






A Model for Implementing Digital Personnel Management in Security and Safety for Engineering Enterprises



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ABSTRACT

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The main purpose of the article is to study the key aspects of digital personnel management of socio-economic systems in terms of security and safety. The object of the study will be enterprises providing engineering services to ensure safety and security. According to the results of the study, the main scientific and theoretical novelty was the formation of a model for the implementation of digital personnel management in terms of ensuring security and safety for an enterprise providing engineering services. The study has limitations and they consist in considering only enterprises providing engineering services, which are a specific type of activity. Further research should be devoted to the study of personnel security against the background of the formation of new principles of digital human resource management. The focus of the study is to focus on the features of digital personnel management and how it can be improved within the framework of security and safety as part of the active development of Industry 4.0. For practitioners and scientists, the consequences of the results of the study may have some beneficial effect on the way the proposed model and its components work.

1. INTRODUCTION

The modern economy and its various areas today need an integrated approach to the implementation of production and economic activities. It is not enough for an enterprise to purchase a production line, an information system, or other equipment. He is interested in it being professionally selected, installed, and operated. Thanks to this, the level of competitiveness of production will be higher. Turning to the engineering company only with the terms of reference, the company after some time will receive several options for solving this problem with justification of the costs of its implementation. In addition, employees of an engineering company can offer options for possible equipment to perform these tasks and provide its installation and commissioning.

Engineering is considered one of the most common types of services in international markets. It provides engineering, technical, and advisory services for the creation of objects and is an important method for increasing the efficiency of capital invested in an object. Engineering is considered as a certain form of export of services from the countries of the manufacturer to the country of the customer, covering a set of works on conducting preliminary studies, preparing a feasibility study, a set of design documents, as well as developing documentation for organizing production and management, operating equipment and selling finished products.

On a global scale, several industries are dominated by engineering companies that have a significant impact on the global economic space and can realize their interests in other countries, developing the process of globalization. As an example of globalization, we can consider the formation of a global system of world engineering. The wave of mergers and acquisitions of multinational corporations, as well as the active development of other forms of international cooperation in recent years, indicate that this industry is transforming from a collection of independent national companies into a rather complex web of interconnected multinational corporations, the degree of integration of which continues to increase. And like any other socio-economic system, enterprises providing engineering services have their own personnel management systems. But in the conditions of Industry 5.0, new digital technologies for personnel management are gradually being introduced.

The key tasks of digital transformation facing HR specialists for enterprises providing engineering services are effective recruiting, training, and attracting motivated employees who can generate innovations and achieve target labor productivity.

The introduction of automation solutions or the replacement of analog processes with digital ones is one of the urgent tasks of the personnel management process for enterprises providing engineering services in modern conditions. Note that business owners should clearly understand from the very beginning: the purpose of digital transformation; what should be changed first

and what resources are needed for this. Information and communication technologies play and will continue to play an important role in business development. The effectiveness of the application of information and communication technologies depends on how effectively the business uses these technologies.

It should be noted that today not all enterprises in the engineering sector of the economy have a modern system of digital personnel management. The whole problem is in the approach and development of technology. If it is difficult to help with technology and it needs a new strategic approach at the country level, it is easier with a methodical explanation. We set ourselves a key question: to form a model that will improve the effectiveness of the implementation of digital personnel management.

The main purpose of the article is to study the key aspects of digital personnel management of socio-economic systems in terms of security and safety. The object of the study will be enterprises providing engineering services to ensure safety and security. The structure of the article includes a review of the literature, a description of the methodology, a presentation of the main results of the study, and their discussion.

2. LITERATURE REVIEW

In the scientific and practical literature [1-3], it is noted that over the course of many decades, various types of technologies (financial, managerial) have increasingly begun to appear. For a long time, they were the main ways of building and managing an organization. But recently, Internet technologies have become a reality, combining a large number of information flows designed for the well-coordinated work of employees and allowing them to more clearly understand their duties and tasks. Internet technologies, with their proper use, allow you to most effectively achieve your goals. They open up a new framework for updating and improving communication and information exchange between people, even between the employer and the applicant (candidate for the position). All these technologies are usually divided into offline (messaging tools that provide off-line communication, that is, communication may not always occur simultaneously) and online technologies (information exchange and communication takes place in real-time).

As some scientists and practitioners note [4-6], artificial intelligence and robotization are one of the most promising areas for the development of the modern recruitment market for enterprises providing engineering services. The recruiter robot learns to have a live conversation: it contacts the candidate via audio or video, conducts a dialogue according to a pre-developed algorithm (asks open and closed questions), and writes down the answers. The robot also learns to recognize emotions during a video interview, records the conversation, and sends SMS, letters, and invitations to any applicants - both those who called and those who did not get through. All this increases the possibility of applying for a job.

Scientists in the literature [7-9] note that three main areas can be distinguished from the side of automating business processes: video and audio interviews, test programs, and personnel assessment systems for enterprises providing engineering services. The indisputable advantages of automation for employers are the ability to search and select candidates remotely, for applicants - to take online interviews and test at a convenient time, and for recruiters - to view

interview records and test results. Such technologies significantly reduce time costs and create comfortable conditions for both recruiters and applicants. Remote work with candidates is especially relevant and in demand when working with regions.

In general, both strengths and weaknesses can be identified in the review of scientific and practical literature. In particular, among the strengths, one can identify an active discussion of the digitalization process in the framework of personnel management at enterprises. Of the weaknesses, is that the methodological approaches and models proposed in this case remain theoretical and have no practical value.

However, given the analysis of the literature, today, the novelty of our study involves the formation of a two-line model for the implementation of digital personnel management in an enterprise that provides engineering services, taking into account security and safety.

3. METHODOLOGY

In order to best represent the implementation of digital management of an enterprise providing engineering services, taking into account security aspects, we decided to apply the method of multilinear functional modeling.

The IDEF0 functional modeling methodology is a technology for describing a system (implementing digital management of an enterprise providing engineering services) as a whole as a set of interrelated actions or functions. It is important to note the functional orientation of IDEF0 - the functions of the system are investigated independently of the objects that provide execution. The "functional" point of view makes it possible to separate the aspects of the purpose of the system from the aspects of its physical implementation. IDEF0 methodology is a formalized approach to the creation of functional models - block diagrams of the process or system being studied (implementation of digital management of an enterprise providing engineering services). Schemes are built according to a hierarchical principle with the necessary degree of detail and help to understand what is happening in the system or process under study, what functions are performed, and what relations its functional blocks enter into with each other and with the environment. The IDEF0 model fundamentally finds it difficult to answer the question of how the processes in the system proceed in time and space. In this case, it is recommended to switch to other models - mathematical, simulation, describing the processes in the functional blocks of the IDEF0 model [10].

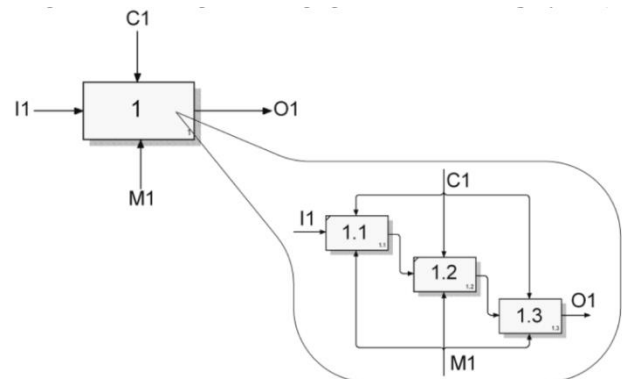


Figure 1. A basic principle of modeling

The first step in building an IDEF0 model is to determine the purpose of the model - the goal (implementation of digital management of an enterprise providing engineering services). Modeling limits are intended to indicate the breadth of coverage of the subject area and the depth of detail and are a logical extension of the already defined purpose of the model. The next step is to indicate the intended target audience, the needs of which the model is being created (employees of the enterprise providing engineering services).

In general, the simulation proceeds schematically as in Figure 1. At the same time, the level of detail of the process is determined specifically by the model developer (Figure 1).

The method allows a gradual and structured representation of the system model through the hierarchical structure of individual diagrams, which makes it less overloaded and easy to read.

To display the categories of information present on the IDEF0 diagrams, there is an abbreviation ICOM, which displays four possible types of arrows: I (Input) - input - something consumed during the execution of the process; C (Control) - control - restrictions and instructions that affect the progress of the process; O (Output) - output - something that is the result of the execution of the process; M (Mechanism) - an executing mechanism - something used to carry out a process, but not consumed by itself.

Arrow names are usually nouns. Arrows can represent people, places, things, ideas, or events. As in the case of function blocks, naming all the arrows in the diagram is only a necessary condition for the reader to understand the essence of the depicted.

The choice of the modeling method was not accidental and involves the technology of demonstrating the ways of introducing certain processes graphically and with a specific direction for this. Which is great for a digital control system. Through blocks numbered A, we demonstrated some aspects of security. In addition, because the arrows provide information about the progress of each block of the model, you can better understand the security status.

4. RESULTS OF RESEARCH

First of all, it should be noted that the implementation of digital personnel management of an enterprise providing engineering services is a complex task and requires the achievement of two goals (A0 and B0). In this case, A0 is the digital transformation of the personnel management system. B0 is the formation of a digital environment for decision-making and security. Each of the goals should be achieved by certain processes, which will eventually be modeled. Let's represent this using a linear connection between the processes of achieving A0 and B0 (Figure 2).

The next step is to identify the key elements that contribute to achieving, for example, A0. Such elements are resource support in the form of finance and modern technical support, without which it is impossible to carry out any digital transformations at an enterprise providing engineering services. At the so-called "output", we will get a certain result, shown in Figure 3.

The first model is dedicated to reaching A0. As a result of the simulation, we have a schematic and graphical representation of how exactly A0 should be achieved (Figure 4).

In general, achieving A0 «Digital transformation of the personnel management system» comes down to the following processes:

A1. Ensure the functioning of the control system. The creation of a digital personnel management system for an enterprise providing engineering services without further systematic changes in its functioning cannot help maintain the required level of security. This is not about chaotic changes in the event of problems being identified, the results of which are reflected in the implementation of threats with corresponding losses and an increase in the likelihood of bankruptcy, but about a reasonable rethinking and restructuring in the activities of security service employees, adjusting the process of controlling influence on security objects and constantly updating interaction with external security entities. The basis for such changes should be the digitalization of information, which is located as a resource at the entrance to the model. The implementation of adaptation procedures should be carried out by the norms of the current legislation and internal regulations. "Weak signals" are used to develop managerial decisions. Adaptation is carried out based on the actual level of safety and security and forecasts of changes in the situation in different time periods, that is, ahead of schedule. The use of digital technologies for the development and implementation of solutions in activities and adaptation technology in the management system requires performers to have specific knowledge, and analytical thinking skills, and work with large amounts of data.

A2. Develop and implement digital management solutions. Based on the results of digital scanning, security officers, by the technology that has developed in the conditions of this enterprise, develop alternative options for management decisions based on the need to respond to certain changes in the external and internal environment of the enterprise that provides engineering services within the available resources. Each management decision must be digitized and justified, that is, correspond to the strategic guidelines for the development of the enterprise and the current situation, as well as have a specific target direction and a clear vision of possible consequences. The criteria for choosing a particular option are the possibility of achieving the set goals and the rational use of resources. Additionally, the position of experts should be taken into account, whose experience can partially compensate for the lack of developments in solving a specific problem that arose in the enterprise for the first time. Each decision must be formalized with the specification of the responsible persons for its implementation. Implementation must be timely and digitally controlled. The implementation process is accompanied by tracking changes in security objects and/or the reaction of environmental subjects by obtaining information about the progress of the process with the adjustment of the control action.

A3. Evaluate digital decisions made. Such an assessment serves as the basis not only for identifying the actual level at a certain point in time but also allows you to track the change in dynamics, taking into account the intensity of changes in the internal and external environment that require a response from security actors. In conditions of relative stability of doing business, the basis for the reaction of security subjects is the experience gained and the need to implement standard solutions. For enterprises providing engineering services in the forefront, it turns out the ability to apply a creative approach in each individual situation with really limited organizational and resource support. Therefore, the evaluation of digital

solutions involves maintaining control over the effectiveness of the actions of an individual employee and the security service as a whole. In the conditions of each enterprise providing engineering services, the evaluation criteria should be specified in order to achieve objectivity and the possibility of improving results.

Modeling should reflect both the main and auxiliary elements of achieving B0 (Figure 5).

Similarly, as in the case of modeling the processes of achieving A0, it is necessary to form a model for achieving B0 (Figure 6).

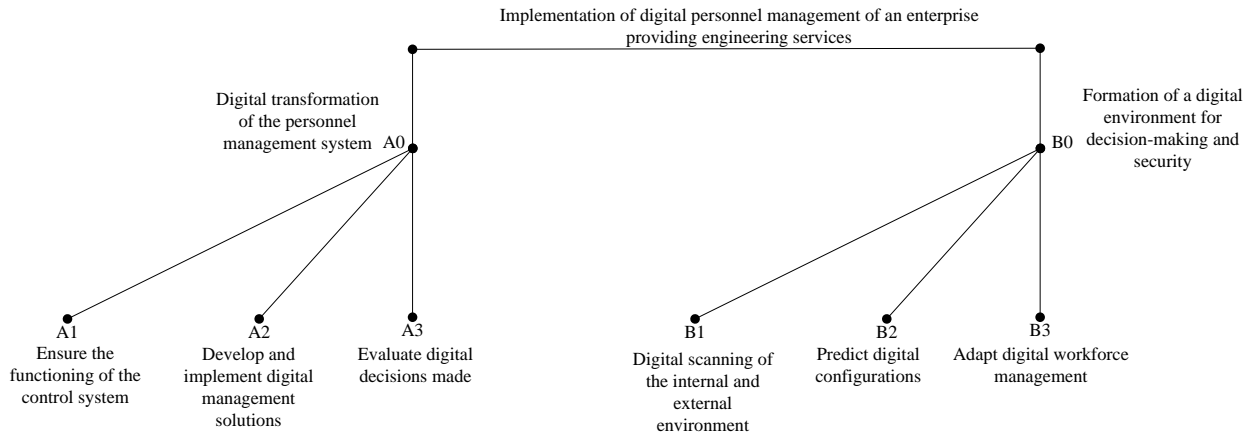


Figure 2. The linear connection between the processes of achieving A0 and B0

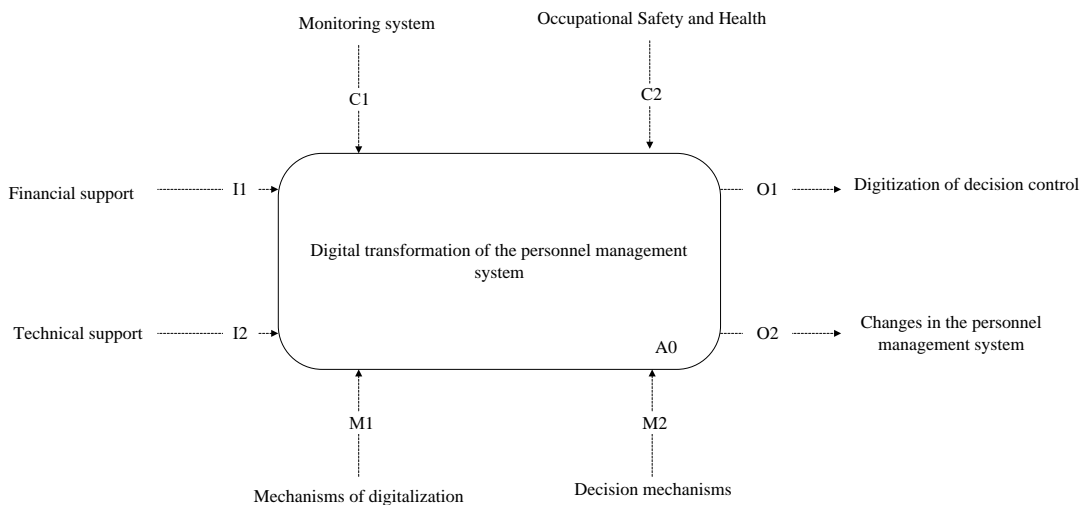


Figure 3. The structure of elements of A0 achievement (ICOM)

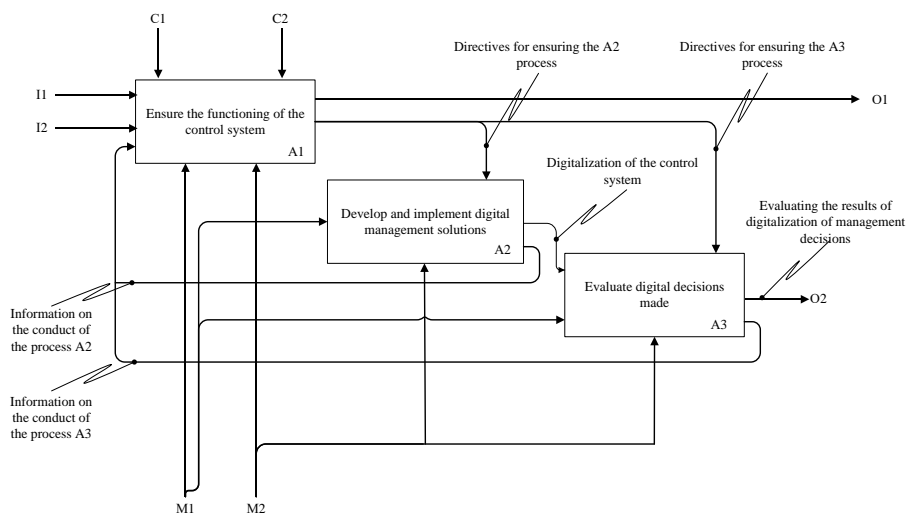


Figure 4. A0 Achievement Implementation Line

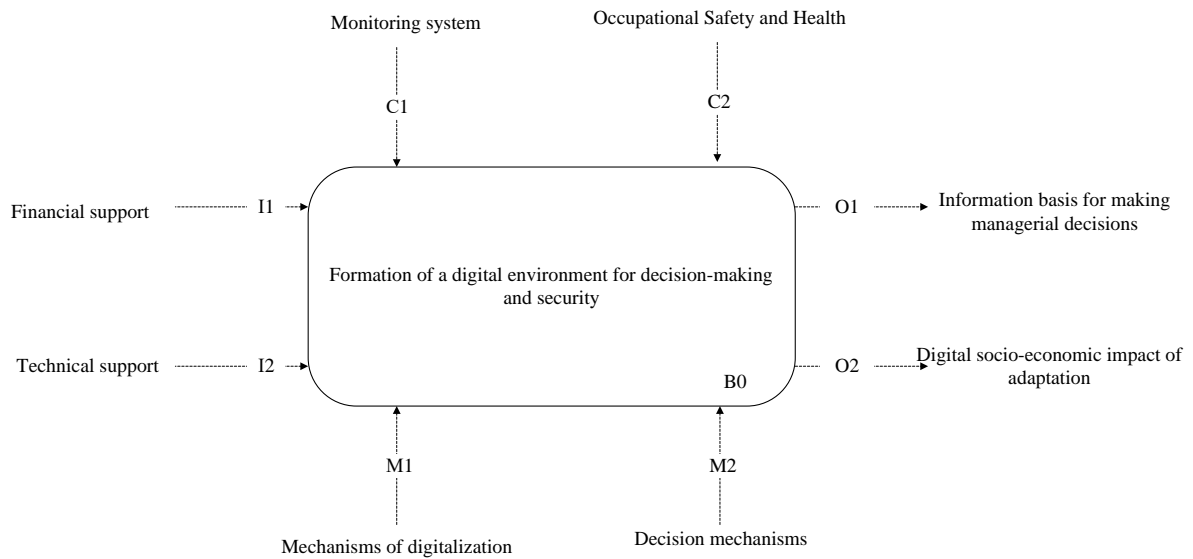


Figure 5. The structure of elements of B0 achievement (ICOM)

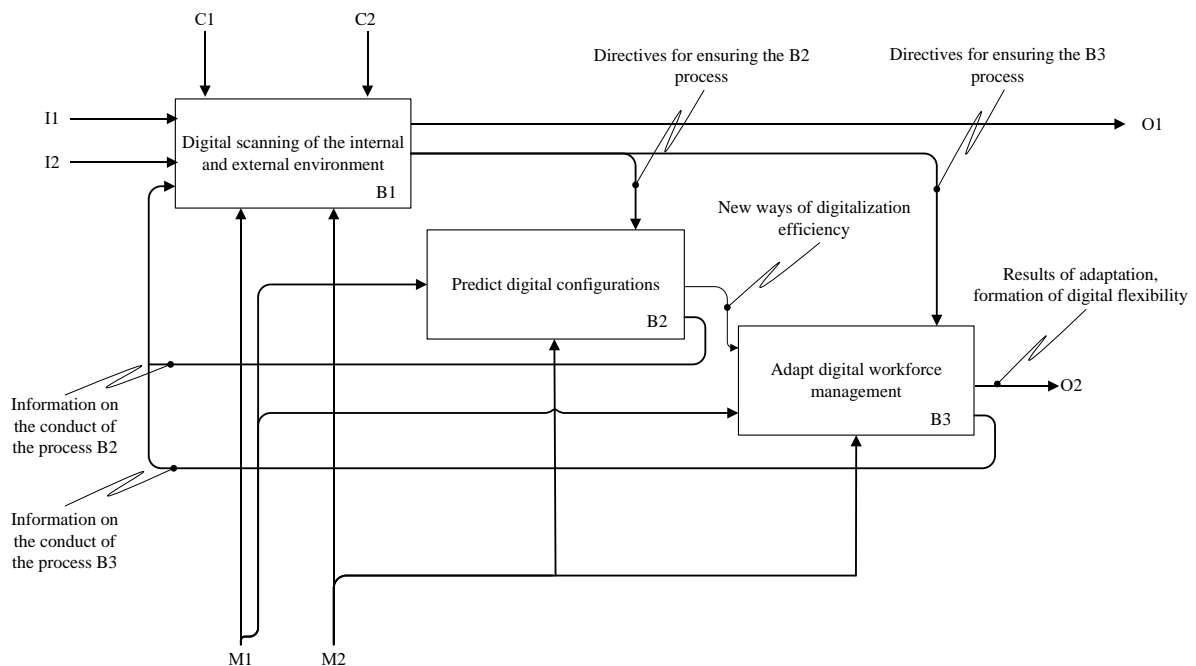


Figure 6. B0 Achievement Implementation Line

In turn, the achievement of B0 «Formation of a digital environment for decision-making and security» should be carried out through the following processes:

B1. Digital scanning of the internal and external environment. The external environment for an enterprise providing engineering services is characterized by a critically high level of dynamism. enterprise providing engineering services. It is equally important to track changes in the internal environment to prevent the emergence of threats or their elimination in the early stages of development. The controllability of the situation through the receipt of digital "weak" signals makes it possible to develop and implement preventive management decisions. The result of this stage is analytical data, information, and messages that create a digital basis for the development and adoption of management decisions by the subjects of safety and security.

B2. Predict digital configurations. The results of a decision system assessment are one of two important factors that should

be used in deciding whether digital change is needed. Another factor is forecasts regarding a possible digital change, based on the results of a biased analysis of security and safety and the development of the situation in the external and internal environment. Forecasts can be pessimistic, optimistic, and realistic. When forming forecasts, an important role is played by the qualification level of an analyst, as well as the ability to attract experts. Forecasts should be based not only on the functioning of a particular enterprise but also take into account the situation concerning competitors, the industry, the national economy, trends in world markets, as well as the interests and abilities of consumers, the development of the political, economic and social sphere. The result of this stage should be forecasts of digital changes.

B3. Adapt digital workforce management. In dynamic conditions, the functioning of maintaining the integrity of the enterprise as a system is possible only through adaptation, which should form the basis for further changes in the

enterprise providing engineering services as a whole. The flexibility achieved in this way becomes the basis for survival and development. The basis for the implementation of adaptation procedures should be the results of the assessment and forecasts of changes in the level of safety and security. Additionally, the ability to carry out such adaptation procedures and the possible consequences of changing the level of digitalization is taken into account. Digital adaptation is carried out by the strategic directions of the development of the enterprise, providing engineering services and relating to the qualitative parameters of the structure of the security system, its relations with other structural divisions within the enterprise, and coordination of actions with external security actors. The result of the implementation of this stage is information about the consequences of digital adaptation.

Goals A and Goals B are interrelated. And the division into two directions A and B is predetermined in order to better and simplistically demonstrate the course of the model. Thus, one model is not accumulated.

5. DISCUSSIONS

When discussing the results of the study, one should compare them with similar ones in other scientific and practical publications. For example, scientists are actively [11-13] investigating aspects of virtual reality for the personnel management system at enterprises providing engineering services. Personnel training and development can be developed through virtual reality and distance learning methods, where you can observe how a potential employee will solve any applied problems and gain knowledge. A similar program or even a video game can be called Accident, in it, you can find out the level of training of an ambulance officer, for example, if he meets an accident on the road.

Also, scientists [14-16] are actively exploring the digitalization of personnel management planning, noting that digital technologies have not bypassed this stage of personnel management. Here it is used as an analytical system, constantly analyzing the work done, and most importantly, displaying those elements of the system that need help (staff). A similar technique is used in the development of video games by companies such as RockStar, in this case, the system indicates which element the players do not use, or there is an error in the development, therefore, this element needs a certain personal consideration of a specialist.

Scientists [17-19] in their works also note digital technologies in the analytical work of personnel management of an enterprise providing engineering services. Analytics in the field of personnel management involves the search for the most suitable personnel for a particular company or a particular industry, as well as the analysis of the key causes of identified problems and the search for their elimination using mathematical models. employer and vice versa, all working conditions, and qualifications of employees are indicated.

As noted in such studies [20-23], today many managers and owners of companies need to think about modern equipment of departments and divisions for personnel management, since without the transition to the use of digital technologies it will be impossible to save.

However, the results of the study obtained by us are different and lie in the fact that through modeling we sought to present the ways and processes for implementing digital

personnel management of enterprises that provide engineering services, taking into account safety and security aspects.

The similarities lie in the fact that the basic theoretical material may be the same, but the approach is different. We have a difference in that we are not just trying to present ways to implement digital management, we take a specific industry (in our case, engineering) and give it through models.

The very approach to modeling complements the very concept of digital policy integration within the personnel management system through new graphic methods and techniques.

The modeling approach can be applied at the level of top management of the personnel security management system at enterprises providing engineering services.

6. CONCLUSIONS

Let us summarize that the leading factor in ensuring the efficiency and competitive advantages of an enterprise providing engineering services at the present stage of economic development is human resources that have economic utility and social value for ensuring safety and security. This leads to the need to apply new approaches to personnel management that can ensure the maximum performance of the specific skills and knowledge of each employee based on digital technologies.

The transition to a new innovative development path, accompanied by the introduction of digital technologies in all spheres of society, leads to a change in the concepts of personnel management. The central place in modern management theory is occupied by added value, which is the result of the activities of employees of an enterprise providing engineering services.

The transition to a digital economy encourages engineering services businesses to innovate through digital strategies. Most economic entities have switched to automating processes in the field of human resource management to one degree or another. With the help of technology, a more efficient selection of personnel for the company is implemented, and personnel accounting is improved; it also speeds up the opportunity to receive employee feedback. Enterprises providing engineering services, seeking to develop their business processes in the field of human resource management, use computer technology only for numbers, but already to research clearer HR analytics, as well as market data and calculate certain forecasts, distance learning employees. All this allows you to reduce the company's costs and focus on employees.

According to the results of the study, the main scientific and theoretical novelty was the formation of a model for the implementation of digital personnel management in terms of ensuring security and safety for an enterprise providing engineering services. The study has limitations and they consist in considering only enterprises providing engineering services, which are a specific type of activity. Further research should be devoted to the study of personnel security against the background of the formation of new principles of digital human resource management.

The personnel of any enterprise, including those providing engineering services, perform tasks and implement management decisions designed to ensure safety and security. Proper personnel management must be properly digitized today in the context of Industry 4.0. The model presented in

the study has unique building blocks to guide the implementation of safety and security through digital governance.

REFERENCES

- [1] Bondaruk, T., Medynska, T., Nikonenko, U., Melnychuk, I., Loboda, N. (2023). Fiscal policy as a guarantee of sustainable development under military conditions. *International Journal of Sustainable Development and Planning*, 18(4): 1097-1102. <https://doi.org/10.18280/ijstdp.180412>
- [2] Bazyliuk, V., Shtangret, A., Sylkin, O., Bezpalko, I. (2019). Comparison of institutional dynamics of regional development publishing and printing activities in Ukraine: methodological and practical aspects. *Business: Theory and Practice*, 20: 116-122. <https://doi.org/10.3846/btp.2019.11>
- [3] Ali, S., Ali, A.J., Ashfaq, K., Khalid, J. (2021). Green human resource management and environmental innovativeness. *International Journal of Sustainable Development and Planning*, 16(6): 1117-1130. <https://doi.org/10.18280/ijstdp.160613>
- [4] Sylkin, O., Shtangret, A., Ogirko, O., Melnikov, A. (2018). Assessing the financial security of the engineering enterprises as preconditions of application of anti-crisis management: Practical aspect. *Business and Economic Horizons*, 14(4): 926-940. <https://doi.org/10.15208/beh.2018.63>
- [5] Ee, E., Halim, H.A., Ramayah, T. (2013). HR outsourcing success: Does partnership quality variables matter? *Journal of Business Economics and Management*, 14(4): 664-676. <https://doi.org/10.3846/16111699.2011.649012>
- [6] Kryshtanovych, S., Kindzer, B., Goryn, M., Kravchenko, A., Frunza, S. (2020). Management of socio-economic development of tourism enterprises. *Business: Theory and Practice*, 21(1): 420-426. <https://doi.org/10.3846/btp.2020.12162>
- [7] Wendra, W., Sule, E.T., Joeliaty, J., Azis, Y. (2019). Exploring dynamic capabilities, intellectual capital and innovation performance relationship: Evidence from the garment manufacturing. *Business: Theory and Practice*, 20: 123-136. <https://doi.org/10.3846/btp.2019.12>
- [8] Kryshtanovych, M., Akimova, L., Akimov, O., Kubiniy, N., Marhitich, V. (2021). Modeling the process of forming the safety potential of engineering enterprises. *International Journal of Safety and Security Engineering*, 11(3): 223-230. <https://doi.org/10.18280/ijssse.110302>
- [9] Rushchyshyn, N., Medynska, T., Nikonenko, U., Kostak, Z., Ivanova, R. (2021). Regulatory and legal component in ensuring state's financial security. *Business: Theory and Practice*, 22(2): 232-240. <https://doi.org/10.3846/btp.2021.13580>
- [10] Kryshtanovych, M., Dragan, I., Grytsyshen, D., Sergiienko, L., Baranovska, T. (2022). The public and environmental aspect of restoring sustainable regional development in the face of the negative impact of military actions on the territory of the country. *International Journal of Sustainable Development and Planning*, 17(5): 1645-1651. <https://doi.org/10.18280/ijstdp.170530>
- [11] Ianioglo, A., Polajeva, T. (2017). The essence and phases of the comprehensive system of ensuring the economic security of enterprise. *International Journal of Learning and Change*, 9(1): 59-74. <https://doi.org/10.1504/IJLC.2017.10005203>
- [12] Rushchyshyn, N., Halkiv, L., Rushchyshyn, M., Medynska, T., Hrytsak, O. (2022). Management of innovative development of enterprises considering their financial and resource opportunities in the context of security. *International Journal of Safety and Security Engineering*, 12(1): 13-20. <https://doi.org/10.18280/ijssse.120102>
- [13] Stachova, K., Stacho, Z., Vicen, V. (2017). Efficient involvement of human resources in innovations through effective communication. *Business: Theory and Practice*, 18: 33-42. <https://doi.org/10.3846/btp.2017.004>
- [14] Boon, C., Eckardt, R., Lepak, D., Boselie, P. (2018). Integrating strategic human capital and strategic human resource management. *The International Journal of Human Resource Management*, 29(1): 34-67. <https://doi.org/10.1080/09585192.2017.1380063>
- [15] Ota, Y., Aoyama, T., Nyambayar, D., Koshijima, I. (2018). Cyber incident exercise for safety protection in critical infrastructure. *International Journal of Safety and Security Engineering*, 8(2): 246-257. <https://doi.org/10.2495/SAFE-V8-N2-246-257>
- [16] Alazzam, F.A.F., Alshunnaq, M.F.N. (2023). Formation of creative thinking of a lawyer in modern conditions of development including the influence of COVID-19 pandemic. *Creativity Studies*, 16(1): 315-327. <https://doi.org/10.3846/cs.2023.16117>
- [17] Saleh, A.J., Alazzam, F.A.F., K.K.A.R., Zavalna, Z. (2020). Legal aspects of the management of cryptocurrency assets in the national security system. *Journal of Security and Sustainability Issues*, 10(1): 235-247. [https://doi.org/10.9770/jssi.2020.10.1\(17\)](https://doi.org/10.9770/jssi.2020.10.1(17))
- [18] Al Azzam, F.A.F. (2019). The adequacy of the international cooperation means for combating cybercrime and ways to modernize it. *NET e-Journal of International Relations*, 10: 64-81. <https://doi.org/10.26619/1647-7251.10.1.5>
- [19] Kryshtanovych, M., Petrovskiy, P., Khomyshyn, I., Bezena, I., Serdechna, I. (2020) Peculiarities of implementing governance in the system of social security. *Business, Management and Education*, 18(1): 142-156. <https://doi.org/10.3846/bme.2020.12177>
- [20] Entringer, T., Nascimento, D., Ferreira, A., Siqueira, P., Boechat, A., Cerchiaro, I., Mendonça, S., Ramos, R. (2019). Comparative analysis main methods business process modeling: Literature review, applications and examples. *International Journal of Advanced Engineering Research and Science*, 6(5): 100-116. <https://doi.org/10.22161/ijaers.6.5.15>
- [21] Gennaioli, N., La Porta, R., Lopez-de-Silanes, F., Shleifer, A. (2013). Human capital and regional development. *The Quarterly Journal of Economics*, 128(1): 105-164. <https://doi.org/10.1093/qje/qjs050>
- [22] Sylkin, O., Kryshtanovych, M., Zachepa, A., Bilous, S., Krasko, A. (2019). Modeling the process of applying anti-crisis management in the system of ensuring financial security of the enterprise. *Business: Theory and Practice*, 20: 446-455. <https://doi.org/10.3846/btp.2019.41>

[23] Kryshchanovych, M., Filippova, V., Huba, M., Kartashova, O., Molnar, O. (2020). Evaluation of the implementation of the circular economy in EU countries in the context of

sustainable development. *Business: Theory and practice*, 21(2): 704-712. <https://doi.org/10.3846/btp.2020.12482>