ISSN 1993-3509 (online)
Экономика строительства и городского хозяйства. 2025. Т. 21, № 1. С. 15—22.
Economics of civil engineering and municipal economy. 2025. Vol. 21, no. 1. P. 15—22.
Научная статья
УДК 65.013
doi: 10.71536/esgh.2025.v21n1.2
edn: myxcpj

СУЩНОСТЬ ФАКТОРА НЕОПРЕДЕЛЕННОСТИ ПРИ УПРАВЛЕНИИ ИННОВАЦИОННЫМИ ПРОЕКТАМИ

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Аннотация. В данной работе исследуется содержание и сущность фактора неопределенности на основе движения от общих закономерностей данного явления, проявляющегося в отношении личностных источников действий и решений человека; к частным проявлениям исследуемого фактора – в условиях осуществления функций управления инновационными проектами. Гипотеза исследования заключается в явлении инициативы человеческой личности, которая выступает в качестве источника возникновения инновационных проектов (и вообще любой деятельности), и лежит в области существенной неопределенности. Согласно теме статьи, идентифицированы различные проявления исследуемого фактора по двум существенным направлениям: сознательная и реактивная неопределенность. Результат теоретического анализа научных источников позволил выделять ряд основных подходов к определению сущности фактора неопределенности, в том числе с позиции содержания проектного управления инновациями в условиях информационной среды. По результатам исследования выдвинуты соответствующие предположения по управлению фактором неопределенности в условиях реализации инновационных проектов.

Ключевые слова: управление, проектная деятельность, инновации, инновационные проекты, планирование, прогнозирование, неопределенность, информация

Для цитирования: Петрунько А. О., Загоруйко Т. И. Сущность фактора неопределенности при управлении инновационными проектами // *Экономика строительства и городского хозяйства*. 2025. Том 21, № 1. С. 15–22. doi: 10.71536/esgh.2025.v21n1.2. edn: myxcpj.

Original article

THE ESSENCE OF THE UNCERTAINTY FACTOR IN THE MANAGEMENT OF INNOVATIVE PROJECTS

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Abstract. This paper examines the content and essence of the uncertainty factor based on movement from the general patterns of this phenomenon manifested in relation to sources of human action and decision-making, to particular manifestations of the studied factor in the context of implementing innovative project management functions. The hypothesis of the study is that the phenomenon of initiative of the personality acts as a source for innovative projects (and indeed for any activity) and lies in the area of significant uncertainty. According to the topic of the article, various manifestations of the studied factor were identified in two essential areas: conscious and reactive uncertainty. As a result of theoretical analysis of scientific sources, a number of basic approaches were identified to determine the essence of the uncertainty factor, including those from the perspective of content of project management in an information environment. Based on the results of study, relevant assumptions were made regarding the management of uncertainty in the implementation of innovative projects.

Keywords: management, project activity, innovation, innovative projects, planning, forecasting, uncertainty, information

For citation: Petrunko A. O., Zagoruiko T. I. The essence of the uncertainty factor in the management of innovative projects. *Economics of civil engineering and municipal economy*. 2025;21(1):15–22. (in Russ.). doi: 10.71536/esgh.2025.v21n1.2. edn: myxcpj.

Problem statement

Modern conditions for active development of science and technology with the integration of digital technologies determine the need to develop and apply modernized models for decision support in management, including project management. The increasing capabilities of artificial intelligence allow us to control the information that is beyond the knowledge of managers, leading to the emergence of «future management» and its derivatives. Consequently, forecasting acquires a special role in planning and implementing innovative projects.

Research and publications analysis

Fundamental research on the categories of uncertainty and randomness was carried out by foreign and domestic researchers, including J. Monod, A. Schopenhauer, I. Kant, M. V. Mikhina, A. A. Radugin, E. V. Avdeenko, etc. Other researchers such as M. F. Ivanov E. V. Tsarkova, N. V. Yudina, M. Lindovsky, and A. Agraval, and some others also worked on studying the nature of the uncertainty factor and the dynamics of information environment in relation to socio-economic processes and innovative projects.

The purpose of the study

The purpose of the study is to identify the constituent elements of uncertainty factors that arise in the management of innovative projects.

The main research material

The concept of «uncertainty» has deep roots that lie in philosophical debates and discussions which continue to this day. One of the philosophical concepts is agnosticism, which considers it impossible to know the real world empirically. This phenomenon is clearly traced in M. V. Mikhina's work [2], which emphasizes differences in interpretations of uncertainty, from the standpoint of choice, knowledge, attitude and doubt, while imagination and thinking lie at the core of the concept.

An important conclusion of this work is the identification of the «directionality» element in the uncertainty management structure, which contains two key components: reactive and conscious. According to M. V. Mikhina, orientation is associated with «force»; although in this case, it is more correct to indicate «will», which not only determines the vector of activity, but also forms its starting point, which is «the reason for everything» [3].

Democritus argued that «everything in the universe is the product of chance and necessity» [4]. Randomness is a phenomenon formed by a multivariate set of external factors that can't be subjectively or objectively assessed, but necessity is also a phenomenon that is formed under the influence of external forces based on principles of direct and indirect dependency, and it can be subjectively assessed. The balance between these two phenomena determines the meaning of the proactive management, so necessity is created through adapting to randomness, which is a passive form of managing uncertainty. From this perspective, it is worth mentioning the property of teleonomy, identified by the French scientist and philosopher J. Monod, which he believed to be inherent to all living beings. Teleonomy consists in transferring design or ideas to inanimate objects, determining their structure and activity algorithm [4]. J. Monod believed that the structure of an inanimate object is not formed by internal relationships, but by the impact of external forces and factors.

The meaning of managing a conscious orientation is largely determined by «initiative», which is a direct continuation of «will» in the trajectory of transforming an idea into a real, material object. Returning to Monod's work, we must indi-

cate the special structure of living beings, which exists on the basis of «autonomous determinism», free from complete submission to external factors. A notable feature of this structure is the informational component, the source of which is always another living being, ensuring its transmission without change and this leads to Monod's definition of «reproductive invariance» [4].

It is important to understand that invariance still means independence in the first place, and only after that it is immutability and multiplication. The evolutionary theory described by Darwin can be interpreted in the following way: invariance precedes teleonomy, that is the improvement of a structure under external influence is possible only if there is an inherent property of invariant reproduction at the heart of this structure. With regard to living beings (or rather, living systems), the element of immutability cannot be absolute: accordingly, any violation leads to random changes that are preserved in genetically transmitted information in accordance with the principle of natural selection [4].

A similar parallel relationship can be traced on the psychological level of personality. This invariant characteristic can be found in the rational component of personality, which is based on accumulated life experience; teleonomic characteristics are mostly emotional intelligence, which determines human behavior under external circumstances. The decision-making theory based on choice includes several approaches to defining this «phenomenon», which are based on conscious-volitional regulation [5]. In other words, self-awareness and will of a person determine his activity, leading to decision-making and actions to implement them. Initiative acts as a special feature of the personality that ensures the transformation of ideas into material embodiment through action [6].

The theoretical basis for reasoning in the field of decision making and its sources includes many different interpretations and definitions. This fact forms the basis of the conscious direction towards uncertainty. Today, it is not possible to reliably predict a person's behavior based on their motives and personality, or their internal psychological structure.

The definition of the essence of reactive uncertainty develops in a slightly different way. Human activity is carried out within a society represented by other people who participate in social relations, and the peculiarity of this uncertainty lies in the external factors of influence. These factors can be either outside the group or specific initiatives of its members.

The duality of uncertainty phenomenon is fully represented in the field of game theory. According to its principles, sources of uncertainty can be [7]:

- independent circumstances from members of a social group;
- conscious interest, as well as inner intentions of each group member;
- a sequence of conscious choices made by each participant in their social interactions.

The presented sources of the phenomenon of uncertainty determine its social content, which, in turn, forms the basis for the economic meaning of this concept. We should recall the universally recognized founder of political economy, Adam Smith, whose proposed concept of «the invisible hand» of market relations describes the phenomenon of uncertainty in a system of commercial relations. However, it is important to understand that the emergence of this concept was impossible without the development of ideas from the school of natural law in the 17th century, with Thomas Hobbes as a key proponent. His merit is in identifying the universal human mind as a source of personality behavior and aspirations, later interpreted as the basis for classical economic choice [8]. In general, economic uncertainty is characterized by the concept of risk, which is a likely negative outcome of an activity, expressed in losses or loss of profits [10]. Thus, the distinction between individual trends is somewhat blurred from the perspective of socio-economic relations. However, one thing is certain – conscious uncertainty often precedes reactive uncertainty in most cases.

Modern successes of scientific and technological progress have led to the emergence of a new form of interaction, it is an informational one. The phenomenon of uncertainty plays a significant role in this area. From the philosophical point of view, the concept of «knowledge» is used to refer to information. It is important to note the work of

S. V. Teploukhov, in which he considers the «needle of uncertainty» model [11]. In this model, a distinction is made between open and closed forms of knowledge: complete certainty is present-

ed as closed knowledge, while complete ignorance is presented as closed ignorance. Consequently, uncertainty about knowledge and information can be characterized by open forms that are influenced by chance or voluntary disregard. It should also be noted that, depending on the level of the need for knowledge (information), the result of the phenomenon of uncertainty may be a risk – with a minimal need; or a threat – with a maximum need.

At the beginning of the new millennium, consistent development of digital technologies led to the emergence of an artificial intelligence system, which in a sense is a digital alter ego of a personality. However, there is a significant difference between artificial intelligence and humans: artificial intelligence interacts with the reactive uncertainty direction for control purposes, as it is based on machine technologies and deep analysis of dynamic data sampling. On the other hand, artificial intelligence is not subject to conscious uncertainty because it either does not participate in decision-making at all or reproduces judgments based on limited human experience embedded in algorithms [12; 13; 14].

This feature of artificial intelligence systems opens up significant opportunities for management activities in general and the decision-making process in particular. These opportunities are expressed through an updated forecasting function, which is enhanced by the arguments of foreign economic figures. This has led to the emergence of the term «forecasting machines» for these systems. In their book with the same name, A. Agrawal, D. Gans and A. Goldfarb propose the idea of a «new division of labor» based on the strengths and weaknesses of humans and artificial intelligence in making predictions [14]. Thus, artificial intelligence is better at identifying cause-and-effect relationships and making logical judgments based on them (managing conscious uncertainty), while people are better at making accurate predictions based on statistical information sampling (managing reactive uncertainty).

Based on this statement, the authors of the book classify information into 4 groups depending on uncertainty: known knowns, known unknowns, unknown knowns and unknown unknowns [11; 14]. Modern artificial intelligence systems are best suited for handling well-known information and can bring forecasting functions almost to automation. However, with obviously unknown knowledge, neither AI systems nor human minds can achieve stable performance in an uncertain environment.

From the perspective of known unknowns, the size of the initial sample plays an important role. Artificial intelligence systems require a large amount of information to make a forecast. However, human causal thinking with limited knowledge can in some cases significantly expand this (turning uncertainty into certainty). The meaning of unknown knowns lies in making an alternative choice in the past: «what would have happened if something had not happened?» [14]. The human mind is able to partly predict the situation under these conditions, while artificial intelligence systems may need intervention in their main algorithm structure.

The field of management activity, especially its most relevant area today, project management, is very similar in content to socio-economic relations and the information environment, but it also has some differences. Innovation, which is closely linked to uncertainty, is a determining factor. Key features of project activities include focus, coordination needs, time constraints, result control, uniqueness of working groups, and achieved effects [15].

The difference between innovation activities, first of all, is characterized by a specific result namely by the creation of unique innovations. The format of project activities contributes to the effective creation and implementation of these innovations. The national standard for innovation management in the Russian Federation [16] defines the operational level of management as project activity; however, at the strategic level, project management is an important step in transforming innovation from an idea to a commercial product.

Based on the presented definition, it is important to note the complex structure of the essence of an innovative project, based on sustainable interrelationships between strategic goals and specific steps for their implementation. The environment for implementing an innovative project under modern conditions is an information environment containing various known and unknown information.

Regarding the essence of the phenomenon of uncertainty that arises during the implementation of management measures for innovative projects,

the best option for identification is the method of proving the opposite. It is worth noting the certainty of elements in such projects [17; 19]:

– limited deadlines;
– limited allocated resources;
– hierarchical sequence of project goals and objectives;
– a stable basis for a phased implementation structure that contains a basic cycle of management functions;
– the concreteness of the starting point and the form of the expected final result of innovative project activity.

Consequently, innovative projects have a certain internal content, which is largely determined by the initiative plan as the source of the innovative project. This is an invariant characteristic of an innovative project. From this perspective the basis of the concept of «invariant reproduction» is changing In relation to project innovation management, reproducibility is determined by scientific potential of innovative project: innovation opens up opportunities for new fields of knowledge and ideas. The element of immutability fades into background: it emerges only at the stage of mass production, when scientific «disrupt» turns into routine «operation» [18]. At the same time, the element of independence, arising from features of project as a unique event, becomes significant. Each implemented unit is inherently independent until integrated into practical activities.

It should be noted that these elements of certainty of an innovative project are more fundamental and formative; in the field of content and specific implementation structure, significant uncertainty arises. This uncertainty is determined by two types – conscious and reactive – as has already been established. Conscious uncertainty comes from innovative ideas; it is impossible to know in advance exactly who will implement the project and how many people will be involved. Reactive uncertainty comes from external conditions; the number and order of resources needed to ensure commercial success are not known reliably (the teleonomic characteristic of J. Monod is traced). There are just a few of the uncertainties that can accompany the implementation of a project.

Thus, it makes sense to classify the phenomena of uncertainty based on approaches to identifying the essence of this phenomenon. A theoretical analysis of scientific sources allows us to identify the following approaches:

From the point of view of the biological structure of living beings, uncertainty in the form of an accident of evolutionary development, in which the phenomenon of teleonomy affects the process of invariant reproduction, resulting in a particular change with unknown consequences [4].

Psychological processes of a personality contain uncertainty in internal motives, which form the quality of initiative are the source of will, as the starting point for decision-making [5].

Within the framework of group interaction, uncertainty is characterized by randomness and is an environment for conflict situations. It has a significant impact on decision making [7].

In the system of social relations, uncertainty means non-obvious cause-and-effect relationships [9].

Economic uncertainty arises in economic relations and acts as a risk factor with a significant impact [10; 19].

From the point of view of innovation projects, uncertainty refers to the lack of information [11].

With regard to the forecasting function, which forms the basis of modern management activities, especially those implemented in relation to innovative projects, uncertainty is represented by four groups of information. Effective control of these information is possible only through interaction with modern digital tools, such as artificial intelligence systems [14].

The considered approaches allow us to comprehensively and consistently identify the essence of uncertainty factors accompanying the process of managing innovative projects.

Conclusions

The philosophical basis for defining the phenomenon of uncertainty includes many different interpretations. Within the framework of the research goal, two key components of uncertainty orientation were identified: conscious and reactive. During the research process based on the deductive method, there was definitely confirmation of the existence of these components in various areas of activity, starting from the biological level and ending with socio-economic relations in the information environment.

It is important to understand that the central element of innovation project activity is the person, and their will, actions, and decisions (as a human factor) are both the source and the tool for controlling conscious direction of uncertainty. External factors, based on the teleonomic principle, act as a source of reactive uncertainty that can be controlled by the forecasting function. New digital means of data analysis such as artificial intelligence tools and systems come to the aid of human beings.

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Вклад авторов: все авторы сделали эквивалентный вклад в подготовку публикации. Авторы заявляют об отсутствии конфликта интересов.

Contribution of the authors: the authors contributed equally to this article. The authors declare no conflicts of interests.

Статья поступила в редакцию 27.02.2025; одобрена после рецензирования 21.03.2025; принята к публикации 28.03.2025.

The article was submitted 27.02.2025; approved after reviewing 21.03.2025; accepted for publication 28.03.2025.