Safety Culture: Historiography of Notion

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Abstract. This article dwells upon the formation of safety culture. It analyzes the data on the causes of accidents with severe consequences. The author stresses it is crucial to promote knowledge of labor protection and safety culture formation to prevent workplace accidents and occupational diseases. This article presents a literature review on the emergence and development of the notion of safety culture. Some documents from the International Advisory Group for Nuclear Safety of the International Atomic Energy Agency and the International Labor Organization that shed light on the theory of safety culture formation. The paper also presents the formation of safety culture in the context of legal and statutory regulation. The research employs such theoretical research methods as analyzing, filing, and aggregation of international documents, regulatory framework, and academic papers, as well as their classification, comparison, and comparative analysis. The issue of defining the structural components and criteria indices for safety culture remains open for discussion. The results of the research can be used as a theoretical basis for the development of conceptual provisions for the formation of safety culture.

1. Introduction
Safety plays a crucial part in the human life. The data on the causes of accidents with severe consequences in the Russian Federation show that over 60% of the accidents are due to structural flaws. For instance, the accidents with severe consequences that happened in the Russian Federation in the first six months of 2019 include [2]:
- those caused by unsatisfactory work arrangements: 13 group cases; 409 bad injury cases, 94 fatal cases;
- those caused by unsatisfactory workplace conditions and arrangements: 1 group case; 58 bad injury cases, 10 fatal cases;
- those caused by flaws in the employee instruction on labor protection: 0 group cases, 59 bad injury cases, 8 fatal cases. These include accidents happening because employees didn't get any labor protection instruction (0 group cases, 18 bad injury cases, 3 fatal cases) and because no labor protection training and tests were arranged for employees (0 group cases, 20 bad injury cases, 3 fatal cases);
- those caused by employees’ not using personal safety equipment: 0 group cases, 28 bad injury cases, 3 fatal cases. These include accidents happening because the employer did not provide the safety equipment: 0 group cases, 10 bad injury cases, 1 fatal case;
- those caused by employees’ breaching the labor routines and discipline: 5 group cases, 145 bad injury cases, 46 fatal cases. These include accidents happening because the employee was under the influence of alcohol, drugs and other toxicants: 0 group cases, 12 bad injury cases, 9 fatal cases;
- those caused by assigning tasks to underqualified employees: 0 group cases; 11 bad injury cases, 1 fatal case;

The analysis of the aforementioned indices demonstrates an existing constant threat to the lives and well-being of employees at work, which is an important factor for the conduct of organizational events to spread knowledge concerning labor protection and to form safety culture for promoting the safe performance of works, business processes, and production activities.

The problems of safety culture formation, health, and wellness are covered in works by V. Akimov, E. Ayubov, T. Belykh, V. V. Berezutskiy, Yu. Vorobyov, V. Gafner, I. A. Golubev, L. Gorina, V. Devisilova, S. Dembitskaya, V. Demychuk, A. Dronov, R. Durnev, V. Yevtseyev, A. Zaporozhets, V. Zatsarnyi, M. Zorina, T. Zyryanova, A. Kazmina, P. Kaigorodov, S. Kosynkina, S. Klevtsov, N. Kulalazeva, V. Mashin, A. Mikhailov, V. Moshkin, I. Nemkova, T. Petukhova, A. Rusalovskiy, U. Sagaydak, V. Saponova, O. Tretjakova, V. Chabana. The issues concerning the historiography of the safety culture notion were investigated by V. Doroshenko, A. Zhuk, S. Klevtsov, V. Mashin, A. Nosovskiy, V. Rudenko. For example, A. Zhuk and his collaborators suggested a periodization for source array on the problems of safety culture comprising 4 stages [4]. V. Mashin and V. Rudenko presented the establishment of the safety culture concept through the documents from the International Advisory Group for Nuclear Safety [5, 14]. A group comprising Yu. Skaletsckiy, D. Biryukov, and L. Yatsenko analyzed foreign and domestic experience in establishing the safety culture as an organizational concept and a world view. Some recommendations were given concerning the introduction of safety culture to increase the overall life safety for the people [9]. The analysis of publications showed that the notion of safety culture is highly interesting for the academic community. However, the research reviewed do not consider the occurrence and the development of the definition of safety culture in the documents from the International Labor Organization. The issue of using this notion by the Russian legislation remains open.

The purpose of this article is to analyze the historiographic aspects of the establishment and development of the safety culture notion and to define the place safety culture occupies in governmental policies on occupational safety.

2. Research Materials and Methods
To study the problem in question, the authors use the following methods: general scientific research methods (analysis, synthesis, aggregation, classification, comparison and specification) to define the features of interpreting the problem in academic literature and international legal documents; logical analysis methods to classify and structure the source base of the research, as well as legal and standard acts regulating the formation of the safety culture; the extrapolation method to study the foreign experience of establishing the safety culture and preventing workplace accidents and to introduce it in the governmental policies on labor protection. Methodologically, the research is based on the interconnections between the different approaches of general and specific scientific methodology defining the establishment of safety culture, specifically the systemic, competence-based, cultural, axiological, anthropological, subject-to-subject and activity approaches. The results of the research can be used as a theoretical basis for the development of conceptual provisions for the formation of safety culture.

3. Results and Discussion
A vast part of a human life is connected with a workplace. It should be comfortable enough for efficient labor and help maintain the employees’ health and provide for their professional development. In the system of Man-Machine-Environment, employees are influenced by various adverse and hazardous factors of the workplace environment, as well as the ergonomics of the workplace, their psychological and functional state, and the atmosphere among the personnel. As a
result, the role of the human factor in providing for the safety of business processes becomes more important. This causes the need to conduct the obligatory instruction of employees on the hazards and ways to prevent them, as well as detecting professional risks and improving their skills in labor protection which stipulates establishing and developing safety culture as a constituent of the common human culture.

While searching for academic sources and dissertations on this problem, the authors came to conclusions that the notion of safety culture can be looked at from the point of view of social sciences, philosophy, psychology, pedagogics, engineering, medicine. This notion becomes highly relevant for the areas associated with the study of the human factor (engineering psychology, workplace ergonomics, labor protection psychology, management theory, occupational safety management). Taking into consideration the diversity of opinions among the academic community concerning the notion in question, the authors deem it necessary to trace its origin and development. To achieve this, the research was structured as follows:

- studying the origin of the safety culture notion in the documents of the International Advisory Group for Nuclear Safety of the International Atomic Energy Agency;
- stages of safety culture formation in the reports of the International Labor Organization;
- current status of safety culture in the Russian legislation.

While implementing the first objective of the research, the authors searched for and classified international sources. The analysis of those showed that the notion of safety culture was first used in the documents of the International Nuclear Safety Advisory Group (INSAG) of the International Atomic Energy Agency (IAEA) that approved a number of reports on safety culture:

No 75-INSAG-1 Summary Report on the Post-Accident Review Meeting on the Chernobyl Accident (1989);
No 75-INSAG-3 Basic Safety Principles for Nuclear Power Plants (1989);
No 75-INSAG-4 Safety culture (1991);
No 75-INSAG-7 The Chernobyl Accident: Updating of INSAG-1 (1993);
No 75-INSAG-12 Basic Safety Principles for Nuclear Power Plants 75-INSAG-3 Rev. 1;
No 75-INSAG-15 Key Practical Issues in Strengthening Safety Culture (2002).

The authors pointed out that the content and descriptions of the aforementioned documents are presented in the papers [1, 7]. Within the document the authors also outlined that IAEA had introduced the notion of safety culture, given a clear definition, and described the characteristics of safety culture. It also set out the requirements for the management and other individuals to maintain safety culture on the political level. Nevertheless, some problems concerning the evaluation criteria for safety culture, as well as the methods and means of its formation, remain open.

The next step of the research is studying the safety culture formation stages in the reports of the International Labor Organization (ILO). The analysis of those showed that the ILO documents also feature the safety culture notion. It is well-known that the ILO holds the Workers’ Memorial Day annually on April 28th. It is dedicated to the workers who died or got injured at work. Since 2003, the ILO uses this day to promote the formation and maintenance of the occupational safety and health concept. In June 2003, the International Conference for Labor proposed a Global Strategy on Occupational Safety and Health [18]. Its goal is to promote occupational safety to the highest level of international and national political programs. The strategy is based on the demand for a more extensive promotion of ”preventive occupational safety culture” on the global level, as well as the necessity of efficient management for occupational risks. The next report continues the discussion of preventive occupational safety culture [8].

The main focus during the Workers’ Memorial Day in 2005 was on the prevention of accidents and health deterioration at work. Due to this, the Occupational Safety Culture Promotion Report by the ILO (Geneva, 2005) was dedicated to the promotion of preventive actions for occupational safety [12].

To implement the results achieved at the previous discussions, the ILO approved the Convention (No.187) concerning the Promotional Framework for Occupational Safety and Health in 2006, where the organization set out a system of continuous promotion of the prevention culture for occupational
safety. According to the Convention, the term “national prevention culture in occupational safety and health” denotes a culture in which the right to the safe and healthy working environment is respected at all levels, where governments, employers and employees take an active part in providing a safe and healthy work environment through a system of rights and responsibilities, while the prevention principles should become a top priority. The formation and maintenance of the “national prevention culture in occupational safety” stipulated the improvement of overall awareness, knowledge, and understanding of the existing safety and risk concepts that people have since primary school and into their working life [6].

Besides, to implement Convention 197, Recommendation was prepared in 2006 (Promotional Framework for Occupational Safety and Health Recommendation, 2006 (No. 197)) [13]. Its provisions suggest that governments and employers or employee organizations shall strive to improve the awareness about and understanding of occupational safety problems to promote the national prevention culture by launching national campaigns, as well as to conduct relevant training and instruction, exchange occupational safety statistics, promote cooperation, organize committees for occupational safety issues and assign employee representatives responsible for occupational safety, and solve problems faced by micro, small and medium businesses while implementing occupational safety actions.

The aggregation and classification of the provisions of Convention 197 and the Recommendation are presented in the ILO report of 2007 titled “Safe and healthy workplaces - Making decent work a reality” [2]. Later on, in 2015, the ILO in its report titled “Building a culture of prevention on occupational safety and health” urged to improve and support the prevention culture for occupational safety on the national level, and they use the notion of “national occupational safety culture”. The ILO considered a number of actions to promote this process [3].

In the next report on the issue of the formation of occupational safety culture, the ILO focuses on the importance of workplace risk and danger definition, as well as the development of the occupational safety culture. In particular, the report explains how the Occupational Safety and Health Convention of 1981 (No. 155), its Protocol of 2002, and the Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187) can help achieve this goal. The guideline explains how the national policies formulated using the principles set out in these documents can provide for the development of a proper basis for the continuous improvement in occupational safety [17].

One of the stages of safety culture establishment is the WISE (Work Improvement for Small Enterprises) program which was first implemented in the Philippines in the late 1990-es with technical support from the ILO. Since then, the WISE program started to spread in other Asian countries and played a significant role in assisting small business employers and employees improve their working conditions and increase their productivity [11].

The approval of the ILO Flagship Programme Global Action for Prevention on Occupational Safety and Health (OSH GAP) was a key element in the sustainable development and formation of the prevention culture in occupational safety [16]. Its goal is the improvement of labor protection via promoting the demand for safe and healthy workplaces, expanding the knowledge on workplace injury prevention, providing guidance to occupational safety specialists, and improving strategic partnerships on various levels of occupational safety management. Within this program, various projects are represented that facilitate the formation of safety culture.

While analyzing the notion of safety culture as interpreted in the Russian legislation, the authors found out that this term was used in NP-001-97 General Regulations of Ensuring Safety of Nuclear Power Plants (OPB-88/97), that was later replaced with NP-001-2015 Federal Rules and Regulations in the Field of Nuclear Energy Use “General Provisions for Nuclear Power Plant Safety Assurance”. These documents set out the key safety criteria for nuclear power plants, as well as the main principles and general requirements for technical and organizational measures aimed at facilitating safety. Besides, GOST R 22.3.07-2014 Safety in Emergencies. Culture of Life Safety. General Provisions was developed as a regulatory basis for safety culture formation. This document sets out the basic provisions and directions for the formation of Life Safety Culture (LSC), as well as the requirements
for the organizational and guidance work in life safety. Within the Russian state program for the Population Employment Promotion, a new Safe Labor subprogram was developed. Its goal is organizing conditions for safe labor culture formation and improving the efficiency of actions aimed at preserving employees’ lives and health at work. Safety culture as the basis for general people safety in the social environment, private life and at work comprises the following: occupational safety culture, nuclear safety culture, fire safety culture, health culture, environmental safety culture, industrial safety culture, life safety culture, road safety culture, and social safety culture. With a view to the provisions made, the authors tried to classify the legal and statutory documents facilitating the formation of safety culture at the national level (Table 1).

| Safety components       | culture                        | Legal documents                                                                                                                                 |
|-------------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Occupational Culture    | safety                         | Labor Code of 10.12.1971 No. 322-VIII                                                                                                               |
|                         |                                | The Ukrainian Law on Occupational safety of 14.10.1992 No. 2694-XII                                                                            |
| Nuclear Safety Culture  |                                | Federal Law No. 170-FZ dated November 21, 1995, On the Use of Nuclear Energy                                                                   |
|                         |                                | Federal Rules and Regulations in the Field of Nuclear Energy “General Provisions for Nuclear Power Plant Safety Assurance” (NP-001-15)     |
| Life Safety Culture     |                                | Federal Law No. 28-FZ dated 12.02.1998 On Civil Defense                                                                                          |
|                         |                                | Federal Law No. 68-FZ dated 21.12.1994 On Protection of the Population and Territories From Emergency Situations of a Natural and Technogenic Character. |
| Health Culture          |                                | Federal Law No. 323-FZ dated 21.11.2011 On Basics of Health Protection of the Citizens in the Russian Federation                                      |
|                         |                                | Federal Law No. 52-FZ dated 30.03.1999 On Epidemiological Well-Being of the Population                                                          |
| Fire Safety Culture     |                                | Federal Law No. 69-FZ dated 21.12.1994 On Fire Safety                                                                                           |
| Environmental Safety Culture |                          | Federal Law No. 7-FZ dated 10.01.2002 On Environmental Protection                                                                             |
| Road Safety Culture     |                                | Federal Law No. 196-FZ dated 10.12.1995 On Safety of Road Traffic                                                                             |
|                         |                                | Decree No. 1090 of the Russian Government dated 23.10.1993 On Traffic Rules                                                                     |
| Social Safety Culture   |                                | Federal Law No. 125-FZ dated 24.07.1998 On Compulsory Social Insurance Against Industrial Accidents and Occupational Illnesses.              |
| Industrial Safety Culture |                         | Federal Law No. 116-FZ dated 21.07.1997 On Industrial Safety of Hazardous Production Facilities.                                               |

4. Conclusions
The results of the analysis of international documents confirm that the notion of safety culture is multi-aspect and has variations, such as occupational safety culture, preventive measure culture for occupational safety, workplace injury prevention culture. The authors believe that to provide safety at work and home, it is more relevant to use a generalized notion of safety culture that contains the
following subtypes: occupational safety culture, nuclear safety culture, fire safety culture, health culture, environmental safety culture, industrial safety culture, life safety culture, road safety culture, social safety culture. The unifying component for the aforementioned safety culture types is a psychological component that aims to shape and develop a safe mindset in people. While searching for legal and statutory documents in domestic and foreign legal environments, the authors came to the conclusion that the legal basis of government policies aimed at the formation of safety culture is quite elaborate even though some issues of practical implementation remain open. The problem of improving the safety culture in the workplace environment remains relevant due to the constantly arising professional, environmental, and industrial risks. With a view to the aforesaid, the authors deem it necessary to continue the work on defining the content, methods, and means of safety culture formation. The further research shall lie in the area of the improvement of legal basis, development of state targeted, industrial and regional programs to improve occupational safety, health, and environment. This stipulates workplace injury prevention, which is largely done through the formation and development of safety culture.

5. References

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