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Dilemmas of measuring the effectiveness of logistics personnel training in the military higher education system

Dylematy pomiaru efektywności kształcenia kadr logistycznych w systemie wojskowego szkolnictwa wyższego

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Abstract. For years, the most important value of any organisation invariably remains the people who make it up. Their competence, knowledge and skills directly determine the outcome of the processes implemented and the level of results achieved. The same situation applies to military logistics personnel performing a wide variety of tasks within the subsystems of the military logistics system. As experience to date indicates, the key issue in the proper preparation of logistics personnel is the education of managerial cadres within military education. In this extremely complex process, it turns out to be a priority to reliably measure the effectiveness of the didactic methods and techniques used, the effect of which unambiguously determines the competences, knowledge and skills of those graduating from specific forms of education conducted within the framework of military higher education. It should be noted that the area subjected to research has not been comprehensively explored in the scientific dimension so far, which results in the fact that the research results obtained and described in the article complement the research gap clearly noticed in the literature on the subject regarding the measurement of the effectiveness of training logistic personnel in the military higher education system. The article is an attempt to fill a research gap in the field of the effectiveness of training logistic personnel for the needs of the armed forces, which undoubtedly exists because the literature on the effectiveness of training does not refer to this area. The aim of this article is to identify and evaluate priority dimensions and methods for measuring the effectiveness of logistics personnel education in the military higher education system. The research problem undertaken to be solved was specified in the following form: which dimensions, measures and indicators should be prioritised in the process of measuring the effectiveness of logistics personnel education in the military

higher education system? A number of methods were used in the material, the leading ones being analysis and synthesis, literature search, abstraction and inference. A diagnostic survey method using an expert interview technique was used as the empirical method. The approach adopted was due to the nature and complexity of the research problem undertaken to solve.
Keywords: efficiency, logistics, armed forces, training, education

Abstrakt. Niezmiennym pozostaje od lat, że najważniejszą wartością każdej organizacji pozostają tworzący ją ludzie. Od ich kompetencji, wiedzy i umiejętności wynika bezpośrednio wynik realizowanych procesów oraz poziom osiąganych efektów. Tożsama sytuacja odnosi się do wojskowego personelu logistycznego realizującego szereg różnorodnych zadań w ramach podsystemów wojskowego systemu logistycznego. Jak wskazują dotychczasowe doświadczenia kluczową kwestią we właściwym przygotowaniu personelu logistycznego jest kształcenie kadr menedżerskich w ramach wojskowego szkolnictwa wojskowego. W tym niezwykle złożonym procesie priorytetem okazuje się być wiarygodny pomiar efektywności wykorzystywanych metod i technik dydaktycznych, których efekt jednoznacznie określa kompetencje, wiedzę i umiejętności osób kończących określone formy edukacji prowadzonej w ramach wojskowego szkolnictwa wyższego. Należy przy tym zauważyć, że poddany badaniom obszar nie był dotychczas kompleksowo eksplorowany w wymiarze naukowym, co skutkuje, że uzyskane i opisane w artykule wyniki stanowią uzupełninie wyraźnie dostrzeganej w literaturze przedmiotu luki badawczej dotyczącej pomiaru efektywności kształcenia kadr logistycznych w systemie wojskowego szkolnictwa wyższego. Artykuł jest próbą wypełnienia luki badawczej w zakresie efektywności kształcenia kadr logistycznych na potrzeby sił zbrojnych, która niewątpliwie istnieje, gdyż w literaturze poświęconej efektywności kształcenia brak jest odniesienia się do tego obszaru. Celem artykułu jest identyfikacja i ocena priorytetowych wymiarów oraz metod pomiaru efektywności kształcenia kadr logistycznych w systemie wojskowego szkolnictwa wyższego. Podjęty do rozwiązania problem badawczy został sprecyzowany w następującej postaci: jakie wymiary, mierniki i wskaźniki powinny stanowić priorytet w procesie pomiaru efektywności kształcenia kadr logistycznych w systemie wojskowego szkolnictwa wyższego? W materiale wykorzystano szereg metod, wśród których wiodące były: analiza i synteza, kwerenda literatury przedmiotu, abstrahowanie oraz wnioskowanie. Jako metodę empiryczną wykorzystano metodę sondażu diagnostycznego z użyciem techniki wywiadu eksperckiego. Przyjęte podejście wynikało z charakteru oraz złożoności podjętego do rozwiązania problemu badawczego.
Słowa kluczowe: efektywność, logistyka, siły zbrojne, szkolenie, kształcenie

Introduction

The demographic, socio-economic and technical-technological changes taking place are creating new challenges in the field of education, both in the civilian and military environments. It is now widely expected in the military sector that education will be a real factor in supporting the development of the armed forces, in particular by increasing the size of the army and preparing graduates in line with the expectations of military units and institutions. At the same time, a number of opinions unequivocally indicate that this will not be possible without ongoing monitoring of the results of education aimed primarily at minimising the differences between the actual competences of graduates and the requirements of the positions in which they will perform professional military service. Without such an assessment, it is not possible to determine whether the stated educational objectives have been achieved and whether the graduates have sufficiently developed their competences, knowledge and skills.

In view of the above, for many years there has been an ongoing search for solutions in the Polish Army, to fully correlate the military education system with social transformation, changes within the armed forces and in their environment. In this process, it seems necessary to refer to the credibility of assessments of the effectiveness of the changes introduced and the solutions implemented. At the same time, it is worth noting that a credible assessment of the effectiveness and quality of the teaching methods, techniques and tools used is one of the basic determinants of the improvement of the forms of education implemented. Assessment of educational effectiveness therefore appears to be a necessary component of systematic improvement of the educational model within higher military education.

The article is an attempt to fill a research gap in the field of the effectiveness of training logistic personnel for the needs of the armed forces, which undoubtedly exists because the literature on the effectiveness of training does not refer to this area. The aim of this article is to identify and evaluate priority dimensions and methods for measuring the effectiveness of logistics personnel education in the military higher education system. The research problem undertaken to be solved was specified in the following form: which dimensions, measures and indicators should be prioritised in the process of measuring the effectiveness of logistics personnel education in the military higher education system? A number of methods were used in the material, the leading ones being analysis and synthesis, literature search, abstraction and inference. A diagnostic survey method using an expert interview technique was used as the empirical method. The approach adopted was due to the nature and complexity of the research problem undertaken to solve.

Literature review

The issue of educational efficiency emerged in the 1960s in the United States (Wawer, 2021, p. 97). At that time, on the backdrop of the rivalry with the Soviet Union, attention was drawn to the quality of education as an 'important development lever, now treated as human capital' (Wenta, 2013, p. 14). In Poland, the issue of educational effectiveness has been present since the early 1980s. The precursor of research in this area was Kazimierz Denek, who focused on the educational process as a function of many variables, i.e. concerning: the work of pupils/students, teachers and academics, educational goals, educational principles, educational content, educational methods, educational forms, didactic means, material and technical base, control and evaluation procedures, educational time and other variables' (Denek, 1981, p. 24). In the 21st century, educational effectiveness has gained new dimensions: psychological, sociological and cultural (Gurycka, Kofta, 1993, p. 6). Today, the conditions and opportunities for acquiring knowledge (learning) are subject to constant change, making the educational process more efficient. New methods of

acquiring any information are determined by modern communication tools and the global computerisation of societies (Wawer, 2021, p. 97). In addition, researchers point out that the education system requires changes adapting it to the requirements of the economy and the needs of modern society, and that it is necessary to move away from passive transmission of knowledge towards interactive training of skills (Maison, 2016, p. 16). Measuring the effectiveness of education has been and continues to be a challenge. After twenty years of research on educational effectiveness, Kazimierz Denek (1997) wrote: "[...] among the various semi-measures of determining educational effectiveness, indicators of absolute and relative knowledge gain and retaining, learning progress, knowledge level of quantitative and qualitative learning outcomes remain particularly useful" (Denek, 1997, p. 96).

Research into the education of logistics managers is also undertaken prominently in the global literature. Authors highlight the need to prepare logisticians to manage the entire supply chain (Erturguta, 2011, p. 2771). Another issue addressed in the research is the diversity of educational content in logistics (related) degree programmes and the lack of unification in this area (Niine, 2015, pp. 4-11). In military universities, study programmes are designed based on the requirements set by normative documents (Model, 2021, p. 32), which are updated annually.

The issue of educational effectiveness in military higher education was taken up, among others, by K. Żegnałek. He pointed to two components of educational effectiveness, i.e. didactic-educational effectiveness and self-educational effectiveness, because education includes both teaching and learning (Żegnałek, 1989, pp. 20-21). Teaching and learning effectiveness considered from the pedagogical point of view is a function of the content of education, teacher-related factors, student-related factors, and the conditions for the implementation of the educational process, while in the economic dimension it is information about the inputs and outputs of the educational process (Jeruzalska, 2000, p. 26).

Nowadays, the issue of the effectiveness of education is raised by researchers in relation to the new conditions created by the development of technology, in particular artificial intelligence (Mindigulova et al., pp. 2000-2003). Digital solutions are also being used in the area of military logistics to revolutionize the processes of goods flow (Liśnik, et al., pp. 17-34) (Dymyt, Wincewicz-Bosy, pp. 5-20), which also has an impact on the education of logisticians. Distance learning, which was popularized during the Covid-19 pandemic, is increasingly being used in education (Kowalski et al., pp. 209-224).

Essence and dimensions of educational performance measurement

In the literature, a great deal of attention has been given to defining the essence and scope of educational effectiveness. The views presented, as in the case of many terms used at the level of theory and practice, show a different character, resulting from its interdisciplinary nature and the purpose of the analyses conducted. Most often, educational effectiveness is considered in pedagogical, sociological and economic terms.

In pedagogical theory, it is indicated that this is primarily the congruence of learning outcomes with the goals set in the educational programme, relating to learners' knowledge, skills and attitudes. The validity of learning objectives results in the fact that it is extremely important that they are well defined. Effectiveness in pedagogical terms is information about the learning outcomes achieved. Educational effectiveness is also determined by conditions related to (Jeruszka, 2000, pp. 42-44):

- the lecturer/teacher (mainly his/her teaching competences and pedagogical methods);
- the learner (their motivation, commitment, intellectual competence);
- the conditions for implementing the learning process (teaching infrastructure, teaching aids and tools used).

In sociological terms, attention is given to the individual and social effects of education and its impact on the functioning of groups and individuals. An important dimension of the educational process is socialisation. Criteria for the effectiveness of education in this approach mainly refer to the individual's social maturity and value systems (Taradejna, 2015, p. 9).

In economic terms, the effectiveness of education is expressed in the relationship of the level of education achieved and the resulting professional opportunities to any material (e.g. financial resources) and immaterial (e.g. time) expenditure incurred in the process of obtaining it. In economic terms, the educational process is seen as an investment that:

- from the perspective of the employee (learner), leads to an increase in professional qualifications (skills, knowledge and competences) that make it possible to obtain additional and/or higher remuneration;
- from the perspective of the employer (the funding/investing institution) leads to an increase in labour efficiency allowing for an increase in labour productivity of the individual/organisation.

Among the many synthetic opinions relating to the effectiveness of education, one dominates, which is primarily expressed in the professional usefulness of graduates and their mobility in the global labour market. Knowledge of these aspects is fundamental for evaluating the educational process as effective or insufficient in terms of the competences obtained and the fulfilment of professional tasks,

graduates' employment and finding their place in the labour market. High efficiency of education therefore affects the productivity and competitiveness of employees and enterprises and is a criterion for the modernity of the theory and practice of the educational process (Taradejna, 2015, p. 9).

In an attempt to systematise the various views on the effectiveness of education, it is worth pointing out that four basic dimensions (economic; personal; professional; synthetic) are distinguished in the actual measurement of the effectiveness and quality of education (Biernacki, 2007, pp. 85-86):

1. **The economic dimension**, i.e. the productivity (service efficiency of the school), which is expressed by comparing the productive input and the economic output (graduates). In a 'production system' such as a higher education institution, financial inputs in the form of teachers' salaries, technical equipment costs, operating costs and tuition fees paid by students (non-public and public evening and extramural schools) are transformed into specific numbers of graduates (bachelor's and master's degrees). In education, the economic effect is a correspondingly high level of knowledge and skills of a student (pupil). In measuring school performance, it can be assumed that the effect is the number of graduates (master's and bachelor's degrees), and the input is the expenditure of the state and local government budgets on education.
2. **The personal dimension**, i.e. student (pupil) satisfaction, understood as the availability of educational services and the quality of teaching. Graduate satisfaction, which should be the subject of the market area of education, should measure the graduate's level of satisfaction with the educational effect, teaching service and available opportunities to enhance knowledge and skills. The satisfaction survey makes it possible to determine to what extent the service offered by the school corresponds to the expectations of the students, to learn more about their preferences and their subjectively perceived learning outcomes.
3. **The professional dimension**, or teaching effectiveness, which measures the ability to improve the student's (learner's) knowledge and skills. Teaching effectiveness, i.e. the ability to improve the state of the student's (learner's) knowledge and skills, is very difficult to measure. While the state of a student's knowledge and skills prior to university education can be estimated fairly well (number of credits in the baccalaureate or entrance examinations), the outcome of university education is mostly spread over time and is largely verified by the labour market (employers).
4. **The synthetic (social) dimension,** i.e. the education of the student (pupil) to an attitude free of egoism that makes it possible to serve society. It is in line with the mission of every university (search for truth, synthesis of knowledge and service to man). The effectiveness of education must

also be looked at from the point of view of preparing human resources for the national economy and culture, as well as the upbringing of mature individuals who can distinguish truth from falsehood and form their own judgement about the objective state of affairs.

Measuring the effectiveness and quality of education in higher education institutions is a very complex and multifaceted phenomenon. Its multidimensionality is a direct result of the nature of higher education institutions and the wide range of teaching and research activities that are carried out by the academic community of a given university. An additional complication is the different specificity of the didactic process aimed at preparing the required specialist in different areas of social life.

In both theory and practice relating to the evaluation of the effectiveness of educational processes, there are, with varying degrees of success, a number of approaches in operation. The solutions presented are constantly being improved, and their ultimate dimension results from the complexity of the methods and measurement tools used, as well as the reliability and validity of the data obtained. At the same time, a careful analysis of the solutions used to assess the effectiveness of education unambiguously indicates that both in theory and practice there is a shortage of methods dedicated to real, comprehensive assessment of the effectiveness of the entire educational process conducted within higher education. In this respect, commonly functioning models, dedicated directly to the evaluation of the effectiveness of training activities, are used and adapted.

Among the most useful and most widely used methods of evaluating implemented training programmes is D. Kirkpatrick's model, developed in the 1960s. According to his assumptions, the analysis of the effectiveness of didactic undertakings should be conducted on four levels of benefits (Piechnik-Kurdziel, 2000, p. 46):

1. Level of response at which subjective opinions and evaluations of the degree of satisfaction of trainees are collected; this is usually measured shortly after the end of the training process.
2. The level of teaching at which, by means of tests or other forms of checking knowledge, the degree of achievement of learning objectives (learning outcomes) is assessed.
3. The behavioural level at which the impact of curricula on modifying the professional behaviour of participants in learning processes is determined.
4. The outcome level at which the benefits achieved by trainees upon completion of training are identified, made visible in the performance of the organisation as a whole.

D. Kirkpatrick's classic model has been extended and refined over the years, and the work and experiments carried out have resulted in a new model built on the foundation of the well-known Four Levels, but each level has been given a new dimension and, most importantly, equipped with tools that make it easier to apply in practice (Fig. 1.)

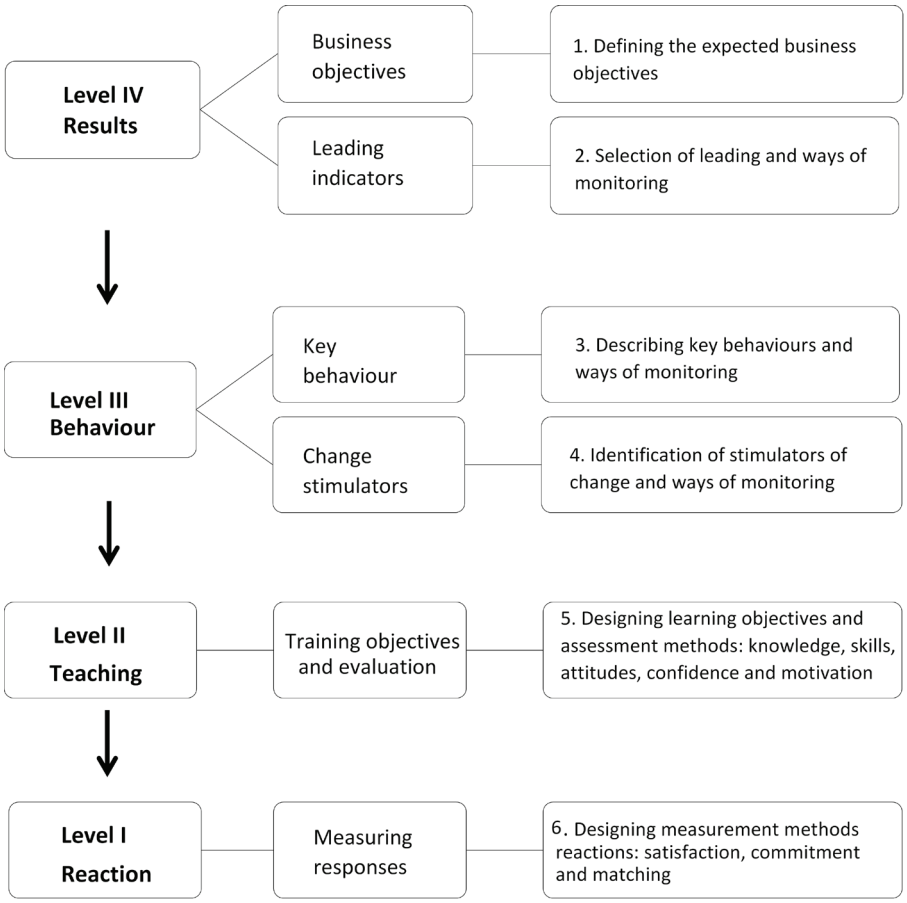

Fig. 1. Evaluation of the effectiveness of training at the Four Levels according to the new Kirkpatrick model

Source: E. Żukrowska E., 2016, Ocena efektywności szkoleń według Nowego Modelu Kirkpatricka [online]. Available at: https://docplayer.pl/18888726-Ocena-efektywnosci-szkolen-wedlug-nowego-modelu-kirkpatricka.html, html [Accessed: 20 November 2022].

The new model includes two additional factors that determine a positive response to training: fit and engagement. The training should be grounded in the participants' professional reality and the delivery method should engage them in the learning process. One of the key differences between Kirkpatrick's traditional Four Levels model and its modernised version is that the new model is not just for training evaluation. The new model focuses on change management, where the four levels are used not only to demonstrate the value the programme has brought, but de facto to create that value (Piechnik-Kurdziel, 2000, p. 46).

Another model used for training evaluation is the Ch. Hamblin model, which is an extension of the D. Kirkpatrick's model by adding a fifth level, also called the ultimate goals level. These are related to the social and cultural values of the organisation. In addition, Ch. Hamblin assumed that it is crucial to formulate the objectives of the training before it begins, while allowing this phase to be skipped if difficulties are encountered that make it impossible to define them (Wozniak, 2012, p. 186).

A model developed at the University of Sheffield is also used to evaluate training, mainly vocational training. It is called C-I-P-O, presenting the successive levels of analysis: context, input, process, outcome. The analysis is carried out on four levels (Kunasz, 2008, p. 134):

1. Context - at this stage, data are collected and processed about the current (baseline) situation at company level, individual problems and the ineffectiveness of certain activities and procedures. The scope of the analysis at this level overlaps with the stage of identifying training needs at individual and organisational level.
2. Input - the data collected at this level is intended to provide information for decisions on the choice of training method or form of training (in-house or external), as well as to calculate the return on training expenditure over time.
3. Process - at this level, evaluations are collected from the participants on the training course, its organisation and content.
4. Outcome - at this stage, information is collected on the actual consequences of the training; three levels of evaluation can be considered: direct, indirect and long-term results.

From the perspective of the considerations under discussion, it is also worth noting the VAE (Value-added in Education) method used to assess the school's contribution to students' examination results. Value-added in Education is defined as the increase in pupils' knowledge as a result of a given educational process. In technical terms, the VAE for a school is the average of the differences between the predicted results and the results obtained in the external examination by its students. The added value of a school thus determined is the average growth in skills and knowledge of the pupils attending it over a given period. VAE is one measure of the quality of a school's work and therefore an important tool for national education policy (Dolata R. et al., 2015].

The selected models and methods presented above for assessing the effectiveness and quality of the training and education process, as well as specific educational activities, can provide a solid basis for developing a set of methods for measuring the effectiveness and quality of education in military higher education institutions. The priority in this respect seems to be the maximum correlation of the solutions used with the specificity of education for the needs of the armed forces.

At the same time, it is worth remembering that in the area in question, the primary objective of training is to prepare officer candidates to command (direct) and perform tasks on the first duty post in conditions of peaceful functioning of the Armed Forces of the Republic of Poland (SZ RP), crisis and war (Decision No. 88/MON, 2020). In addition, during the training of professional soldiers within the framework of various forms of in-service training, their overriding goal is to properly prepare officers for the maximum effective performance of tasks at their future duty positions. The evaluation of the educational process in military higher education institutions should therefore be treated as an integrated research process aimed primarily at developing solutions that enable the permanent improvement of the methods, techniques and didactic tools used. At the same time, it should be borne in mind that the evaluation of the effectiveness and quality of education is valuable only if the results obtained provide a basis for improving the diagnosed situation. This is not possible without close cooperation of all entities involved in the educational process, and the key in this area is communication and precise definition of the expected results.

Priorities in the process of measuring the effectiveness of logistics personnel education in the military higher education system - an empirical study

On the basis of the literature survey, it proved necessary to carry out empirical research in order to solve the defined research problem. Due to the nature of the area researched, the method of a diagnostic survey conducted with the expert interview technique was selected as the most appropriate. Prepared interview sheets, containing three open-ended questions, were addressed to 10 experts representing the scientific community. The experts had in-depth knowledge and many years of experience in the organisation and implementation of educational processes in the military higher education system. In the first part of the interview, the experts addressed the question: *what factors do you think should be evaluated in particular in the process of educating logistics personnel within military higher education?* The second question was in the form of: *Which dimension of the effectiveness of logistics personnel education do you think is a priority in the military higher education system?* The third question was: *Please identify/propose priority metrics and indicators in the process of measuring the effectiveness of logistics cadre education in the military higher education system*.

Due to the limited scope of the present material, the empirical results obtained have been aggregated and presented in Table 1. *Key factors for evaluating the process of logistics personnel education within the military higher education system*, Table 2. *Key factors for evaluating the process of logistics personnel education within the*

military higher education system and Table 3. *Priority dimensions of the effectiveness of logistics personnel education within the military higher education system*.

Table 1. Key factors for evaluating the logistics personnel education process within military higher education

Factors for evaluating the learning process	Details
Educational content	Proper development of learning outcomes (education, training), curricula (courses, training) and course charters, in accordance with the requirements of the military labour market.
Teachers' competences	Content knowledge, teaching preparation, professional experience (content and teaching), teaching aptitude.
Forms and methods of teaching	Appropriately matched to the type of content being taught, making classes more attractive and facilitating learning. Appropriate mix of theoretical and practical activities.
Teaching resources	Teaching room equipment, audiovisual equipment, multimedia teaching material base, laboratories, models, trainers, simulators, 3 D, VRR, open and classified IT infrastructure.
Organisation of the teaching process	Properly designed timetable, number of hours of activities per day, time and space for rest.

Source: Own study

In the opinion of experts, the most important factor in assessing the process of educating logistics personnel within the framework of military higher education is the **content** of education, as the extent of the material taught depends mainly on this, which is directly related to the level of education of graduates. Nevertheless, also important are the forms, methods and means of teaching, which are specific tools of the teacher's work. Their proper selection in relation to the educational content (types of subjects) and the students' abilities and skills may make the learning process easier, more pleasant and simpler. However, if the learning content is not properly selected, even the best teacher's tools will not improve students' knowledge. The teacher's preparation for his/her work and his/her qualities such as personality, communication skills, creativity and charisma can also be considered important, as inspiring students to seek knowledge, investigate finer points and the smallest details can become an experience that pays off in the graduate's future life.

Table 2. Priority dimensions of logistics personnel education effectiveness in the military higher education system

Dimensions of effectiveness of education	Detail	Priority
Professional dimension	Educational effectiveness - measures the ability to improve the student's knowledge and skills.	Very high
Personal dimension	Student satisfaction, understood as the availability of educational services and the quality of teaching.	High
Social dimension	To prepare the student for an attitude free from selfishness that enables them to serve society. Preparation for military service.	High
Organisational dimension	From the learning outcomes developed, to the study programmes, to the teaching and laboratory facilities.	Medium
The economic dimension	Productivity (service efficiency of the school), which is expressed by comparing the productive input and the economic effect (graduates).	Low

Source: Own study

According to experts, an extremely important dimension of the effectiveness of education is the high level of education of soldiers so that they have the appropriate knowledge and skills that are necessary to serve in various positions in the logistics personnel corps. It is also important to educate the ability to search for information, its proper interpretation and practical use. Shaping a soldier for life in a soldier community and instilling ethos and patriotism is also extremely important, but a soldier's education should include elements developing mental and physical resilience. The ability to cope with stress and the hardships of soldiering life become extremely important in crisis situations, for which the army is designed. An important element should be the systematic evaluation of progress in this area, in the process of training, and in situations indicating infirmity, professional help or elimination from the student body should be provided. Another quality is the ability to function in difficult situations, combined with professional knowledge, appropriate ethical and moral values, as this should form the basis for the education (training) of soldiers. The economic dimension is important but should not have a direct impact on the professionalism of teaching.

Table 3. Priority metrics and indicators for measuring the effectiveness of logistics personnel education in the military higher education system

Measure educational efficiency	Educational performance indicator	Priority
Number of specialised subjects	number of specialised subjects / numbers of all subjects in the curriculum	Very high
Fate of graduates	number of graduates employed / total number of graduates	Very high
Number of students	number of students completing studies / number of students entering studies	Very high
Impact of learning on the development of interests and personality changes	% indicator on the basis of cyclic tests	High
Growth and retaining of student knowledge	% indicator on the basis of cyclic tests	High
Structure of training	number of teachers / number of students	Medium

Source: Own study

According to the experts, the education of logistics personnel in the military higher education system should primarily turn towards the professionalism of the students, i.e. the right choice of educational content. That is why the study emphasised that the number of specialised subjects should have the largest possible share in the educational programmes. A no less important measure is the fate of graduates, who should find employment in positions in line with their training and then 'find themselves' in these positions. These two measures correspond with each other, as the content of specialised subjects and the learning outcomes should be developed with the involvement of employers. Another performance indicator is the ratio of graduating students to entering students. One expert suggested that this measure could be the main one for determining the quality of education. It is important to have a system of selection of candidates for studies, verifying their knowledge, which is necessary for further education. If the students in a given group have an equal level of knowledge, their further education will be more effective. The result of these measures should be a similar number of students commencing and completing the education process, as well as a high market value for employment.

To summarise the empirical part of the article, it should be noted that logistics personnel education is primarily concerned with professionals who should be equipped with knowledge and competences appropriate to their intended position. The economic dimension is important but should not have a direct impact on the professionalism of teaching, while the social dimension, although important, at the tertiary level should reinforce rather than shape the patriotic attitudes of students.

Conclusions

The results obtained in the research process mandate the following general conclusions:

1. The effectiveness of logistics personnel training for the military logistics system is determined by a number of factors, which together create the conditions for achieving the goal of the education process - the preparation of a professional logistician. The research clearly indicated that the content of education should be seen as a priority, which should correspond to the expectations of the military labour market.
2. Attention should be given first and foremost to the professional dimension of educational effectiveness, which results in the quality of education expressed by improving the level of students' knowledge. Its improvement is related in particular to the competences of the teaching staff and the teaching methods and tools they use, which are appropriate to the content of education.
3. Measuring the effectiveness of education should focus on the evaluation of educational programmes and content, the number of graduates in relation to the number of students starting their studies and the fate of graduates. The results obtained from the performance measurement should form the basis for systematic evaluation and improvement of the education system.
4. Increased needs for logistics education resulting from the increase in the size of the armed forces and their modernisation require urgent attention to the effectiveness of the education system in military higher education. While developing the capacity of universities (training centres) to train more students (trainees), it is also necessary to modernise the quality and efficiency system of education.

In conclusion, it should be emphasized that conducting research on the effectiveness of education is extremely important due to the dynamic changes taking place in the security environment and logistics systems. This article certainly does not exhaust the complex topic of the effectiveness of training military logistics personnel. It would be necessary to conduct further, more specialized research. Nevertheless, drawing the attention of scientists to the presented problem is important, if only because of the increase in the number of armed forces, which will consequently require changes in military education. The higher education system should keep up with these changes, while incorporating the best practices and research results in the field of effective education.

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