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## ECONOMIC AND SOCIAL EFFICIENCY OF JOINT INTER-UNIVERSITY PROGRAMS

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**Abstract.** This article examines the development of higher education programs, with a particular focus on the structure, design, and implementation of joint inter-university initiatives. It addresses key issues concerning the education of future specialists in engineering and technical fields, emphasizing the essential skills, knowledge, and competencies required for success in an ever-evolving job market. The article argues that joint programs are crucial from both social and economic perspectives, as they enhance educational access, foster innovation, and contribute to the creation of a more adaptable and skilled workforce. Additionally, the analysis explores the challenges and opportunities associated with interinstitutional collaborations, such as curriculum alignment, resource sharing, and quality assurance. By doing so, it aims to offer insights into the strategic value and impact of joint inter-university programs in engineering education and their broader implications.

**Keywords:** *higher education, joint programs, education for the labor market.*

**JEL code:** *M11*

### INTRODUCTION

Engineering plays a crucial role in the industrial development of a country by providing the technical expertise needed to design, build, and improve infrastructure, machinery, and production systems. Engineers drive innovation by developing new technologies and processes that increase efficiency, productivity, and sustainability within industries. Their work is central to the creation of advanced manufacturing methods, which are essential for maintaining competitiveness in the global market. Through research and development, engineers contribute to the growth of high-tech industries, which are key drivers of economic growth and job creation. Overall, engineering supports industrial development by enhancing the quality of products, optimizing resource use, and fostering economic diversification and resilience.

One of the the main industrial sectors in the Republic of Moldova are the automotive industry, special the wiring industry. These sectors have attracted significant foreign investment and are considered key pillars of industrial development in the country, contributing to job creation and exports. The DRÄXLMAIER Group, one of the largest European companies, has starts to invest in three Moldovan companies: in Balți in 2007, in Cahul in 2018, and in Chișinau in 2020. While the company employed around 600 people in 2007, the number has now grown to approximately 3,100 employees. The automotive industry continues to develop, with the company increasingly relying on engineering skills and advanced knowledge. A key question is whether the country has a sufficient number of well-trained engineers to support the growth and development of its industrial sectors, particularly in fields like automotive manufacturing and wiring.

The availability of skilled engineers is essential for driving technological innovation, optimizing production processes, and ensuring the competitiveness of industries on a global scale, especially in an Engineering 4.0. To answer this, we need to examine the available data, which can provide valuable insights into the current state of engineering education, student enrolments, and graduation rates in relevant fields. By analysing trends over recent years, we can assess whether the country is producing enough qualified engineers to meet the demands of its expanding industrial base. Let's delve into the data presented in the table to better understand the situation and identify any potential gaps in the supply of skilled engineering professionals.

**Table 1. Dynamics of the number of students, 2022-2024**

Indicators	2019/2020	2020/2021	2021/2022	2022/2023	2023/2024
Total number of students in public institutions*	47745	49549	50197	47942	47149
Number of students enrolled in public institution	19413	21514	20598	18250	19731
Inclusive: Engineering and engineering activities, pers.	1316	1289	1225	1112	1099
inclusive Engineering and engineering activities, %	6,7	6,0	5,9	6,0	5,6
Total number of graduates	16266	14650	14084	13847	13882
inclusive Engineering and engineering activities, pers.	1172	1012	895	820	720
inclusive Engineering and engineering activities, %	7,2	6,9	6,3	5,9	5,2

\*Note: Private universities do not typically prepare students for careers in engineering.

Source: Developed by the author based on information:

[https://statistica.gov.md/files/files/publicatii\\_electronice/Educatia/Educatia\\_editia\\_2021-2024.pdf](https://statistica.gov.md/files/files/publicatii_electronice/Educatia/Educatia_editia_2021-2024.pdf)

The data presented in the table shows a trend of decline in both student enrolment and graduation in public institutions, particularly in the engineering and engineering-related fields, over the period from 2019/2020 to 2023/2024. The total number of students in public institutions has gradually decreased, from 47,745 in 2019/2020 to 47,149 in 2023/2024. Similarly, the number of students enrolled in these institutions saw fluctuations, rising to 21,514 in 2020/2021 but dropping to 18,250 in 2022/2023, before slightly increasing again to 19,731 in 2023/2024.

Focusing on engineering and engineering-related fields, the number of students enrolled in these programs has also declined steadily, from 1,316 in 2019/2020 to 1,099 in 2023/2024. This reduction represents a shrinking proportion of the total student population, from 6.7% in 2019/2020 to 5.6% in 2023/2024. Correspondingly, the total number of graduates has also decreased, from 16,266 in 2019/2020 to 13,882 in 2023/2024, with the sharpest decline occurring between 2020/2021 and 2022/2023. The number of graduates in engineering and engineering-related fields followed a similar downward trend, from 1,172 in 2019/2020 to 720 in 2023/2024. As a result, the percentage of graduates in engineering has dropped from 7.2% in 2019/2020 to 5.2% in 2023/2024. This overall decline in both enrolment and graduation rates in engineering suggests a reduction in interest or opportunities within this field in the public education system over the observed period.

Therefore, we can conclude that, the data shows a declining trend in both the number of students enrolling in public institutions and those graduating in engineering fields, suggesting a reduction in the focus on or interest in engineering education within public institutions over the observed period.

To effectively meet the needs of companies in the industrial sector, particularly in mechanical engineering, it is crucial to produce a sufficient number of highly trained specialists, especially those with master's degrees. While the question arises whether 20 or 25 students per year is enough to supply this demand, we can estimate that if three institutions are training specialists in this field, the total number of graduates annually would be approximately 75 students (25 students per institution x 3 institutions). However, this number may either fall short or be adequate depending on the actual growth and complexity of the industry's needs. To ensure a consistent and high-quality supply of skilled professionals, establishing a joint program between these institutions could offer a practical solution. A collaborative program could help optimize the number of graduates while enhancing the quality of education, ultimately addressing the growing demand for mechanical engineers. Such an initiative would better align the educational system with the evolving requirements of the industrial sector, ensuring that the workforce is both highly qualified and sufficiently large to meet future challenges.

## **ERASMUS+ PROJECT "ENHANCING MECHANICAL ENGINEERING EDUCATION IN MOLDOVA FOR INDUSTRY 4.0 NEEDEDU4.0**

To address these challenges, the Technical University of Moldova launched an Erasmus+ project, that was financed by the EU in the beginning of 2024. The primary goal of the project is to accelerate the transition to Education 4.0 within Moldovan higher education institutions, ultimately improving the employability of university graduates, especially in the mechanical industry.

The project has several specific objectives:

- Developing and implementing a new joint inter-university master's program in mechanical engineering, with a special emphasis on Industry 4.0, across three institutions in Moldova.
- Strengthening the capacities of higher education institutions in Moldova by implementing innovative teaching and learning methods.
- Creating teaching materials for at least 18 courses within this program.
- Equipping three virtual laboratories to support hands-on, technology-driven learning.
- Establishing long-term cooperation with European Union partners and non-academic partners to support and sustain these initiatives.

This initiative aims to modernize Moldovan higher education, aligning it with European standards and preparing students with the skills needed for the evolving job market.

The Moldovan partners in this project include three universities: the Technical University of Moldova, "Alec Russo" State University of Bălți, and "Bogdan Petriceicu Hasdeu" State University of Cahul. From the European Union, the key partners are the DRÄXLMAIER Group, RWTH Aachen University in Germany, and Transilvania University of Braşov in Romania.

In addition, the project has several associate partners that provide valuable support and expertise: DRÄXLMAIER Group Moldova, the Ministry of Education and Research of the Republic of Moldova, the National Agency for Quality Assurance in Education and Research (ANACEC), and the Chamber of Commerce and Industry (CCI). Together, these partners bring a strong network of academic, industrial, and governmental resources to achieve the project's goals.

The project outlines several activities planned for implementation from 2024 to 2026. To achieve these goals, a consortium has been formed, consisting of the three Moldovan universities mentioned. This consortium is responsible for the following tasks to ensure the project's success:

- Developing the program curriculum, along with curriculum support materials and a methodological guide.
- Preparing a self-evaluation report to obtain provisional authorization for the program.
- Establishing an inter-university team to design and deliver course units for the program.
- Promoting the program within Moldova's vocational education and training (VET) system.
- Coordinating efforts to build essential skills in vocational pedagogy, providing a strong foundation for future VET teachers and their career-related activities.
- Delivering high-quality education within the program by integrating education, research, and innovation, fostering a knowledge-based, sustainable society and nurturing students' creative and critical thinking.
- Enhancing the career prospects of potential managers in TVET institutions by cultivating leadership and management skills.
- Offering guidance and support to departments responsible for the continuous professional development at partner universities to facilitate the program's implementation.
- Pursuing any additional objectives aligned with the project consortium's mission.

The proposed joint interuniversity master program presents both a challenge and a valuable opportunity for the three Moldovan universities as well as for the Moldovan industry. What outcomes and benefits can be expected from this opportunity, and how might such an inter-university program positively impact both higher education and industry in R. Moldova? What specific advantages could arise from combining the strengths and expertise of multiple universities? Additionally, how might this collaborative approach better prepare graduates for the workforce, enhance industry-relevant

skills, and support Moldova's goals for economic and industrial development? Could this program also foster stronger connections between academia and industry, creating pathways for innovation, research, and job creation? Finally, what role might this program play in elevating R. Moldova's educational standards and its international competitiveness in engineering and technology fields?

### **THE MAIN BENEFITS IN THE FIELD OF AWARDING JOINT DEGREES**

Achieving the goal of training in the engineering field requires rethinking study programs at all university levels by exploring the needs of the social and economic environment, by consulting all members of the educational and business sectors. University study programs, both for bachelor's and master's degrees, must be developed taking into account the economic and social requirements of the environment.

The main benefits of awarding joint degrees include fostering strong academic partnerships, enhancing the quality and credibility of educational programs, increasing international recognition and comparability of qualifications, simplifying administrative processes, and creating a more cohesive and enriched learning experience for students across partner institutions.

Awarding inter-university joint degrees demonstrates a strong commitment to collaboration and fosters a deeper sense of community among partner institutions. This approach promotes a unified educational framework and a shared vision for a more integrated student learning experience. Such partnerships enhance program credibility, increase the likelihood of securing funding, and contribute to higher quality educational offerings. Joint degrees also enhance readability and comparability, as they are structured to be easily understood and recognized by the educational system and various universities.

By streamlining administrative procedures, the process of awarding joint degrees reduces redundancy and complexity, thus improving the efficiency of managing academic programs across multiple institutions. Moreover, joint degrees serve as both a practical and symbolic instrument for fostering deeper academic cooperation. Practically, they bring institutions together to develop cohesive curricula, align academic standards, and ensure that students receive an integrated education across partner schools. This collaboration is beneficial for students, who experience a seamless academic journey rather than navigating the requirements of separate institutions.

Symbolically, joint degrees signify a strong partnership and shared commitment to academic excellence, underscoring a unified approach to education across the system. They represent the collective credibility and standards of all institutions involved, making the diploma itself evidence of collaborative educational input.

Moreover, joint degrees streamline the administrative and credentialing processes. With shared procedures and a single diploma, students and institutions alike avoid redundant paperwork and bureaucratic complexities, simplifying degree recognition and enhancing the degree's portability internationally. This makes joint degrees highly valuable for students seeking opportunities in diverse regions and industries, as their qualifications are more easily understood and accepted across different educational and employment landscapes.

Awarding joint degrees offers increased transparency and clarity for employers, making it easier for them to recognize and understand the qualifications of potential employees. By standardizing and consolidating the academic credentials awarded by multiple institutions, joint degrees provide a single, clear representation of a graduate's skills and experiences. This facilitates smoother recognition in the labor market, as employers can confidently assess the education and competencies gained through such programs.

Joint degrees improve the alignment between the degree and the real-world experiences of students. Since joint degree programs are often interdisciplinary and involve multiple institutions, they provide students with a broader range of perspectives, skills, and knowledge that are highly valuable in the workplace. This comprehensive experience is reflected in a joint degree, giving employers insight into the diverse learning environments and collaborative skills that students developed throughout their studies.

Joint degrees serve as a reliable indicator of a graduate's adaptability, cultural awareness, and ability to work within varied academic and professional contexts—qualities that are increasingly



valued in the global job market. For employers, the transparency and clarity of a joint degree streamline hiring processes, reducing ambiguity and ensuring that graduates are well-prepared for roles that demand a combination of expertise, versatility, and cross-cultural understanding.

### CONCLUSIONS

Achieving these opportunities in the R. Moldova will require active commitment not only from the universities involved in the NEEDEDU4.0 Erasmus+ project but also from the MECRM and business partners. This means that universities will need to invest in curriculum development, faculty training, and program promotion, while the MECRM must provide policy support, regulatory assistance, and potentially funding. Business partners also play a critical role by offering industry insights, practical training opportunities, and potentially hiring program graduates. Only through the collaborative efforts of all these stakeholders can the program succeed in aligning education with industry needs and fostering Moldova's economic and industrial growth.

Joint programs offer all parties a good sense of security: the few universities involved go through an intense administrative control and decision-making procedure and can be sure that everyone involved in the program will facilitate employment. Students know exactly what they want and do not have to go through the sometimes very difficult process to find the job. In other words, collaborative academic programs strengthen relationships between universities and serve as a powerful marketing tool to attract new students.

These collaborative programs will result in higher-quality, more attractive educational offerings, facilitate resource efficiency, strengthen program credibility, improve funding prospects, and support broader national recognition and standardization. Joint inter-university programs serve three main purposes: academic, economic and social.

In the academic field, they improve the quality of teaching and learning, promote academic excellence and develop interpersonal competences and awareness. In economic terms, joint degrees respond to the demand for knowledge-based economies, while in social terms, they foster collaboration and cooperation. These programs can boost economic development and increase social cohesion. In addition, joint inter-university degrees promote increased social mobility, as well as promoting self-reliance and personal growth. Although this list is not complete, such an approach is inevitable in today's conditions of student numbers and the demand for graduates by businesses.

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