

## A Planning Model for Improving Personnel Competence in Pursuit of Sustainable Development



Yaroslav Zhovnirchuk<sup>1\*</sup>, Valeriy Cherkaska<sup>1</sup>, Oksana Inozemtseva<sup>2</sup>, Serhii Zhuravel<sup>3</sup>, Dmytro Pyzyuk<sup>1</sup>

<sup>1</sup> Department of Public Administration and Administrative Law, The Institute of State and Law VM Koretsky National Academy of Sciences of Ukraine, Kyiv 59000, Ukraine

<sup>2</sup> Personnel Department, State Emergency Service of Ukraine, Kyiv 59000, Ukraine

<sup>3</sup> Department of Labour and Environment Protection, National University Zaporizhzhia Polytechnic, Zaporizhzhia 69061, Ukraine

Corresponding Author Email: [ya.zhovnirchuk@ukr.net](mailto:ya.zhovnirchuk@ukr.net)

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### ABSTRACT

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The primary objective of this article is to explore ways to improve personnel competence in the context of sustainable development. To achieve this, our key scientific task is to develop a planning model for enhancing personnel competence within the context of sustainable development for a selected organization. The organization's personnel is the subject of this study. Our research was motivated by the objective of discovering ways to enhance personnel competence for socio-economic systems like an organization, all within the context of sustainable development. As a result, we have developed a contemporary three-level planning model for improving personnel competence in the context of sustainable development. Each level of the model is presented in detail and characterized accordingly. We used the IDEF technique as our primary modeling method, and the planning model was developed using vector programs. The key elements of the planning model include graphic visualization, context characterization, and information accessibility. The novelty of our research results lies in the formation of a modern methodological perspective on increasing personnel competence in the context of sustainable development. However, this article has a limitation: the study was conducted solely in the context of improving the planning process. Consequently, we only characterized one stage—planning. Our future research will be directed toward studying all stages of improving personnel competence in the context of sustainable development.

## 1. INTRODUCTION

The economic policies of the state, social and labor relations, as well as the environment of organizations providing engineering services, are all undergoing transformation due to the acceleration of globalization, innovation processes, and scientific, technical, and informational advancements. These changes are driving a shift in the management of such organizations, altering employee requirements and creating a demand for highly qualified specialists.

The practice of managing personnel competence development is characterized by its changeable and fragmented nature, the uncertainty of procedures and specific methods, and a lack of focus on modern human resource management technologies. There is a crucial need to manage the development of personnel competence by creating appropriate opportunities for the formation and improvement of employee competencies. Using a competency-based approach in human resource management is an effective tool for providing highly qualified specialists and is one of the most important factors determining the success of engineering service organizations.

In light of these factors, there is a renewed urgency to reconsider the initial scientific, theoretical provisions, and practical aspects of managing the human resource potential of

engineering service organizations. This reconsideration should be based on a competency-based approach and should include the introduction of new methodological approaches into the practice of managing human resource development.

A critical and timely issue in today's conditions remains the assurance of sustainable development of socio-economic systems at various levels. It is development, not mere growth, that is the priority objective and a special task of numerous management subjects.

Transformations in socio-economic systems, social and labor relations, the nature and content of labor, and sustainable development—driven by the acceleration of globalization, innovation processes, scientific, technical, and informational progress—encourage changes in the personnel policies of organizations providing engineering services and changes in employee requirements. The challenges of reorienting personnel management in the context of sustainable development, providing highly qualified employees, and developing personnel competence are becoming increasingly pressing. The successful functioning and competitiveness of organizations providing engineering services depend on many factors, one of the key ones being human resources. The leading role in the organization's potential belongs to the competence of the personnel, as it ensures the organization's relationship with the external environment and coordinates the

activities of all departments internally. Personnel competence combines both business and personal qualities, as well as the capabilities of employees, which can be put into action to solve immediate problems and achieve goals. The degree of understanding of the importance of human resources for the organization's development has a decisive influence on its results.

The matter of researching human resources remains relevant and calls for further consideration to introduce new approaches to managing personnel competence development in the context of sustainable development, and for the formulation of measures to enhance and develop the human resources of organizations providing engineering services.

Personnel competence in an organization providing engineering services is a socio-economic category in the context of sustainable development. It reflects the combination of qualitative personal (psychophysiological, social, intellectual, creative), professional (professional knowledge, qualifications, work experience, work attitude) characteristics and capabilities of employees necessary for efficient and effective activities, in line with the characteristics and objectives of organizations providing engineering services.

The main purpose of this article is to explore ways to improve the competence of personnel in the context of sustainable development. To achieve our objectives, we have structured the article as follows: a review of the literature, a description of the methodology, presentation of the main study results, their discussion and comparison, and the formation of conclusions. The subject of the study is the organization's personnel.

The primary objectives of this study are to: 1) review existing literature on competence and sustainable development; 2) develop a 3-level planning model for improving competence in the context of sustainable development; and 3) illustrate the application of the model using a case study. The significance of this study is to provide organizations with a practical framework for strategically developing employee competence to achieve sustainable development goals.

## 2. LITERATURE REVIEW

In the scientific literature and practice [1, 2], employees' competencies are increasingly defined as the most crucial asset of an enterprise in the context of sustainable development. This is related to the new role of human resources, which arises as a result of the economy's transformation into a "knowledge economy". It should be emphasized that there is a growing awareness of the importance of employee competencies in the new economy and in the context of sustainable development, as knowledge and its application become a source of enterprise development, and employee competencies are viewed as potential long-term value. A clear understanding and description of competencies will allow us to determine the extent of the job responsibilities of employees in an organization providing engineering services and to detail the requirements for their work.

In the scientific and practical literature [3, 4], there are different approaches to defining the concept of "competence" for an organization providing engineering services: an approach focused on the employee as an individual, a work-oriented approach, and a mixed approach. In the employee-

centered approach, performance is at the heart of effective operation. According to this approach, researchers include knowledge, skills and abilities, as well as more abstract types of competencies, such as patience, perseverance, flexibility, and self-confidence. Under the concept of competence, they mean: individual tools used by employees of an organization providing engineering services to perform specific tasks; knowledge, skills and attitudes reflected in labor productivity; the potential for achieving desired results; complex application of knowledge, skills, values, experience, and external resources for problem-solving and performing different types of activities in a given situation.

In contrast to the employee-oriented approach, where the individual forms competencies, the second approach is work-oriented. Here, the activities necessary to complete the tasks are first formed, and then these activities determine the individual characteristics that the employee must possess. In accordance with the work-oriented approach, the authors define the concept of "competence" as: the characteristics of employees that contribute to the successful performance of work and the achievement of set results; a set of powers and responsibilities assigned to an employee, depending on his position in the hierarchical structure of the enterprise, as well as on the performance of tasks in the relevant functional area of the organization providing engineering services or performing temporary functions [5].

According to most scientists [6, 7], the foundation for sustainable development of enterprises is a combination of three components, namely economic, social, and environmental. The economic component of an enterprise's sustainable development includes the state of financial resources, their distribution and use, which ensure enterprise development based on profit growth, maintaining solvency in the face of changes in the external environment. The social component of the enterprise's sustainable development includes the direction of the enterprise's activities towards increasing the population's living standards and the enterprise's employees as a whole, by improving working conditions, increasing wages, and raising the level of personnel qualifications.

Modern organizations providing engineering services are looking for new methods and ways to maximize the use of employees' knowledge and skills in current operations and in the implementation of long-term goals. In a broad sense, all activities of the enterprise are based on the competencies of employees. Thus, there is a need to identify and develop competencies to improve the organization providing engineering services' efficiency. This becomes possible due to the development and implementation of competency models, which in turn lead to the search for new methods of managing and developing employee competencies [8-10].

Nevertheless, the quest for ways to improve personnel competence in the context of sustainable development remains relevant. The primary scientific task is to form an appropriate planning model for increasing personnel competence in terms of ensuring sustainable development for the selected organization. The premise of the study was the desire to find ways to improve the competence of personnel for such socio-economic systems.

The objective of this study is to develop a planning model based on the competency approach to support the sustainable development of organizations.

### 3. METHODOLOGY

To solve the problems of complex modeling of socio-economic systems, there are many methodologies and standards, including, for example, IDEF technologies (graphically functional, multilevel modeling), as well as object-oriented methods. Along with IDEF technologies, there is a wide variety of alternative approaches, methods and technologies for business modeling, information systems and software. However, within the framework of our study, when it is necessary to present for a particular organization providing engineering services, the steps on how to increase the competence of its personnel, it is IDEF technologies that are appropriate.

The resulting model allows for the results of joint work of the management of an organization providing engineering services and security services and makes timely decisions in the process of engineering activities and interaction. For a formalized description of a multilevel model, the modeling method with IDEF technologies was used.

The technology is based on a graphical language for multilevel system modeling. The model describes what happens in the personnel competence development system, how it is managed, what entities it transforms, what means it uses to ensure in the context of sustainable development. The main conceptual principle of the methodology is the representation of the system under study (in our case, it is the ensuring sustainable development), in the form of a set of interacting and interconnected blocks that reflect the processes, operations, and actions taking place in the system under consideration. In the methodical approach, everything that happens in the system and its elements is usually called a functional process. Each such process is assigned a block.

The interfaces through which the block interacts with other blocks or with the environment external to the simulated environment are represented by arrows entering or leaving the block. The planning model is developed in several stages and levels, which is why it is called multilevel. The developed planning model in the context of sustainable development is a generalized idea of the main stages of the ongoing process. It describes the basic functions that must be performed to implement this process, as well as the input elements, results, performers of the corresponding functions and controls as conditions necessary to obtain the planned result.

For a better understanding of the proposed methodological approach, an actual organization (PJSC "Infusion Engineering Service") providing engineering services and having security and safety concerns should be used. The choice fell on this organization providing engineering services due to the fact that the team of the article has been working on it for more than 5 years. In order to identify and understand the strengths and weaknesses of the selected organization providing engineering services before starting the simulation, we apply the SWOT analysis method.

SWOT analysis allows you to highlight weaknesses, which can then be presented as functional blocks of the model. Without identifying threats and weaknesses, the model will not be clear.

The selected organization is experiencing planning and sustainability issues. In addition, the authors of the article previously worked in this organization and have practical experience and understanding about it.

The limitations of the methodology lie in the inability to identify methods that require significant resource costs.

Since such a method as a SWOT analysis [11-13] can be carried out by the managers and employees of the organization providing engineering services, then for its application there is no need to use expensive quantitative analysis procedures, as well as to involve experts who are poorly informed about the state of the personnel and provided to them by engineering services. This is certainly its advantage, especially if the organization providing engineering services is without proper security and safety. Also, its advantages include ease of use, wide application, obtaining complete information about the company, identifying all the factors that affect the organization for engineering services. This method is universal, because it can be used to investigate any object, including an organization providing engineering services. The SWOT analysis method does not require any special knowledge, except for the state of the organization itself providing engineering services (the authors of the article know the chosen organization and its safety and security system well). Also, such an analysis of the organization can be used not only for strategic management, but also for operational management.

The design of the study implies the following: a SWOT analysis method is used to collect information that will be taken into account in further modeling. Next, we apply the IDEF method for direct modeling. The use of mixed methods is interrelated and important for holistic study design. The reason for choosing these methods is convenience (IDEF universal tool for planning and development).

The main methods of data analysis were descriptive statistics on organizations and thematic analysis.

### 4. RESEARCH RESULTS

To begin with, we will present the results of the PJSC "Infusion Engineering Service" SWOT analysis in the form of an appropriate matrix, highlighting the problematic parts in their activities (Table 1).

**Table 1.** The results of the SWOT analysis (developed by the authors)

S	W	O	T
Profitability	Low staff competence	Improvement of financing	Slow growth or decline in per capita income
Stable growth of engineering services	Low personnel potential	Positive changes in the level and quality of life of the population	Reduction of funding of the engineering industry
High quality control	Low level of safety and security	Positive demographic changes	Significant state influence
A high proportion of managers and specialists	The imperfection of the advertising company	Improving the standard of living of the population	Increase in the price level

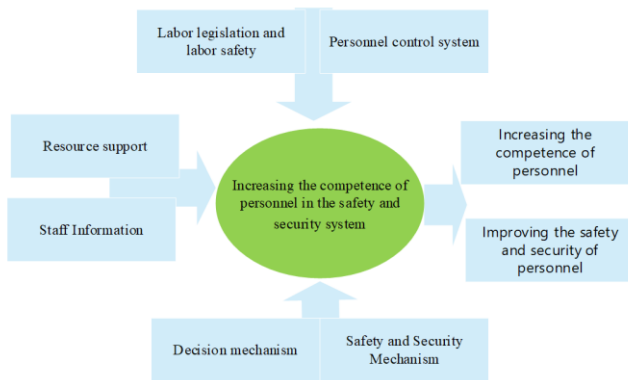
As can be seen from the analysis, the main weak points are safety and security, staff competence. Those are the things that should be modeled.

Thus, the first level of modeling involves defining processes that allow the achievement of the goal of "Increasing the competence of personnel in the safety and security system". In our opinion, each process is a procedure of a certain duration that an organization providing engineering services must perform (Figure 1).



**Figure 1.** The result of the first level of modeling (developed by the authors)

The second level of modeling implies the representation of all elements that accompany the achievement of the goal. Additionally, the result of the second-level modeling is the definition of inputs and outputs (Figure 2).



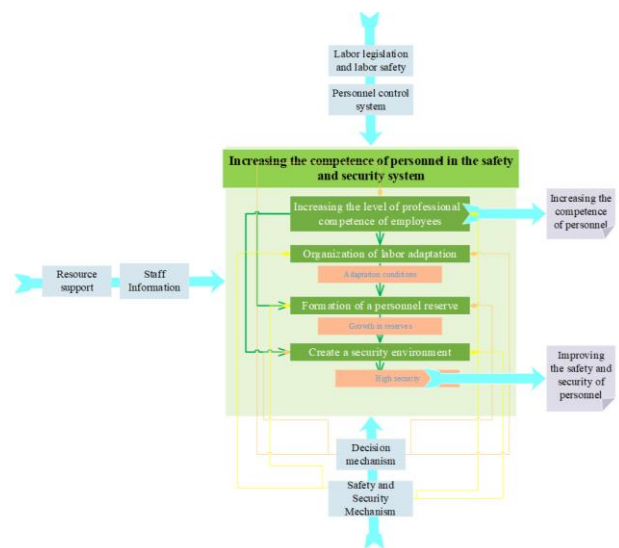
**Figure 2.** The result of the second level of modeling (developed by the authors)

Each process in Figure 1 should be described in detail to increase the capacity of the personnel in the organization providing engineering services in the context of sustainable development:

- ✧ Increasing the level of professional competence of employees: Taking into account the results of the conducted SWOT-analysis, management of the development of personnel competence, the following activities are envisaged related to increasing the level of professional competence of employees in the context of sustainable development: planning the need for training to achieve the required level of competence; creation of an effective system for the formation and direction of managers and specialists for training, training and retraining; updating the content of the system of vocational training and advanced training based on providing employees with the required level of competencies; increasing the level of competence of managers through education, training and retraining.
- ✧ Organization of labor adaptation: The organization of labor adaptation as a direction for improving safety and security is designed to make the adjustment period

of a new employee as comfortable as possible. It is proposed that one of the measures to manage the development of personnel competence is the implementation of adaptation, as a form of individually directed professional training for newly appointed employees under the guidance of mentors, as well as a way to identify and use competencies.

- ✧ Formation of a personnel reserve: The formation of a personnel reserve contributes to meeting the need for rapid replacement of positions, systematic and targeted development of employees. The next measure for managing the development of personnel competence is the formation of a personnel reserve and ensuring the process of formation and development of the competences of the personnel reserve by developing key competencies for the positions of the personnel reserve, conducting a procedure for selecting candidates for the personnel reserve according to the requirements of the competence level of the future reservist, training and improving the level of competence of the reservists for the basis of the evaluation results.
- ✧ Create a security environment: Important factors in managing the development of personnel competence are the creation of a security environment conducive to professional development and capacity building and the improvement of the management organization in order to provide the necessary safety conditions for the implementation of measures to develop the competence of the personnel of the organization providing engineering services in the context of sustainable development. Ensuring the necessary safety conditions for the implementation of measures to develop the competence of personnel should be considered: improvement of the functional and organizational structure; improvement of working conditions and organization of work; proper technical, methodological and legal support; supervising the observance of the professional ethics of the behavior of employees; ensuring awareness of employees; deepening and expanding personal security and safety (Figure 3).



**Figure 3.** The result of the third level of modeling (developed by the authors)

In total, for the PJSC "Infusion Engineering Service", the periodization of the execution of each block of our multilevel model takes 4 months (Table 2).

**Table 2.** Matrix of execution terms of each block of the PJSC "Infusion Engineering Service" model (developed by the authors)

	1 Month	2 Months	3 Months	4 Months
Execution of "Increasing the level of professional competence of employees"	Done in 25%	Done in 45%	Done in 75%	Done in 100%
Execution of "Organization of labor adaptation"	Done in 15%	Done in 50%	Done in 85%	Done in 100%
Execution of "Formation of a personnel reserve"	Done in 20%	Done in 55%	Done in 70%	Done in 100%
Execution of "Create a security environment"	Done in 30%	Done in 60%	Done in 80%	Done in 100%

The practical implementation of the proposed model for managing the development of personnel competence in accordance with the safety approach and in the context of sustainable development will improve the work with personnel, which will contribute to the growth, improvement and development of human resources and is aimed at improving the efficiency of activities in general.

The implementation schedule shown in Table 2 was set as an average of 4 months. In our opinion, more than 4 months to complete each block of the model only delays the process and eats up more and more resources. It is impossible to move forward towards sustainable development for such a long period of time.

The limitations were that we took into account only the planning itself and did not take into account the implementation process itself. At the planning stages, much may not work out in the future. Future research should focus on the implementation of the sustainable development plan.

## 5. DISCUSSIONS

When discussing the obtained research results, they should be carefully compared with the previous ones. Some authors [14, 15] have come to the conclusion that the ability to use vocational training, perform their duties competently, objectively and impartially, which refers to the professional qualification element of human resources, is necessary for conscientiously solving problems and problems in the context of a specific professional activity. Possession of professional knowledge, skills and abilities necessary to perform job duties is characterized by flexible thinking, deep, strong, systematic and comprehensive skills that allow solving complex problems of a theoretical nature in the professional field.

Other scientists [16-18] in their results note that teamwork skills consist of close interaction and interdependence, a sense of belonging to a team, community of work, a sense of responsibility for the results of teamwork. The presence of leadership positions, depending on the position held, is

characterized by the possession of highly developed abilities to positively influence people and pronounced qualities of a leader. Negotiation skills are determined by a high level of business communication skills, the ability to persuade and effectively negotiate. The ability to comply with universal moral norms is characterized by the possession of an appropriate level of culture of behavior and communication with people, flexibility in the use of communication and behavior styles, correctness and at the same time understanding of critical situations.

A separate group of scientists [19-23] noted in their research results that the identification and understanding of the components of human resources is necessary for the formation of the relevant competencies of employees, training programs, training, advanced training of personnel, ensuring a significant contribution to the development of human resources, and increasing the efficiency of the enterprise management system as a whole. Personnel potential is characterized by variability associated with changes in the external and internal environment, personnel policy, personnel movement, changes in the qualifications and professional characteristics of employees, therefore, enterprises face an important task of managing the process of developing human resources, which should be based on economic incentives and social guarantees focused on convergence of the interests of the employee and the organization and the achievement of high labor productivity. The model developed by scientists for the relationship between the structural elements of human resources and the competencies of employees will serve as a guideline in the development of human resources.

However, unlike similar examples, our results of the study have their own characteristic differences. First of all, our approach is focused on modeling ways to improve the competence of personnel not for all types of business activities, but only taking into account the specifics of the activities of organizations providing engineering services. Secondly, in our study, the orientation is on safety and security.

The novelty of the research results is seen in the formation of a modern methodological view on increasing the competence of personnel in the context of sustainable development.

Discussing the key factors affecting the competence of personnel, we highlight the following: the formation of safety and security in the work environment of personnel; and simple professional improvement. Our research confirms the theories that sustainable development is only possible with proper planning.

Discussing the advantages of the IDEF model, it should be noted its visualization and sequencing capabilities within the framework of planning. The new idea as a result was the very approach to planning through modeling. The implication of this research is that the model can be adapted and applied in different organizational contexts for sustainable development by improving staff efficiency and competence. Possible problems remain not always the clarity of the results of the model for staff. There should be clarifications.

## 6. CONCLUSIONS

Summing up and drawing certain conclusions, it should be noted that the management of an organization providing engineering services by creating appropriate opportunities for the formation and improvement of employee competencies is

one of the most important factors in in the context of sustainable development. Competency-based management in the context of sustainable development allows you to focus on the skills, knowledge and other abilities that have the greatest impact on labor productivity and provides a link between the competencies of employees and the necessary activities for the development of human resources. The most important reasons for undertaking activities related to the management of an engineering services organization are to increase labor productivity by ensuring the acquisition of new and improvement of existing competencies in the safety and security system.

The consequences of building this model for theory and practice are as follows:

1. Eliminates the limitation of existing competency models.
2. Contributes to the maintenance of sustainable development.
3. Convenient for making and implementing management decisions on sustainable development planning.

New knowledge is the methodical approach described in the article. We elaborate on its uniqueness in order to improve the reader's understanding of it.

In practice, most managers or specialists of the personnel departments of organizations providing engineering services do not use scientifically based approaches and models regarding the competently oriented formation of safety and security, on the basis of which the need for personnel is determined and a plan for the formation of staffing is developed and implemented.

The application of the three-level planning model proposed by us will improve the work with personnel in the direction of increasing the level of competence of the employees of the organization we have chosen to provide engineering services in the context of sustainable development.

As a result of the study, we have received a modern three-level planning model for improving the competence of personnel in the context of sustainable development. Each of the modeling levels is presented in detail and characterized accordingly.

The article has a limitation, since the study was built as part of the improvement of the planning process, that is, only one stage was characterized - planning. Further research will be directed to the study of all stages of improving the competence of personnel in the context of sustainable development.

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