

Modeling of the Investment Risks in Human Capital as the Factor of Enterprise Safety in the Context of the Stakeholder Theory

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Abstract. The paper presents the results of a study of the investment risks in human capital of an IT-sector enterprise as a factor of its safety, taking into account the aspects of the stakeholder theory. It is determined that the safety of the enterprise operation is the protection of the interests of this enterprise from the internal and external threats, the components of the safety system are interconnected, they are placed on the same hierarchical level and interact with each other. Of all the components of the enterprise safety, economic safety can be considered to be the most informative, as it reflects the consequences of all the processes occurring at the IT-sector enterprise. Provision of the economic safety of the enterprise is aimed at a comprehensive impact on potential and actual risks. It was found that the highest risk is associated with the human factor and investment in human capital of the IT-sector enterprise. It is proposed to assess the magnitude of the investment risks in human capital of the enterprise on the basis of an agreed purpose, which takes into account the coincidence of the goals of the IT-sector enterprise with the personal goals of stakeholders.

Keywords: safety of IT-sector enterprise functioning, investment risks, investments in human capital, agreed purpose, modeling of investment risks, economic safety.

1 Introduction

One of the basic conditions for the operation of the IT-sector enterprise is safety. Trends in global economic systems provide a transition from the extensive ways of

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economic development to new processes that focus on the intensification and application of knowledge and the use of stakeholders interaction as a basis for IT-sector enterprise management.

IT-sector enterprise engineering belongs to the industries with a high level of investment risk due to certain properties of the industry, which include the significant demand fluctuations for products, periodic process and product changes in innovation activity and other features that negatively affect the investment risk of engineering companies.

At the same time, the highest risk among the main investment entities experiences the company due to the dual nature of human capital and the inability to separate the owner of human capital – a person from the labor process – its implementation [1, p. 17].

Consistent study of the threats, components of the safety system of the IT-sector enterprise operation, the risks associated with the human factor and investment in human capital of an IT-sector enterprise allows to consider the human capital in the light of stakeholder theory.

Managers, employees and the staff of the enterprise are its stakeholders and they and their activities form the human capital of the IT-sector enterprise (personal, alienable and collective). Studying the goals and interests of these stakeholders, more information is obtained about the implicit desires of employees, opportunities to motivate them and intensify their activities for the benefit of the company and to achieve the goal of the enterprise activities. According to E. Freeman, only in a coherent multi-vector management policy we can find the answer to the threats posed by the modern market environment [2].

2 Literature review and problem statement

Stable functioning and growth of the economic potential of the IT-sector enterprise, in difficult and changeable conditions, largely depends on the ability to counteract threats. Lack of stability makes society and businesses constantly seek not only ways to adapt to ever-changing conditions, but also to take active steps to ensure operational safety.

The development of the IT-sector enterprise operation system is directly related to the safety of the enterprise and is characterized by the presence of a large number of factors affecting the viability of the enterprise. G. Becker, V. Nikolaychuk, O. Zakharova, E. Freeman, O. Shelest, K. Koerselman, D. Levhari and others studied the issues of investing in human capital and the risks associated with this process, as well as the corresponding impacts of stakeholders.

G. Becker (1962) analyzed the impact of investment in human capital on earnings and distribution of personal income [3]. The risks associated with investing in human capital have been analyzed in the works of D. Levhari and Y. Weiss (1974). The authors included the element of risk in the standard theory of human capital, focusing on the impact of risk and uncertainty, while pointing out the existence of both positive and negative relationship between risk and investment [4]. O. Shelest (2015) pointed

out the risks of investing in human capital taking into account the mobility of workers (at the macroeconomic level), determining the specific risk of the occupational group and conducting a descriptive analysis of expectations of the impact on mobility in occupational groups with different levels of risk [5]. In most studies, carried out [3-7] the attention was paid to educational processes at the macro level, as the ways of forming human capital and investments and risks associated with them.

Despite numerous publications in these areas, the problems associated with the definition of the notion “safety of the enterprise functioning”, with the composition of the structural elements that determine the state of the enterprise safety, the impact of the stakeholders on these components and the corresponding level of risk associated with the investment in human capital of the enterprise remain an urgent challenge.

The aim of the study is the analysis of the essence of the notion of “safety” and the composition of its structural elements as well as expediency of introducing human capital as safety component of the enterprise operation and the formation of the approaches to the process of modeling the value and the impact of the risks of the investment in human capital associated with meeting the needs of the internal stakeholders.

3 Research results

Stable activity and potential growth of economic characteristics of the IT-sector enterprise largely depends on the ability to counteract threats. By the threat to the safety of the enterprise operation is meant the changes in the internal and external environment of the entity, which lead to negative changes in the subject of safety. The subject of threats are the components of the economic system of the enterprise, the parameters of which may exceed the permissible values. The most common classification of safety threats is their division into internal and external. External threats do not depend on the production activities of the enterprise, they arise outside the organization. Internal threats are directly related to the activities of the IT-sector company and the qualifications of its staff.

By the notion of the safety of the enterprise operation system we will mean the protection of the business structure, environmental state, information, employees, capital and profits and interests from internal and external threats. Classification of safety components, in our opinion, is expedient to perform by the areas of enterprise management, which are often reflected in the organizational structure of management: ecological, social, legal, force, information, economic. All these components form a single system that ensures the economic and social interests of the owner of the property of the enterprise and the interests of each employee, based on meeting the needs of consumers and society in certain products. The relationships of the safety components of the enterprise and its composition are shown in Fig.1.

Let us determine the functional load of the main components of the safety system of the enterprise:

- legal safety means comprehensive legal support of the enterprise activity, competent legal work with contractors and the authorities, the solution of other legal issues;
- force safety deals with the modes, physical protection of objects and personal protection of the senior managers, counteraction to crime, interaction with law enforcement and other state bodies;
- information safety is based not only on the protection of own information, including confidential, but also provides business intelligence, information and analytical work with external and internal entities, etc;
- ecological safety involves meeting environmental needs in all aspects of life activity, both from the standpoint of protection of the environment and people from the negative impact of the enterprise and the protection of the enterprise against ecological threats;
- social safety reveals the content of social processes taking place in labor organizations from the standpoint of four components: human mobility, continuity of the development, involvement in the management process, the stability of the social status;
- economic safety is a complex characteristic, by this is meant the level of protection of all types of enterprise potential against internal and external threats, which ensures stable operation and effective development and requires management by the company's top executives.

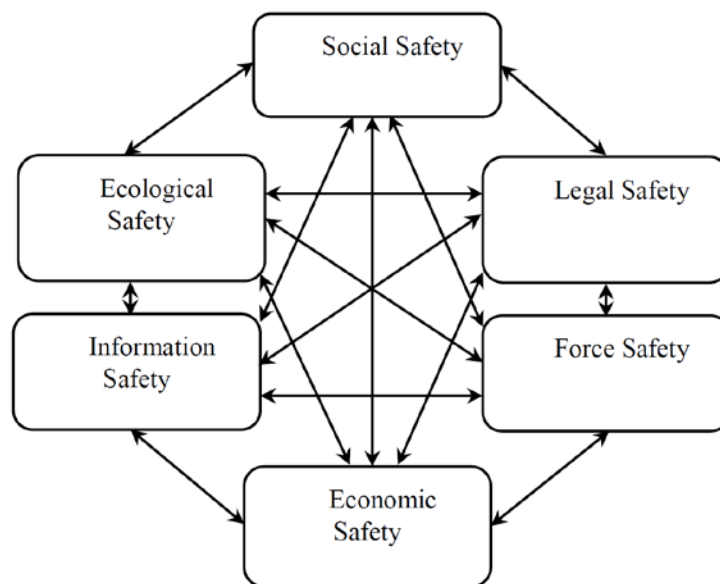


Fig. 1. Relationships of safety components of the IT-sector enterprise

As it can be seen from the given interaction chart (Fig. 1), the components of the above-mentioned safety system are interconnected, and they all interact with the eco-

conomic safety system of the enterprise. Therefore, maximum attention is often paid to economic safety in the functioning of the enterprise, although in the economic literature there is still no consensus on the nature and content of this notion.

Of all the components of the enterprise operation safety, the economic safety can be considered to be the most informative, as one that reflects the consequences of all processes occurring in the enterprise. The aim of the economic safety of the enterprise is to realize a comprehensive impact on potential and actual risks, which is the basis for maximum stability of its operation.

Analyzing the content of economic safety the following functional components of economic safety of the enterprise are distinguished: market; scientific; technical and technological; resource; production; financial; investment; foreign economic; intellectual; organizational, etc.

However, in our opinion, the safety of human capital more deeply characterizes the relationship, problems and trends, risks and prospects of cooperation between employees and enterprises in the economic sphere, the formation of intangible assets and profits. Schematically, the impact of human capital on the components of the safety system of the enterprise operation is presented in Fig.2.

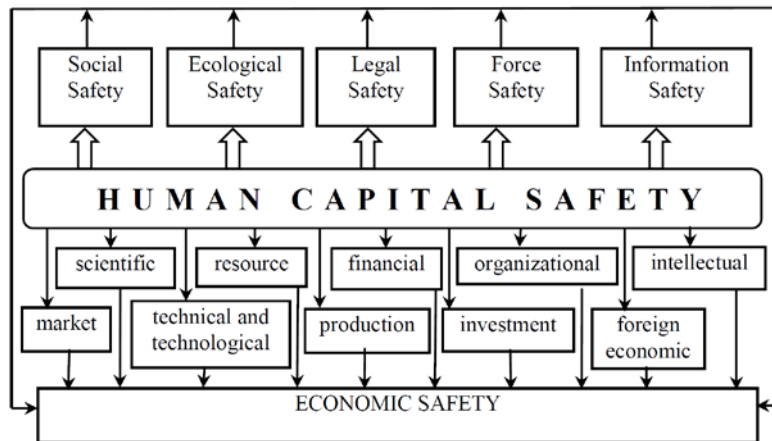


Fig. 2. Impact of human capital on the components of the safety system of the enterprise operation

Effective human resource management occupies a leading position in the development of the enterprise as a whole. The human being is the basic element of functioning of the enterprise, therefore the risks connected with its activity have to take a priority position to prevent threats. Part of the stakeholders of the enterprise (as human capital) occupy a leading position in the system of development resources of each organization and is therefore the main source of the uncertainty.

Experience has shown that more than two-thirds of all threats to the enterprise safety come from or are associated with employees. The process of identifying the company's stakeholders enables to identify certain risks arising from them and minimize the possible losses. Taking into consideration the fact that the human factor

mediates all aspects of the relationship at the enterprise, it is possible to identify the risks associated with internal stakeholders as complex ones.

The list of such risks includes:

- educational risks, i.e. causing the direct material damage to the enterprise due to the dismissal of the employee who received education at the expense of the enterprise;
- risks of the theft of material resources of the enterprise associated with low morale level of employees, lack of proper control and accounting of the use of material resources, nonobservance of the legislation in the organization, both by employees and employers;
- risks of penetration of people who have connections with criminal structures;
- risks of loss, distortion, theft of information by employees in the process of its obtaining, processing, storage, transmission;
- risks of antisocial behavior, or the formation of a category of employees who do not meet the norms of organizational culture, that may cause damage to the enterprise, which will manifest itself in degradation of moral and psychological environment, conflicts, relaxation of labor and performance discipline.

As it was noted by O. Zakharova [8], the emergence of risk in the process of investing in human capital is mainly stipulated by the human factor and the inability to identify and assess possible changes in the level of individual efficiency as a result of certain types of investment costs.

Thus, for the company the risk of investing in human capital is a combination of the probability of the risk of the irreversible full or partial loss of funds invested by the company in human capital and the probability that the company will not receive economic return from the investment in human capital in modern conditions of the investment process and in future. This risk constantly accompanies management decision-making processes needed for the assessment of the socio-economic feasibility of a particular type of investment at different stages of investing in human capital and cannot be completely eliminated.

We will consider the possibility of the determining and modeling of risks, taking into account the impact of the stakeholders on the processes of enterprise operation, namely, the investment in human capital of the enterprise. In the course of their operation, machine-building enterprises can form goals that depend on the interests or influence of a certain group of stakeholders who control the enterprise activity. The strategic goal of the stakeholders is formed on the basis of usefulness or individual interest, and each group of stakeholders tries to subordinate the activities of the enterprise to its own goal. The enterprise may also form for itself different groups of goals that will coincide in part or in full, and/or even conflict with the goals of the stakeholders. Therefore, at some point it is necessary to accommodate such goals. Taking into consideration the above-mentioned, we propose the definition of the agreed purpose.

Agreed purpose is a tactical goal of the enterprise operation, which is derived from the strategy of the enterprise activity and helps to match the goals of the enterprise at certain time intervals with the goals of the stakeholders of different hierarchical lev-

els. The agreed purpose should take into account the coincidence of the goals of the enterprise operation with the personal goals of the stakeholders [9; 10; 11].

Mathematically, the agreed purpose can be written as an equality:

$$Z(F, t) = V(P, t) \quad (1)$$

where $Z(F, t)$ – is the function of the goals of the stakeholders at a certain point in time t ; F – is the level of financial satisfaction of the relevant group of the stakeholders; $V(P, t)$ – is the function of the goals of the enterprise at a certain point in time t ; P – is the level of investment provision of the enterprise for the formation (support) of human capital; t – is the time, and $t \in [t_1, t_2]$, where t_1 – is the minimum value of the planning period; t_2 – is the maximum value of the planning period.

Functions $Z(F, t)$ and $V(P, t)$ can be obtained according to the statistics of the previous period, using the method of regression analysis.

The set of complex risks associated with the company's internal stakeholders can be reduced to two significant groups: the risks associated with the loss (dismissal) of the employee (RE) and the risks associated with the loss of motivation (interest) of the employee (RM). It is also possible to perform the ranking of the enterprise operation risks, applying the method of efficiency evaluation [10; 12; 13].

To form the system of quantitative indices of risk level, we propose to use the utility function (Neumann-Morgenstern function) of two variables – $W(E, M)$, where E – is the growth of the employee productivity with the increase of the education level, compared with the basic productivity; M – is the growth of the employee productivity with the increase of the motivation (interest) level of the employee, compared with the basic productivity. The instantaneous value of the utility function $W(E, M)$ – is taken as the probability of the risk [14; 15; 16].

As it is necessary to take into account in the process of cost assessing of the investment risks in human capital of all its possible negative consequences, we can consider the following formula for the calculation of the average cost measurement of the risk degree regarding the beginning of negative consequences as a result of the loss (dismissal) of a group of employees:

$$R_E = \int \int_S W(E, M) \bullet V_E dS \quad (2)$$

where V_E – is a function of cost measurement of the economic losses as a result of the dismissal of a certain group of workers;

S – is the area of the intersection of the goals of the enterprise and the goals of the corresponding group of stakeholders in the range from t_1 to t_2 (the area of the agreed purpose).

The formula for the calculation of the average cost measurement of the risk degree regarding the beginning of the negative consequences as a result of the loss of motivation (interest) of a certain group of employees will have the following form:

$$R_M = \int \int_S W(E, M) \bullet V_M dS \quad (3)$$

where V_M – is a function of cost measurement of economic losses in the absence of the motivation (interest) of a certain group of employees.

Then the total risk will be:

$$R = \int \int_S W(E, M) \bullet (V_E + V_M) dS = R_E + R_M \quad (4)$$

The calculation of the total risk will allow to perform risk management to reduce its impact.

4 Conclusions

The basic condition for the stable and efficient operation of the IT-sector enterprise is safety. By the safety of the enterprise operation system, it is expedient to understand the protection of the business structure, environmental state, information, employees, capital, profits and interests against internal and external threats.

All the components of the safety system of the enterprise operation are interconnected and interact with the system of economic safety of the IT-sector enterprise, which can be considered to be the most informative, and which reflects the consequences of all processes occurring at the enterprise. The safety of human capital more deeply characterizes the relationship, problems and trends, risks and prospects for cooperation between employees and enterprise in the economic sphere. Human capital occupies a leading place in the system of development resources of each specific organization and is, therefore, the main source of uncertainty and associated risks.

Modeling the risks of investments in human capital in the context of the stakeholder theory can be realized on the basis of the agreed purpose, which takes into account the coincidence of the goals of the enterprise operation with the personal goals of stakeholders.

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