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## **BASIC PRINCIPLES AND COMPONENTS OF RISK MANAGEMENT DURING CONSTRUCTION AND OPERATION OF FACILITIES: PUBLIC ADMINISTRATION ASPECT**

**Annotation:** The article generalizes approaches to the classification of principles and components of risk management in the state regulation of the construction industry.

To understand the applied nature of compliance with the principles of risk management in the regulation of the construction industry, it has been grounded that in order to reduce the risk (prevention and reduction of probable damage) in this area in emergency situations of a natural and man-made nature, the state regulates the legal field of such processes, setting a number of requirements in regulatory documents and construction standards, as well as creating laws and regulations governing design and construction.

These documents establish the obligations of specific subjects (executors) to reduce the potential risk, provide specific measures, sanctions in case of non-fulfillment, as well as determine the conditions and procedure for regulating economic and other activities. In addition, one of the activities of the state to prevent risks and improve the quality and reliability of the projected construction object, guarantees the safety of the person in it, is the state system of licensing activities in the construction industry. Thus, the state's activities in this area are in particular related to risk management.

It is noted that public-management processes are also difficult to predict and are related to the activities of enterprises and organizations in which the state acts as an entrepreneur (state-owned enterprises) or a business partner.

It is substantiated that the principles of risk management are defined in different spheres, using different approaches, are correlated with each other. Therefore, there is a need to adapt the findings of the world scientific thought about risk management, not only in scientific developments, namely in the specific application of their nature. It is noted that ISO risk management principles can be fully (without exception) taken as a basis for the construction and operation of buildings, indicating their content and specifics for the construction industry.

**Keywords:** risk management, principles, risk management, principles, components of management process, construction industry.

## **ОСНОВНІ ПРИНЦИПИ І СКЛАДОВІ РИЗИК-МЕНЕДЖМЕНТУ ПРИ БУДІВНИЦТВІ ТА ЕКСПЛУАТАЦІЇ СПОРУД: ДЕРЖАВНО-УПРАВЛІНСЬКИЙ АСПЕКТ**

**Анотація.** Узагальнено підходи щодо класифікації принципів та складових ризик-менеджменту при державному регулюванні будівельної галузі.

Для розуміння прикладного характеру дотримання принципів ризик-менеджменту при регулюванні галузі будівництва обґрунтовано, що для зниження ризику (попередження та зменшення ймовірного збитку) в цій галузі за надзвичайних ситуацій природного і техногенного характеру держава регулює правове поле таких процесів, встановлюючи низку вимог в нормативних документах і стандартах з будівництва, а також створюючи закони та підзаконні акти, що регулюють питання проектування та будівництва.

Цими документами встановлюються обов'язки конкретних суб'єктів (виконавців) щодо зменшення можливого ризику, передбачаються конкретні заходи, санкції в разі їх невиконання, а також визначаються умови та порядок регулювання господарської та іншої діяльності. Одним з видів діяльності держави щодо попередження ризиків та підвищення якості і надійності об'єкта будівництва, що проектується, гарантій безпеки перебування в ньому людини, є державна система ліцензування діяльності в будівельній галузі. Таким чином, діяльність держави в цій сфері пов'язана саме з управлінням ризиками.

Зазначено, що державно-управлінські процеси також важко передбачувати та пов'язані з діяльністю підприємств і організацій, де держава виступає як підприємець (державні підприємства) чи бізнес-партнер.

Обґрунтовано, що принципи ризик-менеджменту визначені у різних сферах з використанням різних підходів, які мало корелюються між собою. Тому виникає необхідність адаптації напрацьованих світової наукової думки щодо управління ризиками не лише в наукових доробках а саме в конкретному прикладному їх характері. Зазначено, що принципи ризик-менеджменту, вироблені ISO можуть бути повною мірою (без виключень) взяті за основу при будівництві та експлуатації споруд, зазначаючи їх зміст і специфіку для будівельної галузі.

**Ключові слова:** управління ризиками, принципи, принципи ризик-менеджменту, складові процесу управління, будівельна галузь.

## **ОСНОВНЫЕ ПРИНЦИПЫ И СОСТАВЛЯЮЩИЕ РИСК-МЕНЕДЖМЕНТА ПРИ СТРОИТЕЛЬСТВЕ И ЭКСПЛУАТАЦИИ СООРУЖЕНИЙ: ГОСУДАРСТВЕННО-УПРАВЛЕНЧЕСКОЙ АСПЕКТ**

**Аннотация:** Обобщены подходы к классификации принципов и составляющих риск-менеджмента при государственном регулировании строительной отрасли.

Для понимания прикладного характера соблюдения принципов риск-менеджмента при регулировании отрасли строительства обоснованно, что для снижения риска (предупреждению и уменьшению возможного ущерба) в этой области при чрезвычайных ситуациях природного и техногенного характера государство регулирует правовое поле таких процессов, устанавливая ряд требований в нормативных документах и стандартах по строительству, а также создавая законы и подзаконные акты, регулирующие вопросы проектирования и строительства.

Этими документами устанавливаются обязанности конкретных субъектов (исполнителей) по уменьшению возможного риска, предусматриваются конкретные меры, санкции в случае их невыполнения, а также определяются условия и порядок регулирования хозяйственной и иной деятельности. Кроме того одним из видов деятельности государства по предупреждению рисков и повышению качества и надежности проектируемого объекта строительства, гарантий безопасности пребывания в нем человека, является государственная система лицензирования деятельности в строительной отрасли. Таким образом деятельность государства в этой сфере в частности связана именно с управлением рисками.

Отмечено, что государственно-управленческие процессы также трудно предсказуемы и связаны с деятельностью предприятий и организаций, в которых государство выступает в качестве предпринимателя (государственные предприятия) или бизнес-партнера.

Обосновано, что принципы риск-менеджмента определены в различных сферах с использованием различных подходов, которые мало коррелируют-

ся между собой. Поэтому возникает необходимость адаптации наработок мировой научной мысли по управлению рисками не только в научных работах, а именно в конкретном прикладном их характере. Отмечено, что принципы риск-менеджмента, произведенные ISO могут быть в полной мере (без исключений) взяты за основу при строительстве и эксплуатации сооружений, определяя их содержание и специфику для строительной отрасли.

**Ключевые слова:** управление рисками, принципы, принципы риск-менеджмента, составляющие процесса управления, строительная отрасль.

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**Target setting.** Public administration in any sphere is aimed at implementing the main functions and following a certain set of principles. State regulation of individual sectors is determined by the specifics of the valuation of a particular type of activity. There is a special need for state intervention in the form of creation of a regulatory framework in those areas which are associated with risks and threats. The main areas of activity where the risk is a peculiarity is first of all construction, health care, chemical industry, transport and others. Each of these areas uses a specific set of risk prevention and risk coverage tools, for which certain management principles are implemented in the area. Thus, first of all, construction belongs to the spheres which are characterized by the probability of a large number of risks. Their occurrence is associated with financial, technical, technological, legal, and other types of support of activities in this sphere. Therefore, it makes sense to determine the main principles and components of risk management during construction and operation of facilities.

**Recent research and publications analysis.** Some aspects of risk management in public administration are a

subject of research of such scientists as O. Bilyavska, V. Horbulin, A. Kachynski, P. Mykhno, O. Polovtsev, A. Rachynskyi, H. Sytnik, V. Soroko, Y. Stoleto, T. Pakhomov, V. Sharyi. The study on specific issues of risk management in construction activity was a subject of publications of such domestic researchers as H. Verbitska, I. Kucherenko, O. Kuchma, V. Kravchenko, M. Malyk, N. Lutanyuk, K. Palyvoda, V. Poliachenko, T. Serdyuk, T. Shevchuk and others. However, the approaches to defining the components of risk management in the public administration vary considerably, establishment of the system of principles requires approval.

**Paper objective.** Therefore, the objective of this paper is to systematize the principles of risk management in the public administration of construction activity and to establish components of risk management.

**Presentation of the basic material.** Management of risks, or risk management, as a component and an approach in theories of management largely referred primarily to areas of activity of profit-making organizations to minimize contingencies and to ensure economic benefits. The issues of risks and their classification in the profit-making sector were studied, in particular, by

Y. Stoletov, who argues that “given the limited resources and financial capabilities each party to the business interests tries to find ways to optimize its costs and maximize its benefits (profit)” [1]. Running the business by the market rules, “economic entities find themselves in conditions of uncertainty and are on the edge of the law” [1]. Then in such a relationship, the public authorities act as a factor limiting the external environment, at the same time determining the system through legal norms. On this basis it should be noted that the key in such relationships is understanding of situation in which the subject and entity of management get. The situation should be understood as “a complex of various conditions and circumstances that create themselves certain atmosphere for a particular activity” [1]. That is, the “atmosphere” may hinder or facilitate the implementation of certain intentions, and the elements of uncertainty are inherent to the functioning and development of many processes. Such interpretation of the concept of situation leads to the understanding that due to different kind of situations, the result cannot be fully predicted. This fully applies to the processes in public administration.

Therefore, there is a need to carry out assessment of activity risks. “Risk is a quantitative characteristic of impact of dangers, which are formed by human activity, that is, mortality rate, morbidity and disability caused by the effect of a particular danger on people. Risk is directly linked to the concept of damages, that is, with a probability of loss or damage of the subject, the less risks is studied, the more damage is caused” [2]. It is the avoidance or mi-

nimization of such cases that should be regulated by the government, since the market with its aim of making a profit is not able to fully control the process of achieving the goal. In this regard, there is a need for accumulation and analysis of information regarding various adverse events to determine common trends and regularities of their manifestations. Moreover, public administration processes are also difficult to predict and are associated with the activities of enterprises and organizations in which the state acts as an entrepreneur (state enterprises) or a business partner.

An issue of partial predictability of processes in the sphere of public administration was covered in the works of N. Lutaniuk and P. Mykhno, O. Polovtsev. So, in particular, it is argued that “effective management of the public administration subject in modern conditions involves consideration of uncertainty and risk situations” [3]. “Organizations, no matter how large or small they are, face internal and external factors that shape the uncertainty. The effect of this uncertainty is a “risk” that is inherent in all activities” [4].

In studies of O. Polovtsev risk management in public administration is considered first of all from the standpoint of assessment and analysis of risks in management, more specifically “within logical and probabilistic approach” [5]. The researcher proposes “to exercise risk management based on logical and probabilistic approach in the management process over public administration subject”. The attractiveness and advantages of this approach are in clarity and certainty of quantitative risk evaluation and hand-

son opportunities during the analysis of the influence of system elements on its stability and security” [5].

This approach requires a clear classification of risks according to different criteria, and as a consequence ways to minimize them. However, even the economic literature is limited to the list of ways to limit risk without clear guidance regarding their use at a certain size of the potential damage, without introduction of clear criteria. One of the logical approaches to classifica-

tion of risks is to divide them into classes (groups), each of them is subdivided into certain types. This is the approach used by Y. Stoletov (table 1, compiled by the author), who states that “risk classification is the systematization of numerous risks based on characteristics and criteria and can gather a large number into general terms” [1].

However, this classification of the subject of risk management is far from complete, it indicates only the approaches to the classification and the

*Table 1*

**Risk classification by Y. Stoletov**

<b>Classification criterion</b>	<b>Types of risks</b>	<b>Content of risk manifestation</b>
Time of occurrence	retrospective	an overview of what happened in the past, an assessment of impact factors from the point of view of what happened
	current and future	determined by the current situation or the introduction of certain changes in the future
Basic factors of occurrence	political	determined by the change in the political situation, which in its turn affects entrepreneurial activity (border closures, fighting, etc.)
	economic	determined by adverse conditions in the economy of enterprise or in the economy of the state
Nature of accounting	external	related to the enterprise activities or its responsive group External risks are affected by a large number of factors — political, economic, demographic, social, geographical and others.
	internal	determined by the enterprise activities or its responsive group
Nature of the effects	pure (simple or aggregate)	always carry the loss of business activities
	speculative	can carry both — a loss and additional profit. The reason for this type of risks can be changes in the market, changes in currency exchange rates, changes in tax legislation and other
Area of occurrence	production	related to the manufacturing sector, production technologies
	commercial	related to changes in the market, suppliers, customers, competitors
	financial	related to the change in fiscal policy, inflation etc
	insurance	related to insurance

basic criteria. This is because the risk as a subject of management has different manifestations depending on the scope of activities, impact factors on the processes, situations and so on. Therefore, such studies should not be separate, they must be integrated into the world space. The development of the international standard ISO 31000:2009 Risk Management. Principles and Guidelines and ISO Guide 73:2009 Risk Management. Vocabulary was the result of research made by scientists from Australia, New Zealand, Japan and several other countries. “They have become effective tools used by private, state and municipal organizations of developed countries for the development, implementation and continuous improvement of the risk management system as a mandatory component of their management systems [3, p.10].

Thus, ISO 73:2009 defines risk as an effect of uncertainty on objectives [6]. ISO – International Organization for Standardization 31000:2009 defines the principles to ensure the effectiveness of risk management of the organization. These principles are defined as one of the management rules which characterize risk management from different points of view. That is, risk management:

- creates and protects evaluation (contributes to the improvement of health indicators, a person’s life, compliance with legislation, environmental protection etc.);
- is an integral part of all organizational processes;
- is a part of the decision-making process;
- expresses uncertainty;
- is structured, organized and coordinated in time;

- is based on the best available information;
- has its own peculiarities for each organization;
- takes into account human and cultural factors;
- is a dynamic process that can be repeated in time and is changeable;
- helps to improve the performance of the organization;

Transparency and inclusiveness are natural for risk management (transparency for investors and involvement of an increasing number of participants) [6].

Thus, these principles are those recognized general rules, which should be a basis for elaboration of risk management principles in a specific field. “The principle, in contrast to the idea of the law, in a plane of practice, should serve as the direction of behavior, the function of forming the behavioral standard of the ideal model” [ 8, p. 38]. Being derived from the common laws, the principles of risk management reflect the relationship, in accordance with which the management system should be established, operate and develop. It is impossible to achieve the objectives of risk management without operation of mechanism of public administration – “a means of achieving the targets, which implies the implementation of measures that are carried out on the basic principles in functional activities and management practices”. [ 9, p. 12]. Let us try to correlate the principles of risk management defined by ISO with the most complete list of similar principles in public administration specified by O. Biliavska [10]. In addition, these principles should be not just identified in the abstract way, but also transferred to the practical le-

vel, being linked with a specific industry sector, namely with construction (table 2 developed by the author).

There are always risks in construction in general and housing in particular. Some of them, the so-called inherent risks, can be pre-considered and transferred onto the shoulders of in-

urance companies. These risks include risks associated with the uncertainty of the process of running housing construction business. These losses are difficult to predict. It is hardly possible to transfer them onto the shoulders of insurance companies” [11]. Therefore, in large measure, in construction,

Table 2

**The relevance of the ISO risk management principles with similar principles in the field of public administration and construction**

<b>The principle of risk management in PA.</b>	<b>The essence of the principle of risk management in public administration</b>	<b>ISO risk management principle</b>	<b>Risk management principle in construction</b>
1	2	3	4
Target-setting	provides for harmonization of the goals of risk management with the mission and goals of the public authority in general. In particular, at first glance, a complete avoidance of risk is a positive thing in the public authorities. However, this situation is connected with the limit of the state’s ability to perform its functions. Therefore, the goal of risk management cannot be a complete avoidance of risk, but taking it into consideration to an acceptable level	part of the decision-making process	you need to think about the consequences/ effect of risk
Efficiency	reflects achievement of the maximum results in risk management with minimum cost, i.e. the cost of managing risk must be less than the possible costs that could be borne when implementing a risk in the absence of risk management. According to this principle, it is more profitable to undertake expenditures into managing risk than to incur costs as a result of adverse events		it makes no sense to risk more than your own capital can afford



1	2	3	4
Feedback	the current results of risk management must be compared with the goal set at the beginning. Violation of feedback leads to failures of the risk management system and the wrench of results that adversely affect the operation of the entire organization	structured, organized and coordinated in time	
Comprehensiveness	different risks should not be managed separately. The principle of comprehensiveness means that they should create a closed system having a hierarchical form during risk identification. They can be managed by different methods, but taking into account each other and with the cumulative assessment of the simultaneous action of all the risks. It is necessary to ensure that reducing one type of risk does not lead to growth of the other one.	an integral part of all organizational processes	
Tolerance	risk management must be structured in such a way that deviations in the system's operation (public authority) within a certain range of parameters of elements, subsystems, external environment or the behavior of other systems did not lead the system to disaster. The formation of risk management mechanism it is appropriate to define as many factors influencing the activities of a public authority as possible	takes into account human and cultural factors	you cannot risk the larger for the minor

the principles of risk management are studied. H. Verbitska uses a specific approach to the formulation of principles

in construction. The basic principles of risk regulation, according to her, are as follows:

- it makes no sense to risk more than their own capital can afford;
- you need to think about the consequences of risk;
- you cannot risk for the minor [12].

The rest is considered by the researcher as measures and techniques for limiting risk, allocating them into external and internal. “External methods of risk minimization include: transfer of risk, insurance, financial diversification, management consulting. There are the following internal methods of limiting risk: limiting, obtaining additional information, reserving funds to cover unexpected costs, business planning, validation of business partners, proper selection of personnel, organization of protection of trade secrets” [12]. As the study shows, risk management principles identified in different fields using different approaches are little correlated between each other. Therefore, there is a need to adapt the achievements of world scientific idea regarding risk management not only in scientific works, namely in their specific practical character. In our opinion, *risk management principles produced by ISO can be fully (without exception) taken as a basis in construction and operation of facilities, noting their contents and specifics for the construction industry.*

Besides, it should also be noted that in addition to the basic risk management principles in public administration that can be correlated with the ISO principles, O. Biliavska notes a number of specific principles, such as “causality, independence, integration, continuity, adequacy and reliability of information, adaptability, consistency, scientific validity” [10]. This list is

broader in comparison with the basic principles and is more consistent with the ISO risk management principles.

To understand the applied nature of the observance of risk management principles when regulating the construction industry it is advisable to bring to the light that to reduce the risk (prevention and reduction of possible damage) in this area in case of emergency situations of natural and technogenic character, the state regulates the legal field of such processes, establishing a number of requirements in the statutory documents and standards for construction, as well as creating the laws and regulations governing design and construction issues. These documents set out responsibilities of specific actors (performers) regarding minimization of possible risk, provide for specific measures, sanctions in case of non-compliance, and define the terms and procedure for regulation of economic and other activities. In addition, the state system of licensing in the construction industry is one of the state activities regarding risk prevention and improvement of the quality and reliability of the designed facility, security guarantees of staying inside of it. Thus, the state’s activity in this area in particular is associated with risk management.

Therefore, logically continuing on the subject, attention should be paid not only to principles but also on the components of risk management. “Risk management is a set of methods, techniques and measures that allow to predict the occurrence of risk events to a certain extent and take measures to reduce them” [13, 257].

By the structure of risk management, ISO 73:2009 refers to the rela-

tionship of elements ensuring that the principles and organizational measures used in designing, developing, implementing, monitoring, reviewing and continually improving risk management throughout the organization. Structure of risk management should be integrated into the overall strategy, policy and practice of the organization [6]. ISO Guide 73:2009 gives the following interpretation of the main components of the risk management process:

- establishing the context as defining external and internal factors to be taken into account when managing risk, and setting the scope and risk criteria and risk management for the risk management policy;

- continual and iterative processes that an organization conducts to provide, share or obtain information, and to engage in dialogue with stakeholders regarding the management of risk;

- risk assessment as a process, encompassing risk identification, risk analysis and evaluation of risk degree. With that, risk identification refers to the process of identifying, listing and describing the elements of risk, the risk analysis – the process to comprehend the nature of risk and estimate its level, and the establishment of the degree of risk – the process of comparing the analysis results with risk criteria to determine its admissibility;

- risk treatment as the process of its modification by removing the risk by means of taking decisions about the renunciation of work, in process of which or which could give rise to a harmful event, the elimination of sources of risk, changing the consequences of dangerous events;

- monitoring and reviewing as continual checking, supervising, critically observing or determining the status in order to identify change from the performance level required or expected, and to establish the degree of its adequacy and efficiency [6].

However, theoretical developments of scientists are rarely used in the practice of public administration in general and in construction in particular. Thus, P. Mykhno says: “At the same time, Ukrainian bodies of public administration, especially at the regional level, and local authorities rarely apply the world’s proven practices for effective risk management in their activities. This minimizes their effectiveness and pushes for excessive use of resources” [4]. At the same time T. Shevchuk notes that our legal framework at least in the investment part to a greater extent regulates risks for investors and governments. “Institutional investors, bodies of state power and local authorities are most protected from the risks. The least protected from the risks are individual investors who do not have the organizational, legal and information capabilities of effective risk management. That is what causes the need for investment by individual investors through financial intermediaries” [11]. Thus, legal factors of risk in construction are the most deterministic, predictable among all factors such as: economic, legal, administrative, architectural and construction.

Individual risks in construction are regulated by statutory acts. Thus, T. Serdyuk notes that “the legislation of Ukraine provides for the obligation for the trustee company to insure financial risks and responsibi-

lity towards investors for damage or destruction of property in their possession. They also provide for compulsory insurance by the developer of the responsibility before third parties, as well as insurance of construction and installation works" [4]. However, the question remains regarding the management of other risks that are not even insured, except documentation. The state provides for the formation of the Insurance Fund of Documentation, its management, keeping, and delivery to users of copies of documents of the Fund required for production, maintenance and repair of products of defence, mobilization and economic purpose, for *construction*, rescue and emergency recovery work and works during the special period, and also in the sphere of preservation of information on cultural values. Therefore, researchers in this field note that "the construction industry like no other is associated with the emergence of the financial and technical risks. Risks can arise both from the side of investors, developers and professional contractors in the international practice. Construction risks are a form of engineering or technical risks" [15]. So the question regarding generating components of public risk management in construction first requires the specification of the management subject, and thus a clear classification of risks from the perspective of public administration, disclosure of the principles of risk management specified in ISO 31000 International Standard specifically for the construction industry and, consequently, management subject and risk management scheme in public administration, suggested by

V. Polovtsev, can be adopted to comply with the ISO. It consists of a logically closed "sequence of the following procedures:

- prediction of inefficiency (failure) of management, caused by the parameters, i.e. when parameters go beyond the corridor of acceptable values;
- modeling and allocation of resource requiring test parameters, control and corrective actions;
- elaboration of process or system development with determining the values of test parameters, control and corrective actions at individual stages;
- processing information and making decisions about the choice of corrective actions;
- clarification of models to determine parameter values, resources for parameters and losses in case of impossibility to implement these parameters" [15].

Such modeling of risk management systematises the sequence of actions of the subject of management, gives the opportunity to select individual components of management as a dynamic process. That is, this approach allows to consider the system of risk management not in static, but in dynamics. However, the most important component of providing dynamic management process is such a component in static as personnel, since risk management requires deep knowledge of the industry where risk management is carried.

**Conclusions from this study and perspectives for further research in this direction.** Thus, the analysis of the scientific development of the subject of risk management in the construction sphere from the standpoint of administration has pointed to ambiguity of

the approach to classification of the subject of management, its principles of management, and, accordingly, components of such management. To solve the issue as to generating components of public risk management in construction it is required to specify the subject of management, therefore it requires a clear classification of risks in construction and in state regulation of this process. Adaptation of the ISO risk management principles to the conditions of state management and regulation of the construction sphere must be the direction of further scientific research. It is also appropriate to adapt the developed risk management models in the public sector to the construction industry and to develop requirements for the management entity in terms of competencies. In addition, the risk of a managerial decision by a civil servant in this field can be considered a separate area of research, since the activities of civil servants are clearly regulated by the law and by-laws, provided by the fundamental law of the state, which indicates that civil servants must act within the limits and in the manner prescribed by law. However, the law not always can regulate all situations that arise in management activities, so officials can act at their discretion within the law, based mainly on their own management experience. Acting at one's discretion in the field of public administration is associated with the risk both for the official and the consequences of making a risky decision for others. The classification of such risks and definition of the components of management resulting from such an approach may be a direction for further research.

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