

# Innovative Approach to Assessing Safety Culture in Enterprise Personnel Management System

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**Abstract** – The article examines the safety culture of modern enterprises from the standpoint of safety-oriented approach within five components: teamwork, organizational component, functional component, identification of bottlenecks, and "work on mistakes" risk minimization. This position for highlighting the structural elements of security culture is explained by the possibility of covering all components of economic security of enterprise and management system, with emphasis on actions and reactions of direct performers and managers at different levels. The article describes the procedures for assessing safety culture, which includes nine stages. One of the main elements of such an assessment is the use of an appropriate questionnaire, which, with anonymity and prompt processing allows us to establish the real situation with the level of safety culture at an enterprise. The assessment of the level of safety culture was carried out on the example of five enterprises, and it was determined the stage for each of them (pathological, reactive, calculative, proactive, generative). Management decisions and certain measures to improve its level are taken based on the results of a comprehensive assessment, which in turn directly affects the economic security of an enterprise.

**Keywords** – safety culture, management system, enterprise, safety culture level indicator.

## 1. Introduction

In the context of increasing negative trends in the development of socio-economic systems, the possibility of the safe existence of enterprises and their competitiveness depends on the actions and decisions of enterprise management, as well as on the responsibility of the performers [9]. All this requires an assessment of safety culture, which is directly related to the organizational culture of enterprises, determines the development of appropriate scientific and methodological approaches and the need to implement the provisions of non-pecuniary management in the management system [3], [7].

Safety culture is generally identified in the scientific literature with workplace safety. In our opinion, safety culture is a more complex concept; it should cover various areas of activity and functioning of an enterprise. For example, the current conditions require enterprises to widely use information and communication technologies, and the "leak" of information can cause significant damage to the economic security of an enterprise, creates a request for compliance with certain rules of conduct with commercial information. This example is directly related to the safety culture, concerns a separate component of the economic security system. There can be many such examples, because problems arise in each of system's components. This example is directly related to the safety culture, which relates to a particular component of the economic security system, and there may be many such examples, as problems arise in each of system's components. Of course, safety culture is primarily related to enterprise personnel, and more specifically depends on their actions. The level of maturity of safety culture depends on the effectiveness of enterprise economic security and security-oriented management. In our opinion, the issue of safety culture

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in the formation of safety-oriented management is very important and requires more detailed study and analysis in order to form a scientific and methodological approach to its evaluation.

Based on the study of the history of security culture, experts have identified five stages through which it evolves [6]:

1. Pathological – Who cares as long as we are not caught;
2. Reactive – Safety is important, we do a lot every time we have an accident;
3. Calculative – We have systems in place to manage all hazards;
4. Proactive – We work on the problems that we still find;
5. Generative – Safety is how we do business round here.

This approach is useful from the standpoint of assessing the level of safety culture of the studied enterprises, as it allows determining the characteristics of the safety culture (from pathological to productive) based on the developed assessment methodology. However, this is not an end in itself and involves the formation of a number of measures to improve its level, and this is directly reflected in ensuring the economic security of an enterprise, as it forms a safety-oriented environment

in which the provisions of safety-oriented management can exist.

This approach is interdisciplinary, as the assessment of safety culture is used in medicine [2], [4], energy industry [11], [8], aviation [5], [10] and other areas [1], [9].

For industrial enterprises and directly enterprises of the construction industry, this approach is associated with the safety of production processes and compliance with safety rules by staff, but this somewhat narrows the scope of this approach.

## 2. Research Method

From the point of view of safety-oriented management, safety culture should be explored within five components: teamwork, organizational component, functional component, identification of bottlenecks, and "work on mistakes" risk minimization. This position on highlighting the structural elements of safety culture is explained by the possibility of covering all components of the economic security of an enterprise and management system, with an emphasis on the actions and reactions of direct performers and managers at different levels. The procedure for assessing the level of safety culture of an enterprise is shown in Figure 1.

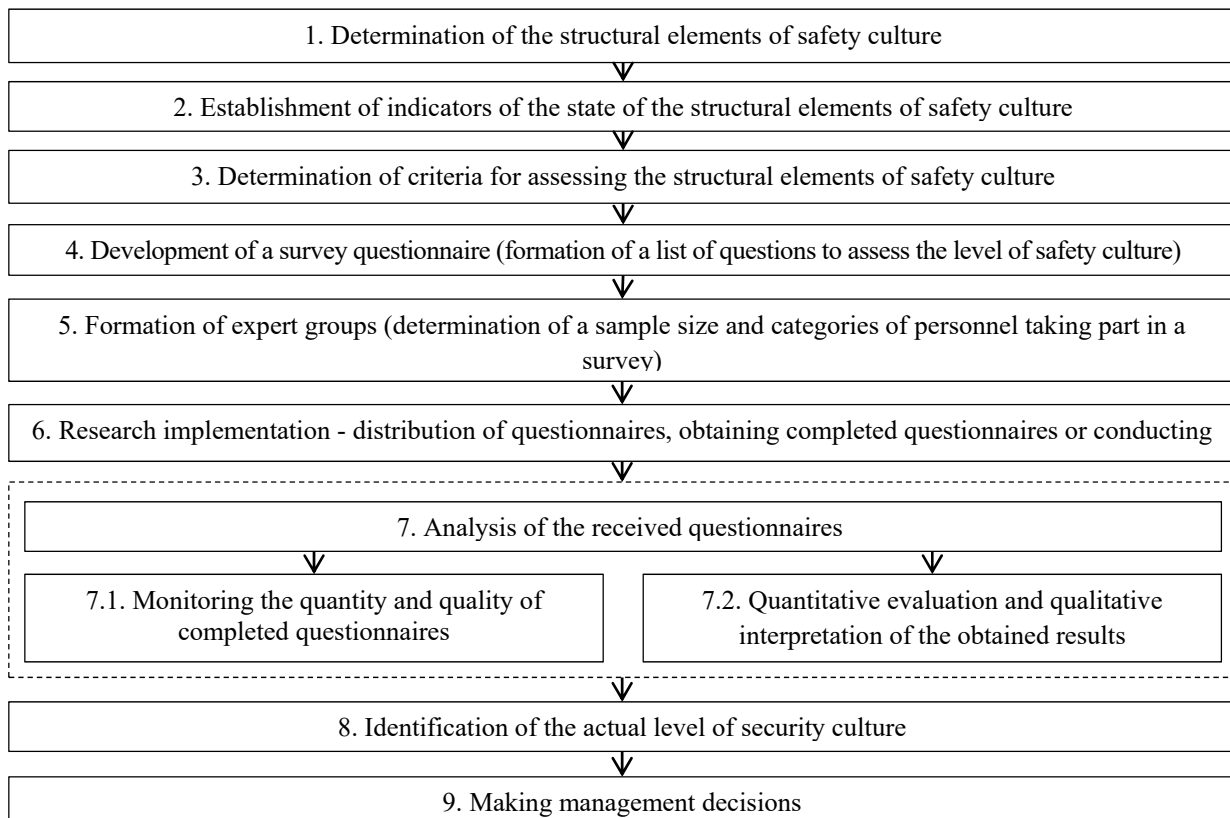


Figure 1. The procedure for assessing the level of safety culture of an enterprise

The analysis of the stages of the presented procedure shows the emphasis in the first stage on the definition of the structural elements of the security culture (five components). Then there is an establishment of indicators of the state of structural elements (second stage) and the definition of criteria for assessing the structural elements of security culture (third stage). Particular attention should be paid to the formation of the questionnaire (fourth stage), as it should contain the main components and questions that would allow for a minimum period of time to get the most information about the real state of security culture of an enterprise. In this case, the duality of the answers (yes / no) allows us to determine quickly the overall level of evaluation both in terms of individual components and within the evaluation as a whole. Expert groups are formed in the fifth stage. Such groups should cover all components of an enterprise management system and functional units, as defined in the first section of the dissertation components of the economic security system cover the seven main areas of operation of an enterprise as a whole. At the stage of research implementation (sixth stage), there are direct survey

processes with distributing questionnaires and explaining their completion order. The seventh stage is the analysis of the received information with the obligatory monitoring of the quantity and quality of the filled questionnaires, after which the quantitative assessment and general interpretation of the obtained results is carried out. This allows identifying the actual level of safety culture (eighth stage) in terms of five possible states. Each state is determined within the range from 0 to 1, or from 0 to 100% in increments of 0.2. That is, the ranges of estimates for the pathological state (0-0.2), reactive state (0.21-0.4), bureaucratic state (0.41-0.6), proactive state (0.61-0.8), and productive state (0.81-1). This gradation has a sufficient degree of detail of the results and is the basis for the formation of appropriate management decisions (ninth stage), which will differ in scale, cost and efficiency of implementation. One of the main elements of such an assessment is the use of an appropriate questionnaire, which, subject to anonymity (Table 1) and prompt processing, allows establishing the real situation with the level of safety culture in an enterprise.

Table 1. Enterprise safety culture assessment questionnaire

#	Question	Reply *, **	
		Yes	No
1	Teamwork (KOM)		
1.1	Employees of the enterprise support each other	x	
1.2	On a need doing a lot of work quickly, the employees of the enterprise (department) work together as a team	x	
1.3	At the enterprise, employees treat each other with respect	x	
1.4	When one of the employees is very busy or does a large amount of work, colleagues are always ready to help	x	
1.5	We have enough staff to handle the load	x	
1.6	There is constructive cooperation between the employees of the enterprise, who must work together	x	
1.7	It is a pleasure to work with employees of other divisions of the enterprise	x	
2	Organizational component (OPT)		
2.1	Senior management has a clear idea of the risk associated with an enterprise activity	x	
2.2	Management's actions show that safety is a top priority	x	
2.3	Top management takes into account business security when developing strategic, operational programs for development	x	
2.4	Management provides a work environment that promotes business security	x	
2.5	In general, the level of business security is getting improved	x	
2.6	I am provided with sufficient resources (personnel, financial, material, etc.) to ensure the safe operation of a	x	
2.7	Business security decisions are made at the appropriate level by the most qualified employees	x	
2.8	Employees do not hesitate to ask questions to more experienced employees	x	
2.9	Employees are afraid to ask questions when they see mistakes in the other colleagues' actions		x
2.10	Business security changes are problematic		x
	Functional component (ФУН)		
3.1	There is a well-established communication between management and employees of an enterprise regarding the factors that negatively affect business processes and performance	x	
3.2	I have enough time to perform tasks safely within my functional responsibilities	x	
3.3	New staff is properly trained at the enterprise where I work	x	
3.4	There are often problems with the exchange of information between departments of the enterprise		x

3.5	Disregard of policies and procedures is rare in my department	x	
3.6	My business unit does a good job of managing risk to keep the business safe	x	
3.7	Distribution of functional responsibilities at the enterprise is of sufficient quality	x	
3.8	Functional managers are experts in their field	x	
4	Identification of bottlenecks (IBM)		
4.1	Top management is well aware of the types of errors that actually occur in the enterprise	x	
4.2	Organizational culture in the enterprise makes it easy to learn from others' mistakes	x	
4.3	Management shows interest in business security only after adverse events		x
4.4	I made mistakes that could potentially damage the performance of the enterprise		x
4.5	If I make a mistake that has significant consequences and no one notices, I don't tell anyone		x
4.6	Personal problems can negatively affect my work		x
4.7	The enterprise uses modern technologies	x	
4.8	The management system at the enterprise is flexible	x	
5	"Work on mistakes" risk minimization (MPI3)		
5.1	Employees of the enterprise are not punished for mistakes, but the reasons for their occurrence are analyzed	x	
5.2	Error reporting is encouraged in the enterprise and in individual structural components	x	
5.3	Disputes will be resolved properly (not who is right, but what is the best for achieving the result)	x	
5.4	There is a practice of encouraging employees to take action to identify serious errors	x	
5.5	I learned to do my own work better by learning about the mistakes my colleagues made	x	
5.6	Are situations of work in extreme conditions considered?	x	
5.7	Is the control system of operational processes at the enterprise effective?	x	

\* must choose one answer; \*\*x – characterizes the assessment of enterprise safety culture as the strong side and the absence of problem points (risks of activity)

The assessment of the safety culture level of the studied enterprises was carried out according to the following methodology. Let us denote the answer (judgment) of the  $j$ -th expert regarding the  $i$ -th point of the five components of the enterprise safety culture (Table 1) as follows:

$$KOM_{ij} (i = \overline{1, 7}), \quad (1)$$

$$OP\Gamma_{ij} (i = \overline{1, 10}), \quad (2)$$

$$\Phi VH_{ij} (i = \overline{1, 8}), \quad (3)$$

$$IBM_{ij} (i = \overline{1, 8}), \quad (4)$$

$$MPI3_{ij} (i = \overline{1, 7}), \quad (5)$$

Each designation in formulas (1) – (5) corresponds to an understandable mnemonic of five subheadings of Table 1. Let the answers "yes" correspond to the value 1 everywhere, except for paragraphs. 2.9, 2.10, 3.4, 4.3, 4.4, 4.5, 4.6. Answers "yes" in these paragraphs correspond to 0, because they are opposite in meaning. So, the answer "no" corresponds to the value 0 everywhere, except for paragraphs 2.9, 2.10, 3.4, 4.3, 4.4, 4.5, 4.6, in which there will be 1. Thus, in each questionnaire there will be  $7 + 10 + 8 + 8 + 7 = 40$  values of 1 or 0. Let  $N$  experts be invited in total. After they have filled out the questionnaires, this data is processed as follows. First, the average of the  $i$ -th point of each component is determined:

$$KOM_i = \frac{1}{N} \cdot \sum_{j=1}^N KOM_{ij} (i = \overline{1, 7}), \quad (6)$$

$$OP\Gamma_i = \frac{1}{N} \cdot \sum_{j=1}^N OP\Gamma_{ij} (i = \overline{1, 10}), \quad (7)$$

$$\Phi VH_i = \frac{1}{N} \cdot \sum_{j=1}^N \Phi VH_{ij} (i = \overline{1, 8}), \quad (8)$$

$$IBM_i = \frac{1}{N} \cdot \sum_{j=1}^N IBM_{ij} (i = \overline{1, 8}), \quad (9)$$

$$MPI3_i = \frac{1}{N} \cdot \sum_{j=1}^N MPI3_{ij} (i = \overline{1, 7}). \quad (10)$$

Next, we calculate the standard deviation (SD) between the average values (6) – (10) and the approximate vectors of the values of each of the five components of enterprise safety culture (Table 1):

$$\xi_{KOM} = \sqrt{\frac{1}{7} \cdot \sum_{i=1}^7 (\overline{KOM}_i - KOM_i)^2}, \quad (11)$$

$$\xi_{OP\Gamma} = \sqrt{\frac{1}{10} \cdot \sum_{i=1}^{10} (\overline{OP\Gamma}_i - OP\Gamma_i)^2}, \quad (12)$$

$$\xi_{\Phi VH} = \sqrt{\frac{1}{8} \cdot \sum_{i=1}^8 (\overline{\Phi VH}_i - \Phi VH_i)^2}, \quad (13)$$

$$\xi_{IBM} = \sqrt{\frac{1}{8} \cdot \sum_{i=1}^8 (\overline{IBM}_i - IBM_i)^2}, \quad (14)$$

$$\xi_{MPI3} = \sqrt{\frac{1}{7} \cdot \sum_{i=1}^7 (\overline{MPI3}_i - MPI3_i)^2}. \quad (15)$$

Of course, exemplary vectors correspond to the case when all the answers in Table 1 are positive (everywhere - the answers are "yes", except for items

2.9, 2.10, 3.4, 4.3, 4.4, 4.5, 4.6, where it is "no"):

$$\begin{aligned} [KOM]_{i \times 7} &= [1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1], \\ [OPT]_{i \times 10} &= [1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 0 \ 0], \\ [\Phi VH]_{i \times 8} &= [1 \ 1 \ 1 \ 0 \ 1 \ 1 \ 1 \ 1], \\ [IBM]_{i \times 8} &= [1 \ 1 \ 0 \ 0 \ 0 \ 0 \ 1 \ 1], \\ [MPIB]_{i \times 7} &= [1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1]. \end{aligned}$$

$$I_{CPKB} = 1 - \frac{\xi_{KOM} + \xi_{OPT} + \xi_{\Phi VH} + \xi_{IBM} + \xi_{MPIB}}{5}, \quad (16)$$

in which the indicator is  $I_{CPKB} \in (0;1)$ . If SD (11) – (15) decreases from the sample state, then the SLSC indicator will increase. This will mean an increase in the level of safety culture of the studied enterprise.

### 3. Results

It is easy to make sure that each SD (11) - (15) lies in the range between 0 and 1. Therefore, the state of the level of safety culture (SLSC) of an enterprise can be assessed by the formula

This technique has been tested in five companies. The results are presented in Tables 2 – 6.

Table 2. The results of the survey of 26 experts at SLC "Khmelnyskzalizobeton" ( $I_{CPKB}=0,717$ )

Answers of 26 experts																							Average	SD
0	1	0	1	1	0	0	0	0	1	0	1	0	1	1	1	1	1	0	1	1	1	1	0,654	0,289
0	0	1	0	1	1	0	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	0,769	
1	0	1	0	1	1	1	1	1	0	0	1	0	0	1	1	0	1	1	1	1	1	1	0,731	
0	1	0	1	1	0	1	1	1	1	1	1	0	0	0	1	0	1	0	0	1	1	0	0,615	
1	0	0	0	1	1	1	1	0	1	0	0	1	1	1	1	1	0	1	1	1	1	1	0,692	
1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	1	0,731	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	0,846	
1	1	0	1	1	1	0	1	0	1	1	0	1	0	0	1	1	1	0	1	1	0	1	0,692	
1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	0	1	0,769	
1	1	1	0	0	1	0	1	1	1	0	1	1	0	1	1	1	1	1	0	1	1	1	0,769	
1	1	0	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	0	1	0,808	
1	1	0	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	0,846	
1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	0	1	0	1	1	1	1	0,808	
0	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	0,846	
1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0	0,808	
1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0,192	
1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0,231	
0	0	1	1	1	1	1	1	0	1	1	0	0	1	1	0	0	0	0	0	1	1	0	0,538	
0	1	1	0	1	0	0	1	1	0	0	1	1	1	1	1	0	0	0	1	0	0	0	0,5	
1	1	1	1	0	1	0	1	1	1	1	1	1	0	1	0	1	1	0	1	1	0	0	0,692	
1	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	1	1	0	0	1	0	0	0,346	
0	1	1	1	1	1	0	0	1	1	0	0	1	0	1	0	1	1	1	0	0	1	0	0,577	
1	0	1	0	1	1	1	1	1	1	0	1	1	1	1	0	0	1	1	0	1	0	1	0,731	
1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	1	0	1	1	0	1	1	0	0,769	
1	0	1	1	0	1	0	1	0	1	1	0	0	0	1	1	1	1	1	0	0	1	1	0,654	
1	1	1	1	0	1	1	0	1	1	0	1	0	1	1	0	0	0	0	0	1	1	1	0,615	
1	1	1	1	0	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0,808	
0	0	0	0	1	1	0	1	0	0	1	1	0	0	1	0	0	0	0	1	1	0	0	0,385	
0	0	0	0	1	0	1	0	1	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0,231	
0	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0,385	
0	1	0	1	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0,308	
0	1	1	0	1	1	1	0	1	0	1	1	0	1	1	0	0	0	0	0	1	0	0	0,5	
1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	0	1	1	1	1	0	0	0,808	
1	1	1	1	1	1	0	0	0	1	1	0	1	1	0	1	1	1	0	1	1	0	1	0,692	
1	0	1	1	1	0	1	1	1	1	1	0	1	1	1	1	0	1	1	0	0	1	0	0,731	
1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	0,885	
1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	1	0,885	
1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	0,885	
1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	0	0	0	1	1	0	1	0,769	
1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	0	0	1	1	1	1	1	0	0,808	

According to the results given in Table 2, the state of the level of safety culture according to the corresponding indicator is 0.717. This indicates a fair high level of safety culture of the represented enterprise. Similar surveys are given in Table 3 for SLC "Khmelnitsky plant of building materials".

Table 3. The results of the survey of 31 experts at SLC "Khmelnitsky plant of building materials" ( $I_{CPKB}=0,486$ )

Answers of 31 experts																										Average	SD		
1	1	0	1	1	0	0	0	1	0	1	0	1	1	1	0	1	0	0	1	1	1	1	1	1	0	1	0,677	0,487	
1	1	0	1	0	1	0	1	1	0	1	0	0	1	1	1	0	0	1	0	1	1	0	0	0	1	1	0,516		
1	0	1	1	0	1	0	0	1	0	0	0	1	1	1	1	1	0	0	0	1	1	1	0	0	1	1	0,516		
1	0	0	1	0	0	0	1	0	1	1	1	1	1	1	0	0	0	1	0	0	0	1	0	0	1	1	0,452		
0	1	0	0	0	1	1	0	0	1	0	1	0	0	0	0	0	0	1	1	0	0	1	0	1	1	1	0,452		
0	0	0	0	0	1	1	1	0	0	1	1	0	0	0	0	0	1	0	1	0	1	0	1	0	1	1	0,419		
1	1	1	1	1	0	0	1	1	0	1	1	1	1	1	0	1	1	0	0	1	0	1	0	0	1	0	0,613		
0	0	0	1	1	0	0	0	0	0	1	0	0	1	0	1	0	1	1	0	1	1	1	1	1	0	0	0,452	0,465	
1	0	0	1	0	0	1	1	0	1	1	1	0	1	0	0	0	0	0	1	1	1	0	1	1	1	1	0,548		
0	1	0	0	1	0	0	1	0	1	1	1	0	1	0	0	0	0	1	1	1	1	0	1	0	1	1	0,548		
1	1	0	0	1	1	1	1	0	1	1	1	0	0	1	0	1	1	0	1	1	1	0	0	1	1	1	0,677		
0	0	1	0	0	1	1	0	1	0	0	1	0	1	0	1	1	1	1	0	0	1	1	0	1	1	0	0,484		
1	1	0	1	0	1	0	1	1	1	0	1	1	0	0	1	1	0	1	0	1	1	1	1	0	1	1	0,613		
1	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	1	0	0	1	0	1	1	1	0	1	0,419		
1	0	1	0	1	0	0	0	0	1	1	1	1	0	1	1	0	1	1	1	0	0	1	1	1	0	0	0,548		
0	0	0	1	1	1	0	0	1	0	1	0	0	1	0	0	1	1	1	0	1	0	0	0	0	0	0	0,355		
1	1	1	1	0	1	1	0	0	0	0	1	0	0	0	1	1	1	1	0	1	0	1	1	0	0	1	0,516		
1	0	0	0	1	0	1	1	1	0	1	1	0	0	1	0	1	0	1	0	1	0	0	0	1	1	1	0,516	0,456	
1	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0	1	0	1	0	1	1	0	0	0	0	0,484		
0	0	1	0	1	1	0	0	1	0	1	0	0	0	0	1	0	1	1	0	0	0	1	0	1	1	1	0,452		
0	0	0	0	1	0	1	0	0	0	1	0	1	0	1	0	0	1	0	1	1	0	1	1	0	0	1	0,419		
1	1	1	1	1	0	0	0	1	0	1	0	0	1	0	0	1	1	0	1	0	1	1	1	1	1	0	0,645		
1	1	1	1	1	0	0	0	1	0	0	0	0	1	1	0	0	1	0	0	1	1	1	0	1	1	1	0,516		
1	1	0	1	1	0	1	1	1	1	0	0	1	1	1	0	1	1	0	0	1	1	0	0	1	1	1	0,645		
0	1	0	1	1	1	0	1	1	1	0	1	0	0	0	1	1	0	0	1	1	0	1	0	1	1	1	0,548		
0	0	1	1	1	1	1	0	0	0	1	1	1	0	1	1	1	1	0	1	0	0	1	0	0	0	0	0,516	0,484	
0	0	1	1	1	0	1	1	0	0	1	1	1	1	0	1	1	1	1	0	1	0	1	1	0	0	0	0,548		
0	0	1	1	1	0	1	1	0	0	1	1	1	1	1	0	1	1	0	1	1	0	0	0	1	1	0	0,613		
0	0	1	0	0	1	0	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0	1	1	0	0,581		
1	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	1	0	0	0	1	0	1	0	1	0,581		
1	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	1	1	0,323		
0	1	1	1	0	0	1	1	1	0	0	1	0	0	1	1	1	1	1	0	1	1	0	1	1	1	1	0,677		
1	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0,581		
0	0	0	1	1	0	0	0	0	1	1	0	0	0	1	0	0	1	0	0	1	0	1	0	0	1	1	0,355	0,676	
0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1		0,29
0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0,258		
0	0	0	1	0	0	0	1	0	1	0	0	1	1	0	0	0	0	0	0	1	1	0	1	0	1	1	0,387		
1	1	1	0	0	0	0	1	1	0	1	0	0	0	0	1	0	1	1	0	1	0	0	1	0	1	1	0,452		
0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0,258		
0	0	0	1	0	0	0	0	1	1	0	0	1	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0,29		

According to Table 3, we can conclude that the indicator of the level of safety culture for the studied enterprise is 0.486. This situation indicates an average level of safety culture and a certain inertia of processes. For LLC "Hama-Tekhnika LTD" the results of the questionnaire are presented in Table 4.

Table 4. The results of the survey of 22 experts at LLC "Hama-Tekhnika LTD" ( $I_{CPKB}=0,245$ )

Answers of 22 experts																				Average	SD		
1	0	0	0	1	1	0	0	0	0	0	1	0	1	0	0	1	1	0	0	1	0	0,364	0,789
0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,182	
0	0	0	0	0	0	1	0	1	1	0	0	1	0	0	1	0	0	0	0	0	0	0,227	
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0,182	
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	1	0	0,182	
0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	1	0	0	0	0,227	
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0,136	
0	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0,273	
1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0,227	
0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	1	1	1	0	0	0,273	
0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0,182	
1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0,273	
1	0	1	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0,273	
0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0,182	
0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0,182	
1	1	1	1	0	1	0	1	1	0	1	0	1	0	0	1	0	1	0	1	0	1	0,591	0,605
1	1	1	1	1	1	1	0	0	1	1	0	1	0	1	1	0	1	1	0	0	1	0,682	
1	1	1	0	1	0	1	0	1	0	0	0	1	1	0	1	1	1	0	1	0	0	0,545	
0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	1	0	1	0	0,273	
1	0	0	0	1	1	1	0	0	0	0	1	1	1	0	1	1	0	0	1	1	0	0,5	
1	1	1	0	0	0	1	1	0	1	1	0	1	1	0	0	1	0	1	1	1	0	0,591	
1	1	1	0	1	0	1	1	0	1	1	1	1	0	0	0	1	1	1	0	0	0	0,591	
0	1	0	1	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0,227	
0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	1	1	1	0	0	0	0	0,273	
0	1	0	0	1	1	1	0	0	0	1	1	0	0	1	0	0	0	1	0	1	1	0,455	
0	0	0	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0,273	0,817
0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0,136	
1	1	0	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	0,818	
0	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	0,818	
1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0,955	
0	1	1	0	1	1	1	1	0	1	1	0	1	1	0	0	1	1	1	0	1	0	0,636	
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0,136	
0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0	0,182	
0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0,182	0,821
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0,227	
0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0,182	
0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	1	0,273	
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0,136	
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0,045	
0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0,227	

The results of a survey of 22 experts at LLC "Hama-Tekhnika LTD" indicate a low level of safety culture of the enterprise, as the indicator is only 0.245. In LLC

"Globo-LTD" the survey was also carried out, and the results are given in Table 5.

Table 5. The results of the survey of 20 experts at LLC "Globo-LTD" ( $I_{CPKB}=0,439$ )

Answers of 20 experts																			Average	SD	
1	0	0	0	1	1	1	0	1	1	1	1	1	0	0	0	0	1	0	1	0,55	0,504
1	0	0	1	1	1	0	0	0	0	0	1	1	1	0	1	1	1	0	1	0,55	
0	0	0	0	1	0	1	1	0	1	0	1	0	0	0	0	0	0	0	1	0,3	
1	0	1	1	1	1	1	0	0	1	1	1	1	0	0	1	0	1	0	0	0,6	
1	0	0	0	1	1	0	1	1	0	1	1	0	0	1	1	1	1	0	1	0,6	
1	1	1	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	1	0	0,4	
0	0	1	1	0	0	0	0	1	1	1	1	1	0	0	1	1	1	1	0	0,55	
0	1	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0,55	
0	0	0	1	0	1	1	0	0	1	1	1	1	1	0	1	0	1	1	1	0,6	
1	0	0	0	0	0	1	1	1	1	0	1	0	1	0	1	0	1	0	1	0,5	
1	1	1	0	0	0	0	1	0	1	0	1	1	1	0	0	1	1	1	1	0,6	
1	0	0	1	0	1	0	1	1	0	0	0	1	1	1	0	1	0	0	0	0,45	
0	0	1	1	1	1	0	1	1	0	1	0	0	1	0	1	1	1	0	0	0,55	
0	1	0	0	0	0	1	1	1	0	0	1	0	1	0	1	1	0	0	1	0,45	
0	1	0	0	1	0	1	0	0	0	0	1	1	0	1	0	0	1	1	0	0,4	
1	1	1	0	1	1	1	0	0	1	1	1	1	1	1	0	0	1	0	1	0,7	
0	1	0	0	1	0	0	1	0	1	1	0	0	0	0	1	1	0	1	1	0,45	
1	0	1	0	0	0	0	0	0	1	1	1	1	0	1	0	1	0	1	1	0,5	
0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0,15	
0	0	0	1	0	0	1	0	0	1	0	1	0	1	0	1	0	0	0	0	0,3	
1	1	1	1	0	1	1	1	0	1	0	1	0	1	0	1	1	0	0	1	0,65	
1	0	0	0	0	0	0	0	1	0	1	0	1	0	1	1	0	0	0	0	0,3	
0	0	1	1	1	0	1	0	0	0	1	1	0	0	0	1	1	0	0	0	0,4	
0	0	0	1	0	1	1	0	1	0	1	0	0	1	1	0	0	1	1	1	0,5	
0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0,15	
0	1	0	1	1	1	1	1	1	0	1	0	1	1	0	0	1	1	0	1	0,65	
0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	0,85	
1	1	1	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	1	0,4	
0	0	1	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	1	0,25	
1	0	0	1	1	1	0	1	1	1	0	0	0	0	1	0	1	0	0	1	0,5	
0	1	0	1	0	0	1	0	1	1	0	0	1	0	1	0	0	0	0	0	0,35	
1	1	0	1	1	1	1	1	0	1	1	0	0	1	0	0	1	0	1	1	0,65	
1	1	1	0	0	0	0	0	0	1	1	1	0	0	1	1	1	0	1	1	0,55	
1	0	1	1	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0,35	
0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0,1	
0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0,25	
0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0,2	
0	0	0	0	0	1	0	1	0	1	1	0	1	0	0	0	0	0	0	1	0,3	
0	1	0	1	0	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0	0,3	
0	1	0	0	0	0	0	1	0	1	1	0	0	0	0	1	1	1	0	0	0,35	

According to the results of the questionnaires, the level of safety culture according to the indicator is 0.439. For LLC "Mriia Zabudovnyka" the corresponding indicator makes 0,438, that is indicators are almost similar (Table 6).



Table 6. The results of the survey of 17 experts at LLC "Mriia Zabudovnyka" ( $I_{CPKB}=0,438$ )

Answers of 17 experts																Average	SD
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0,059	0,867
1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0,118	
0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0,176	
0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0,176	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0,118	
1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,118	
0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0,176	
1	0	0	1	0	0	0	0	0	0	0	0	1	1	0	1	0,294	
1	0	1	0	1	1	0	0	1	0	0	0	0	0	0	1	0,353	
0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0,176	
0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0,176	
0	1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0,235	
1	0	0	1	0	0	0	0	0	1	1	0	0	1	1	0	0,412	
1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0,235	
0	1	0	0	1	0	0	0	0	1	1	0	1	1	1	0	0,412	
1	1	0	1	1	0	0	0	1	1	1	1	0	1	1	1	0,706	
1	1	1	1	0	1	1	0	0	1	1	1	1	1	1	1	0,824	
1	1	1	1	1	1	0	0	1	1	0	0	1	1	1	0	0,647	
1	1	1	1	1	0	0	1	1	1	1	0	1	1	1	0	0,765	
1	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	0,706	
0	0	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0,294	
1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0	0,824	
0	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	0,765	
1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0,824	
0	1	1	0	1	1	1	1	1	0	1	1	1	1	0	0	0,706	
1	1	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0,294	
0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0,176	
0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0,882	
0	0	1	0	0	1	0	0	1	0	1	1	1	1	0	1	0,529	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
1	1	0	1	1	1	1	1	1	1	0	0	1	1	1	0	0,765	
0	0	0	0	0	1	1	0	0	0	0	1	0	0	1	0	0,235	
1	1	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0,294	
1	0	1	1	1	0	1	1	1	1	1	0	1	1	1	0	0,765	
1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0,824	
1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0,941	
1	1	1	0	1	1	1	1	1	1	1	0	0	0	0	1	0,706	
1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	0,882	
1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0,941	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0,941	

The assessment of the level of safety culture of the studied enterprises allowed to identify its different levels, which allowed to form a generalized table of

gradations of the levels of safety culture of the studied enterprises (Table 7).

Table 7. The level of safety culture of the studied enterprises

State	Company Name				
	SLC "Khmelnyskz alizobeton"	SLC "Khmelnitsky plant of building materials"	LLC "Hama-Tekhnika LTD"	LLC "Globo-LTD"	LLC "Mriia Zabudovnyka"
pathological					
reactive			+		
bureaucratic		+		+	+
proactive	+				
productive					

#### 4. Conclusions

The results of the assessment of the level of safety culture of the studied enterprises indicate the absence of both pathological and productive levels. This situation is mainly due to the instability of such enterprises (especially in a pandemic) and mainly the "traditional vision" of the construction business. The reactive level of safety culture in LLC "Hama-Tekhnika LTD" is due to the relatively small size of the enterprise and its specialization. Given the standardized approaches to work and similar orders and production processes, the company states situational management. Although the emphasis on improving the security culture of the enterprise is definitely needed.

SLC "Khmelnyskzalizobeton" was diagnosed with a proactive level of safety culture, since the company has been implementing innovative approaches in production for a long time, which are characterized by complex technological operations and extremely costly in terms of providing resources. In the process of implementing innovative technological approaches, the company faced a large number of problems, including security. However, the effective management of the enterprise and the strategic vision of its development as a whole made it possible to prevent negative manifestations of threats and specific risks in the activities of SLC "Khmelnyskzalizobeton".

SLC "Khmelnitsky plant of building materials" was diagnosed with a bureaucratic level of safety culture, since traditional production and traditional approaches to management rely mainly on directives and orders, while strict adherence to them provides (in the opinion of the management) the only correct way to operate and develop such a subject of management. The production of building materials and the construction of residential buildings is also rather tightly controlled by the state, which also provides an impetus for the development of bureaucratic approaches to the implementation of safety culture in practice. The emphasis in the development of just such enterprises is shifting to minimizing potential risks due to administrative methods of management, stimulating the bureaucratization of management processes. On the one hand, comprehensive instructive support of processes is an extremely useful approach, but this deprives enterprise management of a sufficient level of flexibility.

LLC "Mriia Zabudovnyka" is also characterized by a bureaucratic level of safety culture and strict regulation of procedures is aimed, first of all, at compliance with production standards and safety of

production processes, minimizing further economic risks and is the key to stable operation of the enterprise in the market.

The characteristic of the levels of safety culture at the studied enterprises indicates the need to increase it, which can be implemented using the provisions of safety-oriented management. At the same time, it is the management processes and the direct adoption of management decisions based on the analysis of information from various sources, modeling the processes of its interpretation and processing that make it possible to form economic and mathematical models for ensuring the necessary states of the economic security system.

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