Psychological factors of personal safety culture of electric network masters

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Abstract – **Personal safety culture is defined as "the product of individual and group values, attitudes, perceptions, competence, and employee's behavior patterns". The study identified the factors of the corporate safety culture: the involvement of employees in the organization of communication on security issues; security credibility in the organization; assessment of mutual assistance in matters of security. The structure of the factor of personal safety culture is determined, which includes personal discipline, personal responsibility, position in uncertainty. Psychological factors of personal safety culture of electrical network masters have been revealed: employee's readiness and willingness to assist in critical situations, evaluation of safety management, learning from mistakes and past incidents, state of communication on the issues of safety implementation, assessment of organization's resources for safety ensuring.**

Keywords – safety culture, personal safety culture, corporate safety culture, psychological factors of the safety culture

I. INTRODUCTION

A master of electrical networks is one of the key positions in the electric grid complex. The professional activity of the master includes the management of subordinate personnel and the implementation of control functions related to the admission of personnel to work with electrical installations. In previous studies a list of professionally important qualities of the master of electrical networks has been determined [5]. The reliability of the master's job determines the qualities required for the reception and analysis of working information. The work of the master requires qualities aimed at the interaction with subordinate personnel. The abilities to make and implement professional decisions are also required. The work of the master provides the safe operation, repair and maintenance of power equipment.

The list of requirements for professional activity and reliability of the master includes higher professional education, knowledge of technological processes, electrical safety certification, responsibility for the safety of events, competence in the field of regulatory documentation, instructions and rules [8].

For the ability to cope with safety requirements it is not sufficient for the master to be only technically trained. He needs to work quickly and efficiently with information, organize effective communications, avoid mistakes in solving critical situations. In addition, it is important for the master to be able to maintain the psycho-physiological working conditions in difficult circumstances of professional activity. These qualities form the employee's personal safety culture [7].

"Safety culture" is an interdisciplinary term. Safety culture is defined as "the product of individual and group values, attitudes, perceptions, competence, and patterns of human behavior" [6, 9]. It is customary to distinguish organizational and psychological safety conditions such as worker's participation in safety management, worker's organizational commitment to safety, accident investigation and reporting, communications related to safety management, risk perception, subjective perceptions of danger [1, 2].

Practically, there are three factors in the organizational structure of safety culture: safety priorities, involvement of personnel in safety management and safety training using the experience of critical and emergency situations [3, 4].

Our study of the psychological factors of personal safety culture of electrical network masters is aimed at the analysis of the psychological basis for the development of personal safety culture of employees.

II. THE RELEVANCE OF THE STUDY, ITS PURPOSE AND RESEARCH METHODS

The relevance of the study of the psychological foundations of personal safety culture of the masters of electrical networks is determined, firstly, by the fact that the master of electrical networks is one of the key positions that ensure the safe operation, repair and maintenance of power equipment in the power grid complex. Secondly, high standards of the corporate safety culture have been adopted in the energy industry, and there is a need to establish key points for the development of a personal safety culture for the personnel of energy enterprises, especially for the most important and responsible positions regarding safety in the energy sector.

The purpose of the study was to identify the psychological factors in the development of personal safety culture of the masters of the electric grid complex.

The research methods included an assessment of the corporate and personal safety culture of the masters of the electric grid complex, methods of qualitative analysis and statistical analysis of the data obtained.

As the main research methodology, a questionnaire developed by L.N. Goryunova and V.V. Kozlov has been used to assess the safety culture. This questionnaire includes an assessment of various aspects of the safety culture: personnel's confidence in the system of occupational safety in the organization, the operation of the system of violations and incidents reporting, organization of teamwork and mutual assistance from other workers in difficult situations related to safety matters, employee's perceptions of the work of administration managers to provide occupational safety, the state of resource provision of safety; use the experience of past mistakes and safety incidents, employees' understanding of personal safety responsibility, employee's attitudes to discipline and safety commitment, the state of communications in the organization related to safety issues; employee's involvement in safety management; personal worker's position in situations of uncertainty related to occupational safety.

The survey was attended by masters of the grid energy organization – 411 people in total. All survey participants were males, all of them had gained the special higher education and their length of service ranged from 3 to 11 years.

III. DISCUSSION OF THE RESEARCH RESULTS

A. *Factors of corporate and personal safety culture*

The factor analysis of the obtained data made it possible to identify four factors and interpret them as factors of the corporate and personal safety culture:

- The involvement of the employees in communication on safety issues;

- Safety credibility in the organization;

- Assessment of mutual assistance in matters of safety;

- Personal safety culture, including personal discipline, personal responsibility, position in uncertainty.

Factors of the corporate safety culture include: the involvement of the personnel in communications on safety issues, confidence in safety management in the organization; assessment of mutual assistance in matters of safety. Involvement of the organization's employees in communicating on safety culture issues presumes a joint open discussion of safety incidents, feedback from employees on measures to improve safety, and proposals from employees to improve safety management. Confidence in safety in the organization implies the employees belief that the organization is doing everything necessary and possible to ensure safety. Employees appreciate the organization's efforts to maintain safety. Assessment of safety mutual assistance means the employees assurence that they will be assisted in all cases of safety risk. Employees are confident that they will receive the support of colleagues and organization managers in emergency and critical situations.

The factor of *personal safety culture* includes personal discipline, personal responsibility and the position of the worker in a situation of uncertainty.

Personal discipline assumes that the worker voluntarily follows the rules of labor discipline and work safety. Compliance with the rules of discipline and work safety is a top rated quality of the worker. The organization has created an atmosphere of respect and recognition of the authority of that workers who observe the labor discipline.

Personal responsibility means that the employee honestly performs duties and solves problems within the limits of his professional responsibility. Personal responsibility is understood as a voluntary and motivated overcoming of difficulties in work. Personal responsibility is based on the employees' perceptions of a fair and coherent balance of duties and rights regarding safety.

The position of the employee in a situation of uncertainty is expressed in the ability of the employee to make responsible decisions with a lack of information on the causes and development of the crisis situation in the absence of clear instructions or algorithms of labor activity in such situations. Workers evaluate critically inconsistencies in working conditions, acts, actions that may lead to an error or an incorrect action. Experts understand that complex technologies may become unpredictable and unmanageable. Employees seek for clarity in understanding situations when they are faced with uncertainty. They assess the risk and the possibilities of overcoming it before the start of action. Experts rely only on facts if something goes wrong. They admit and plan the possibility of errors, hidden problems and inherent risk.

In a process of comparison of identified factors in different branches of the organization, it was determined that there were no significant differences between the branches except for the variables of *Personal responsibility, Personal discipline* and *Position in uncertainty*. This fact indicates that the safety culture phenomenon, on the one hand, is part of the overall corporate culture of the organization. On the other hand, it is determined by the training and professional qualities of the organization's personnel.

B. Psychological predictors of personal safety culture

Psychological predictors of personal safety culture are those psychological qualities that have a significant effect on important aspects of the worker's safety culture. As a result of the linear regression analysis the effect of psychological variables on the other aspects of personal safety culture has been established.

Significant effect on *the involvement of the employees in safety* is provided by learning from mistakes, the willingness of employees to report about safety breaches, the use of safety communications, and the assessment of relevant organization resources.

The ability of employees to learn from mistakes is effected significantly by personal discipline and willingness to assist in difficult situations.

The extent to which the employees are ready *to report about violations of the safety system is* significantly effected, according to the results of the regression analysis, by assessment of safety management of administration and confidence in safety in the organization.

Employee's personal responsibility effects the evaluation of administration's safety performance.

Most of the qualities have a mutual influence on each other. Employee's readiness to assist in difficult situations is also effected by training on mistakes, evaluation of management's work, assessment of the organization's safety resources, and personal responsibility of employees.

The *assessment of the organization's safety resources* is significantly effeced by the involvement of employees in safety management, the readiness of employees to assist in difficult situations, confidence in safety in the organization, and personal discipline of employees.

As it is already stated above, the factor *Personal safety culture* includes the quality of employee's personal responsibility, personal discipline and the position of employees in a situation of uncertainty. These qualities are interrelated and effect each other.

In addition, the dependent variable *The employee's personal responsibility* is significantly effected by the variables *Willingness to assist in critical situations* and *The Evaluation of management's work*. The following variables have a significant effect on the dependent variable personal discipline. They are - *learning from mistakes, state of communications for safety implementation, evaluation of organization's safety resources*.

The position of a worker in a situation of uncertainty is affected by his personal responsibility and personal discipline. The position of the employee in a situation of uncertainty is related to the fact that employees do not have clear work settings on how to behave if the situation is uncertain. Some employees run unnecessary risks. Others, on contrary, do not take initiative in solving difficult work situations. The position of the employee in a situation of uncertainty is formed spontaneously. In such cases, the organization needs to describe and implement corporate standards of working behavior in situations of uncertainty, taking into account the characteristics and specifics of each situation individually. That is, the organization needs to describe what rules the employee should follow in uncertain and dangerous situations, though remaining within the framework of regulatory documents.

Thus, the *Personal safety culture* of workers is associated with such qualities as:

- Willingness of workers to assist in critical situations;
- Evaluation of management's safety performance;
- Learning from the mistakes of past incidents and difficult situations;
- State of communications for safety implementation;
- Assessment of the organization's safety resources.

IV. FINDINGS AND CONCLUSION

The results of the study revealed the main issues of personal safety culture development of electric network masters. Personal safety culture of workers is associated with a number of qualities – personal responsibility, personal discipline and position in a situation of uncertainty.

Alongside with the *personal safety culture* factor, the factors of the corporate safety culture have been also extracted and identified. These factors are the involvement of the organization's employees in safety communication, the safety credibility in the organization, the evaluation of mutual assistance in matters of safety.

The components of a *personal safety culture* – personal responsibility, personal discipline, and position in a situation of uncertainty – effect each other, forming a single construct.

The limited research resources, though, make it possible to determine also that the willingness of employees of the organization to assist in critical situations, and the evaluation of administration's safety performance, significantly effect the employee personal responsibility .

Significant effect on the personal discipline of workers is exerted by training on past mistakes and incidents, as well as by state of communications for safety implementation in the organization, and by the employees' assessment of the organizational safety

The position of a worker in a situation of uncertainty is effected by his personal responsibility and personal discipline. From the practical point of view, to develop an employee's position in a situation of uncertainty it is necessary to describe and implement the corporate standards of working behavior in situations of uncertainty. The employees should follow these standards of working behavior in uncertain and dangerous situations. Such rules must include recommendations to stop and to do nothing until the situation is clarified, to critically evaluate inconsistencies in working conditions, to take into account the fact that technologies may become uncontrollable, to assess the risk. This risk assessment need to be done basing only on the available facts and before taking any active steps.

This study represents a narrowly focused search for answers to that questions that need to be posed mach more broadly. What is safety? How do employees understand safety? What are internal safety factors? If we quote Eastern sayings, in this work we are like "a shepherd who pastures

the cows, but the others will drink the milk of wisdom." However, this is the necessary stage of learning about the problem through its concrete manifestations in practice. The immediate prospect of understanding the factors of personal safety culture is seen in clarification of the scientific content of the phenomenon "employee's position in a situation of uncertainty" and its analytical components.

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