014	2015	2016	2017	2018
Labor costs management (wage) ( $R_w$ )	125.3	93.1	111.4	106.0	97.6	118.3	130.1
Total production costs of market products ( $R_{tc}$ )	115.4	66.6	133.6	113.7	77.4	85.4	66.6
Net profit (loss) ( $R_p$ )	18.1	65.6	49.6	177.6	26.8	48.0	56.4
Non-manufacturing costs ( $R_{nc}$ )	20.5	79.7	103.6	172.6	64.6	20.5	79.7
Sales volume of products ( $R_{sv}$ )	99.3	67.5	138.4	128.0	72.5	79.3	89.6
Market share controlled by the enterprise ( $R_{ms}$ )	93.0	107.5	139.5	120.0	109.7	101.2	95.7

Source: Own calculations (based on (Official, 2020))

Based on the data of Table 1, we will determine the level of correspondence or inconsistency in growth rates of the evaluated indicators with the normative ratio.

It should be noted that during 2011-2014 the financial result of the enterprise was a loss. Accordingly, the growth rates for 2012-2014 show the growth of loss but not profit. That is why, while determining the actual sequence of the studied indicators in 2012-2014, the rate of profit growth will be in the first position in series of data, as profit growth is absent and growth rates concern the increase of loss. Accordingly, taking into account the actual growth rate data can lead to mistakes.

From 2015 till 2018 the enterprise improved its

performance and profit became the financial result of its operation. Therefore, for this period, the rate of profit growth can be taken into account by the actual value in a series of data.

Taking into account that the main goal of PJSC “Sumykhimprom” is saving existing market positions, the normative structure of indicators will be the following:

$$R_{tc} < R_w < R_{nc} < R_p < R_{ms} < R_{sv}$$

Next, we determine the sequence of growth rates of indicators for the period under study:

$$2012: R_p < R_{nc} < R_{ms} < R_{sv} < R_{tc} < R_w \quad (18,1\% < 20,5\% < 93,0\% < 99,3\% < 115,4\% < 125,3\%).$$

$$2013: R_p < R_{tc} < R_{sv} < R_{nc} < R_w < R_{ms} \quad (65,6\% < 66,6\% < 67,5\% < 79,7\% < 93,1\% < 107,5\%).$$

$$2014: R_p < R_{nc} < R_w < R_{tc} < R_{sv} < R_{ms} \quad (49,6\% < 103,6\% < 111,4\% < 133,6\% < 138,4\% < 139,5\%).$$

$$2015: R_w < R_{tc} < R_{ms} < R_{sv} < R_{nc} < R_p \quad (106,0\% < 113,7\% < 120,0\% < 128,0\% < 172,6\% < 177,6\%).$$

$$2016: R_p < R_{nc} < R_{sv} < R_{tc} < R_w < R_{ms} \quad (26,8\% < 64,6\% < 72,5\% < 77,4\% < 97,6\% < 109,7\%).$$

$$2017: R_{nc} < R_p < R_{sv} < R_{tc} < R_{ms} < R_w \quad (20,5\% < 48,0\% < 79,3\% < 85,4\% < 101,2\% < 118,3\%).$$

$$2018: R_p < R_{tc} < R_{nc} < R_{sv} < R_{ms} < R_w \quad (56,4\% < 66,6\% < 79,7\% < 89,6\% < 95,7\% < 130,1\%).$$

Thus, each year the actual series of indicators has a sequence that differs from the normative one during. It is explained by the internal instability of the enterprise and by the dynamics of the external environment.

For a better understanding of the indicators for the evaluation of the strategy from the innovative perspective of the manufacturer, we will evaluate the correspondence between the normative and actual structure of the indicators by rank correlation coefficient – Spearman’s coefficient (Table 2).

Table 2

The relationship of the normative and the actual series of indicators from the innovative perspective of manufacturer in 2012-2018 (a case of PJSC “Sumykhimprom”)

Normative indicator, $X_i$	Actual value, $Y_i$	Normative rank, $x_i$	Actual rank, $y_i$	The difference between the ranks of the series indicators, $d_i$	Quadratic sum of the rank difference of the series indicators, $d_i^2$	Spearman’s coefficient ( $K$ )
<b>2012</b>						
The growth rate of total cost of market products	115.4	1	5	-4	16	-0.43
The wage growth rate	125.3	2	6	-4	16	
The growth rate of non-manufacturing costs	20.5	3	2	1	1	
The growth rate of profit	18.1	4	1	3	9	
The growth rate of enterprise’s market share	93.0	5	3	2	4	
The growth rate of the sales volume of the enterprise	99.3	6	4	2	4	
<b>2013</b>						

The growth rate of total cost of market products	66.6	1	2	-1	1	0.14
The wage growth rate	93.1	2	5	-3	9	
The growth rate of non-manufacturing costs	79.7	3	4	-1	1	
The growth rate of profit	65.6	4	1	3	9	
The growth rate of enterprise's market share	107.5	5	6	-1	1	
The growth rate of the sales volume of the enterprise	67.5	6	3	3	9	
<b>2014</b>						
The growth rate of total cost of market products	133.6	1	4	-3	9	0.37
The wage growth rate	111.4	2	3	-1	1	
The growth rate of non-manufacturing costs	103.6	3	2	1	1	
The growth rate of profit	49.6	4	1	3	9	
The growth rate of enterprise's market share	139.5	5	6	-1	1	
The growth rate of the sales volume of the enterprise	138.4	6	5	1	1	
<b>2015</b>						
The growth rate of total cost of market products	113.7	1	2	-1	1	0.49
The wage growth rate	106.0	2	1	1	1	
The growth rate of non-manufacturing costs	172.6	3	5	-2	4	
The growth rate of profit	177.6	4	6	-2	4	
The growth rate of enterprise's market share	120.0	5	3	2	4	
The growth rate of the sales volume of the enterprise	128.0	6	4	2	4	
<b>2016</b>						
The growth rate of total cost of market products	77.4	1	4	-3	9	-0.09
The wage growth rate	97.6	2	5	-3	9	
The growth rate of non-manufacturing costs	64.6	3	2	1	1	
The growth rate of profit	26.8	4	1	3	9	
The growth rate of enterprise's market share	109.7	5	6	-1	1	
The growth rate of the sales volume of the enterprise	72.5	6	3	3	9	
<b>2017</b>						
The growth rate of total cost of market products	85.4	1	4	-3	9	-0.2
The wage growth rate	118.3	2	6	-4	16	
The growth rate of non-manufacturing costs	20.5	3	1	2	4	
The growth rate of profit	48.0	4	2	2	4	
The growth rate of enterprise's market share	101.2	5	5	0	0	
The growth rate of the sales volume of the enterprise	79.3	6	3	3	9	
<b>2018</b>						
The growth rate of total cost of market products	66.6	1	2	-1	1	0.14
The wage growth rate	130.1	2	6	-4	16	
The growth rate of non-manufacturing costs	79.7	3	3	0	0	
The growth rate of profit	56.4	4	1	3	9	
The growth rate of enterprise's market share	95.7	5	5	0	0	
The growth rate of the sales volume of the enterprise	89.6	6	4	2	4	

Source: Own calculations

Next, we graphically represent the dynamics of Spearman's coefficient (Fig. 2).

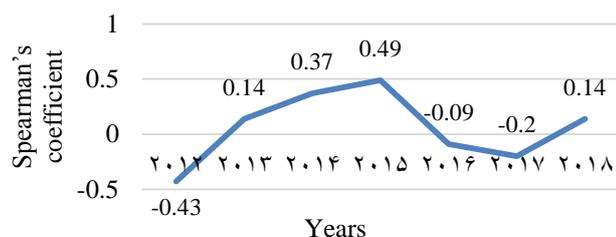


Fig. 2. Dynamics of Spearman's coefficient during 2012-2018 for PJSC "Sumykhimprom"

According to Figure 2 from the perspective of the enterprise, where the products are sold, the strategy is unstable. This is evidenced by the fact that in 2012 the Spearman's coefficient had a negative value, during the next three years (2013-2015) there was a steady increase in Spearman's coefficient and it was approaching 1, although in 2016 and 2017 it again received negative value. Such a rapid change in the signs of the correlation coefficient reflects negative trends in the development of the enterprise and a decrease in its effectiveness.

It is well known that the implementation of any strategy is accompanied by risks. To determine the level of risk during the implementation of business strategy, we use the Altman Z-score model [31], [32], [33]. This indicator allows determining the effectiveness of the strategy taking

into account the existing risk conditions, as well as determining the risk zone in which the enterprise is located.

The results of the calculation of the Altman Z-score model for 2012-2018 are given in Table 3.

Table 3  
Calculation of the coefficients and the integrated indicator of the probability of bankruptcy according to E. Altman Z- score model

Indicator	Years						
	2012	2013	2014	2015	2016	2017	2018
X <sub>1</sub> (earnings (income) before interest and tax/total assets)	-0.44	-0.51	-0.24	0.02	0.01	0.14	0.01
X <sub>2</sub> (sales/total assets)	1.34	1.08	1.42	1.82	1.66	1.72	1.83
X <sub>3</sub> (market value of equity/total liabilities)	0.13	0.13	0.12	0.12	0.14	0.11	0.09
X <sub>4</sub> (retained earnings/total assets)	-0.19	-0.22	-0.1	0.01	0.00	0.08	0.02
X <sub>5</sub> (working capital/total assets)	-0.88	-1.28	-1.29	-1.29	-1.64	-1.58	-1.49
Z	-1.36	-2.37	-0.99	0.42	-0.19	0.46	0.16

Source: Own calculations

For illustrative purposes, there is a graphical representation of the dynamics of E. Altman Z-score by years (Fig. 3).

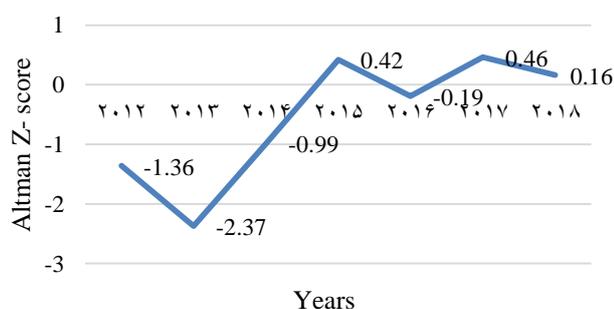


Fig. 3. Dynamics of E. Altman Z- score for 2012-2018 for PJSC “Sumykhimprom”

Thus, Table 3 and Figure 3 indicate that the enterprise is in the risk zone of bankruptcy and the indicator is even less than 0 in some years. That is why this enterprise is at risk of bankruptcy, which is largely due to the lack of financial stability. Since the enterprise has a significant amount of borrowed capital, which indicates the high dependency of the enterprise from external sources of financing.

Also, during all analyzed years, the negative value of own working capital is observed, that is, working assets are largely financed by short-term loan funds. But the above-mentioned problems can be solved by the use of

management measures. The above will not prevent strategy implementation.

Therefore, it can be said that during the period under review (2012-2018), the structure of the actual performance results and the normative series of indicators do not match. Thus, when evaluating a strategy (Figure 3), it can be seen that the coefficient varies significantly over the years from negative to positive, that is, there is no approximation of the enterprise performance indicators to their normative values, which indicates problems in strategy implementation. Besides, the enterprise is at risk according to Altman’s indicator.

Accordingly, it can be noted that the enterprise needs to review the current business strategy, considering the actual state of the indicators, the current level of risk and the peculiarities of legal regulation for innovative activity in the chemical industry.

The findings indicate potential the following recommendations for PJSC “Sumykhimprom”:

1. The enterprise needs to expand its market share both in Ukraine and abroad because it will increase sales. Taking into account that the main products of the enterprise are titanium dioxide and compound mineral fertilizers, the expansion of market share should be carried out for both categories of products. The market share of titanium dioxide on the territory of Ukraine can be expanded due to the gradual conquest of the market share that belonged to the plant “Crimean Titan” and the elimination of external competitors, the main of which are Chinese manufacturers. Currently, the enterprise exports its products to more than 30 countries of the world; first and foremost it is the EU countries and the USA, which are also the main competitors of PJSC “Sumykhimprom” in the foreign market. To expand the market share of titanium dioxide outside Ukraine, PJSC “Sumykhimprom” can export products to other regions of the world, for example, to the Asia-Pacific region. Regarding mineral fertilizers, this type of product is sold to domestic consumers. Accordingly, first of all, PJSC “Sumykhimprom” should work to expand the market share on the territory of Ukraine, which can be achieved by gradual elimination of the main competitors – Russian and Belarusian companies that occupy more than 90% of market capacity. This is possible due to the reduction in production costs. Also, the enterprise needs to seek ways to enter foreign markets, in particular, markets of Latin America, India and China, which are the main consumers of mineral fertilizers in the world. Already, the enterprise is actively working on the production of innovative products – compound mineral fertilizer, grade NPK 6:24:12, which may provoke the interest of domestic and foreign consumers.

2. The enterprise should keep the trend of production costs reduction. Since, lower production costs will put down the price, which can become one of the competitive advantages of the enterprise and will allow expanding the market share.

3. The enterprise should increase the profit. It can be

4. provided both by cost control and by increasing sales, including as a result of geographic expansion and intensity of product sale.

#### 4. Conclusions

Thus, innovative development of chemical industry enterprises is ensured in the conditions of increasing competition in foreign and domestic markets on the basis of development and implementation of effective business management strategies. Based on the evaluating the business strategy according to the manufacturer's innovation management principles of chemical companies (a case study of PJSC "Sumykhimprom") it is determined that the strategy needs to be improved. From the innovative perspectives of the manufacturer, there are negative trends in the company's development and decrease in the efficiency as Spearman's coefficient indicates, which are the result of the instability of the strategy implemented by the company.

According to the above, the process of strategy implementation by the company is complicated by current circumstances and requires support and control by the management. It is confirmed by E. Altman's Z-score, which indicates that the company is at risk zone. So the complex of recommendations to improve the business strategy which forms the basis for the methodology of the selection the most objective strategic alternative in the chemical companies is proposed. Also it's very important to accelerate the harmonization of Ukrainian legislation in the field of chemical products protection with the norms of EU countries, to stimulate the improvement of regulatory legal support of innovative activity, to eliminate differences in the regulatory framework (laws and regulations) in Ukraine. And it will increase the competitiveness of the chemical industry in European markets.

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#### Conflict of Interest

The author declares that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancy have been completely observed by the authors.

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