

# Optimization Management Model of the Industrial Enterprise Innovation Potential Development on the Basis of a Value-Oriented Approach

Oksana Zamazii

*Department of Accounting,  
Audit and Taxation,  
Khmelnitskyi National University,  
Khmelnitskyi, Ukraine  
oks.zam@gmail.com*

Valentyna Stadnyk

*Department of Management,  
of Administration and Hotel  
and Restaurant Business,  
Khmelnitskyi National University,  
Khmelnitskyi, Ukraine  
stadnyk\_v\_v@ukr.net  
<http://orsid.org/0000-0002-2095-3517>*

Galyna Sokoliuk

*Department of Management,  
of Administration and Hotel  
and Restaurant Business,  
Khmelnitskyi National University,  
Khmelnitskyi, Ukraine  
sokoliukg@gmail.com*

Natalja Prylepa

*Department of Management,  
of Administration and Hotel  
and Restaurant Business,  
Khmelnitskyi National University,  
Khmelnitskyi, Ukraine  
nataprylepa@gmail.com*

**Abstract** — The problem of the optimization model constructing of industrial enterprise innovation potential development for improving their ability to implement competitive strategies has been actualized. The expediency of the value theory basic provisions using for this has been substantiated. The gist and functional assignment of the enterprise innovative potential from the standpoint of value-oriented approach have been considered. It has been argued that the main criterion of the optimal option choosing from possible alternatives of innovation potential development should be maximization of the company's ability to create consumer values in the context of selected competitive strategies. Technological and cognitive components of consumer value in connection with structural elements of the enterprise innovative potential have been highlighted. The optimization model for managing the industrial enterprise innovative potential development has been built adhering to the value-oriented approach. As the tools of practical implementation of this model the methods of expert evaluation and analysis of hierarchies that are used to assess the probable risks of decision-making have been determine.

**Keywords** — *enterprise innovative potential, consumer value, profit, risks, expert evaluation, hierarchy analysis*

## I. INTRODUCTION

A distinctive feature of the modern market environment is the high dynamics of processes taking place in the area of exchange of goods and resources. Scientific and technological progress makes an increasingly diverse resource base of economic activity, and the socio-economic development of the society changes consumer preferences, forms new needs and develops ways to meet them. This requires a constant search for new market opportunities, and hence active innovation, which is now the main source of competitiveness.

The ability of an enterprise to actively use innovative factors to ensure its competitiveness directly depends on its

innovative potential. It is the innovation potential that serves as a generator and implementer of the changes that make the enterprise's production system flexible, able to react promptly to dynamic market changes. This is emphasized by many scholars.

It should be noted that the existing scientific works on management of innovation potential development of industrial enterprises are rather significant. However, to date, many issues remain controversial starting from the allocation of its structural elements and the clear identification of their functional purpose [1], [2], [3], the determination of a set of indicators to assess the level of its implementation in specific conditions of management [4], [5], [6] and modeling its state for the future [5], [6] to the development of scientific and practical recommendations for the management of development, taking into account the features of the market environment [7], as well as the integration opportunities of economic entities in the region [6]. Nevertheless, the problem of increasing the role of innovation factors in the processes of formation of competitiveness continues to be urgent for most industrial enterprises in Ukraine. The confirmation is the downward dynamics of the main indicator of productivity of innovation activity in industry as over the past 10 years, the share of innovation products in total volumes of industrial output has decreased from 5,9% (2008) to 0,7% (2017) [8]. It can be assumed that this is due to the discrepancy of the structural components of the innovation potential with the tasks that the company must address in the context of the relevant strategy for the determined period.

After all, the competitiveness of the subject of economic activity, its ability to find and defend its place in the market economic space is determined not only by its ability to find a free market niche or create it, offering the new public goods to the market. It also depends on its ability to properly position these products on the market, to find convincing arguments to confirm its utility (value) for target groups of

consumers. Therefore, it seems logical to assert that it is appropriate to manage the process of development of an enterprise's innovative opportunities in the context of improving its ability to create consumer values, that is on the basis of a value-based approach. This conception was substantiated by us in [9], but it was not considered in the context of the development of an industrial enterprise's innovative potential. Besides, such a task represents both scientific and practical interest, since it enables to form a new scientific and methodical approach to modeling the decision-making process in the field of innovative management, the practical implementation of which will contribute to improving the efficiency of innovation activity. This determined the purpose of this study.

The purpose of the paper is to use a value-based approach to construct an optimization model for managing the development of the innovative potential of an industrial enterprise.

## II. RESEARCH METHODOLOGY

The methods of economic and statistical analysis study the dynamics of innovation activity indicators and its results in the industrial sector of the economy of Ukraine. The methods of logical generalization and scientific abstraction prove the expediency of managing the innovative potential development of an industrial enterprise from the point of view of value-oriented approach. The methods of economic and mathematical modeling formulated and solved the

optimization problem of managing the development of innovative potential of an enterprise on the basis of a value-oriented approach.

## III. RESULTS

The objective function of the Value-Based Management (VBM) concept is to maximize the company's market value, so management's focus is concentrated on key factors contributing to the growth of this value [10]. This ensures a qualitative improvement of the whole set of strategic and operational decisions that are taken by managers at all levels of the management hierarchy. And the experience of the most successful companies with well-known brands shows that the most active and effective innovation activity played a key role in increasing their market value.

Although, the transfer of this idea to the practice of managing Ukrainian companies did not give the desired result. In particular, it was due to the lack of development of the stock market, which did not allow really assessing the growth of the market price of shares and influencing the processes of creating value through motivational leverages.

And the probable consequence of this is the constant reduction of the innovation contribution in the overall performance of industrial enterprises, which has become especially noticeable in recent years. This is evident from Table 1, which is based on the data from the State Statistics Service of Ukraine [8].

TABLE I. DYNAMICS OF INDICATORS OF INNOVATION ACTIVITY AND ITS RESULTS IN THE ACTIVITY OF INDUSTRIAL ENTERPRISES OF UKRAINE \*

Indicators	Indicators by years							
	2011	2012	2013	2014	2015	2016	2017	2018
The share of industrial enterprises that introduced innovations, %	12.8	13.6	13.6	12.1	15.2	16.6	14.3	-
Scopes of sold industrial production, UAH billions *	1305	1367	1322	1428.8	1776.6	2158.0	2625.9	2508.6
The share of innovative products in the scopes of industrial products sold, %	3.8	3.3	3.3	2.5	1.4	-**	0.7	**
Volume of sold innovative industrial production, UAH billions.***	49.59	45.11	43.63	35.72	24.87	-	18.38	-
Introduced new types of products, titles	3238	3403	3138	3661	3136	4139	2387	**
New types of equipment among these	897	942	809	1314	966	1305	751	**

Notes: \* excluding the temporarily occupied territories of the Autonomous Republic of Crimea, Sevastopol, and from 2014 the parts of the territories of Donetsk and Luhansk regions of Ukraine;

\*\* according to this indicator, the data are not available in official statistics;

\*\*\* the author's calculations

According to official statistics, the revenue from the sale of innovative products in 2017 only marginally exceeded the figure of 2014 and was below 40% from 2011, while the figures given in absolute terms do not take into account inflation which has significantly progressed during this period, and should lead to an increase in sales volumes in monetary terms, even in the unchanged sales volumes in physical units. Therefore, they do not reflect the critical state that has developed in the field of innovation management at the industrial enterprises of Ukraine. Indeed, the dynamics of the contribution of innovation in the performance of industrial enterprises can be seen by the indicator of the innovative products proportion in the total scopes of its implementation (a relative indicator that offsets the error on inflation processes). As can be seen from Table 1, it is constantly decreasing, from 3.8% in 2011 to 2.5% in 2014 and up to 0.7% in 2017. Statistical data on the introduction of product innovations also indicate a serious deterioration in

this area, especially in 2017, when their number has decreased almost twice, including the samples of new technology (in 2018 there is no data on innovation activity in Ukraine at all). And this is despite the fact that many industrial enterprises still have a real task to enter new markets instead of the lost markets in the Russian Federation.

This task is strategically important for machine-building enterprises, which mainly worked on the Russian markets and are now forced to diversify their activities by resorting to an innovative product portfolio update.

At the same time, the data in Table 1 may indicate not only that Ukrainian inventors in the majority are not capable of creating innovations that have a significant consumer value, but also that business owners in Ukraine are not interested in innovative upgrade of production due to the lack of appropriate motivational levers in the institutional environment. And this limits the use of the VBM concept in

its classical format as a tool for strategic management in the development of companies. However, the main features of the VBM concept are that the market value of the company is ensured by its ability to create a consumer value better than its competitors and have advantageous position among market counterparts, became a source of ideas on how to develop this ability even in an imperfect institutional environment.

In our opinion, the emphasis on this aspect in the concept of value-based management allows us to form a universal approach to building an effective management system for any industrial enterprise, in the long-term strategic perspective. Confirmation of our position will be based on the logical connection of such categories as "enterprise competitiveness", "consumer value", and "innovation". Obviously, an important link in this chain is the definition of "innovative potential of the enterprise". F. Kotler [11] clearly emphasized that competitive advantages are achieved by enterprises through the development of proposals that meet the needs of target consumers to a greater extent than the proposals of competitors.

The consumer value of a particular product encompasses both its functional value objectively determined by certain characteristics of the product (which is the derivative of the technological component of the process of creating value), and the value formed in the perception of this product and its subjective assessment by a particular consumer (cognitive component of value). Among them, the direct technological component includes: scientific research, engineering, technological, production potential. To the cognitive component - marketing and information-interface - in the part that deals with work with consumers.

It is obvious that the contribution of structural elements of the innovation potential to create value for consumers of different target groups will be different. Because for some consumers in the structure of consumer value the functional characteristics of the product are in the first place, and the others are interested in purely representative, image-making characteristics. From the point of view of the interests of an enterprise it is important to pay more attention to the development of those components of the innovation potential, which will maximize the utility function based on the specifics of activities in the target markets.

Development of innovative potential (*IP*) of any enterprise requires the investment of funds, and requires the optimization in the area of bearing the corresponding costs. This means that it is necessary to identify the innovative potential of the enterprise (*IPE*) as a utility function within the limits of the marginal utility law. According to this law, there is a close link between the value of *IPE* activities and their usefulness for their intended use which is productive innovation in the creation of products with a consumer value. However, it is necessary to differentiate the content of the definitions of utility and value with respect to *IPE* measures. Useful may be measures aimed at increasing the innovation activity of the enterprise.

However, if these measures are excessive, too costly, they reduce their value, and vice versa. Taking into account the above-mentioned, the value-added measures we will further understand as the result of their implementation which will increase both the innovative activity and the

efficiency of the innovation activity of the enterprise. In addition, according to the logic of the creation of consumer value, from the set of alternatives it is necessary to give priority to the activity, which will more favorably increase the efficiency of the innovation activity of the enterprise.

Given the large number of factors that influence the consumer's perception of a product's value, it is important to identify among them the components of the innovation potential, the purposeful development of which will be more effective in terms of maximizing the target function. This optimization task can be solved by means of economic-mathematical modeling.

Any action on the formation and development of *IPE* will be costly, so it is important to identify the following strands of effort, in which the "cost-result" ratio would be optimal. That is, we will take for the initial hypothesis that, due to the development of a company's *IP*, its ability to create a consumer value should be maximized, which will give consumers the advantage of the company's products rather than its competitors. Ultimately, this should be embodied in the growth of the mass of profits from the sale of products that the company produces.

The solution to this task is to select a certain number of structural elements of the enterprise's *IPE*, as well as the form of their combination, which collectively provides the high ability of the enterprise to create the consumer value. Such a choice must satisfy a certain criterion. The most obvious criterion is the profit from sales of products to consumers. It can be stated that the profit of an enterprise has a direct connection with its *IP* because the result of the implementation of innovations should be that the so-called entrepreneurial profit is higher than the profit from the implementation of traditional business processes. However, a clearer definition of the parameters of this dependence for a particular company requires an individual approach.

Consequently, we define the conditions for solving the optimization problem of *IPE* development based on the criterion of maximizing its profit. If there are  $K$  of options of an enterprise's *IP*, where  $K = 1, 2, 3, \dots$ , then considerations for analyzing their ability to maximize the target function are as follows. The option  $K=1$  does not provide any choice, but practically (and not theoretically) such an option in the dynamic socio-economic system, which is an enterprise, cannot exist. Therefore, we will assume that the problem of choice will always exist and this means that  $K \geq 2$ . Let  $IP_k$  be the company's *IP*  $k$ -option (*IP* means Innovative Potential). Accordingly, we have to make the choice on the variety (list) of all options  $\{IP_k\}_{k=1}^K$ . According to the criterion of maximizing profit, the optimization problem is formalized as follows:

$$IP^* \in \arg \max_{\{IP_k\}_{k=1}^K} p(IP_k), \quad (1)$$

where  $p(IP_k)$  is the profit of an enterprise that implements a  $k$ -option of its innovation potential during the planned period. Obviously that  $IP^* \in \{IP_k\}_{k=1}^K$ .

Of course, it should be borne in mind that profits are generated from various activities, both from the introduction of novelties, and from the implementation of traditional business processes. Correspondingly, this can be found in the

formalized representation of the problem (1). However, in this case, we use the generalized content of the category of profit, the methods of formation of which (and types) are specified for a specific enterprise, the specifics of its products, and conditions of activity on certain target markets of consumers. In particular,  $p(IP_k)$  can mean profitability, if the situation so requires. And even more generally we can consider the function  $p(IP)$  set on a discrete (finite) utility set  $\{IP_k\}_{k=1}^K$ , which in a partial case will be various financial results or coefficients that reflect the economic efficiency of the activity (profit, profitability, etc.). In most cases, we will consider the medium-term profit (or some of its normalized or standardized characteristics) obtained during the planned period (month, year).

However, in any case, regardless of the selected criterion, which can be a standardized profit, it is the result of the interaction of an enterprise with a certain IP format from an external competitive environment. That is, the reaction of this environment to the implementation of enterprise's IP, embodied in products that have consumer value for target audiences. Therefore, we denote  $p_j(IP_k)$  as the profit of the enterprise that it receives, implementing the  $k$ -option of its IP in conjunction with the  $j$  factors of the competitive environment. In other words,  $j$  is the number of competitors, although the factors of competitive interaction can be seen wider. For example, if a competitor uses different tools of influence on consumer behavior (dumping, best service, flexible payment terms, online sales, etc.). Then, instead of the task (1), the task is

$$IP^* \in \arg \max_{\{IP_k\}_{k=1}^K} p_j(IP_k), \quad (2)$$

in which  $j = \overline{0, M}$  for the maximum number of factors of competitive interaction  $M$ . This number also depends on a number of conditions, where  $M = 0, 1, 2, \dots$ , although the case  $M = 0$  is unlikely.

Proceeding from the conditions of the optimization problem (2), we obtain a number of such tasks, each for the corresponding number of factors of competitive interaction, the appearance of which cannot be predicted:

$$IP^* \in \arg \max_{\{IP_k\}_{k=1}^K} p_0(IP_k) \quad (3)$$

$$IP^* \in \arg \max_{\{IP_k\}_{k=1}^K} p_1(IP_k) \quad (4)$$

$$IP^* \in \arg \max_{\{IP_k\}_{k=1}^K} p_2(IP_k) \quad (5)$$

...

$$IP^* \in \arg \max_{\{IP_k\}_{k=1}^K} p_M(IP_k) \quad (6)$$

Task (3) occurs when a competitive interaction (most likely temporarily) is absent. Task (4) is for the case of one competitor or factor of competitive interaction, (5) for two, etc. The task (6) is the result of total competition with the maximum intensity of economic counteraction. Several tasks can occur simultaneously if, say, the market conditions change day by day. In addition, if factors of competitive interaction are different or levels of external influence are different, their number increases. And then a series of simple tasks of the type (1) becomes very long. So, instead of the

rather trivial optimization task (1), which assumes that the function  $p(IP)$  on the set  $\{IP_k\}_{k=1}^K$  is already known, we obtain the task of multi-criteria optimization (3) - (6).

However, in addition to the criterion of profit maximization, which directly depends on those components of the enterprise's IP that form the functional characteristics of the consumer value, we should bear in mind the economic risks arising from the cognitive component of the consumer value and indirectly determined by the communication-interface part of the IP forming the enterprise's image (its trade mark) [12]. Then there is another optimization task on a discrete set  $\{IP_k\}_{k=1}^K$ :

$$IP^* \in \arg \min_{\{IP_k\}_{k=1}^K} r(IP_k), \quad (7)$$

Where  $r_j(IP_k)$  is a risk for an enterprise to lose a market segment due to unsuccessful use or implementation of the  $k$ -option of its IP (for example, functionally perfect development did not find its consumer due to its unsuccessful positioning on the market).

Thus, taking into account the factors  $j$  of competitive interaction, instead of the task (7), it is more logical to formalize the task of minimizing risks in the following way:

$$IP^* \in \arg \min_{\{IP_k\}_{k=1}^K} r_j(IP_k) \quad (8)$$

From here we have  $M + 1$  of the tasks of minimizing risks:

$$IP^* \in \arg \min_{\{IP_k\}_{k=1}^K} r_0(IP_k), \quad (9)$$

$$IP^* \in \arg \min_{\{IP_k\}_{k=1}^K} r_1(IP_k) \quad (10)$$

$$IP^* \in \arg \min_{\{IP_k\}_{k=1}^K} r_2(IP_k) \quad (11)$$

$$\dots, IP^* \in \arg \min_{\{IP_k\}_{k=1}^K} r_M(IP_k) \quad (12)$$

Consequently, taking into account the tasks (3) - (6) and (9) - (12), which need to be solved simultaneously (to obtain a single solution  $IP^*$ ), we obtain the multi-criteria optimization task:

$$IP^* \in \arg \max_{\{IP_k\}_{k=1}^K} p_j(IP_k) \text{ where } j = \overline{0, M} \quad (13)$$

and

$$IP^* \in \arg \min_{\{IP_k\}_{k=1}^K} r_j(IP_k) \text{ where } j = \overline{0, M}. \quad (14)$$

To solve this problem it is necessary to evaluate the  $M + 1$  function with  $\{p_j(IP_k)\}_{j=0}^M$  and  $M + 1$  function with  $\{r_j(IP_k)\}_{j=0}^M$  on a finite set of the enterprise's IP options  $\{IP_k\}_{k=1}^K$ . It is advisable to do this by applying methods of expert evaluation and analysis of hierarchies [13].

If there are  $k$ -options of IP for each  $j = \overline{0, M}$ , we will present a matrix of pairwise comparisons for the evaluation of the function  $p_j = p_j(IP)$  where  $p_j = [p_{ik}^{(j)}]_{K \times K}$ . The elements of the matrix  $p_j$  are characterized by the following properties:



$$p_{kk}^{(j)} = 1 \quad \forall k = \overline{1, K} \quad \text{and} \quad p_{ik}^{(j)} = \frac{1}{p_{ki}^{(j)}} \quad (15)$$

By definition, the matrix  $P_j$  is a positive inverse-symmetric matrix of  $k$ -order.

According to the standards of the hierarchy analysis method, the correlation between the  $i$ -option and  $k$ -option of the  $IP$  ( $IP_i$  and  $IP_k$ ) is estimated by the experts as follows:

$$p_{ik}^{(j)} \in \left\{ \frac{1}{9}, \frac{1}{8}, \frac{1}{7}, \frac{1}{6}, \frac{1}{5}, \frac{1}{4}, \frac{1}{3}, \frac{1}{2}, 1, 2, 3, 4, 5, 6, 7, 8, 9 \right\}, \quad (16)$$

where  $p_{ik}^{(j)}$  is an averaged expert judgment from the group of experts. In this case, we will have in mind such an interpretation of expert opinions (Table 2).

TABLE II. THE VALUE OF EXPERT JUDGMENTS REGARDING THE COMPARATIVE UTILITY OF OPTIONS  $IP_i$  AND  $IP_k$  TO OBTAIN TARGET PROFIT WITH THE  $j$  FACTORS OF COMPETITIVE INTERACTION

The average value of expert judgment	Comparative utility of options $IP_i$ and $IP_k$ to obtain target profit with the $j$ factors of competitive interaction
$p_{ik}^{(j)} = 1$	$IP_i$ and $IP_k$ are equally useful
$p_{ik}^{(j)} = 3$	$IP_i$ is somewhat more useful than $IP_k$
$p_{ik}^{(j)} = 5$	$IP_i$ is more useful than $IP_k$
$p_{ik}^{(j)} = 7$	$IP_i$ is much more useful than $IP_k$
$p_{ik}^{(j)} = 9$	$IP_i$ absolutely prevails $IP_k$

Numbers (1, 3, 5, 7, 9 and their inverse quantities) are the main numbers of expert judgments. Numbers 2, 4, 6, 8 and their inverse values are used to facilitate compromises between expert judgments, which differ somewhat from the basic numbers of judgments. Our task is to determine the priorities of all options of enterprise's  $IP\{IP_k\}_{k=1}^K$ . The priority of this  $i$ -option  $\tilde{a}_i^{(j)}$  will be determined as follows:

$$a_i^{(j)} = \sqrt[K]{\prod_{k=1}^K p_{ik}^{(j)}}, \quad (17)$$

after that

$$\tilde{a}_i^{(j)} = \frac{\tilde{a}_i^{(j)}}{\sum_{k=1}^K \tilde{a}_k^{(j)}}, \quad i = \overline{1, K} \quad (18)$$

Priorities (18) have the property of standardized values:

$$\tilde{a}_i^{(j)} > 0 \quad \text{and} \quad \sum_{i=1}^K \tilde{a}_i^{(j)} = 1 \quad \forall i = \overline{1, K} \quad (19)$$

Having determined the priorities (18), we evaluate the coherence of the matrix  $P_j$ . To do this, we calculate its maximum value:

$$\lambda_{\max} = \sum_{k=1}^K \sum_{i=1}^K p_{ik}^{(j)} \cdot \tilde{a}_k^{(j)}. \quad (20)$$

In the case of good coherence, the value (16) is sufficiently close to  $K$ . The index of consistency of expert opinions is calculated by the formula:

$$I_{\text{cons}} = \frac{\lambda_{\max} - K}{K - 1}, \quad (21)$$

We find the relation of coherence:

$$r_{\text{cons}} = \frac{I_{\text{cons}}}{I_K}, \quad (22)$$

where  $I_K$  is an average random index for a positive inverse-symmetric matrix of  $k$ -order; this index is taken from a well-known table. The satisfactory coherence of the matrix pair wise comparisons corresponds to expert judgments, in which  $r_{\text{cons}} \leq 0.1$ .

Similar statements are logical for the function of risk  $r_j(IP_k)$ . As a result, it remains to solve a one-criterion task:

$$IP^{**} \in \arg \max_{\{IP_k\}_{k=1}^K} H(IP_k) \quad (23)$$

This allows us to choose the optimal  $IP$  structure of an enterprise  $IP^{**}$  that is able to maximize the flows of creation of consumer value in the defined strategic segment of the target market.

Practical testing of the developed model of the structure optimization of the enterprise's innovative potential, taking into account the contribution of its individual components in the growth of the company's ability to create consumer values (increase in the profit mass) is carried out on the basis of the characteristics of PJSC "Ukrelectroaparat"'s  $IP$ . Given the specifics of its activities (the company operates in the market of goods with industrial and technical purposes with a high level of individualization of operational parameters), and the development of its  $IP$  mainly occurred in the areas of engineering and technological design. That is, within the technological component of the formation of consumer value. In the opinion of the company's management, it enabled to maximize the consumer value of products for individual customers and minimize the risks of rejection of products by the market.

We believe that the task of minimizing the risks connected with investing in the development of structural components of  $IPE$  should be addressed in all functional areas of enterprise management. Therefore, in order to assess the risks it is expedient to select experts from among the management employees involved in the implementation of main managerial functions and responsible for the development of the innovative potential of the enterprise. In our opinion, it is such departments as financial, marketing, chief engineer (technology update department) and personnel management. Given that the risks that may have an impact on the success of innovation change differ in strength of impact, the strength of the influence of the selected groups of factors is determined by the method of hierarchies' analysis. The coordination of experts' opinions was estimated using the coefficient of concordance. The level of consistency of opinion was high, and the coefficient of concordance is equal to 0.516.

According to experts, the greatest risks in implementing the projects of development of innovation potential at the enterprise were made by the subsystem of financial management as the attraction of funds for technological upgrade was mainly due to credit resources. The highest

assessment of the competence of specialists in risk aversion was received by the Chief Engineer, who substantiated and provided technological changes. Experts are confident that the technologies involved are flexible enough, reliable in operation and able to provide the necessary quality parameters in the production of new consumer values, which was confirmed by the practical activities of the enterprise after the implementation of innovative changes.

At the same time, the experts pointed out the insufficient level of development of the IP marketing component, which is functionally designed to work with consumers. The risks are one-sided concentration of attention on market research issues to identify new consumer demands and insufficient attention for the promotion of already developed models of products on the market, which causes the growth of specific innovative costs and, consequently, decrease in profitability of the work.

The experts also pointed out the significant impact on the risks of the innovative potential growth of the personnel management service. Although they generally noted the presence of the necessary professional competencies in key personnel (both in the field of designing new consumer values and in the field of technological support for their production in the short term), but doubts were expressed about the adequacy of incentives for the effectiveness of innovations. Employees of the Research and Development department and the Technology department consider their remuneration to be insufficient in comparison with the value of labor input. And this testifies to the importance of the development of the interface component of the enterprise's innovation potential, which forms the motivation environment for introduction of innovation. This requires the use of interconnected systems of coordinates of motivation technologies that would include strategic, tactical and operational aspects of creating consumer values. Relevant recommendations were developed for PJSC "Ukrelectroaparat" and positively adopted by the company's management.

#### IV. CONCLUSIONS AND OUTLOOKS

In a highly dynamic market environment, the innovation potential serves as a basis for competitiveness and a source of sustainable development for any entity. However, only if it ensures the ability of the enterprise to implement innovative solutions that most closely match the market context in each of its period and spatial localization. The paper states that such a conformity can be determined from the standpoint of the theory of value. To confirm this, the logical connection between the categories "enterprise's competitiveness", "innovation", "innovative potential" is formed and the place of "consumer value" is shown. It is emphasized that from the point of view of the theory of value, the value of the enterprise as a market entity will grow in the context of increasing its ability to create consumer values. This served as the basis for asserting that the objective function of management of the innovation development potential should be to maximize the ability of the enterprise to create a consumer value. Taking into account that the technological and cognitive components of consumer value, by the force of their influence on the final result, are different for different target markets, and also they

are formed by different structural elements of the innovation potential, thus it is indicated that the solution of the problem of innovative potential development should take into account the contribution of various structural elements of innovative potential in the implementation of the target function. Adhering to the value-based approach, an optimization model for managing the development of the innovative potential of the industrial enterprise was built. It is noted that the tools of practical implementation of this model are methods of expert evaluation and analysis of hierarchies, which are used to predict the amount of profit and estimate the probable risks of making appropriate decisions. The fragment of the analysis of such kind of risks is presented in the areas of formation of structural elements of the machine-building enterprise's innovative potential. The scope of practical application of the developed optimization model can be extended to other structurally designed functional economic systems that dynamically develop and can be described in the categories of values and risks.

#### ACKNOWLEDGMENT

The work was carried out within the State budget project "Modeling financial and economic security of businesses in their innovative development strategies", project's registration number 0117U001170.

#### REFERENCES

- [1] I. V. Radzivilo, "The mechanism of formation of the innovative potential of an industrial enterprise: structuring and identifying the elements", *Effective Economy*, 2012. [Online]. Available: <http://www.economy.nayka.com.ua/?op=1&z=1295>. Accessed on: July 9, 2019.
- [2] O. Yu. Shylova, and E. S. Chermoshentseva, "Innovative Potential: The Essence and Mechanism of Management", *Marketing and Management of Innovations*, no. 1, pp. 220-227, 2012.
- [3] N. I. Verhohliadova, and I. O. Kashirnikova, "Methodical approach to the definition of the innovation potential of the enterprise", 2013. [Online]. Available: [www / economy.nauka.com.ua/?or=18lz=2458](http://www.economy.nauka.com.ua/?or=18lz=2458). Accessed on: July 14, 2019.
- [4] I. V. Rodionova, "Assessment of the level and directions of improvement of innovative potential of light industry enterprises," *Herald of Khmelnytskyi National University. Economic Sciences*, no. 4 (2), pp. 193-196, 2012.
- [5] A. S. Telnov, and S. A. Popel, "Construction of a prediction model for the innovation potential of an industrial enterprise", *European Journal of Scientific Research*, no. 1, pp. 113-120, 2015.
- [6] P. M. Hrihoruk, and N. A. Khrushch, "Integral assessment of the level and dynamics of the innovation potential of the region", *Management and marketing of innovations*, no 3, pp. 109-129, 2016.
- [7] B. S. Annayev, "Formation of Innovation Capacity: Enterprise Opportunities and Market Conditions," *Economy. Management. Business*, no 3, pp.14-21, 2014.
- [8] Scientific and innovative activity (1990-2017), 2018. [Online]. Available: <http://www.ukrstat.gov.ua>. Accessed on: July 9, 2019.
- [9] V. V. Stadnyk, and O. V. Zamazyi, "Innovative factors in the system of value-based management of an industrial enterprise," *Actual Problems of Economics*, no. 9, pp. 242-249, 2015.
- [10] John D. Martin, and J. William Petty, *Value Based Management*. Harvard: Business Press, 2000.
- [11] F. Kotler, and Keller, "Marketing Management," Global Ed., 2016.
- [12] Yu. H. Yun, L. Z. Ying, Z. Zhu and Z. Pingfeng, "Research on Ranking Evaluation Models of Safety Risk in Productive Enterprises based on the Perspective of Supervision". *Procedia Engineering*, no. 84, pp. 100-107, 2014.
- [13] T. Saati, "Decision making. Method of analysis of hierarchies", Moscow: Radio and communication, 1993.