MANAGEMENT OF INNOVATION PROCESSES IN THE BUSINESS ENVIRONMENT IN THE CONTEXT OF DIGITALIZATION OF THE ECONOMY

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Abstract. *The process of digitalization is characterized by transformation, the introduction of digital technologies to optimize and automate business processes, improve communication with consumers and increase the efficiency of business activities. Today, the introduction of innovations that ensure business digitalization is a catalyst for economic growth and long-term competitive advantage. The rapid and profound effects of the transition to digitalization will only be possible when digitalization becomes the basis of the life of our society, business, and government agencies. In addition, Ukraine's digital development is about creating market incentives, motivations, demand, and shaping the needs for the use of digital technologies, products, and services among Ukrainian industries, spheres of life, business, and society for their efficiency, competitiveness, and national development. There is a need to organize the company's activities taking into account the peculiarities of the transition to new principles of the digital economy, forecasting possible related problems, as well as developing solutions and proposals to minimize the negative consequences and enhance the main result of the company's activities. A system of effective management of available resources and business processes of an enterprise based on innovative technologies and methods of business process optimization, which are becoming an important management tool through continuous process improvement and optimization, can provide significant competitive advantages. Thus, it is advisable to analyze the system of managing innovation processes in the business environment in the context of the digitalization of the economy. The purpose of the study was to study the features of innovative process management in the business environment in the conditions of digitalization of the economy. The results of the study show that a favorable innovation environment should be formed proportionally. The disproportion of the innovation environment towards content, technology, or competencies leads to unfavorable conditions for innovation, as well as the emergence of an "IT trap" on the path of a business entity to the digital economy. In view of the above, it is worth noting that the digitalization of society is expanding the range of subjects of innovation activity, including Internet users. The innovative potential of individuals is currently underestimated, and it is enormous.*

Keywords: *digitalization, innovation processes, business environment, digital transformations, management.*

Digitalization in Ukraine is still happening at a much slower pace than in developed countries. Nevertheless, today's rapidly changing business environment requires managers to use the latest digital technologies and, accordingly, new management approaches. Today, the introduction of innovations in business practices that ensure its digitalization is a catalyst for economic growth and long-term competitive advantage.

The approved goals and directions of the Strategy for the Development of the Information Society of Ukraine, approved by the Cabinet of Ministers of Ukraine on May 15, 2013, No. 386-p. The basis for the development and implementation of the Strategy is the Constitution of Ukraine and the Law of Ukraine "On the Basic Principles of the Development of the Information Society in Ukraine for 2007-2015", other regulatory acts, according to which the state creates conditions for the development of the information society in Ukraine, indicate that IT infrastructure and information resources should facilitate the creation of innovations. Information technologies and information resources alone create new opportunities for creating innovations, but are not sufficient for organizing innovation activities in the context of digitalization.

Innovation activity can be represented as a linear process that involves the sequential passage of several stages. Most researchers define basic research as the initial stage of innovation activity. However, research results show that there is no well-established mechanism for transferring the obtained research results to innovation activities.

The processes of scientific research and innovation activities have important differences, the main ones being the goals of these processes. The purpose of scientific research is to obtain new scientific knowledge, while innovation is aimed at developing an innovation that meets market demand and profitability requirements. The results of scientific research contribute to solving a scientific problem. Often, a scientific contribution may consist in finding approaches and methods that are not applicable to solving a scientific problem, but this contribution significantly shortens the path to its solution in further research.

Scientific research is usually funded in the form of grants and projects that provide for reimbursement of costs based on research results. Financing of innovation is perceived as an investment in the future achievement of economic effects by business entities, gaining competitive advantages, increasing market share, reducing the cost of customer service, etc.

Fundamental and applied research should be distinguished as a special type of activity carried out by research organizations that are involved in the generation of all types of resources for innovation. Research organizations create information resources, improve or develop technologies, acquire new knowledge and competencies in performing operations, solving economic problems, etc. A business entity (enterprise) receives information about scientific research and its results through access to information resources. It is determined that science and innovative competitiveness have a great influence on each other.

Business entities, as a rule, do not conduct scientific research, but are directly involved in the creation of these innovations, which will be new, popular in the market and will bring profit. The impetus for creating an innovation is the search for an idea as a result of creativity. Scientists note that under the influence of external factors, the innovation process is formed, which includes: the formation of an idea (or concept), the development of an innovation (prototype) and innovation.

One of the researchers of creative thinking, Edward de Bono [1], notes that the need for information and its analysis are the constituent elements of creative thinking.

In the XX century, domestic and foreign scholars began to consider creative activity as a system that covers almost all business processes and requires appropriate methods and technologies. Approaches to the organization of creative activity have emerged, the most popular of which are the Inventive Problem Solving Theory (IPT) and lateral thinking. Inventive Problem Solving Theory (IPT) is a science that studies the objective laws of system development and develops a methodology for solving problems, i.e., rules, techniques, methods, laws that can be used to invent and find solutions to problems.

In foreign and domestic practice, the design thinking approach to organizing creative activity and searching for innovative ideas is becoming popular. Methods of searching for an idea are in many ways similar to methods of searching for new knowledge.

For a business entity, the starting point of the innovation process is the search for an idea. The scheme of the innovation process is shown in Fig. 2.1. Depending on the type of economic activity of a business entity and the innovation it creates, the innovation process may be supplemented by various stages. An innovation process aimed at bringing an innovation to the market may include the stage of acquiring a ready-made innovation.

Innovations of various kinds and types may result from innovation activities. Innovations in the economy are manifested mainly in the form of reducing the cost of goods or in the form of new qualities of goods that are preferred by consumers. In order to win in the competition, innovation is one of the most important means.

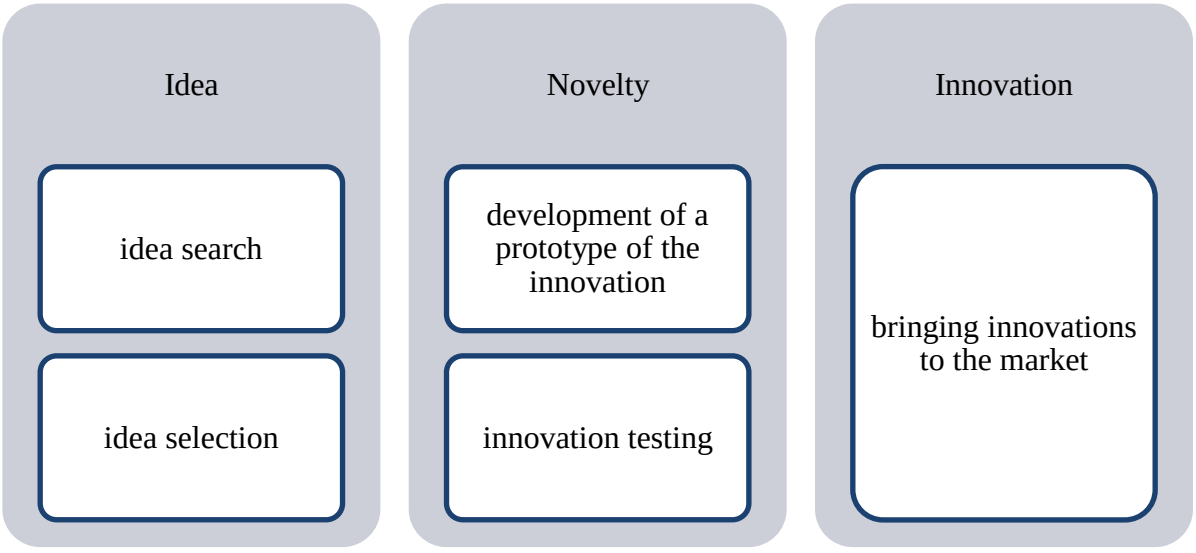

Figure 2.1. Diagram of the innovation creation process

Source: compiled by the authors

What unites innovation processes and the stages of their implementation is that they are creative. The first step in creating an innovation or acquiring it is to find an idea. At the first stage, the problem is formulated, possible solutions are identified,

solutions are analyzed and evaluated according to the selected criteria, and the best option is chosen. Creativity is of great importance in finding a social problem or economic need that can be addressed by an innovation. It is scientific and technical creativity that allows turning an idea into an innovation, and an innovation into an innovation.

Also, the organization of production and bringing an innovation to the market requires a creative approach.

Specialists who create innovations should develop creative thinking. F. Webster [2] notes that despite significant differences in views on the form and content of the information society, almost all scientists agree that human creativity, which includes analytical processing of information and creation of new knowledge, is becoming the most popular and valuable.

In the context of the spread of smart IT and the penetration of automation into many processes, professionals must first of all be ready to creatively search for solutions, ideas and future prospects.

Internal resources of a business entity are not enough to create effective innovations. Generating and accumulating types of innovation resources is an expensive and time-consuming process. Internal information resources contain information about the entity's developments, products, services and processes. Competencies include the amount of knowledge and experience accumulated by the entity in solving creative tasks [3].

Internal resources constitute the innovative potential of a business entity, which allows it to use the most important resources in its innovative activities. Experts in the field of innovation management say that "in-house research and development is an excellent means of increasing the ability to perceive new things". Businesses need experience in creating innovations to acquire and disseminate effective innovations. Thus, the innovation environment should provide the opportunity to act as both suppliers and consumers of innovations.

External resources for a business entity serve as a means of access to global experience and achievements (Fig. 2.2). The theoretical provisions of the concept of

innovation environment are that the most important resources of innovation activities are accumulated in the external environment as a result of the activities of many business entities. The most important resources include content, technologies and competencies.

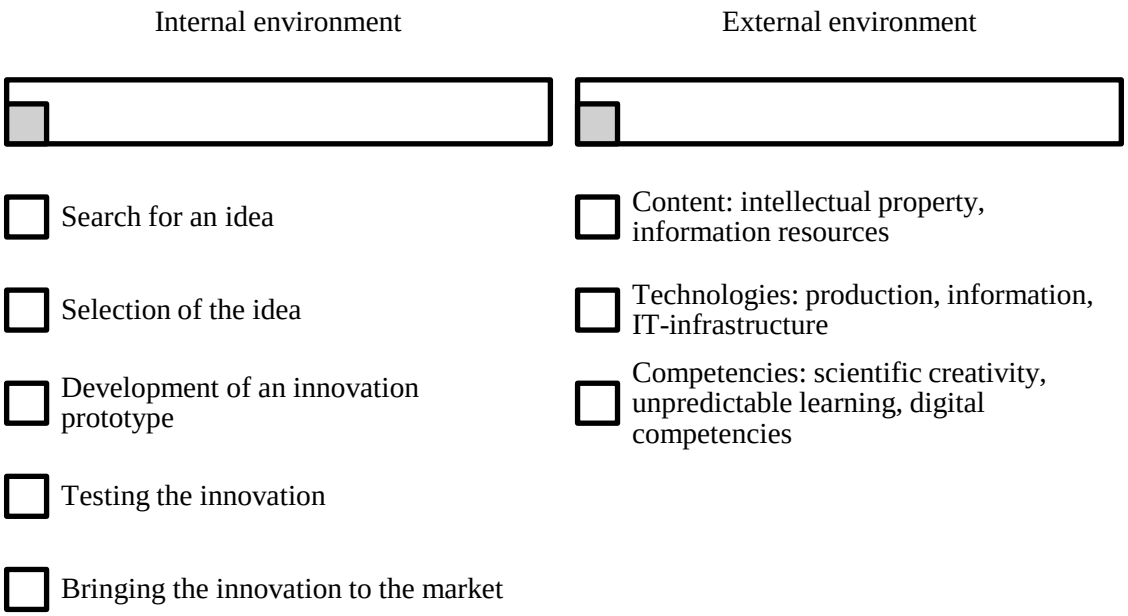

Figure 2.2. Resource support of the stages of the innovation process

Source: compiled by the authors

The resources necessary for innovation are contained in the environment in which the business entity operates. It is customary to distinguish between internal and external environments in relation to an entity. The external environment is determined by various factors, including market, political, social, cultural, geopolitical, etc. In the scientific literature, the concepts of "environment" and "space" can be found in the same sense. Often, the concept of "space" is related to the regional economy, where the geographical factor is decisive. There are also various definitions of the external environment in the scientific literature, including environmental, market, educational, institutional, socio-cultural and political environments [4].

The variety of approaches to defining and systematizing the environment of business entities indicates the complexity of this concept.

Financial factors are often put at the heart of the potential for innovative development of the domestic economy. A number of studies reveal a lack of financial resources for successful innovation activities of domestic enterprises. Researchers emphasize that manufacturing enterprises need financial and investment mechanisms to create innovations to a greater extent, while the factors of availability of IT, information resources and competencies (qualified personnel) fade into the background. However, the study of quantitative indicators of access to IT, information resources and competencies for innovative activities of enterprises demonstrates the shortage of these resources for domestic enterprises. Financial support is undoubtedly important for any activity, as well as the ability to acquire the necessary resources for its implementation.

The need to introduce the concept of innovation environment is due to the specifics of innovation activity and its high importance for economic growth. Despite the fact that the concept of "innovation environment" is popular, there is no common understanding among domestic and foreign scholars of what to include in this Concept [5].

Let us consider approaches to defining the content of the innovation environment. In terms of content, the innovation environment is a set of innovations that create new opportunities for the development of a particular area.

The concept of "innovation environment" appeared in the 1980s as a means of analyzing the systemic conditions for organizing the innovative activities of economic entities in order to create new production and develop new markets. One of the first scholars to define this concept was Manuel Castells, who viewed it "as a specific set of production and management relations based on social organization, which generally shares a work culture and instrumental goals aimed at generating new knowledge, new processes and new products." This definition is based on a systemic principle, where the researcher considers the innovation environment as a set of different systems that ensure the creation of innovative products, but only in the process of organizing and managing production [6].

There are various definitions of the innovation environment in the scientific literature. Let us consider some of them:

- innovation environment (IE) - a set of certain components of the socio-economic, organizational, legal and political environment that ensure or hinder the development of innovation activities to realize and increase innovation potential. It is divided into external and internal environment. This concept does not clearly define the specifics of the innovation environment, but rather considers the interconnection of different environments;

- innovation environment - a set of mechanisms, tools, processes, infrastructure elements and human capital that support innovation activities. In this context, the mechanisms and tools that support innovation are defined [7].

All of these definitions reflect the subjective views of researchers on defining the boundaries within which the innovation system will be created. It should be noted that there is no single definition in the regulatory framework yet.

The innovation environment should be understood as a set of systems that are the fundamental core that forms innovation activity, based on the classical theory of innovation by J. Schumpeter.

There are several approaches to considering the essence and content of the innovation environment:

- social approach, in which the innovation environment is understood as "...a set of legal, material, financial, economic, political, spiritual conditions of existence, the formation of interacting individuals, social groups, institutions, cultures that ensure the development of innovations and their further transformation into innovations. In other words, an innovation environment is a social space organized in a certain way...";

- activity-based approach, in which the innovation environment is understood as "...a certain socio-economic, organizational, legal and political environment that has developed and provides (stimulates) or inhibits the development of innovation activities..."

- the environment approach itself. This approach considers the innovation environment either as "...a combination of the internal and external environment of the participant of the innovation process..." or "...as the environment of the participant of the innovation process, which has an indirect or direct impact on the conditions of innovation activity and its result..." or "...the environment that constitutes the external environment of any participant of the innovation process, which has an indirect or direct impact on the conditions of innovation activity and its result...".

It should be noted that in the latter aspect (the environmental approach), the innovation environment is also considered not only as an environment, but also as "...socio-economic, legal environment...", in which "...transfer and use of knowledge, ...commercialization of innovations..." takes place.

Some studies present the innovation environment as a set of academic, educational, professional, technological, economic, entrepreneurial, expert and other environments.

However, such broad definitions do not allow for the development of correct tools for assessing the state of the innovation environment and managing its formation.

In the works of some scholars, great attention is paid to technological factors of the innovation environment, such as Internet penetration and development of technological infrastructure and access to it, provision of the economy with highly productive jobs, as well as social aspects. These approaches are aimed at studying the internal environment of a business entity for conducting innovation activities, namely the intensity of IT use, the impact of IT and the Internet on the state of the social and economic environment [8].

The methodologies of international organizations, on the contrary, emphasize the state of the macro environment of innovation. The World Bank identifies four pillars of the knowledge economy in its measurement of the knowledge economy: training, adaptation of innovations and technologies (use of innovations and technologies), information infrastructure, and a favorable economic and institutional regime. Investments in these pillars of the knowledge economy should lead to

increased productivity and knowledge-based economic growth. The World Bank's methodology is designed to help countries identify the challenges that need to be addressed and the opportunities they can exploit in the knowledge economy. Through its assessments and research, the World Bank draws the attention of policy makers and entrepreneurs to issues that require government support and future investments necessary for the country's transition to a knowledge economy. The peculiarity of the World Bank's methodology is that it includes a large number of expert assessments, which are subjective indicators.

Some leading researchers insist on the allocation of regional classification features when considering the innovation environment. This is the place where services are created and consumed in the electronic environment, the territorial factor is not critical. Despite the fact that domestic software developers are separated from American ones by an ocean, they are heavily influenced by american IT companies [9].

Many years of research and accumulated empirical data indicate that innovations are created taking into account the accumulated global experience and knowledge in almost all regions and sectors of the economy. The globalization trend in information support of innovation activities leads to the fact that information about innovations or new knowledge is instantly spread around the world, thereby removing any spatial barriers to access to them. It should be noted that globalization does not solve the problem of overcoming the digital divide in economic development by individual regions.

The example of high-tech corporations Google shows that these companies go beyond the IT industry and the World Wide Web. They find applications for their developments in various economic spheres, including education, catering, retail, etc., which they had not considered for economic activity.

All enterprises operate in an environment that, thanks to the Internet, globalization and convergence trends, is becoming common to them. Differences arise in the subjects themselves in terms of using the capabilities of this environment to access the resources of innovation and create innovations.

The innovation environment can be understood as the environment in which business entities interact with innovation resources and other entities (customers, partners, suppliers, etc.). In the previous phases of socio-economic development, this interaction took place within the internal environment, and in these conditions it includes external resources and external actors. Thus, the environment of innovation activity becomes external.

The innovation environment performs a number of important new functions:

- providing access to external (for organizations) resources of innovation activity;

- involvement of external actors in the organization's innovation process, for example, through crowdsourcing mechanisms or living laboratories

- integration of innovation resources into the ecosystem, which allows organizations to use resources taking into account their interconnections.

The environment defines the basic conditions, the change of which leads to the support of certain activities or the creation of barriers to their implementation [10].

The concept of innovation environment is included in such concepts as the knowledge society and the digital economy. But at the same time, the concept of "innovation environment" is generic for a number of other concepts (Fig. 2.3).

Let's consider the concepts included in the ontology of the concept of creating a favorable innovation environment for the digital economy.

A knowledge society is a society whose development is ensured by expanding the employment of citizens in the field of knowledge creation, dissemination and use, where the IT infrastructure guarantees all stakeholders access to IT and information resources.

An information society is a society in which information and the level of its use and accessibility have a fundamental impact on the economic and socio-cultural conditions of citizens' lives and the economic activity of enterprises.

The digital economy - is an economic activity characterized by the growth of economic efficiency through the use of information resources and the totality of IT.

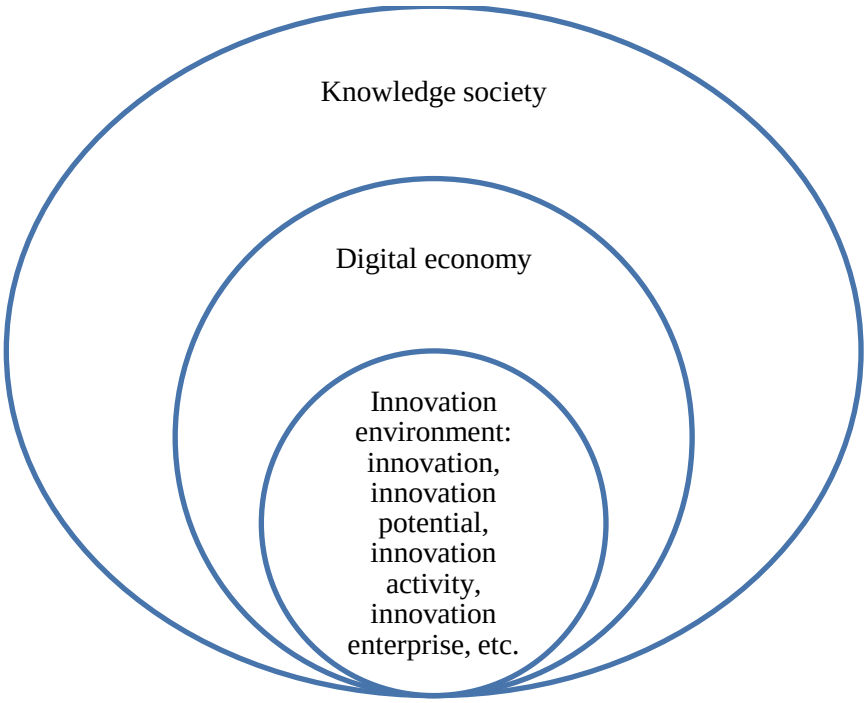

Figure 2.3. Relation of the concepts of innovation environment to other concepts

Source: compiled by the authors

The innovation environment includes the following concepts:

Innovation - is the final result of innovation activity, which is embodied in the form of a new or improved product introduced to the market, a new or improved technological process used in practice, or a new approach to social services.

The innovation potential is the ability of a business entity to create innovations, which is expressed in the provision of personnel, intangible assets, information resources, enterprise development strategy and innovation policy [11].

Innovative entrepreneurship - is a special innovative process of creating something new, a business process based on a constant search for opportunities and a focus on innovation.

Innovative development - is a process of qualitative transformation of technical and technological factors and organizational and economic conditions of production and economic activity of socio-economic systems based on the creation and implementation of innovations.

Innovative activity - is a type of activity related to the transformation of ideas into technologically new or improved goods or services introduced in the market, into

new or improved technological processes or methods of production (transfer) of services used in practical activities.

The innovation process - is a set of actions to transform knowledge or ideas into innovations, usually including the stages of searching for an idea, developing an innovation and bringing an innovation to the market.

In the context of the transition to the digital economy, the innovation activity of business entities directly depends on the state of the innovation environment.

The innovation environment of business entities largely depends on external factors and consists of the conditions of access to external resources for innovation. If access to resources is not complicated, it will be a favorable innovation environment, and if access to resources is limited and/or complicated, the innovation environment will be unfavorable [12].

The concept of forming the innovation environment of the digital economy ensures the development of this environment in such a way that business entities have access to the resources of innovation in the context of digitalization of society.

The study has shown that the most important information resources for innovation in the development of the digital economy are divided into three types: content, technology and competencies. Access to these resources has a great impact on the innovation activity of business entities in developed and transition economies.

In the process of innovation activity, a business entity interacts with the innovation environment in an individual way (Fig. 2.4).

An entity uses an individualized set of resources from the external environment through mechanisms such as contracts, licenses, or government support measures. The composition of the innovation environment resources used by an entity depends on the type of activity that is core to the entity. Innovation activity will depend on the internal factors of the entity, while external factors will serve to limit its potential. The environment determines the basic conditions of a particular activity. Changes in conditions lead or may lead to the support of certain activities, as well as the creation of barriers to their implementation.

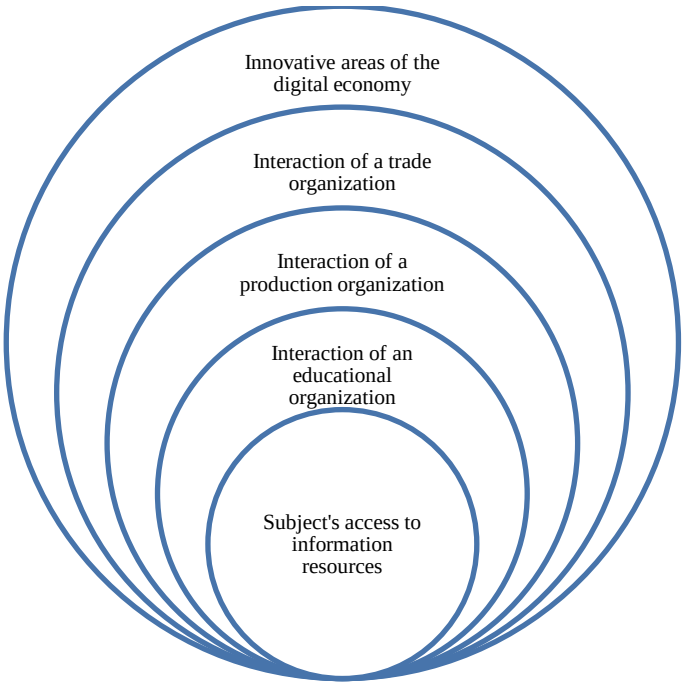

Figure 2.4. Interactions of business entities in the innovation environment

Source: compiled by the authors

The concept of forming an innovation environment is based on the development of information resources of innovation activities: content, technologies and competence. In general, the transition from one stage of IT application to the next leads to the expansion of the innovation environment, which makes new types of innovation resources available to business entities for use.

The development of one type of information resource for innovation should be supported by the proportional development of other types. In order for a business entity to obtain valuable information or new knowledge from an increased amount of content, it needs access to appropriate computing power (technologies) and competencies. At the same time, the emergence of new technologies should be accompanied by new content and competencies [13].

The development and spread of IT creates opportunities to engage citizens, consumers of goods or services, clients, partners, and public authorities in innovative activities. Expanding the range of innovation actors allows for the use of new methods of collecting ideas, such as crowdsourcing, testing an innovation or

prototype, and bringing an innovation to market through new competencies and information resources.

Changes in the content, technologies, and competencies of the IT economy are presented in Table 2.2.

Table 2.2. The most important information types of resources of innovation activity at the stages of using IT economy

Stage	Content	Technologies	Competencies
Automation	Structured data	Automated processing of structured data	Collection, storage and processing of structured data
Informatization	Information resources, including structured, unstructured, and unstructured data	Corporate information systems, decision support systems	Search, evaluation and processing of information resources
Digitalization	A digital data resource that is updated in real time	Large data, neurotechnologies and artificial intelligence, distributed ledger systems, etc.	A wealth of knowledge, skills and abilities to apply digitalization achievements in economic activities

Source: compiled by the authors

The development and growth of each type of innovation resource is the result of the activities of many entities that act independently of each other, and, on the other hand, combine their computing devices and communication lines into a common IT infrastructure that allows them to collect and process digital data together. Accordingly, the innovation environment can be measured by the sum of all the resources available to the subjects of their activities [14].

In accordance with the developed system of indicators of the state of the innovation environment of the digital economy, we will set targets and thresholds for monitoring the process of its formation. Given that the development of the digital economy is a global trend, and as a result of digitalization, globalization factors increase their impact on the effectiveness of innovation, the values of indicators of the state of the innovation environment should be set depending on the development of global information resources.

The threshold value of the indicator of formation of the innovation environment of the digital economy should be set only at the level of the world average. In this case, the development of the digital economy and the realization of its opportunities in Ukraine will go hand in hand with the development of the world economy.

In order to obtain advanced effects from the development of the digital economy, Ukraine's innovation environment must develop at a pace that is faster than the global average. High rates of development of the innovation environment of the digital economy are demonstrated by: China, the United States, South Korea, Japan, Germany, and the United Kingdom.

Modern official business and scientific literature introduces concepts with the adjective "digital" to emphasize the change in the stages of IT use from informatization to digitalization. Thus, the concepts of "digital content", "digital technologies" and "digital competencies" have become established. Let's consider the content of the most important types of innovation resources, access to which is necessary in the innovation environment of the digital economy [15].

Digital content as a type of innovation resource includes information resources stored in digital form. Starting from the automation stage, there has been an accumulation of arrays of structured data in digital form, which is almost the entire modern information resource. Thanks to the spread of IT, every business entity is able to use digital data in its innovation activities. A business entity can organize the collection and processing of digital data on its own or purchase these services from data providers, such as digital platforms.

At the stage of informatization, knowledge was of great value for innovation activities as the most meaningful category of information that can be used to solve problems, including the development of innovations. At the same time, the main task that has grown within the framework of information support for innovation activities is to identify the source of new knowledge, systematize it and organize access to it.

In the context of digitalization, the amount of data that can be processed using IT to find the solution to an information problem is of particular value. It should also

be noted that the amount of accumulated digital data increased more than 2,000 times between 2010 and 2021 [16].

Thus, the type of innovation resource - content - includes the entire array of data accumulated by society in digital form.

In the context of the concept, digital technologies are expressed as a set of IT that ensures the accumulation and processing of digital data. Digital technologies include, in addition to new IT, already widely known ones (artificial intelligence, 3D printer, etc.), for which the modern IT infrastructure, due to the depreciation of the technologies themselves, and the accumulation of the necessary data volumes, has made it possible to find new ways to apply them in the economy. It should be noted that back in 1990, the concepts of computer, electronic and digital technologies were perceived as identical. The popularity of certain terms varied depending on economic sectors and even continents. For example, while in Europe the most commonly used terms were "electronic library", "electronic service", etc., which by definition were electronic, in North America the term "digital" was more common and, accordingly, "digital library", "digital service", etc.

For the purposes of state policy in the digital economy, the concept of "end-to-end technologies" is distinguished. "Cross-cutting technologies are key scientific and technical areas that have the greatest impact on the development of new markets. They are organized into groups such as big data, artificial intelligence, distributed ledger systems, quantum technologies, new and portable energy sources, and others."

The composition of digital technologies can vary significantly across different sectors of the economy. For example, the research company Gartner annually publishes reports on technology cycles in various industries (education, healthcare, electricity, financial services, government, manufacturing, retail, new technologies and telecommunications) and types of economic activity (audit and risk, communications, customer service and support, finance, human resources, information technology, innovation and strategy, marketing, trade, supply chain) [17].

Digital competencies imply the ability of specialists to create innovations using digital content and technologies that increase the efficiency of economic activity. At the same time, the composition of digital competencies will vary significantly depending on the industry in which the business entity operates and the subject area in which each particular specialist works. Possession of knowledge and competencies by the relevant specialist in the subject area is the basis for the formation of digital competencies.

In order to use the achievements of the digitalization of society in innovative activities, special competencies in working with both technologies and data are required. The concept of computer literacy or information competence has been replaced by the concept of digital competence [18].

Leading scholars distinguish several types of digital skills, including general, professional, complementary, and skills in using digital economy services. The regular change of names in the designation of the necessary IT training and content reflects the fact that these requirements are constantly evolving and becoming more complex.

The results of the study show that a favorable innovation environment should be formed proportionally. The disproportion of the innovation environment towards content, technology, or competencies leads to unfavorable conditions for innovation, as well as the emergence of an "IT trap" on the path of a business entity to the digital economy.

Business entities of the above-mentioned types of economic activity are the first to move to the digital economy and create the necessary socio-economic, information and technological conditions for access to the achievements of the digitalization of society for entities of other types of economic activity.

The innovation environment is formed by many business entities, objects and relations between them, which have a direct or indirect impact on each other's economic activities. A number of scholars identify the following subjects of the innovation environment:

1. Financial institutions that provide investment support for innovative activities of business entities are subjects of innovative activities.

2. Scientific research institutes (R&D) as a source of scientific knowledge in the field of basic science and applied research are included in the list of innovative entities. It should be noted that R&D institutes are an important element of the innovation system that generates all types of innovation resources.

3. Educational institutions that provide training for innovative activities and are subjects of innovative activities. In the context of the digitalization of society, new business entities are emerging whose activities are carried out exclusively in the electronic environment of the Internet using digital data and computing devices. As a rule, these resources of innovative activity are not owned by the business entity. In the innovation environment, a new type of entity should be identified - the owners of digital data and computing power.

In view of the above, it is worth noting that the digitalization of society is expanding the range of subjects of innovation activity, including Internet users. The innovative potential of individuals is currently underestimated, and it is enormous.

Consumers of goods and services are a source of ideas for the innovation process. Business entities are certainly interested in including consumers in their innovation environment, thereby allowing them to be involved in the development and testing of their goods and services. The practice of consumers improving goods is quite common.

Economic theory has established that property relations through production (economic activity) form the basis of socio-economic relations. In the case of digitalization of society, the ownership of the most important resources of innovation is rapidly transforming.

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