

FORMATION OF A STRATEGIC MODEL FOR ASSESSMENT OF THE INNOVATIVE POTENTIAL OF AN ENTERPRISE

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ABSTRACT

A strategic model for assessment of the innovative potential of an enterprise based on category theory has been built. This approach involves the assessment of four components, three of which reflect the components of the innovation potential-resources, competences and abilities, and the fourth reflects the concrete embodiment of the implementation of the innovation potential-innovation projects. The resources, abilities and competences within this model are analyzed on the basis of the binary logic of the analysis of economic processes, which allows to evaluate the interaction of its three contents using the transitivity.

Keywords: Dynamic Model, Innovation Potential, Corporate Ideology, Innovation Behavior.

JEL Classifications: M5, Q2.

INTRODUCTION

The effective functioning of a business in an information economy requires major changes in the organization of business activities. Only those enterprises that can generate innovations become successful. The latter are considered to be an important source of competitive advantage in the activities of globally operating enterprises, and in a number of industries-also without any alternative condition for survival. At the same time, the information revolution has changed the environment for the functioning of modern enterprises, creating, primarily, fundamentally new conditions for enhancing their innovative development. Its resources are largely determined by the nature and specificity of the existing business models, as well as the possibilities of using the relevant organizational forms of innovation activity and the adequate forms and methods of its investment support.

In modern economic literature, innovation plays a key role among the factors that stimulate economic growth: its positive influence is confirmed both theoretically and empirically.

Innovation activity has a number of specific features: it is characterized by increased riskiness, unpredictability of results, delayed effect (the long-term nature of obtaining results), and at the same time the potential possibility of obtaining high profits. The effectiveness of innovation activity is determined by the degree of effectiveness of innovations compared to the costs of an entrepreneur for their implementation and implementation. Innovations often bring a delayed effect, which does not appear immediately after they end.

REVIEW OF PREVIOUS STUDIES

The motivation to introduce innovations appears only when new methods of management or new technologies, firstly, remained unavailable to other manufacturers for some time, and secondly, created an opportunity to make a product cheaper or of better quality. In other words, innovations make sense in conditions when they contribute to the formation of competitiveness of both the manufactured goods and the company (Nakashydzė & Gil'orme, 2015). The main incentive for innovation is competition. Innovations become a way to gain competitive advantage, strengthen the position of the company in the industry and provide an opportunity to obtain the best financial results (Budzianowski, 2016).

Thus, it can be argued that innovation contributes to the ability of a certain business entity to lead and win the competition, resulting in additional profits (rent). Therefore, innovations should be considered solely as an integral part of the competitive market, which necessarily presupposes the presence of a systemic relation between innovation, entrepreneurship and competition (Altuntas et al., 2016). In this systemic relation, the innovation market, in which entrepreneurs meet and compete, plays the key role.

The linear model is based on the “*technological push*” hypothesis (from science to the market), the main points of which are: first, the development of scientific thought occurs relatively independently from the practice (market) and is expressed in an objectively conditioned change in scientific paradigms; secondly, the inverse relationship between the economic environment (market needs) and scientific and technological development is not significant (Gil'orme et al., 2016).

As part of this hypothesis, the innovation process is viewed as a sequential transformation of an idea into a commercial product through the stages of fundamental, applied research, experimental design and technological development, marketing, production, and finally sale. But in the economies of industrialized countries, this simplified model has become a “*non-working*” in the last 30-40 years (Malecki, 2018). This is due to the fact that the ideas that underlie innovations are distributed in society through a large number of different channels. The inconsistency of the linear model is also in the fact that it does not take into account the influence of the environment (market) on the events related to research and development, and is simply unable to reflect the complexity of the relationships between science and production. In addition, within the framework of such a model, the consumer and his requests are ignored.

METHODS

This determines the significance of the second hypothesis explaining the reasons for the innovation process, namely, the idea of “*pressure of market demand*” (from market needs to science). This hypothesis links the growth of the innovation potential of the economy to the requirements of the market.

The priority in this case is the presence of certain market needs associated with trends in the economic development of the national and global economy: innovations are actively brought into production only when demand growth requires a sharp increase in production, that is, the root cause for innovation activity, according to the second hypothesis, is economic conditions, and, above all, market factors. At the same time, the economic effect is most often received by the economic entity that has not necessarily created innovations, but has applied it or has ownership of it. Thus, in a market economy, not only innovation as a market product, but science itself, which generates innovations, is highly dependent on the market.

RESULTS AND DISCUSSION

The study of the theoretical and methodological foundations of the formation and development of the innovation potential of enterprises proved the feasibility of using the four component matrix for processes of assessment and monitoring of the development of the innovation potential based on a modified approach adapted to the innovation theme (Van et al., 2017). This approach involves the assessment of four components, three of which reflect the components of the innovation potential-resources, competences and abilities, and the fourth reflects the concrete embodiment of the implementation of the innovation potential-innovation projects.

Let us set:

$$\begin{aligned}
 R &= \{r_1, r_2, \dots, r_n\} \text{-multiple } n \text{ of enterprise resources;} \\
 Z &= \{z_1, z_2, \dots, z_k\} \text{-multiple } k \text{ of enterprise abilities;} \\
 C &= \{c_1, c_2, \dots, c_j\} \text{-multiple } j \text{ of enterprise competences;} \\
 P &= \{p_1, p_2, \dots, p_g\} \text{-multiple } g \text{ of enterprise innovation projects.}
 \end{aligned}$$

Then, it is necessary to simulate the internal structure of the relations between existing resources, abilities and competencies that are contained in the enterprise. This is convenient to do, using the main provisions of the theory of categories. The transition from the sets will be carried out by successively filling in the set of relational matrices, in the cells of which the degrees of dependence or strength of the control vectors between abilities, resources and competences are put down.

Therefore, the set $R \rightarrow Z$ describes the degree of resource involvement in the process and, accordingly, the dependence of the quality level of the ability zk on a specific resource m . The binary relation $\{RZ\}$ shows the degree of influence of each individual resource on the individual abilities, and, accordingly, the degree of dependence of the abilities on the quality of the corresponding resources. Let us determine this relation in the matrix form (here FRZ : $R \times Z$ is the corresponding function), which will have the following form (Formula 1):

$$\{RZ\} = \begin{vmatrix} F_{RZ(r_1z_1)} & F_{RZ(r_1z_2)} & \dots & F_{RZ(r_1z_k)} \\ F_{RZ(r_2z_1)} & F_{RZ(r_2z_2)} & \dots & F_{RZ(r_2z_k)} \\ \dots & \dots & \dots & \dots \\ F_{RZ(r_mz_1)} & F_{RZ(r_mz_2)} & \dots & F_{RZ(r_mz_k)} \end{vmatrix} \quad (1)$$

Quantitative assessments of the degree of dependence or influence are set on a five-point scale.

Similarly, in the part of the matrix $\{ZC\}$ the degree of dependence, controllability of abilities zk from each specific competency ci is displayed. This binary relation represents the degree of dependence of the capabilities of the enterprise on each competence defined by the expert method, and, accordingly, the degree of controllability of each competence ci with the individual available abilities zk .

In the part of the matrix {CP}, a binary relation is considered, which represents the degree of influence of each individual competence *ci* to individual works of j-project.

In the part of the matrix {RP}, the influence of the set of enterprise resources *rn* to the set of works of each innovative project *pj* is described. This binary relation represents the degree of use of each resource in the individual works of the *j*-project, and, accordingly, the degree of dependence of the project works on the quality of the corresponding resources. The sets thus defined make it possible to determine how the resources, abilities and competencies of an enterprise are related to innovative projects. For this it is necessary to use set composition operations.

In order to determine how the individual abilities of a company are connected with certain innovative projects, that is, to get relations {ZP}, we will perform a sequential closure of the set of relations {RZ} on the set of relations {ZC}. To do this, we need to compare the degree of dependence of abilities on the quality of the corresponding resources with the dependence of the abilities of the enterprise on each competence defined by the expert method and, accordingly, the degree of controllability of each competence *ci* on the individual available abilities *zk*. Quantitative assessments of the effectiveness of the impact of a particular ability on individual projects can be obtained by calculating the weighted average of the degree of resource attraction in each specific project.

The compositional rule that will be used for this gives a relation which elements are determined.

$$F_{ZP(z_k p_g)} = \frac{\sum_{t=1}^n F_{RP(r_n p_g)} \times F_{RZ(r_n z_k)}}{\sum_{t=1}^n F_{RP(r_n p_g)}} \tag{2}$$

Similarly, the calculation of competencies is carried out.

The relation {ZP} obtained using the compositional rule is characterized by the corresponding matrix (Table 1), where the value is rounded to whole numbers.

| Table 1 INFLUENCE OF INNOVATION ABILITIES ON THE PERFORMANCE OF WORK ON INDIVIDUAL INNOVATION PROJECTS | | | | | | |
|--|----|-----------|------------------|-----------------------|---------------|----------------------|
| Factors of influence | | | Abilities (Z) | | | |
| | | | z1 procedures | z2 business models | z3 culture | z4 venture groups |
| Projects (P) | p1 | Project 1 | | | | |
| | p2 | Projec 2 | | | | |
| | p3 | Projec 3 | | | | |
| | p4 | Projec 4 | | | | |
| | pg | ... | | | | |

Similarly, the compositional rule applies to finding the closure of the just-received relation {ZP} on the relation {CP}.

By applying the compositional rule in various combinations, it is possible to determine how each project depends on the quality of resources, knowledge, experience, skills, and quality of business processes in an enterprise. As a result, a comprehensive assessment of the resource

base, competencies and abilities of the organization will be obtained for the successful implementation of innovation projects. Using this method, it is possible to determine which innovation competencies do not need or need to be developed, and as a result-the organization has an idea of which projects it is capable to implement now and which in the future with the development of relevant competencies and so on.

Since innovation solutions are the product of intellectual activity, therefore, enterprises should be interested in attracting creative workers, developing their abilities and skills contributory to the creation of innovations. The problem of the relationship between human resource management and innovations is rightly called the modern “*black box*” (Taddeo et al., 2017). In general, this relationship is characterized as complex, multifactorial and dynamic, that even more complicates the process of its analysis and interpretation. In foreign studies, a scientific direction has been formed that focuses precisely on the human component of the innovation process-innovation working behavior, which is viewed as a complex of mental and physical activity of employees aimed at solving a number of tasks that contribute to the achievement of the main goal-innovation development (Tetiana et al., 2018a:2018b).

In fact, innovative working behavior can be viewed as a phenomenon that mediates the relation between human resource management and innovations in organizations and reflects the modern philosophy of the economic growth innovation factor humanization.

The study also confirmed the thoughts that HR technologies, such as the organization of work teams providing a variety of professional skills, an experience sharing and healthy competition, influence the innovation potential of enterprises. It is also proven that there is a relationship between personnel performance evaluation systems, incentive systems and career opportunities within the enterprise, which provides support for innovations. There is evidence not only that learning, assessment and promotion contribute to innovation processes, but also that the characteristics of these practices correspond to different types of innovation activity.

More flexible organizations in the selection make greater demands on the professional and social competence of staff, which include such qualities as responsibility, ability to adapt to new conditions, reflection, cooperation, and sociability. At flexible enterprises, routine procedures were minimized, more attention was paid to cooperative forms of work, they were largely open: they paid attention to external communications with organizations engaged in similar activities, and consultants. In addition, the positive role of competition was revealed: enterprises had to show greater flexibility and use various training programs, delegation of responsibility and team-based organizational forms in a highly competitive environment. The most effective HR-practices included the promotion of creative employees hiring, the introduction of a wide range of responsibilities as opposed to strict separation of powers, continuous training and career opportunities within the company, incentive systems focused on results, and the organization of effective teamwork.

Innovation competences are manifested in various areas, such as: creation of conditions for research projects, for example, when making appropriate changes in the organizational structure; establishment of constructive relationships with other organizations; generation of new ideas; innovation promotion; implementation of innovation projects, as well as organization of opportunities for process reflection of innovation development (feedback) (Yu et al., 2018). With the help of a formalized innovation strategy and purposefully organized actions for personnel management, one can influence the degree of development and manifestation of these forms of innovative behavior (Tetiana et al., 2018).

The main factor for the successful development of innovation competencies, in our opinion, is harmonization of relations between the participants of the innovation process, which consists in creating and maintaining a favorable innovation climate in an organization, which manifests itself in various aspects of its life activity. In fact, this entails the leadership with the system model of human resources management, which includes an effective organizational structure, communication system, staff diversity (by age, sex, knowledge, experience), methods of encouraging and rewarding employees who have achieved success in the field of innovation.

The introduction of innovative technologies requires leaders who are able to create teams of like-minded people and consolidate wide categories of personnel around the goals of innovation development and who possess the competence of forces, motivation for innovative activity. In fact, the leaders serve as a “*trigger*” of transformations, including innovative ones. For the success of such transformations, the leaders themselves must be “*charged*” with innovations, unconditionally believe in them, practice the principles of innovative development, and also appreciate the qualities in people around them who are permanently linked with innovations (Vel et al., 2018).

CONCLUSION

In this situation, it is logical to assume that innovation values should become the core of the system of value orientations of managers. Ideology is a powerful factor determining the characteristics of the company and its position in the market, which embodied in the vision, mission, declared values of the company and the principles of personnel management. Corporate ideology can determine the innovation development of a company and charge its personnel with innovation activity or, on the contrary, hinder the manifestation of innovation activity and success in innovation.

The foundation of corporate ideology is laid by the founders of the company and senior executives. It is in the corporate ideology that their value orientations are reflected.

Corporate ideology is a tool to achieve the company's strategy, therefore, it is expected to be thoughtful, in systematic connection with the business goals and priorities of the company. Corporate ideology, as a rule, is disclosed in such corporate documents that describe the strategy and policy of personnel management, code of business conduct, standard of culture management, etc. A number of companies have developed a personnel management policy, a corporate code of business conduct, a personnel management strategy, and a corporate standard of culture management.

Improvement of innovation effectiveness is possible through the use of the principle of humanization of the development of innovation potential, that is, reliance on key competencies. To manage the development of the innovation potential of an enterprise, a dynamic model is proposed, based on identification and analysis of innovation resources, abilities and competencies, which provides for sequentially cyclical implementation of the following steps: firstly, analysis of the components of the innovation potential; secondly, selection of targeted innovation projects; thirdly, determination of correspondences between the components of the innovation potential and target projects; fourthly, program design for the development of innovation potential.

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