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MODEL OF TRAINING OF PERSONNEL IN THE FIELD OF CRITICAL INFRASTRUCTURE PROTECTION IN THE HIGHER EDUCATION SYSTEM

A theoretically grounded model of training personnel in the field of critical infrastructure protection in the higher education system has been developed. It is emphasized that the features of the developed model are complexity, phased implementation, dynamism, interconnectedness of components, integration of the quality assurance system, etc.

It is emphasized that the proposed model takes into account modern specific organizational and managerial mechanisms for forming a system of training specialists in the field of critical infrastructure protection within higher education, takes into account advanced trends in the development and quality assurance of educational activities and higher education, modern principles of implementation of educational (educational and professional) programs by higher education institutions, and also determines the procedure for stakeholder interaction in the process of developing and implementing these training programs for subjects of the national critical infrastructure protection system.

Keywords: *model, training, critical infrastructure protection, higher education.*

Statement of the problem. In modern security conditions, one of the priorities for ensuring national security for Ukraine is the protection of critical infrastructure (CI) [1].

The effectiveness of CI protection depends on certain factors, including the level of training of specialists of the relevant subjects of the national CI protection system [1].

Training personnel for the subjects of the national CI protection system is one of the priority tasks of forming and implementing state policy in the field of CI protection [2].

At the same time, domestic experts note that the current system of training personnel in a given field does not fully meet the requirements of the current security environment and needs to be modernized [1, 3].

Analysis of recent research and publications. The issue of training personnel in the field of CI protection was paid attention to in their scientific works by such domestic scientists as O. Sukhodolya, L. Arsenovich, S. Telenyk, and others.

In article [1], the author proposed a set of competencies and expected learning outcomes for graduates of educational (educational and professional) programs of higher education institutions on CI protection.

The author of the work [3] provided a classification and a set of methods for organizing the training system in the field of CI protection.

The publication [4] substantiates the directions of training and advanced training of specialists in the selected field of research.

The results of the analysis of sources on the research topic allow us to state that there has been significant progress in the specific area of scientific research. However, in the author's opinion, insufficient attention is currently paid to the issue of forming a modern system of training personnel in the field of CI protection within higher education, which also confirms the relevance of further scientific research in the selected area of research.

The purpose of the article is to develop and theoretically substantiate a model for training personnel in the field of critical infrastructure protection in the higher education system.

Summary of the main material. The author understands the model of training personnel in the field of CI protection in the higher education system as an imaginary analogue of the process of developing and further implementing educational (educational and professional) programs for training highly qualified specialists in higher education institutions for subjects of the national CI protection system.

It is quite clear that this process will occur under the pressure of a combination of factors of the external and internal environments.

External factors are factors, conditions and circumstances that are devoid of prejudice and influence of management entities and, regardless of their awareness, affect the process of training personnel in the field of CI protection. Internal factors appear as contradictions that arise directly during the development and implementation of relevant training programs [5].

The model of the training system in the field of CI protection in the higher education system (model) contains the following blocks: organizational and management block, block of implementation of educational programs by higher education institutions, and block of external monitoring of the quality of educational activities of higher education institutions and the quality of higher education.

The organizational and management block reflects the process of developing and preparing for further implementation by higher education institutions of educational (educational and professional) programs for training personnel for subjects of the national CI protection system.

The Ministry of Economy of Ukraine is the main body in the system of central executive bodies, which ensures the formation and implementation of state policy in the field of state orders for the training of specialists [6].

The state order for training personnel in the field of CI protection in the higher education system is formed by the Ministry of Economy of Ukraine upon submission of the Ministry of Education and Science of Ukraine and the authorized body in the field of CI protection, considering the medium-term forecast of the need for relevant specialists in the labor market, which is compiled by the State Statistics Service of Ukraine [7].

CI operators, functional and sectoral bodies in the field of CI protection, other entities of the national CI protection system participate in the formation of a state order for personnel training through the authorized body in the field of CI protection.

The authorized body in the field of CI protection collects and summarizes proposals from entities of the national CI protection system regarding

amendments to higher education standards in specialties in which personnel are trained in the field of CI protection, and submits these proposals to the Ministry of Education and Science of Ukraine.

Considering the proposals of the authorized body in the field of CI protection, the Ministry of Education and Science develops draft amendments to the specified standards in accordance with the established procedure and posts them on its website for public discussion. After the public discussion, the draft amendments to the standards, if necessary, are finalized considering the proposals received and sent for approval to the National Agency for Quality Assurance in Higher Education (hereinafter referred to as the Agency). After the Agency approves the draft amendments to the higher education standards, the Ministry of Education and Science issues an order on their approval [8].

Subjects of the national system of protection of CI, scientific institutions, professional and public organizations, other interested persons (developers) may, on their own initiative, if necessary, develop draft professional standards (draft amendments to existing standards). Before applying to the National Qualifications Agency, developers inform the Ministry of Economy of the decision made to develop draft professional standards for professions (types of occupations) that are not in the National Classifier of Ukraine "Classifier of Professions". After receiving applications, the National Qualifications Agency processes them and, if they meet the specified criteria, enters information into the Register of Qualifications, about which it informs the developers, the Ministry of Economy and other subjects [9].

Higher education institutions independently develop and approve educational (educational and professional) programs (make changes to existing programs) considering the requirements established by law for the relevant level of higher education, as well as the requirements of relevant higher education standards. Educational (educational and professional) programs that provide for the award of professional qualifications must ensure compliance with the requirements of relevant professional standards (if any). When developing educational (educational and professional) programs, higher education institutions must also take into account the requirements of relevant international standards (if any) [10].

In addition, in order to ensure the proper quality of educational activities and the quality of higher education under educational (educational and

professional) programs, higher education institutions should involve external and internal stakeholders in the development of these programs.

Higher education institutions, in order to conduct educational activities at certain levels of higher education and educational programs that provide for the award of professional qualifications in professions for which additional regulation has been introduced at a certain level of higher education, obtain an appropriate license in accordance with the procedure established by law [10, 11].

Prior to the licensing stage, higher education institutions carry out measures to prepare scientific and pedagogical staff, educational and material resources, and educational and methodological support for the implementation of educational (educational and professional) programs. In the future, the development and further improvement of the specified target components will be carried out.

After carrying out the procedures and approving and receiving the relevant documents, it is possible to state that higher education institutions are ready to implement the relevant educational (educational and professional) programs.

The block of implementation of educational (educational and professional) programs by higher education institutions reveals the process of direct training of personnel for subjects of the national CI protection system.

Of course, the process of training personnel should be based on compliance by higher education institutions with a quality policy, which is implemented through various internal procedures and measures to ensure the quality of educational activities and the quality of higher education. In order to implement these procedures and measures in higher education institutions, an effective system of internal quality assurance of education should be created [10, 12].

Training of personnel in the field of CI

protection should be based on the following basic principles: motivation of higher education students to study; application of innovative technologies, forms, methods and means of teaching by scientific and pedagogical workers in the process of training education students; involvement of professional practitioners, industry experts and representatives of employers in the educational process; creativity of scientific and pedagogical workers in the process of implementing educational (educational and professional) programs; system-activity approach in training personnel; relationship of education with modern science and practice; ensuring academic mobility of scientific and pedagogical workers and higher education students; digitalization of training; adherence to the principles of academic integrity; informal training of scientific and pedagogical workers and higher education students.

The final stage of training personnel in the field of CI protection is certification, the purpose of which is to establish the compliance of the learning outcomes of higher education applicants with the requirements of the educational program [10].

The block of external monitoring of the quality of educational activities of higher education institutions and the quality of higher education reflects the procedures and measures that are carried out to evaluate educational (educational and professional) programs and educational activities of higher education institutions under the specified programs in order to ensure and improve the quality of higher education.

External monitoring of the quality of educational activities of higher education institutions and the quality of higher education can be carried out by the Agency, foreign accreditation agencies, and independent institutions for the assessment and quality assurance of higher education [13, 14].

Figure 1 shows a diagram of a training model for CI protection in the higher education system.

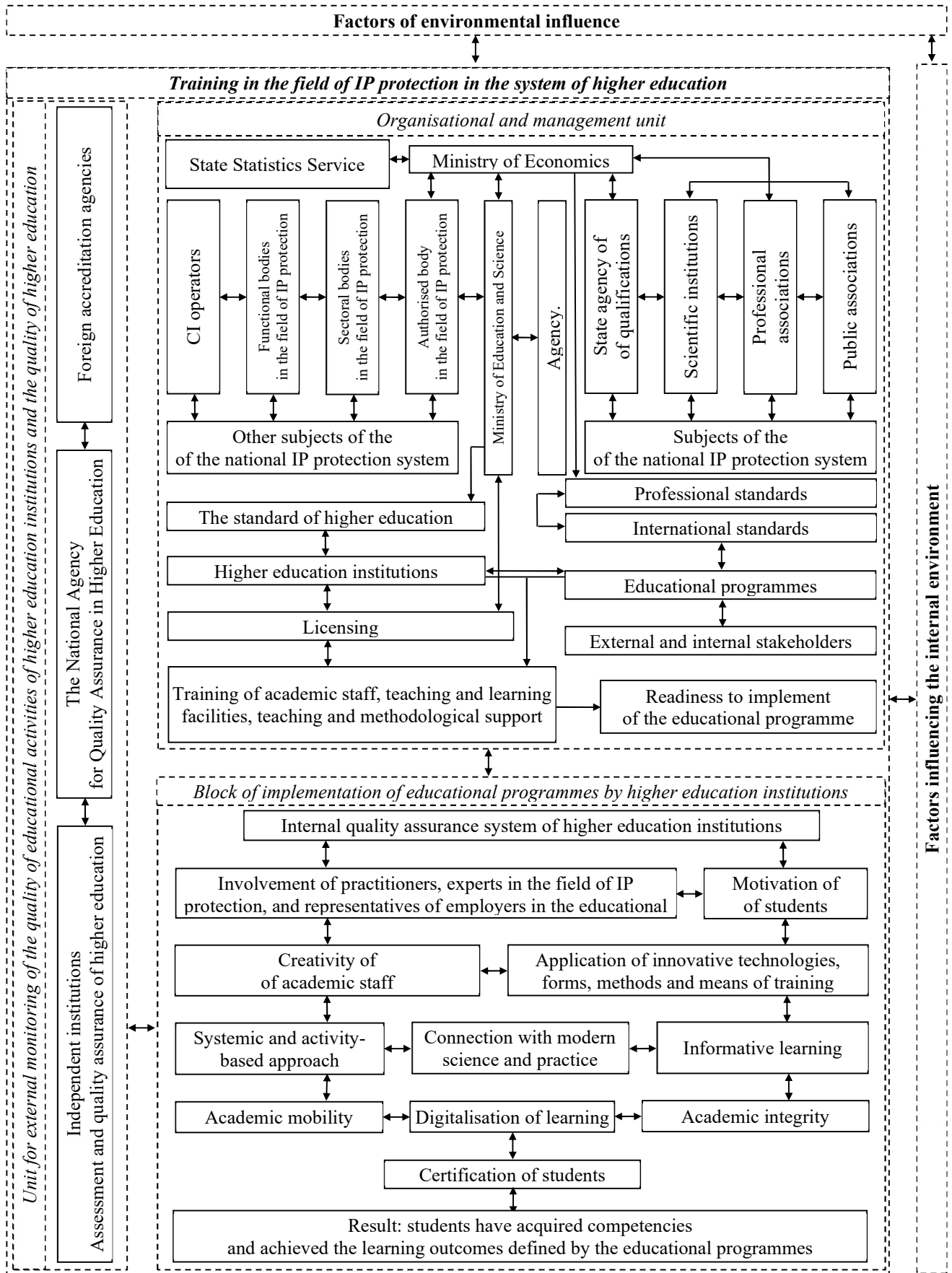


Figure 1 – Model of training in the field of critical infrastructure protection in the higher education system (developed by the author)

The result of the process of training personnel in the field of CI protection in the higher education system is the acquisition of competencies by higher education students and their achievement of learning outcomes that will ensure their effective professional activities.

Conclusions

Thus, the article develops and theoretically justifies a model for training personnel in the field of critical infrastructure protection in the higher education system.

The features of the developed model are its complexity, phased implementation, dynamism, interconnectedness of components, integration of the quality assurance system, etc.

The proposed model takes into account modern specific organizational and managerial mechanisms for forming a system of training specialists in the field of critical infrastructure protection within higher education, considering advanced trends in the development and quality assurance of educational activities and higher education, modern principles of implementation of educational (educational and professional) programs by higher education institutions, and also determines the procedure for stakeholder interaction in the process of developing and implementing the specified training programs for subjects of the national critical infrastructure protection system.

The direction of further scientific research on the training of personnel in the field of critical infrastructure protection is the development and theoretical substantiation of models of training specialists for subjects of the national critical infrastructure protection system in the systems of professional (vocational and technical) and professional military education.

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МОДЕЛЬ ПІДГОТОВКИ КАДРІВ У СФЕРІ ЗАХИСТУ КРИТИЧНОЇ ІНФРАСТРУКТУРИ В СИСТЕМІ ВИЩОЇ ОСВІТИ

У статті розроблено і теоретично обґрунтовано модель підготовки кадрів у сфері захисту критичної інфраструктури в системі вищої освіти. Наголошено, що особливостями розробленої моделі є комплексність, поетапність запровадження, динамічність, взаємопов'язаність складників, інтегрованість системи забезпечення якості тощо.

Акцентовано на тому, що пропонується модель, яка враховує сучасні специфічні організаційно-управлінські механізми формування системи підготовки кадрів у сфері захисту критичної інфраструктури вищої освіти, враховує передові тенденції розвитку і забезпечення якості освітньої діяльності та вищої освіти, сучасні принципи запровадження вищими навчальними закладами освітніх (освітньо-професійних) програм, а також визначає порядок взаємодії заінтересованих сторін у процесі розроблення і реалізації зазначених програм підготовки персоналу для суб'єктів національної системи захисту критичної інфраструктури.

Ключові слова: *модель, підготовка кадрів, захист критичної інфраструктури, вища освіта.*

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