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EUROPEAN MECHANISMS OF ORGANIZATIONAL SUPPORT OF VOCATIONAL EDUCATION DEVELOPMENT AND POSSIBILITIES OF THEIR IMPLEMENTATION IN UKRAINE¹

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Summary. *The dynamic development and integration of new technologies, the growth of the share of the service sector compared to the manufacturing sector, the processes of digital and green transition are the modern challenge for the development of vocational education in terms of the need to train specialists in new specialties, to develop soft competencies in accordance with the new requirements of the labor market. The objective of the paper is to structure European mechanisms of organizational support for the development of vocational education and to clarify the possibilities of their implementation in Ukraine. Comparative analysis of the structure of education recipients in the EU and Ukraine is carried out in this paper and significant discrepancies are identified. The organizational mechanisms for supporting the development of vocational education in the EU are structured according to their functional purpose and the following mechanisms are highlighted: management, staffing, financing, social partnership, innovative development, and ensuring the quality of education. The most valuable mechanisms from the perspective of their potential for implementing this experience in the development of the vocational education sector in Ukraine are emphasized. The mechanism of dual education is analyzed and it is found that in the countries (mostly highly developed ones) where dual system of vocational education is available, the share of employed people after completing formal education in vocational institutions is significantly higher than in those where such system is underdeveloped. The difficulties of implementing dual education in Ukraine are identified: lack of state support and incentives for enterprises; reluctance or inability of enterprises due to high financial burdens (student salaries, equipment, mentors); lack of clear mechanisms for implementation of dual education. The features of the Centers of Professional Excellence in the EU are described and the trends of their creation in Ukraine are clarified. Special attention is focused on the need to create regional Centers of Professional Excellence in communities with industrial potential, especially in regions suffering from war damage, which would enable vocational education to be adapted to the needs of specific territories. The scale and complexity of the transformation of vocational education in the context of the digital and green transition are revealed.*

Key words: *vocational education, organizational mechanisms, digitalization, innovations, dual education, centers of professional excellence.*

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ЄВРОПЕЙСЬКІ МЕХАНІЗМИ ОРГАНІЗАЦІЙНОГО ЗАБЕЗПЕЧЕННЯ РОЗВИТКУ ПРОФЕСІЙНОЇ ОСВІТИ ТА МОЖЛИВОСТІ ЇХ ІМПЛЕМЕНТАЦІЇ В УКРАЇНІ

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Резюме. Динамічний розвиток та інтеграція нових технологій, зростання частки сфери послуг у порівнянні зі сферою виробництва, процеси цифрового та зеленого переходу є сучасним викликом розвитку професійної освіти в частині необхідності продукувати спеціалістів нових спеціальностей, розвивати м'які компетенції відповідно до нових вимог ринку праці. Метою статті є структуризація європейських механізмів організаційного забезпечення розвитку професійної освіти та з'ясування можливостей їх імплементації в Україні. Проведено порівняльний аналіз структури здобувачів освіти у ЄС і Україні та виявлено значні невідповідності. Структуровано організаційні механізми підтримання розвитку професійної освіти в ЄС за функціональним призначенням та виділено: механізми управління, кадрового забезпечення, фінансування, соціального партнерства, інноваційного розвитку, забезпечення якості освіти. Акцентовано на найцінніших з них з позиції потенціалу імплементації досвіду для розвитку сфери професійної освіти в Україні. Проаналізовано механізм дуальної освіти та з'ясовано, що у країнах (здебільшого це високорозвинені країни), де існує дуальна система професійної освіти, частка зайнятих після отримання формальної освіти у професійно-технічних закладах значно вища, ніж у тих, де вона нерозвинена. З'ясовано складнощі реалізації дуальної освіти в Україні: відсутність підтримки з боку держави та стимулів для підприємств; небажання чи неспроможність підприємств через велике фінансове навантаження (зарплата учням, обладнання, наставники); відсутність чітких механізмів реалізації дуальної освіти. Охарактеризовано особливості Центрів професійної досконалості в ЄС та з'ясовано тенденції їх створення в Україні. Акцентовано на необхідності створення регіональних центрів професійної досконалості у громадах із промисловим потенціалом, особливо у регіонах, що зазнали воєнних руйнувань, що дозволить адаптувати професійну освіту до потреб конкретних територій. Виявлено масштаби та складнощі трансформації професійної освіти в контексті цифрового та зеленого переходу.

Ключові слова: професійна освіта, організаційні механізми, цифровізація, інновації, дуальна освіта центри професійної досконалості.

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Statement of the problem. Vocational education plays an important role because it develops human capital, which is the basis for technological change and economic growth. Dynamic technological development, processes of digitalization and green transition, integration of technologies (services, platforms, logistics, IT, e-commerce) result in the transformation of requirements for vocational education in terms of the need to supply the labour market with specialists in new occupations.

Modern EU labour market is characterized by the increasing share of the service sector compared to the manufacturing sector (70% to 30% of the EU economy). In EU countries, financial, educational and creative services have an increasing

impact on economic growth as they provide high added value, innovation and competitive advantages in the global market. Such trends pose a challenge for the development of professional education in terms of the need to train specialists in the service field, IT, logistics, tourism, healthcare, as well as to develop soft skills and customer orientation, and teamwork communication. Another challenge for vocational education is migration processes in Europe, which affect the demand and supply of qualified labour. Labour mobility requires recognition and certification of qualifications. The above mentioned challenges require the improvement of organizational mechanisms supporting the development of vocational education in accordance with modern labour market requirements, adoption of flexible forms of organization, and changes in the methods of operation.

Analysis of available researches and publications. The mechanisms of dual education in the EU were studied in the papers by Huisman A., Hippash-Schneider U. [1], Köpsén J. [2]. Public-private partnership in vocational education was investigated in the papers by Kim J., Han M. [3], L. Sergeeva, T. Lukina [4]. Digitalization was analyzed in the papers by Prima R., Goncharuk O., Prima D., Roslavets R. [5]. At the same time, the dynamics of new technologies, digitalization, and green transformation require the improvement of organizational mechanisms for the development of vocational education and require in-depth research.

The objective of the investigation is to systematize European mechanisms of organizational support for the development of vocational education and to identify the possibilities of their implementation in Ukraine.

Statement of the problem. In order to achieve the objective, the following scientific tasks have been set: to identify current problems in the development of vocational education; to investigate modern European organizational mechanisms for ensuring the development of vocational education and to structure them according to their functional purpose; to characterize the most valuable organizational mechanisms for the development of vocational education in terms of their potential for implementing the experience in Ukraine. In order to implement the above set tasks, the methods of analysis, synthesis, systems approach, and statistical methods are used in this paper.

Presentation of the main material. The EU vocational education market includes various types, including vocational education based on complete secondary education, post-secondary vocational education, on-the-job training, courses, internships, STEM training, etc. To compare the educational systems of different countries, the ISCED classification (International Standard Classification of Education) developed by UNESCO, where vocational education is ISCED 3 (ED 35) and ISCED 4 (ED 45) is used.

In the structure of vocational education applicants in the EU, 93% are students acquiring profession simultaneously with complete secondary education and only 7% are students who deepen their professional qualifications or undergo retraining. The number of applicants acquiring vocational education or further education is higher than that of those pursuing higher education. In Ukraine, the situation is completely opposite – the number of students pursuing higher education is twice as high as those studying in vocational education institutions and in grades 10–11 of high school with career-oriented programs (Fig. 1).

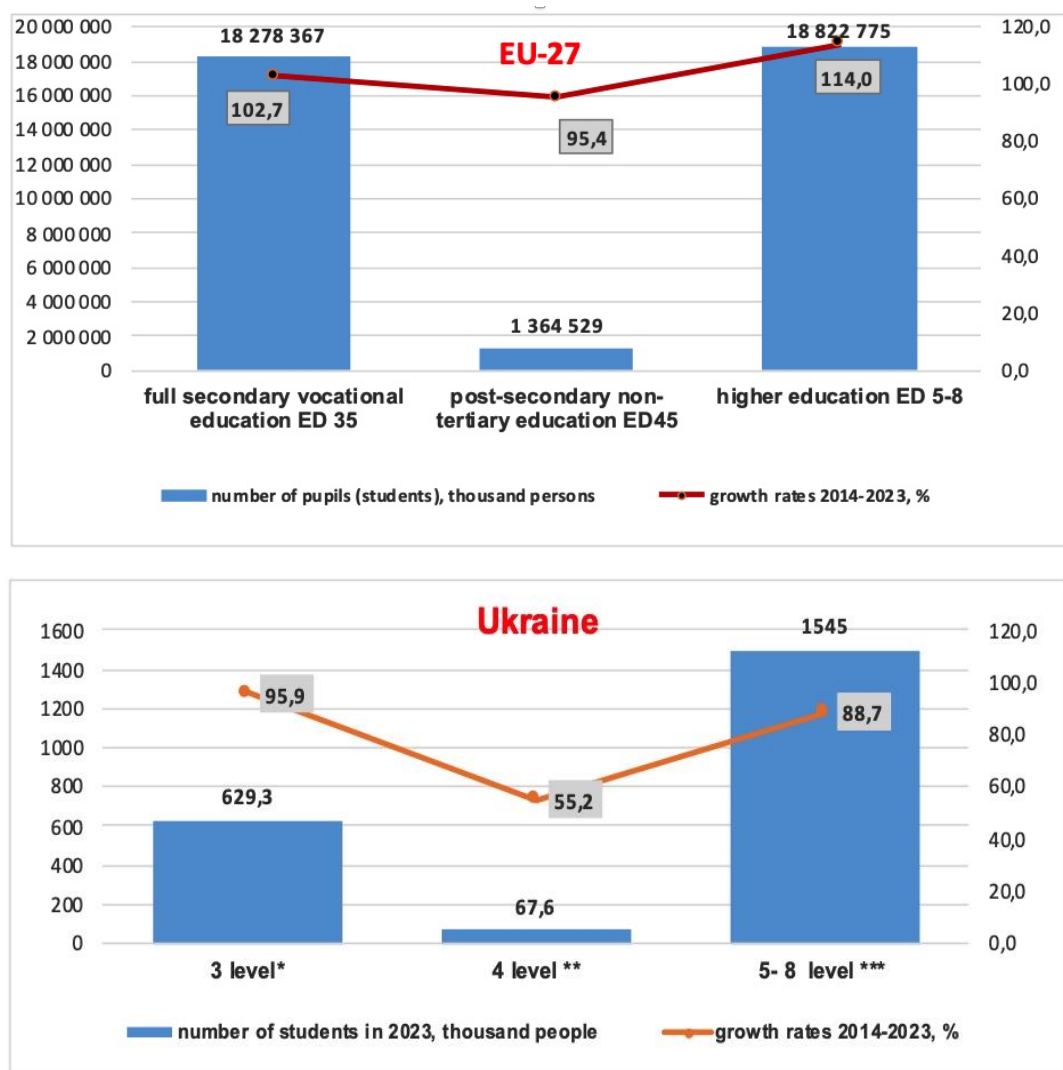


Figure 1. Number of students in the EU countries (27 countries) and Ukraine by education levels in 2023 and student growth rates in 2014–2023

*3 level (students of grades 10–11 (12) of general secondary education institutions, students (trainees) of vocational education institutions who are pursuing complete general secondary education)

**level 4 (students (trainees) of vocational education institutions who are pursuing vocational education)

*** (students of professional higher education, bachelor's, master's degrees)

Source: compiled by the author.

Moreover, in Ukraine, unlike the EU, the number of pupils/students is decreasing in all areas, and the greatest decline is observed among those who pursue vocational education. Among the main reasons are war, migration, and stereotypes undervaluing vocational education.

The organizational mechanism for ensuring the development of vocational education is understood as a set of institutions, tools, methods and management procedures aimed at the effective functioning and modernization of the vocational education system in accordance with the demands of the economy and society [4]. The experience of the implementation of financing mechanisms of vocational education and training (VET) confirms that they are actively developing and becoming increasingly diversified. According to functional purpose, it is reasonable to structure the organizational mechanisms for the development of vocational education and training by the following directions (Table 1).

Table 1. Mechanisms for organizational support of vocational education

| <i>Mechanism by functional purpose</i> | <i>Mechanism components</i> |
|---|---|
| Management mechanisms | European Centre for the Development of Vocational Education and Training CEDEFOP, state and regional planning of vocational education development; licensing, accreditation of educational programs; development of vocational education standards; coordination with the employment sector |
| Human resource support mechanisms | Professional development of teaching staff; internships for teachers; incentive programs for teaching staff |
| Financing mechanisms | State funding, funding from local budgets; grants, donor assistance; public-private partnership; educational vouchers |
| Social partnership mechanisms | Dual education; supervisory boards of vocational education institutions; partnership agreements with business; participation of employers in shaping the education content |
| Mechanisms of innovative development | Creation of centers of professional excellence (CoVEs), digitalization of the educational process; development of STEM education; integration of green skills into educational programs; creation of educational hubs |
| Mechanisms of educational quality assurance | National (NQF) and sectoral qualifications frameworks (SQF); external assessment of learning outcomes; European Qualifications Framework (EQF) |

Source: compiled by the author.

Let us consider the most valuable of them from the perspective of the potential for implementing experience for the development of the VET sector in Ukraine. Perhaps the most successful organizational mechanism for vocational education is dual education, the main task of which is to bridge the gap between theory and practice. Dual education enables graduates to become specialists who are completely adapted to the specific needs of a particular enterprise. It is well developed in most European countries, and Germany is recognized as a leader in the implementation of dual education, where the students can be enrolled in 40 thousand dual education programs and trained in more than 350 specialties. In the countries that have dual vocational education system, graduates from vocational institutions have significantly higher employment rate compared to those ones where such system is less developed. In particular, within three years of completing vocational education, 80.5% of graduates in Germany, 85.8% in Austria, 85.1% in Denmark, and 83.3% in Switzerland are employed (see Fig. 2). At the same time, it should be noted that countries with well-developed dual education system have more competitive economies.

In Ukraine, the possibilities of implementing the dual education mechanism are limited by the following problems: weak partnership between educational institutions and enterprises; insufficient state support and incentives for enterprises; reluctance or inability of enterprises due to the large financial burden – student salaries, equipment, mentors; lack of clear operational mechanisms for dual education, although dual education is legally enshrined in the Law of Ukraine «On Education» and the Law of Ukraine «On Vocational Education» [7]; and the preference of employers for alternative arrangements, such as short-term internships.

Centers of Vocational Excellence (CoVEs) in the EU are an important element of the innovation ecosystem, supporting the smart specialization of European regions. They serve as a tool of public-private partnership and function as hubs that combine business, education, and science. Modern teaching methods, dual education, digital technologies are implemented here, new skills are formed in the context of the green and digital transition. The innovative areas of European centers of professional excellence are green energy and climate technologies, artificial intelligence and digital skills, industry 4.0, biotechnology and healthcare, and creative industries. The centers have mixed public-private funding. Business provides modern equipment or access to production facilities, defines competencies according to labour market needs, and offers internships for learners. Public funding is provided by national budgets, EU programs, and European Investment Bank loans.

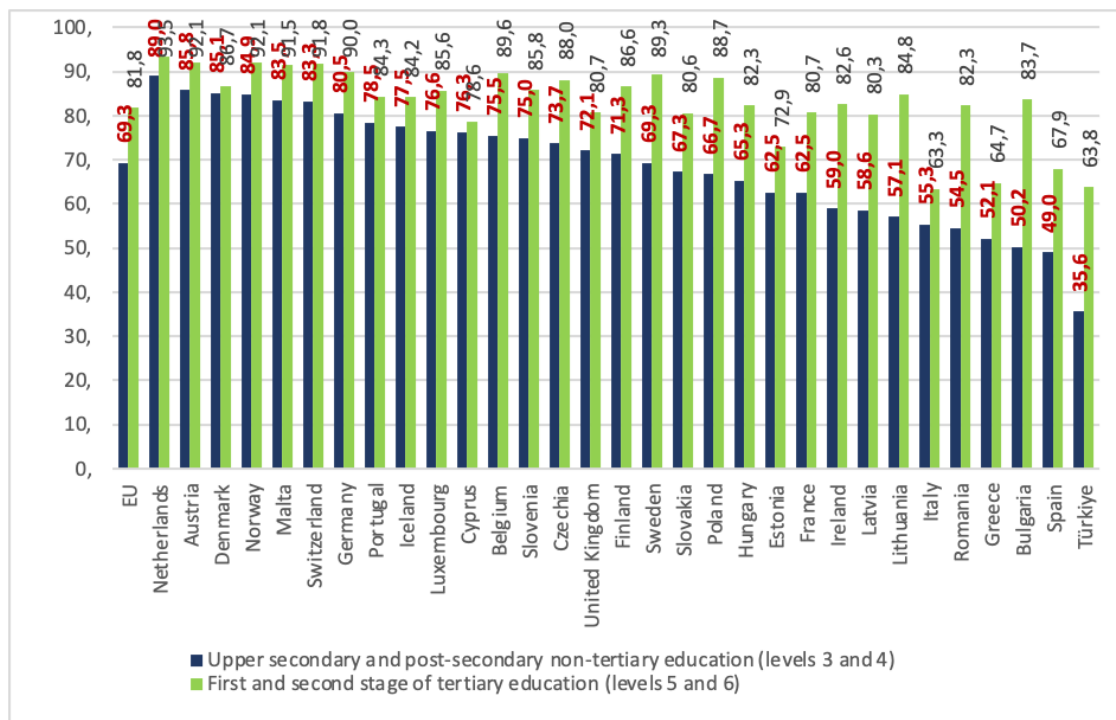


Figure 3. Employment rate within three years after completing formal education, by education level, EU countries, 2024

Source: compiled by the author.

CoVEs are created not only at the level of individual countries, but also as transnational platforms for the exchange of experience and practices. Examples of such platforms are EPLUG (European Platform for Urban Greening), which include Denmark, the Czech Republic, the Netherlands, Finland, Spain, and Romania. The aim of the platform is sustainable development of urban space and climate adaptation. It is implemented by developing new curricula and teaching methods for urban greening; exchange of practices between countries; creation of Centers of Professional Excellence. Another example is ALLVIEW – Alliance of Centres of Vocational Excellence in the Furniture and Wood Sector (Belgium, Germany, Poland, Italy, the Netherlands, France, Slovenia), which was created for the furniture and wood-processing industry and is aimed at the development of professional skills by means of digital technologies, circular economy, and the creation of skills assessment methodology [8].

Ukrainian Centers of Excellence have been established since 2016 and are gradually transforming from renovated vocational schools to innovation hubs. The first steps included the decentralization of vocational education management and the creation of regional hubs based on the strongest vocational education institutions. During 2019–2023, with the support of the EU, Germany, Finland, Poland, and Estonia, the programme «EU4Skills: Better Skills for Modern Ukraine» was implemented in pilot regions (Lviv, Rivne, Chernivtsi, Vinnytsia, Poltava, Zaporizhzhia, and Mykolaiv regions). Among the objectives of the Program are such as: to increase the effectiveness of the reform and improve the quality and attractiveness of vocational education and training, and its compliance with labour market requirements, as well as to modernize infrastructure and equipment in selected educational institutions. The completed tasks include the renovation of vocational education institutions and the establishment of supervisory boards at vocational education institutions. The government project «100 Workshops» is being implemented in 2024–2025. The project was created and

implemented due to the European Union's financial support program for Ukraine, the Ukraine Facility Plan. Its aim is to upgrade the workshops of vocational education institutions. The European Executive Agency for Education and Culture (EACEA) is funding the establishment of 64 Centres of Vocational Education Excellence in Ukraine, 16 of which started their activities in March 2025. The project is aimed at improving the level of vocational education in new high-tech sectors with significant innovation potential, such as the maritime and port industry, as well as air mobility (drones and small aircraft), and in traditionally important economic sectors, including the automotive industry and welding, construction and housing services, agriculture, manufacturing, hydrogen energy, and smart energy systems. Some initiatives implement a cross-sectoral approach, focusing on the dual transition (digital and green) [9].

Digital transformation of society requires new skills from students, teachers, and instructors of vocational education institutions, and also enables the implementation of new learning formats in vocational and technical schools.

There is a growing role of online education, which is more flexible and requires digital skills. Both online and offline education markets have their advantages. Online education enables people who are employed, have families, or live in remote locations to study. At the same time, offline education cannot always be replaced by distance learning. For such vocational skills as welding, electrical installation works, and other manual works, the presence of students and the availability of modern vocational education centers are essential. It is obvious that in the future a hybrid model of vocational education will be maintained. It will be delivered in traditional vocational education institutions and distributed due to online platforms.

At present, there is a large number of companies and online platforms that provide technical training, in particular, the online platforms Coursera for Business and Udemy for Business offer training for specialists in various industries, Mind Tools for Business and FutureLearn strive to make education accessible in the form of short courses, mobile learning or employer-sponsored programs, Absorb LMS, EdX and Simplilearn conduct pilot tests of skill-developed tools with personalized learning pathway [10]. Dynamic development of science and new technologies will contribute to the transformation of online platforms that will offer new courses in accordance with the demands of the economy and labour market. With the increasing implementation of digital platforms, automation, and artificial intelligence in industry, the demand for workers capable to support, manage, and maintaining these systems will rise. Additionally, the use of virtual reality and simulation tools in teaching will improve the learning process by making it more interactive and effective, thereby increasing engagement and outcomes. Due to continuous innovation and broader adoption, the global vocational education and training market will become a central component of how the world prepares its workers for the future. In the future, the global market of vocational education and training will become more personalized and accessible. Online platforms, virtual simulations, and interactive modules will play an increasingly important role in how students acquire skills. These changes will enable students to study at their own pace, from almost any location worldwide. The combination of in-person and online learning will open opportunities for more people to succeed in specialties that previously required physical presence [10].

In addition to digitalization and automation trends, the EU labour market is shaped by «green transition». Such trends pose a challenge to the development of vocational education. Although many vocational education institutions integrate «green» skills into curricula and training programs, the main problem is limited opportunities for acquiring skills in the workplace, as the demand for qualified workers with «green» skills is growing faster than the pace at which vocational education is changing and training and practical centers are being created.

Conclusions. The transformation of domestic vocational education is taking place in accordance with modern trends in economic development, new labour market requirements, and the integration of domestic vocational education into the European educational and scientific space. The source of innovative experience for Ukraine is European organizational mechanisms for ensuring the development of vocational education. Domestic vocational education is in the state of reforms and with the partnership support of the EU, many organizational mechanisms and tools for the development of vocational education are being implemented in Ukraine, in particular, the creation of centers of professional excellence, the creation of supervisory boards on the basis of public-private partnership, digitalization and green transition, etc.

At the same time, the dual education mechanism is difficult for implementation due to the lack of state support and incentives for enterprises; the reluctance or inability of enterprises due to the large financial burden (student salaries, equipment, mentors); the lack of clear mechanisms for implementing dual education despite its legislative consolidation in the new Law of Ukraine «On Vocational Education».

The EU supports the development of Centers of Professional Excellence (CoVEs) as a tool for integrating education, business and innovation. It is important to create regional centers of vocational excellence in communities with industrial potential, especially in regions devastated by war. Locally-focused approach will enable VET to be adapted to the needs of specific territories and will contribute to economic recovery.

In the coming years, the labour market will be shaped by two trends: digitalization and the «green» economy, which requires changing the directions of training directions and implementation of new educational programs by vocational education institutions as well as the use of tools such as online platforms, virtual simulations, interactive modules in learning and skills development. This requires flexibility, financial support, and advanced training of teachers.

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