Project Management Risk Assessment Methodology in the State Border Guard Service of Ukraine

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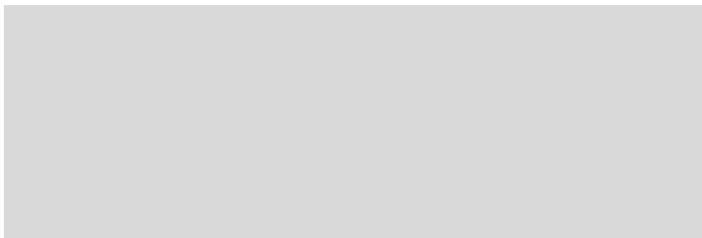
Abstract: *The strategic management in the State Border Guard Service of Ukraine, which includes management decisions, is always associated with certain risks due to the high level of uncertainty in the internal and external environments. This totally applies to the decision-making process in project activities. At the same time, each alternative carries a greater or lesser risk of failure, wasted resources, effort and time. In this connection the article considers methodological issues of project management in the State Border Guard Service of Ukraine; a risk assessment model in the implementation of projects has been proposed and the risk impact on success probability of projects has been determined. The project management methodology depends on their scale, timing, location and conditions of implementation. But at all life cycle stages of any project, there will be problems associated with the presence of risks that will affect the project success negatively. One of the ways to reduce the risk in the project activities of organizations is to involve higher educational institutions, where significant scientific potential is concentrated. The article proposes the methodology for risk assessment of projects which are implemented in the State Border Guard Service of Ukraine together with the departmental educational institution which is based on probabilistic-statistical modelling using expert assessment. Taking into account that the activities of each of the project participants are associated with their own group of risks, the article identifies four main groups of risk factors.*

Keywords: *State Border Guard Service of Ukraine; project management; project success; risk impact; assessment.*

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1. Introduction

The present-day management in the State Border Guard Service of Ukraine (hereinafter – the Border Guard Agency) should be aimed at creating and maintaining a balance between ensuring an adequate level of border security and maintaining the openness of the state border for legitimate cross-border cooperation (Zalozh, 2016).

To achieve this goal, the management of the border guard agency makes strategic management decisions, which are aimed at transformation in organizational structures, forms and methods of management and resources. It ensures the stability of the agency functioning and its development. The necessity to make management decisions on carrying out organizational changes is also caused by the existing military-political and socio-economic situation, which places high demands on accelerating the border guard agency adaptation to the rapidly changing conditions of life and functioning.

All organizational changes require the development and implementation of projects (obtaining a certain unique result), for the effective implementation of which it is necessary to change approaches, including principles and management technologies including the methodology of making management decisions on project implementation (Popov, 2010).

Project development and implementation is a long process, and the implementation of all procedures and the effectiveness of the project itself largely depend on the quality of the project management process at all stages, in particular, when making a management decision, which should foresee all possible risks that may affect the project success (Mazur et al., 2004).

This applies without exception to all areas of the border guard agency activity. Moreover, it is very important to remember that failure to complete a project or problems with its implementation, which is carried out by the border guard agency, can lead to resonance in the society, cause inefficient use of public funds and failure of the state to ensure the appropriate level of the state border security.

All this requires the border guard authorities to know the theory of management decisions, the theory of project management, and specific project management methodology must meet the real conditions of the state development and the special activity features of the State Border Guard Service of Ukraine.

The theoretical basis of the article is scientific research on topical issues of project management in the fields of public administration, management of organizations and institutions in various areas of activities and forms of ownership. The development of the author's approach to the defined problem was influenced by the scientific works and research results of many scholars. In the latest edition of the textbook Clifford F. Gray & Erik W. Larson (2014) presents all the project stages, including the integration of the organization's project strategy, defining the project goal, a project plan development, risk management. Jeffrey K. Pinto (2004) described the management of the project environment, the interaction of the project and the organization, the management of project objectives and planning, all the aspects which are related to human resources. S. D. Bushuiev & N. S. Bushuieva (2005), V. A. Rach (2000) analysed the existing systems of knowledge, methodologies and technologies of project management. They also considered the current directions of their development. V. V. Morozov, O. V. Kalnichenko & Yu. H. Turlo (2011) considered in detail the stages of the project life cycle defining the functions and roles of the project organizational structure and the formation of key documents. A. I. Orlov (2003) gave examples how to use the intelligent tools (methods of decision making, optimization, expert assessments, modelling, controlling) in solving practical problems of project management.

These scientific works not only formed the scientific achievements of project management, but also carried out the practical implementation of the results in project management of different scales and in different activity areas.

However, despite extensive research on this issue, there is a focus on a narrow area of activity – business project management. This issue has been considered partially at the level of the professional training (Bloshchynskyi,

2017; Karpushyna, et al., 2019) or foreign language training in order to enhance the training of future border guard officers (Bloshchynskyi, 2017; Lysenko et al., 2020). At the same time, the study of project management issues in the State Border Guard Service of Ukraine, as a special-purpose law enforcement agency, has not received sufficient attention from scientists yet. This determines the relevance of the research topic and stipulates the further development of the theoretical principles of project management in the border guard agency and the proper practical recommendations for improving the process under study.

2. Methodology

The aim of this research is to determine the methodological basis of project management in the State Border Guard Service of Ukraine, to analyse the potential risks that affect the project management success and to develop a model for their assessment for further consideration in the decision-making process.

Despite the fact the project management as a separate independent branch of management (specific management activities) was formed in the middle of the XX century, the general agreement of scientists and practical experts regarding the definition, context and content of the categories "project" and "project management" as well as a practical model for project management has not been reached yet.

At present, different sources interpret the concepts of "project" and "project management" in their own way (Campbell & Collins, 2012; Morris & Geraldi, 2011; Zalozh, 2016), however, in our opinion, they do not contradict, but rather complement each other and are united by common semantic accents: a sequential (coordinated) set of measures, one-time nature, the result uniqueness, temporal localization and limited resources.

Accordingly, the term "project" in the border guard agency means a system of coordinated and managed activities, which are aimed at achieving a specific goal (a unique result that has requirements for the quality of ensuring the state border security) under conditions of time and resource constraints as well as specific features of organization and implementation.

Under the term "project management" we mean a methodology of planning (decision making), organization, management, coordination of all resources throughout the project cycle, which is aimed at effective achievement of its goals by applying modern methods, techniques and management technologies.

The project management methodology depends on the project scale, the implementation timeline, quality, limited resources, location and conditions of implementation. All these factors are the basis for distinguishing different types of projects in the State Border Guard Service of Ukraine – their classification (Popov, 2010; Morozov, et al., 2011; Mazur, et al., 2004).

By scale, the projects in the border guard agency should be divided into:

- small project – a form of individual initiative, which has received recognition from others. They are small in scale, simple, limited in volume and may not require external financing, special equipment, etc. An example of such a project can be the initiative research work of any department of the National Academy of the State Border Guard Service of Ukraine (hereinafter – the educational institution), which is aimed at improving certain areas of activity;

- medium project – the most common one in practice. These projects have a relatively short duration, but require more careful study of all project subsystems and involve more considerable expenses. A typical example of a medium project is the modernization of organizational structures of the bodies of the State Border Guard Service of Ukraine;

- large projects – targeted programs that contain many interconnected projects, united by a common goal, allocated resources and time. Such projects are characterized by high cost, labour intensity, duration of implementation. An example of such a project can be the Strategy for the development of the border guard agency for a certain period, etc.

By purpose, the projects can be divided into:

- "breakthrough" strategic projects – the projects, the implementation of which introduces essential changes in the elements of the internal environment of the border guard agency;

- operational activity improvement projects – projects that improve the characteristics of the internal environment elements of the border guard agency;

- compliance support projects – the projects that maintain the characteristics of the internal environment elements of the border guard agency at the required level.

By timeline of implementation – short-term (1-2 years), medium (3-4 years) and long-term (5-10 years).

By location and conditions of implementation, projects can be international, state, territorial and local.

Each project is divided into several phases, the set of which is its life cycle. In the process of the life cycle, the project is born (formation of the project concept), planned (developed), implemented and completed.

The state of the project, regardless of the defined classification, from its idea up to its completion is characterized by a change in a number of indicators that determine its essence and on the basis of which the project success is determined. Therefore, for the high-quality implementation of a project (achievement of success) it is necessary to make it manageable.

At any stage of the project cycle, it will be necessary for the border guard management authorities to make management decisions in order to solve the problems, which are connected with the presence of risks in all activity areas. The experience of project implementation allows us to conclude that the main risk factors may be: instability of legislation, economic and social situation; uncertainty of the military-political situation; incomplete scope (inaccuracy) of provided information; uncertainty (inaccuracy) of objectives, interests and behaviour of participants in public relations; change of power; technological risk, etc.

In addition, despite the wide range of different types of projects, we can highlight a general list of problems that arise during their implementation:

- projects last longer than a planned period (deadlines for their implementation are not realistic);

- many corrections and alterations and as a result – overtime work;

- lack of human, financial and logistical resources;

- impossibility of well-timed access to the necessary resources (information, logistical, etc.);

- constant change of priorities (requirements to perform another task, which is considered to be more urgent or important);

- making a lot of effort to achieve intermediate results;

- a large number of projects that are being implemented simultaneously;

- "student syndrome", which is associated with the phenomenon, when very often the project team begins to be fully engaged in tasks at the last moment before the deadline, and as a consequence there are delays;

- insufficient qualification of the project manager and team (lack of necessary skills and knowledge);

- the project uncertainty, etc.

All these drawbacks are also inherent in the projects, which are implemented by the management bodies of the border guard agency, and, accordingly, all project activities are always associated with certain risks that may have a negative impact on the project success.

One of the possibilities to reduce the risk in the project activity is the cooperation of the relevant management bodies of the Border Guard Agency Administration with its educational institution. Taking into consideration that a significant scientific potential is concentrated in the educational institution of the border department, this will contribute to solving such a problem as a lack of qualified personnel or the lack of specialized knowledge and skills to formulate the project concept and its development.

In the management decision making the main factors, on which measures for reducing the level of project risks are focused, are the volume and reliability of information on risk sources as well as the degree of control over them.

Therefore, we should consider the problem of risk assessment of projects that are implemented in the border guard agency, on the example of the interaction between the management bodies of the Border Guard Agency Administration and its educational institution, which is based on probabilistic-statistical modelling with the use of the expert assessment (Orlov, 2003).

Therefore, at least two organizations participate in this project – an educational institution (scientific and pedagogical team) and an employer (the appropriate management body of the Border Guard Agency Administration). As a rule, the work on the project is divided into two stages: the first stage is the actual research work of an applied nature (the educational institution is responsible for this stage); the second one is the implementation of the obtained results in the practical activities of the border guard agency (the appropriate management body of the Border Guard Agency Administration is responsible for this stage).

It should be noted at once that a certain group of risks is associated with the activities of each of the project participants. And in the structure of the group of project implementation risks in the educational institution, the risks of not performing work in accordance with the technical task as well as not returning (fully or partially) of spent resources come to the fore.

The possible results of the research work can be described in the following way:

1)   work and obligations of all project participants are fulfilled in full;

2)   the research part of the work is performed in full, but for certain reasons the employer has not fulfilled his obligations in full, which did not allow to implement the work results in the practical activities of the agency;

3)   the research part of the work has not been completed, but significant scientific results have been obtained. Extra time is required to complete the work;

4)   the research part of the work has not been performed, but some interesting scientific results have been obtained. However, the initially planned scientific result will not be achieved in the near future;

5)   the fulfilment of the research work in the educational institution is completely disrupted.

In addition, in any of the above-mentioned cases, there is also the likelihood of exposure to environmental risks, which may worsen the result of the project activity.

So, the assessment is unequivocal only in two cases out of five: result 1 is a complete success, and result 5 is a complete failure. In other cases – results 2, 3, 4 – some scientific results are received. Moreover, in the case of results 1, 2, the staff of the educational institution performed everything that was required.

We should consider the process of implementing projects in the border guard agency in detail.

3. Results

Construction of a general project implementation model. In identifying the main factors that determine the project implementation risks, we will proceed from the fact that: first, a team of scientists from the educational institution work, then they transfer their developments to the employer for the adoption and implementation of the results in the practical activities of the border guard agency. The probability that a team of scientists will perform their work fully depends on two groups of factors, which are determined by situations within the team and within the educational institution (in the article we assume that these groups of factors are independent of each other). The third risk factor is related to the project employer, the fourth one – to the negative impact of the external environment.

Thus, we distinguish four main groups of risk factors associated with: the team of performers; educational institution as a whole; the employer; the influence of the external environment. We assume that all four

groups of factors in the theoretical-probabilistic sense are independent of each other.

Accordingly, the general form of the mathematical model for calculating the risks of project implementation will be the following one (1):

$$P_y = P_1 \times P_2 \times P_3 \times P_4, \qquad (1)$$

where P_s is the probability of "complete success", and the risk that the project will not be fully implemented is estimated by the probability of "lack of complete success", i.e. by the variable $(1 - P)$; P_1 – the probability that the situation within the team of performers will not interfere with the project (therefore, the risk of the team is estimated by the variable $(1 - P_1)$; P_2 – the probability that the situation within the educational institution will not interfere with the project $(1 - P_2)$ – the risk of the educational institution; P_3 – the probability that the employer will complete his work, after the team of scientists completes their part of the project in full $(1 - P_3)$ – the risk of the employer; P_4 – the probability that the situation in the external environment will not prevent the project implementation $(1 - P_4)$ – the risk of the external environment.

Calculation of partial probabilities by risk groups. When calculating these probabilities, we will approximate them using linear functions (2):

$$
\begin{aligned}
P_1 &= 1 - X_1 \times g_1 - X_2 \times g_2 - \cdots - X_i \times g_i \\
P_2 &= 1 - Y_1 \times q_1 - Y_2 \times q_2 - \cdots - Y_j \times q_j \\
P_3 &= 1 - Z_1 \times f_1 - Z_2 \times f_2 - \cdots - Z_m \times f_m \\
P_4 &= 1 - U_1 \times w_1 - U_2 \times w_2 - \cdots - U_c \times w_c
\end{aligned}
,
$$

where X_1, X_2, …, X_i, g_1, g_2,…, g_i – score of the factors when calculating the risk within the team of performers and their weighting factors; i – the number of factors in the first group; Y_1, Y_2, …, Y_j, q_1, q_2,…, q_j – score of the factors, when calculating the risk of the educational institution

and their weighting factors; j – the number of factors in the second group; Z_1, Z_2, …, Z_m, f_1, f_2,…, f_m – score of the factors, when calculating the employer's risk and their weighting factors; m – the number of factors in the third group; U_1, U_2, …, U_c, w_1, w_2,…, w_c – score of the factors, when calculating the risk of the environment and their weighting factors; c – the number of factors in the fourth group.

The score of the factors X_i, Y_j, Z_m, U_c are evaluated by experts for each specific project, and according to the results of expert evaluation, the scores of weighting factors g_i, q_j, f_m, w_c are set the same in groups for all projects.

Taking into consideration the results of the research analysis (Zalozh, et al., 2008) as well as the practical experience of analysis and risk management, the expert group was asked to evaluate the factors X_i, Y_j, Z_m, U_c according to the following qualitative scale:

0 – a virtually impossible event (with a probability of less than 0.01);

1 – an extremely unlikely event (with a probability of 0.02 to 0.05);

2 – unlikely event (probability from 0.06 to 0.10);

3 – an event with a probability that cannot be ignored (0.11 to 0.20);

4 – a quite probable event (probability of 0.21 to 0.30);

5 – an event with a significant probability (more than 0.30);

Assuming that the maximum score is 5, the sum of all weighting factors was chosen to be 1/5 (0.2). Therefore, if for all factors the experts set the maximum score (5), then the corresponding probability is estimated as 0, i.e. the project implementation is considered to be impossible, and vice versa.

To determine the factors that will determine the risk in groups P_1 – P_4 and their weighting factors, we involved the experts from among the officers of the Border Guard Agency Administration, who deal with project implementation in accordance with their functional responsibilities, and the scientific and pedagogical staff of the agency educational institution. The sample size was 30 people, which is sufficient to determine the weight of the factors. Given the objectives of the study, the number of factors was

minimized by excluding insignificant ones, i.e. those factors that do not significantly affect the project implementation process.

The evaluation results are shown in Tables 1-4.

Table 1. Factors that will determine the risk of the performers' team and their weight

Factor number	Factor description	Weighting factor (g_i)
X_1	The project implementation will be affected by underestimation of the research complexity (including the possible choice of a fundamentally incorrect research direction)	0.03
X_2	The project implementation will be affected by lack of time (due to improper planning of the project implementation process, provided that the main research direction is chosen correctly)	0.08
X_3	The project implementation will be affected by problems that are related to the scientific supervisor, in particular, with his long absence, his substitution or insufficient qualification.	0.06
X_4	The project implementation will be affected by problems that arose during the implementation of tasks and are related to other members of the performers' team (except the leader), including their insufficient qualifications	0.03

Table 2. Factors that will determine the risk of the educational institution and their weight

Factor number	Factor description	Weighting factor (q_j)
Y_1	The project implementation will be affected by organizational changes in the educational institution	0.02
Y_2	The project implementation will be affected by the lack of necessary resources or inconsistency of the facilities and resources	0.08
Y_3	The project implementation will be affected by the problems that are related to change of priorities (requirements to perform another task that is considered to be more urgent or important)	0.07
Y_4	The project implementation will be affected by	0.03

	problems that are related to a large number of projects being implemented simultaneously	

Table 3. Factors that will determine the risk of the project employer and their weight

Factor number	Factor description	Weighting factor (f_m)
Z_1	The result of the project implementation will be affected by problems that are related to the drawbacks in the work of its management bodies, including the untimely provision of the project performers with the necessary resources (redistribution of resources to other projects)	0.05
Z_2	The result of the project implementation will be affected by the problems that are related to the change of course (policy) priorities of the border guard agency that will make the project results unnecessary.	0.07
Z_3	The result of the project implementation will be affected by problems that are related to the inability to implement the results in the practical activities of the border guard agency	0.06
Z_4	The result of the project implementation will be affected negatively by organizational changes in the border guard agency, in particular, by a change of management	0.02

Table 4. Factors that will determine the external environment risk and their weight

Factor number	Factor description	Weighting factor (w_c)
U_1	The project implementation possibility will be affected by the lack or reduction of funding for the border guard agency (budget reduction)	0.02
U_2	The project implementation possibility will be affected by changes in the status and / or strategy of the border guard agency and its bodies, including the educational institutions (in particular, due to liquidation or reorganization) by the decision of higher authorities (the ministry or the state leadership)	0.07

U$_3$	The project implementation possibility will be affected by decisions of the relevant higher authorities (ministries or the state leadership) that are related, for example, to the information closure or to a policy choice that make the project implementation unnecessary or inappropriate	0.03
U$_4$	The project implementation possibility will be affected by changes in the military-political situation, which will lead to the decision of the relevant higher authorities (ministries or the state leadership) to change the priorities in the activities of the border guard agency and its bodies	0.08

Therefore, the probability of successful project implementation is assessed by the following mathematical model:

$$P_y = \overset{4}{\underset{k=1}{\hat{O}}} P_k, \tag{3}$$

where

$$P_1 = 1 - 0{,}02 \times X_1 - 0{,}08 \times X_2 - 0{,}07 \times X_3 - 0{,}03 \times X_4;$$
$$P_2 = 1 - 0{,}02 \times Y_1 - 0{,}08 \times Y_2 - 0{,}07 \times Y_3 - 0{,}03 \times Y_4;$$
$$P_3 = 1 - 0{,}05 \times Z_1 - 0{,}07 \times Z_2 - 0{,}06 \times Z_3 - 0{,}02 \times Z_4;$$
$$P_4 = 1 - 0{,}02 \times U_1 - 0{,}07 \times U_2 - 0{,}03 \times U_3 - 0{,}08 \times U_4.$$

The research results were implemented in the research activities of the National Academy of the State Border Guard Service of Ukraine named after Bohdan Khmelnytskyi. The calculation of probabilities that are related to the implementation of three standard projects of the border guard agency and the dependence of project success on the impact of certain risk groups are shown in Table 5 and Figure 1.

Table 5. Probability calculation of the implementation of standard projects

Project number		Project 1	Project 2	Project 3
	1. Risk within the team of performers			
g_i		X_{i1}	X_{i2}	X_{i3}
0.03		1	2	4
0.08		0	1	3
0.06		0	1	4
0.03		1	2	5
P_1		**0.94**	**0.74**	**0.25**
	2. Risk inside the educational institution			
q_j		Y_{j1}	Y_{j2}	Y_{j3}
0.02		1	2	3
0.08		0	1	2
0.07		0	1	4
0.03		1	1	5
P_2		**0.95**	**0.78**	**0.35**
	3. Risk of the project employer			
f_m		Z_{m1}	Z_{m2}	Z_{m3}
0.05		1	1	2
0.07		0	0	2
0.06		0	0	1
0.02		1	1	1
P_3		**0.93**	**0.93**	**0.68**
	4. Risk that is connected with the external environment			
w_c		U_{c1}	U_{c2}	U_{c3}
0.02		1	1	2
0.07		0	0	2
0.03		1	2	1
0.08		0	0	1
P_4		**0.95**	**0.92**	**0.71**
	Probability of the project implementation			
P_y		**0.79**	**0.49**	**0.04**
	Probability of fulfilling project tasks without taking into account the employer's risk			
$P_1* P_2* P_4$		0.85	0.53	0.06
	Probability of fulfilling project tasks without taking into account the external environment risk			
$P_1* P_2* P_3$		0.83	0.54	0.06
	Probability of fulfilling project tasks without taking into			

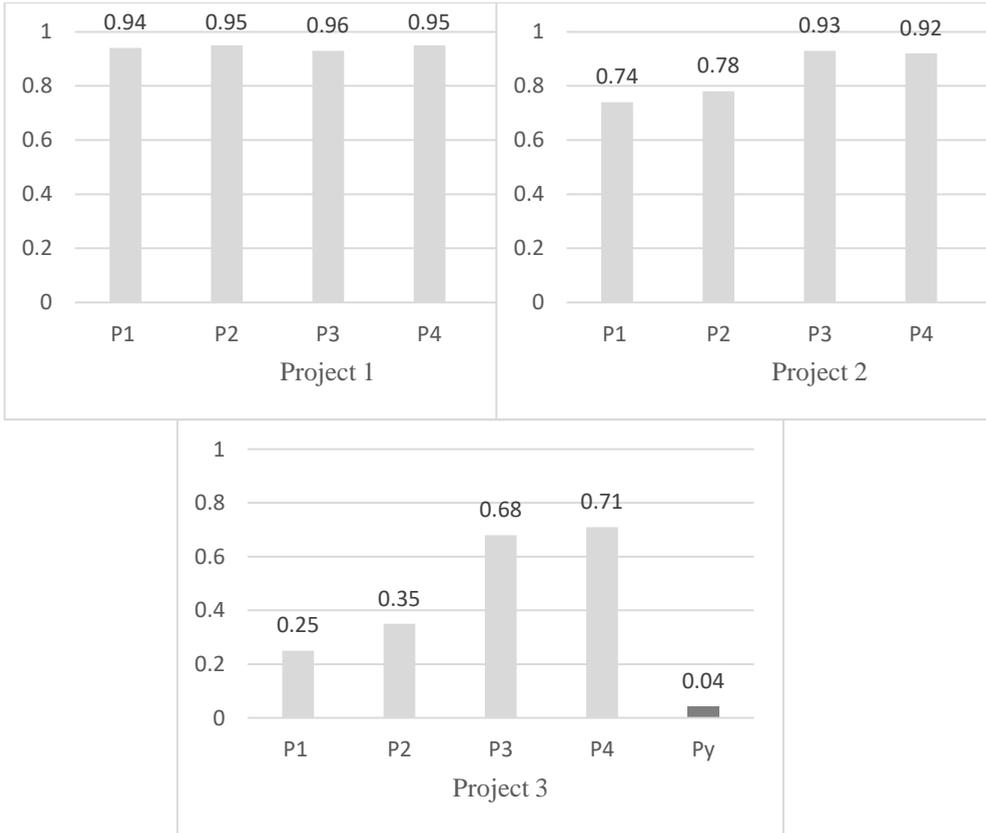| Project number		Project 1	Project 2	Project 3
	account the educational institution risk			
$P_1* P_3* P_4$		0.83	0.63	0.12
	Probability of fulfilling project tasks in the educational institution			
$P_1* P_2$		0.89	0.58	0.09

Figure 1. Dependence of the project success probability on the impact of certain risk groups.

The obtained result provides an opportunity to draw conclusions about the impact of a factor change on the overall probability of the project implementation. The results of the implementation showed that in general the proposed model use allows to calculate potential risks at the project

planning stage in advance and manage them in order to ensure the project management success of the border guard agency.

4. Conclusions

Thus, the decisions, which are made in the project planning and implementation, vary in both the complexity and the scale of the involved resources. As a rule, decisions are a choice of several options or alternatives. In this case, each alternative carries a greater or lesser risk of failure. Therefore, the project manager's task is to assess alternative solutions not only in terms of resource and time parameters, but also in terms of failure risks or work performance with improper quality level.

So, this article considers the basics of the project management methodology, the issue of risk assessment of the implementation in the State Border Guard Service of Ukraine. The research is based on the results of the scientific school of the border guard agency in the field of risk analysis and practical results, which were obtained during the project management.

In particular, the probability of the first project implementation is high and depends almost equally on all four factors. The probability of the second project implementation is 50/50 and is connected with the presence of all four types of risk. The probability of the third project implementation is the lowest as it is connected with high risk within the team of performers and within the educational institution.

The obtained results lead to the conclusion that the conceptual phase and the project planning phase are very important stages in the project implementation. The more thoroughly the project is thought out and planned, the less difficulties await at the implementation stage. The use of the proposed risk assessment methodology at the project planning stage will allow not only to calculate potential risks in advance, but also to minimize their negative impact, which will ensure the project success

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