Some Aspects of Anthropotechnical Safety Management Concept

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Abstract. The basic model of management and planning strategy is the triad: “goals and objectives” - “conceptual programs, courses of action and sets of rules for decision-making” - “resources”. The strategy is also considered as the unity of five components (“pentad”: plan; sample, model, template; positioning; perspective; “trick”, i.e. a distracting manoeuvre. There are different manners of developing strategies and concepts: upon the fact of a pathogenically detected and already occurred problematic emergency; as a result of predicting the possibility of an emergency before its occurrence and with a desire to guarantee the anthropotechnical safety of functioning and the quality of life of a person, social groups and society as a whole. The destabilizing factors that arise in investment construction projects during the construction phase are of particular importance. The questionnaire-based survey of experts is used to determine these factors, their impact on the ultimate goals of the project that construction participants may encounter when implementing investment construction projects. Distribution of destabilizing factors by type, classification, and spreading them among a number of local public and private enterprises working in the construction sector is one of the important areas of anthropotechnical safety. Actions and resources, which seem safe at the moment, can cause emergencies and consequences in their unpredictable combinations. The study of this problem is an urgent task of the near future and one of the fundamental areas of anthropotechnics.

1. Introduction
Basic concepts, terms and definitions

The “strategy” is:
● modelling and formal description of the most important long-term goals and objectives in a particular problem area;
● development of the course of the implementation of actions and the use of necessary resources, capable of achieving the intended goals and objectives.

These goals (objectives) should be unchanged in the long term, and the processes of their achievement are determined by many “concepts” that have the organizational form of “action programs” in real management practice, which are often oriented towards a shorter implementation period than the “strategy”. The feasibility of such conceptual programs is provided by different resources, and the process of implementing these programs is subject to dynamic changes in a multidimensional and multi-parameter environment in which long-term strategic goals are achieved [1-3, 4-7].
2. Materials and methods

It is possible to distinguish different strategies in the activities: strategies of concentrated, integrated and diversification “growth”, as well as strategies of “reduction” (cessation of efforts and cost reduction). The strategy is considered a combination of four groups of rules for coordinated and orderly achievement of goals in the long term:

1. Rules for assessing the results of solving a problem based on criteria (the qualitative aspect of the criterion of such an assessment is called an objective, and the quantitative aspect is called a task).

2. Rules for the interaction of the organizational structure with the external environment (declared results of activities, technologies for their circulation on the market in a competitive environment, business strategy).

3. Rules for the formation of relationships and procedures within the organizational structure (organizational concept).

4. Rules for managing stable activities of the organizational structure (operational techniques).

The development of a strategy does not lead to immediate action. Its result is the identification of a general area for the unconditional resolution of problems that have arisen, focusing on certain tasks and the possibilities for solving them; exclusion of alternative opportunities as incompatible with the chosen strategy. At the stage of strategy development, it is necessary to use generalized, incomplete and inaccurate information, which is then specified in the development of various concepts for implementing the chosen strategy. Elements of strategy in concepts act as criteria (objectives and tasks).

A number of researchers (Igor Ansoff, Henry Mintzberg and others) consider the strategy as a unity of the five components (“pentad”): plan; model; positioning; perspective; “trick”, i.e. a distracting manoeuvre.

The following choices are very important for each researcher:

● what is primary for him - a strategy or a concept?

● what does he consider to be the “starting point” and the beginning of activity when formulating his image of the future?

The main ability of a self-thinking person, and not a programmable biorobot - an implementer of “effective business”, should be the formation of his conscious ideal, his mission from God, his own path along which a person must go through all the circumstances of real life. Such a path is the main life strategy of a person. Its formation is a spiritual and worldview task, not an intellectual or organizational and technical one.

Solving for himself the problem of the primacy of a strategy or a concept, a person must understand the long-known truth:

● first, determine the ideal worldview of your life itself, its goals, your path unchanged in time and circumstances, as a strategy that you have determined by conscience and consider necessary for yourself, in which you are sure, of which you are absolutely devoted and ready to defend;

● then each time you predict or understand that the circumstances of life have changed, do not adapt your human qualities and conscience to them, adjust, if necessary, the existing one or form a new concept as a certain next stage of your path, remaining within the framework of your strategy.

3. Results and discussions

A strategy and a concept are the fundamental terms of strategic, tactical and operational management, the relationship of which different authors understand differently (for example, the interpretation of A. Dmitriev, 2012, (figure 1).
A number of researchers are attempting to build a complete Concept-Strategy scheme (for example, the interpretation of I. Kozyrev, 2012, figure 2)
The minimum number of experts who must participate in the study to create a representative amount of statistical data, based on a given reliability of the result \((A = 0.95)\), is determined by the formula \([10-11]\).

\[
E = \frac{h^2 r_a r_o}{\Delta^2}
\]

Figure 2. Complete Concept-Strategy scheme (by I. Kozyrev, www.business-gazeta.ru, 2012)

This means that the questionnaires are submitted to scientific experts in order to express an opinion on the degree of its effectiveness in obtaining information, which the scientific researcher would like to collect, i.e. by comparing the subject of the scientific research with the questions that the researcher asks in the form of the questionnaire. The researcher can also use questionnaires that were formulated by previous researchers on the same topic of scientific research with the addition of amendments that he considers appropriate in order to transfer the research into a positive approach.

Figure 3 shows the number of answers depending on the number of years of experience, where the vast majority of respondents had more than 15 years of experience.

The significance of the destabilizing factors affecting the construction industry is calculated in table 1. They are studied in the questionnaire by analyzing data from 73 questionnaires to which the participating experts answered. The range of significance varies from five options, from inefficient \((0)\%\) to very high impact \((100)\%\).
Figure 3. Number of answers by years of experience.

Table 1. The coefficient of significance of destabilizing factors

| Destabilizing factors                                                                 | Symbol | Coefficient of significance, % |
|--------------------------------------------------------------------------------------|--------|-------------------------------|
| Fluctuations in labor productivity for machinery and workers                         | $C_1$  | 69                            |
| Factor due to which there is no safety measure                                        | $C_2$  | 58                            |
| Unskilled labor                                                                      | $C_3$  | 75                            |
| Lack of labor, materials and equipment                                               | $C_4$  | 52                            |
| The use of modern equipment and technology for the first time without training and with the lack of experience | $C_5$  | 56                            |
| Suddenly interrupted funding                                                         | $C_6$  | 79                            |
| Supply of invalid or inappropriate materials                                          | $C_7$  | 71                            |
| Design errors                                                                        | $C_8$  | 63                            |
| Difficulty in obtaining licenses and work permits, as well as compliance with certain rules and laws | $C_9$  | 41                            |
| Legal disputes between project participants during the construction phase             | $C_{10}$ | 34                           |
| Political and social pressure from various parties in the project                    | $C_{11}$ | 44                           |
| Bribery and corruption                                                               | $C_{12}$ | 73                           |
| Theft and insecurity                                                                 | $C_{13}$ | 62                           |
| Difference between implementation and required specifications due to misunderstanding of schemas and specifications | $C_{14}$ | 49                           |
| Inaccuracy in the calculation of the scope of work                                   | $C_{15}$ | 33                           |
| Bad weather or very unexpected ones                                                  | $C_{16}$ | 40                           |
| High competition during bidding                                                      | $C_{17}$ | 29                           |
| Inaccurate project schedule                                                          | $C_{18}$ | 37                           |
| Bad connection between site and contractor                                           | $C_{19}$ | 35                           |
| Inflation and price fluctuations                                                     | $C_{20}$ | 45                           |
| Delays and technical problems with subcontractors                                    | $C_{21}$ | 39                           |
| Equipment failure and injury in the team                                              | $C_{22}$ | 76                           |
The studied destabilizing factors were ranked from the most significant ones to the least significant ones in accordance with the statistical analysis adopted in the questionnaire (figure 4).

**Figure 4.** Ranking of destabilizing factors depending on significance.

As an example shown in figure 5, the destabilizing factor indicated by C₆ shows that the number of responses giving this risk 100% significance is 40 out of 73, and giving 75% significance is 15 out of 73 and etc.

**Figure 5.** The degree of significance of the factor
The following conceptual provisions are suggested for research in the above areas of management: management – always a human activity, in which goals and interests play a decisive role; management is diverse and multivariate, therefore it is impossible to reduce it to any single option, no matter how perfect this option may seem; management has two interrelated aspects of functioning: socio-economic and organizational-technical; management is built on the desire for harmony (coordination, organization, etc.), but it is the harmony of balance, the harmony of contradictions, combination, and not the harmony of absolute stability, homogeneity, sameness or uniqueness.

It is believed [1-3] that “... The strategy is a worldview devotion to one's Choice, Ideal. The concept is a setup, a way to return to the path of the strategy (Path). Without a life strategy, concepts are empty. A person who does not choose will never take responsibility for the action and for himself - he doesn't have a strategy. But choosing, a person does not reason conceptually - he simply feels his way: is he betraying himself at the moment or not? Is his life time wasting away or not? Therefore, the internal setup is always important - it is always single and should not succumb to corrosion of time and circumstances. A setup (feeling) is a strategy, and concepts are navigation in circumstances based on this feeling... Human qualities and “conscience” are not adapted to the market. This is unnatural. Therefore, strategies are always above the market and primary in relation to the market. The more true the strategy, the higher it is than the market, and the market should “open up” for it... Classics of the economy, starting with A. Smith, pointed to the importance of the human factor (everyone quickly forgot his “Theory of Moral Sentiments” as the second important component of the more famous work “An Inquiry into the Nature and Causes of the Wealth of Nations”; it is in it that sustainability of wealth is linked to the moral foundations of life)... Of the three global ways of making money: usury (Rockefellers), exchange rates, diamonds, etc. (Rothschilds), wisdom control (Vatican City), the last is the most effective. And it is clearly above the market...”.

Thus, the concepts are secondary in relation to the strategy, certainly important and can be of different levels and qualities. The concept is a complex of key positions or attitudes of thinking that allow maintaining the orientation of thought activity and productive activity. The diversity of opinions on this subject only emphasizes the importance and relevance of a constant study of this problem [1-9].

Substantive and effective management is always the result of the manager’s preliminary thought activity, his ability to show the volume and structure of his knowledge, his predisposition to cognition, to the development and improvement of his thinking. According to priority areas of knowledge used in thought activity, thinking is conditionally divided into humanitarian, mathematical and technocratic.

**Humanitarian thinking** most often gives preference to aspects of research related to a person, chooses figurative (infographic) modeling, operating with concepts, reasoning with situations and the nature of behavior as its tools. **Mathematical thinking** operates with the logic of symbols and the ultimate abstraction, the clarity of understanding dependencies, reducing everything to modeling community. This is the strength and weakness of mathematical thinking. An exception to the consideration of particulars in the analysis of phenomena reveals their essence, but leads to the loss of very important details, specific characteristics and features (and we remember that “the devil is in the detail”). **Technocratic thinking** reduces all phenomena and problems to simple causal relationships. When studying socio-economic problems, it is not only ineffective, but also dangerous, since it leads to the simplification of real processes, the exclusion of many important relationships from the study (situational, periodic, functional, variable, indirect, etc.) [1-3, 8-11.15-17].

Of course, there are no “bad” or “good” types of thinking. Different types of thinking in different conditions can be more or less effective, and their use in collective activity is necessary and can be regulated.

By the degree of abstractness and generalization, theoretical, empirical, and factual thinking can be distinguished.

A new phenomenon, which is not yet fully understood by either the philosophical or social science thought of mankind, is the clearly expressed opposition of the modern market and capitalist form of economy by Nature.
In the technical and sociological spheres of activity, the practice of averaged normalization has developed, which is based on “not taken on faith” (the so-called “reliable”), not always domestic statistical data [9-14.15-17].

The study focused on the significance of the occurrence of destabilizing factors and their impact on the main objectives of the project, presented in time, expenses and quality during construction projects. The study identified projects implemented by public and private enterprises, the subject of the study was limited to engineers, managers, project managers and consultants.

The results showed that there are many destabilizing factors that are of great importance and affect the main goals of the project. The results of the study showed that financial, technical, labor and legal factors had the greatest influence and importance among the destabilizing factors. Therefore, more attention should be paid to strategy in order to avoid or minimize these factors.

Thus, both external and internal factors and processes can act as sources of a destabilizing factor in construction. Moreover, their impact is reflected in the cost and terms of the project.

The information obtained in the analysis process is the basis for developing an action plan for using ways to cope with these factors, which allows for the timely adoption of balanced, well-developed decisions, determination of specific responses aimed at resolving destabilizing situations and those responsible for their implementation [13].

Plans to manage the destabilizing factors of the construction industry should include several important points:

1. Conducting training courses on how to cope with these factors for project participants in order to qualify them and teach them how to perform the necessary work at all stages of the project.
2. Elimination of administrative red tape, which may cause a delay in order to obtain licenses and work permits.
3. Do not engage in infrastructure projects in politically unstable areas in order to avoid financial losses.
4. Make sure that the materials comply with the specifications at each stage of the project on an ongoing basis, as well as use technical resources with high productivity and efficiency that are consistent with the project.

The development of an effective decision-making mechanism aimed at optimizing the level of the destabilizing factor allows implementing preventive measures, responding to deviations at the initial stage, and not after the fact, when it is already impossible to exclude losses [14]. External destabilizing factors, usually not taken into account when solving the problems of organization and construction technology, can have a significant impact on the stability of construction enterprises. It is also believed that they minimize the consequences of their occurrence. The necessary regulatory and technical measures will be developed and studied in the following studies, which will examine the influence of external destabilizing factors on the stability and efficiency of construction enterprises in more detail.

4. Conclusions
Among the many methods, techniques and technologies for the formation of directive (prescribed for use) standards of integrated safety, it is possible to distinguish the following ones: fundamentally new (original); developed “by analogy with world experience” (adapted); borrowed (taken out of the context of “foreign” cultures and imposed by administrative and command methods for unconditional use).

These standards apply to all known spheres of life: “environmental” or the sphere of human existence in nature; “social” or the sphere of collective relationships and interactions in the community; “technogenic”, recultivated, or the sphere of all material things created in the processes of thought activity and the subsequent productive activity of a human; “informational” or the sphere of origin, perception, processing, accumulation, transmission and impact of information, as well as reaction to it; “energy” or the sphere of detection (generation) of energy, its accumulation, transportation and use (i.e. paid consumer burden).
Modern theoretical concepts (not related to business and employment problems) combine the last two spheres into one “information and energy” one based on the well-known functional dependence of the “bit” and “joule” units (according to Felker).

For each of these five spheres of life, as appropriate, legitimate (authorized for use by the official authorities) averaged standards of integrated safety are created, which have an officially regulated term of their functioning [9-11,15-20].

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