

Innovation process in a knowledge-intensive organization: conditions for the efficiency



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The paper discusses the conditions for achieving the required efficiency of the innovation process in a knowledge-based organization. A model to evaluate the efficiency of the innovation process is presented. The model includes four interrelated and interdependent subsystems: generation of new knowledge, generation of creative solutions based on new knowledge, implementation of innovations, and institutionalization of innovations. It is shown that an institutionalization subsystem is largely determined by the level of development of an innovation culture of both individuals involved in the innovation process and the entire team of an organization.

Keywords: innovation process, knowledge-intensive organization, model of innovation process, innovation culture.

Introduction

The innovation process in a knowledge-based organization (an enterprise, a research institute, a higher education institution, etc.) is intended to overcome the contradictions arising within the socio-cultural system, for the purpose of the transition to a knowledge-based economy. A dominant factor in this economy is the transformation of new knowledge into a principal component of the productive forces, into intellectual resources of a knowledge-based organization.

Intellectual resources (capital, assets) of a higher education institution are explicit (expressed) and implicit (not expressed) results of intellectual activities of an individual and the entire team of a higher education institution, reflecting their abilities, skills, and combined knowledge [1]. With regard to the higher education institution as a participant of innovation activities, the innovation process should be considered as a basic mechanism of self-development of a person and the system of higher vocational education, improving their ability to generate ideas. Nowadays, a knowledge-based organization (to which any higher education institution should be referred) that has launched the process of innovation-based development, immediately gets into competitive environment where staying afloat is only possible through the innovation race and ever-increasing

innovation output. The propensity of creative individuals, organizations, and the society to innovations should be based on an understanding of the essence of the innovation process and its constituent subsystems.

Innovation process as a complex dynamic system

Based on the subject-matter of innovation, the paper [1] provides the following definition: «innovation is an integrated process of creation, distribution and use of new practical means (novelty) to meet human needs changing in the course of the development of social and cultural systems and their actors.»

This definition of innovation is acceptable to any sphere of human activity: economic, technological, scientific, administrative, educational, etc. In this context, the innovation process can be represented as a set of subsystems: generation of new knowledge, generation of creative solutions based on new knowledge, implementation of innovations, and institutionalization of innovations.

It is obvious that the innovation process functions as a complex dynamic system. A lack of understanding of the essence of the innovation process often leads to seeing it as a routine activity, perceived as a linear process from the science to the profits gained in a market. The specific nature of complex and uncertain dynamic systems

places new, higher requirements for people involved in such systems. An actor of the innovation process «has to think based on not ‘causal chains’, but ‘causal networks’» [2].

This results in situations that are challenging due to not only the need to choose one of many alternatives, but also the fact that any problem leads to a variety of consequences that must be considered. An actor of the innovation process should not only identify relevant signs of the situation on the ground, but also know the structure of the system. The situation at hand is only the current state of the system and its variables. One should not only understand what happens, but also predict what will or may happen in the future. This requires structural knowledge of how the system variables are interrelated and how they influence each other. Ideally, this knowledge is represented in the form of mathematical functions. However, under certain conditions it can be represented in the qualitative form: «if x increases, then y decreases (increases)». A common set of such assumptions related to unilateral or multilateral, simple or complex relations among variables of the innovation process as a complex dynamic system is called a «model of reality» [3]. It can be conscious (explicit) or be in the form of implicit knowledge, which is common among specialists in a particular field of knowledge. In any case, an actor of the innovation process generally has to deal with incomplete and incorrect data or hypotheses. Such working conditions arise in dynamic systems, to which the innovation process belongs. In such situations, people prefer to consider inaccurate assumptions about the system to be correct, clinging tenaciously to clearly false hypotheses.

Model to evaluate the efficiency of the innovation process

There is a principle of dominant (priority) development [4] in a triad constituting the innovation process which is presented in Fig. 1 and includes subsystems of generation of new knowledge (science) E1, generation of technological solutions based on new knowledge (technology) E2, and implementation (production) of innovations E3.

For the effective deployment of the innovation process to ensure the transition of a knowledge-based organization into an appropriate state, the development rate of a product (technology) must exceed the production growth rate and the rate of technological development. Formally, this principle can be expressed by the following relation:

$$dE_1/dt > dE_2/dt > dE_3/dt,$$

where E_1, E_2, E_3 are generalized parameters that characterize the development level of the respective subsystems: science, technology, and production. The required (appropriate) values of $E_1, E_2,$ and E_3 will be determined by the required (appropriate) level of the transition of a knowledge-based organization into a new state, which depends on the complexity of contradictions arisen within the organization and requires additional intellectual and material resources to overcome these

contradictions. Hence, the appropriate efficiency of the innovation process (EIP) EA will depend on the function of three variables: $E_A = F(E_1, E_2, E_3)$. In turn, achieving EIT level of E_A depends on the organization’s potential in terms of basic science η_1 , applied research η_2 , and production and technology η_3 . The coefficients η_1, η_2, η_3 should be seen as a ratio of the current development levels of science, technology, and production within the organization to the respective appropriate (required) levels. In most cases, the organization may not be ready to overcome any contradictions at the time of the launch of the innovation process and, therefore, the values of η_1, η_2, η_3 are usually less than one. Consequently, the potential efficiency of the innovation process E_P will be determined as a function of more variables: $E_P = F(E_1\eta_1, E_2\eta_2, E_3\eta_3)$.

Accordingly, the value of E_P will also determine (Fig. 1) a lower potential level of a possible transition of the organization into a new state. However, the real EIT E_R is largely (and sometimes crucially) dependent on the subsystem of institutionalization of innovations and its current level E_4 , which depends on the level of innovation culture η_4 of both individual actors of the innovation process and the entire team of an organization [1].

The term «innovation culture» is used in the scientific literature to emphasize that now it is not enough to just talk about knowledge and skills required for innovation, it is necessary to show the importance of understanding how a person interacts with this knowledge, how new knowledge can influence the structure and the inner world of an individual and the society as a whole. The innovation

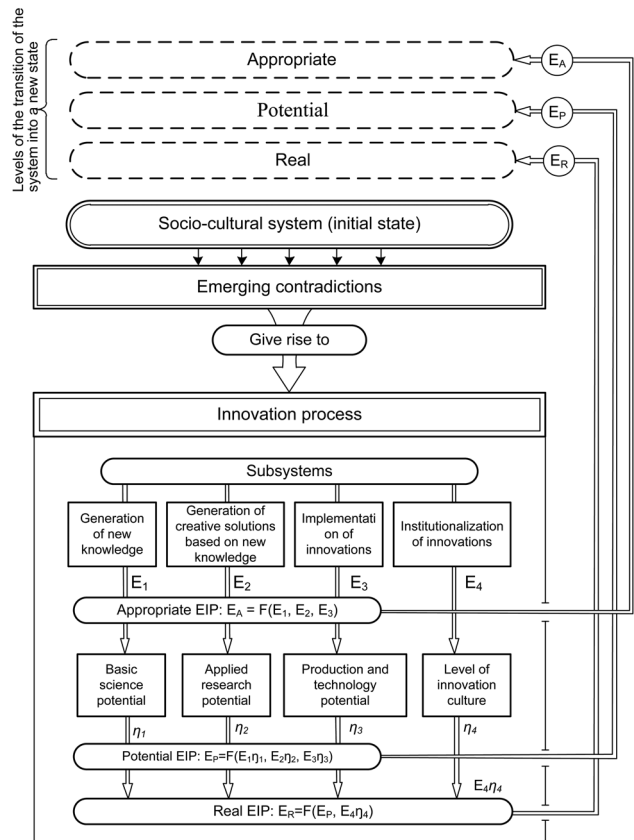


Fig. 1. Model to evaluate the efficiency of the innovation process (EIP) as a function of the state of its subsystems

culture manifests itself in embracing innovation by an individual or a human community, and in their willingness and ability to participate or contribute to or at least not to prevent from the implementation of innovations with anticipated positive effects. The innovation culture can be seen as a complex social phenomenon, which combines scientific, educational, and cultural matters with social and, above all, professional practice. In other words, the innovation culture is a new historical reality — it is a culture of the community which consciously transforms their life arrangement. However, it is necessary to distinguish the concepts of «innovation culture of a society (organization)» and «innovation culture of an individual.»

The innovation culture of a society (organization) can be seen as a set of material and spiritual values that form innovation infrastructure and innovation institutions in the society and provide for a conscious transformation of socio-cultural forms of life arrangement.

In turn, the innovation culture of an individual is an area of his/her spiritual life, which reflects his/her values embodied in motives, knowledge, and skills, in models and standards of conduct, and ensures his/her openness to new ideas and ability to support and implement innovations in all areas of life [1].

Returning to the model to evaluate the efficiency of the innovation process presented in Fig. 1, the real efficiency E_R will be determined by a function which is further dependent on the actual level of development of the subsystem of institutionalization of innovations:

$$E_R = F(E_p, E_f, \eta_1).$$

This model considers in a consistent manner potential and real capabilities of the society and an individual knowledge-based organization or an educational institution to implement the launched innovation process, which is a key condition for the competitive advantage of the organization. The above conditions determine the efficiency of individual subsystems as well as the innovation process as a whole.

Inadequate development of any of the subsystems dramatically reduces, and in some cases eliminates the opportunity to implement the innovation process, to achieve the desired higher level of the transition of an organization into a new appropriate state.

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Инновационный процесс в наукоемкой организации: условия достижения эффективности

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Рассмотрены условия достижения требуемой эффективности инновационного процесса в наукоемкой организации. Представлена модель оценки эффективности инновационного процесса. Модель включает взаимосвязанные и взаимообусловленные четыре подсистемы: генерации новых знаний; генерации творческих решений, основанных на новых знаниях; реализации новшеств; институционализации нововведения. Показано, что подсистема институционализации в значительной степени определяется уровнем сформированности инновационной культуры как отдельных субъектов инновационного процесса, так и коллектива организации в целом.

Ключевые слова: инновационный процесс, наукоемкая организация, модель инновационного процесса, инновационная культура.

НАЧАТ ПРИЕМ ЗАЯВОК НА УЧАСТИЕ В МНОГОСТОРОННЕМ КОНКУРСЕ В РАМКАХ ЕВРОПЕЙСКОЙ ПРОГРАММЫ ЕВРОТРАНСБИО

Фонд содействия начинает сбор заявок на участие в конкурсе «Международные программы», который направлен на поддержку российских организаций, участвующих в выполнении инновационных проектов в рамках двусторонних и многосторонних международных программ сотрудничества, подтвержденных подписанными Фондом соглашениями и меморандумами.

Конкурс ориентирован на поддержку предприятий, выполняющих перспективные разработки и имеющих зарубежных партнеров, за счет взаимодействия в которых возможно повысить конкурентоспособность своей продукции и коммерциализовать результаты научно-технической деятельности за счет получения доступа к передовым технологиям и экспертизе, а также возможности вывести свою (а также совместно разработанную) продукцию на зарубежные рынки.

Гранты предоставляются малым инновационным предприятиям в размере не более 15 млн руб. при условии финансирования из собственных и (или) привлеченных средств третьих лиц в размере не менее 50% от суммы гранта. Срок выполнения НИОКР – 18 или 24 месяца.

В конкурсе могут принимать участие юридические лица, соответствующие 209-ФЗ от 24.07.2007 г., подавшие заявки с приложением необходимых документов в автоматизированной системе Фонда online.fasie.ru. Перечень критериев и порядок оценки представлены в Положении о программе.

Заявки принимаются с 18:00 (мск) 1 декабря до 12:00 (мск) 9 февраля 2016 г. Срок рассмотрения не может превышать 130 календарных дней с момента окончания срока приема заявок.

Подать заявку можно через систему АС «Фонд-М» по адресу <http://online.fasie.ru>. Контактное лицо по конкурсу: Левченко Ольга Георгиевна, levchenko@fasie.ru.

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