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Technological innovations and their impact on higher economic skills and studies: realities and perspectives

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Abstract
Lately, innovation has become an inevitable notion in all fields of activity, innovation based on technology,on products, on processes, innovation in the behavioural approach. The beneficial effects of innovation areundeniable, but few studies have investigated this phenomenon, particularly in terms of the skills it requires,the labour market, how it will affect economic specialities and the number of specialists in this field. The aim of this article is to study the effect of innovation on the training of economic specialists and theskills required. How the structure of specialisations will change, the number of specialists needed on thelabour market will change, as a result of digitisation and IT-based business models.
Research methods: comparative analysis of the skills required by employers compared to those currentlyprovided, deduction of future needs in relation to future professions, modelling of the scenario of existenceof future universities.
As a result of the research we propose to identify the future specialties with an economic profile as a resultof the application of information technologies with an economic profile, the required competences, the mosteffective study/learning methods, the determination of the university/economic studies in the future.

Keywords: innovation, skills, educational system, digitalization, economic specialties.

Classification JEL: 033, F01,F44

Introduction. Rapid developments in science and technology are having an impact on every aspect of economic activity. The use of modern technologies impacts on a variety of business activities, helps to overcome various production, financial, geographical barriers, etc. The years 2020-2023 continue the digital evolution with high-performance technologies capable of revolutionizing society globally.
According to the Worldwide Digital Transformation 2022 Predictions by the International Data Corporation (IDC), global spending on digital transformation in 2022 is expected to reach $1.8 trillion (17.6% more than in 2021). Given these figures, predictions for 2023 and beyond confirm an increase in investment in digital transformation technologies: "Already in 2023, 90% of organizations worldwide will prioritize investments in digital tools to augment physical spaces and assets with digital experiences." - as IDC highlighted at the annual IDC Future Scape meeting.
According to McKinsey about 60% of activities can be partially automated while less than 5% can be fully automated. Although Forrester Research estimates that RPA automation will threaten the livelihoods of about 9% of the global workforce, RPA is also creating new jobs, including changing existing ones.
The main benefit of RPA is automating repetitive tasks that people did before, allowing them to focus on more creative and productive tasks. In addition, it saves costs, increases profitability, reduces time spent on time-consuming tasks and has a lower probability of error.

In connection with these trends, the training process for specialists is also undergoing major changes. The literature survey in this field identifies several works in the field of curriculum and generalized skills, and the topics we want to address

I.Findings of the situation to date: At the moment the training process of specialists are focused on the curriculum, not on the mode of training, competences and skills needed. Often universities have a multi-level approval process, which takes time, and market requirements change rapidly.
Under these conditions, there is a gap between the skills offered by educational institutions and the needs of the labour market, slow and difficult procedure of rapid innovation.
In the given study, we actually wanted to identify how things stand at the moment in the training of specialists in economic sciences. We started by identifying the universities that train specialists in this field, because logically they are the ones who actually innovate the most in this field.

Table N1. Ranking of Universities in Social Sciences and Management in Europe

Name of university	Place in world ranking	Place in European ranking	Accumulated points
University of Oxford	2	1	93,5
The London School of Economics and Political Science (LSE)	5	2	91,9
University of Cambridge	6	3	91,7
Bocconi University	14	4	84,1
UCL	21	5	81,8
London Business School	23	6	81,0
University of Amsterdam	29	7	80,2
INSEAD,France	31	8	79,9
The University of Manchester	32	9	79,8
The University of Warwick	40	10	78,5

Elaborat: de autor în baza QS world University ranking by subject 2023

Based on this ranking, we analyzed the economics degree programmes offered by these top universities at bachelor and master level to see how the economics majors actually correspond to market requirements?
In fact, we have identified more recent, innovative degree programmes that in our view would meet the needs of the contemporary labour market.

Table No.2 Undergraduate and Master's programmes at leading European universities

University name	Innovative programmes at Bachelor's level	Innovative programmes at Master's level

University of Oxford	BSc Economics and Management	Artificial Intelligence for Business Strategy and Innovation MSc Global Healthcare Leadership
The London School of Economics and Political Science (LSE)	BSc Data Science , 2024 BSc Matematics Statistics and Business, 2024 BSc Actuarial Science BSc Matematics and Data Science	MSc Statistics (Social Statistics, Financial Statistics) MSc Quantitative Method and Risc Managment MSc Finance and Private Equity MSc Management of Information Systems and Digital Innovation MSc Global Health Policy
University of Cambridge	BSc Economics	Msc Land Economy MSc Economics MSc Matematics
Bocconi University	BSc Mathematical and Computing Sciences for Artificial Intelligence BSc Economics, Management and Computer Science	Economics and Management of Innovation and Technology Data Science and Business Analytics Cyber Risk Strategy and Governance Artificial Intelligence Transformative Sustainability
UCL London	-	Prosperity, Innovation and Entrepreneurship MSc Global Prosperity MSc Health in Urban Development MSc
London Business School	-	Master in Finance and Investment Masters in Analytics and Management Global Masters in Management
University of Amsterdam	BSc Econometrics and Data Science BSc Actuarial Science	Business Data Science Entrepreneurship and Innovation Quantitative Finance Big data in Finance) Digital Marketing Digital Management
INSEAD,France	-	Digital Transformation & Innovation
The University of Manchester	Traditional economic specialisations	MSc Data Science (Business and Management) MSc Development Finance MSc Digital Marketing MSc Digital Management MSc Healt Data Science

		MSc Matemathical Finance
The University of Warwick	BSc Economics and Data Science	MSc Data Analytics MSc E-Business Management MSc Engineering Business Management

Source: Prepared by the author based on the web of the universities concerned 2023

From this information we can conclude that already a large number of universities are putting more emphasis on training specialists in: data science, big data, digital marketing, management, etc.

We wanted to see how other educational institutions in the Republic of Moldova and Romania are aligned in this field, economic sciences.

Namely we looked at 3 universities: ASE Bucharest, ASE Moldova Chisinau, FSEGA University Babes Bolay (UBB) Cluj, leading universities in training specialists in economics.

Table N 3. Innovative bachelor/master degree programs at 3 universities of economic profile Romania, Republic of Moldova

University name	Innovative programmes at Bachelor's level	Innovative programmes at Master's level
ASE Bucharest	Traditional specialisation	Digital business and innovation (in French) Business intelligence (in English) Applied statistics and data science E-Business Accounting, Audit and Management Informatics (in English) Management of rural and regional development projects Online marketing
UBB , FSEGA	Business Information Systems	Decision Support Systems for Business* Digital Marketing* Marketing and Business Communication* Projects Management and Valuation* Business Modeling and Distributed Computing*
ASEM Republic of Moldova	Traditional economic specialisations	Actuarial science and business risk Digital Business Management Accounting and related electronic services Information Management

Source: Elaborated by the author based on web info of ASE, UBB,ASEM

II.Analysis of labour market requirements.

In order to see if what is being prepared matches the needs of the market, we also selected the basic needs identified in the labour market, of employers. In this respect we have analysed at several companies what skills are emphasised by employers. From the advertisements placed by 20 employers in the Republic of Moldova, mainly innovative companies, the most requested positions are: 1. Project manager, 2. Marketing specialist, 3. Social media marketing specialist 4. Search engine optimization (SEO) specialist, 5. Online advertising (PPC) specialist, 6. Customer relationship management (CRM) specialist, 7. Software developer 8. Cybersecurity Specialist, 9. Facebook ADS Specialist, 10. DevOp Engineer.

From these most sought-after job positions, we have selected for a more detailed description the specialists who usually train economic institutions. Project Manager position. Skills required being: 1. Planning and organisation: ability to develop and implement project plans, organise resources and manage time and budget effectively. 2. Leadership skills: ability to motivate and guide the project team, delegate tasks and make wise decisions. 3. Effective communication: ability to communicate clearly and concisely with team members, clients and other stakeholders, listen and resolve conflicts in a constructive manner. 4. Risk management: ability to identify and assess risks, develop mitigation plans and effectively manage project changes and challenges. 5. Results orientation: the ability to pursue objectives and achieve desired results, monitor and evaluate project performance.

From Digital Marketing Specialist Highly sought after skills required being: 1. Digital knowledge: familiarity with the online environment, digital platforms and trends in digital marketing. 2. Digital marketing strategies: ability to develop and implement effective online marketing strategies including SEO, PPC, social media marketing, content marketing and others. 3. Data analysis and interpretation: ability to analyze marketing data and Interpret results to evaluate campaign performance and make adjustments accordingly 4. Creativity and quality content: ability to create relevant and engaging content for different digital channels such as blogs, websites, social media and email.

5. Project management and prioritization: ability to organize and manage multiple projects, meet deadlines and prioritize tasks based on marketing goals.

Social Media Marketing Specialist Required skills being: 1. Knowledge of social media platforms: familiarity with major social media platforms such as Facebook, Instagram, Twitter, LinkedIn and others, as well as understanding their functionalities and algorithms. 2. Content strategies: ability to develop and implement effective content strategies to attract and engage audiences on social media platforms 3. Data analysis and monitoring: ability to analyze metrics and monitor performance of social media campaigns to evaluate results and make adjustments to improve results 4. Communication and writing skills: excellent written communication skills and the ability to create engaging and relevant content for various social media platforms. 5. Community and customer relationship management: ability to manage and interact with online communities, respond to comments and questions, and build strong relationships with customers through social media platforms.

Search Engine Optimization (SEO) Specialist Skills required being: 1. SEO knowledge: understanding of SEO principles and practices, including on-page and off-page optimization, keyword research and link building strategies. 2. Analysis and monitoring: the ability to use analytical tools and techniques to evaluate SEO performance, identify opportunities for improvement and track progress. 3. Technical knowledge: understanding technical aspects of SEO such as site structure, loading speed, mobile optimization and markup scheme. 4. Content skills: skills in creating and optimising content for search engines, including the use of relevant keywords, catchy titles and well-written meta descriptions.

5. Adaptability and continuous learning: the ability to adapt to frequent changes in search engine algorithms and to keep their knowledge up-to-date through continuous learning and following industry trends.

*For Online Advertising Specialist (PPC***)** Required skills being: 1. Knowledge of advertising platforms: familiarity with online advertising platforms such as Google Ads, Facebook Ads, LinkedIn Ads, Twitter Ads and others, as well as an understanding of the functionality and targeting options available. 2. Campaign strategies: ability to develop and implement effective PPC campaign strategies, including choosing relevant keywords, budgeting, bid optimization and performance monitoring 3. Analysis and optimisation: the ability to analyse data and optimise PPC campaigns for performance to achieve better results and higher ROI. 4. Marketing knowledge: understanding of marketing principles and consumer behaviour to create relevant and engaging ads that appeal to the target audience. 5. Analytical and reporting skills: skills in using analytical

and reporting tools to monitor and evaluate campaign performance, and the ability to communicate results and recommendations to clients or stakeholders.

For the Customer Relationship Management (CRM) Specialist, the required skills are: 1. Knowledge of CRM systems: familiarity with the different CRM systems and platforms available and understanding of their functionality and capabilities. 2. Communication skills: the ability to communicate effectively with customers, both written and verbal, and to respond promptly to questions or requests. 3. Data management and analysis: the ability to collect and manage customer data in the CRM system, and to analyse this data to identify trends and opportunities to improve customer relationships. 4. Customer focus: the ability to understand and meet customer needs, provide quality support and assistance, and build long-term customer relationships. 5. Collaboration and coordination: the ability to work with different internal departments, such as sales, marketing or technical support, to ensure a consistent and satisfying customer experience and to resolve customer issues or questions in an efficient manner.

A new specialty being Facebook ADS Specialist The skills required of this specialist are: 1. Advanced knowledge of the Facebook Ads platform: understanding of the specific functionalities and features of the Facebook Ads platform. 2. Targeting strategies: ability to develop effective targeting strategies to reach the right audience in Facebook advertising campaigns. 3. Ad creation and optimization: skills in creating engaging and relevant content for Facebook Ads, as well as the ability to optimize ad performance based on campaign objectives. 4. Data analysis and interpretation: ability to analyze Facebook Ads campaign performance data and interpret results to make adjustments and improvements. 5. Budget and bid management: ability to effectively manage campaign budgets and make smart bidding and spending decisions to achieve optimal results.

At the specialist deficit such as DevOps Engineer Required skills being: 1. Automation and scripting: ability to automate processes and write efficient scripts to facilitate deployment and management of infrastructure and applications 2. Infrastructure management and configuration: strong knowledge of IT infrastructure administration and configuration, including operating systems, servers, networks, and cloud computing services 3. Continuous integration and continuous delivery (CI/CD): experience implementing and managing CI/CD practices to ensure fast and reliable application delivery 4. Incident monitoring and management: ability to monitor and manage infrastructure and applications in real time, identify problems and respond promptly to incidents. 5. Collaboration and effective communication: skills in teamwork, clear communication and effective collaboration with other members of the development and operations team to ensure efficient delivery and stability of systems.

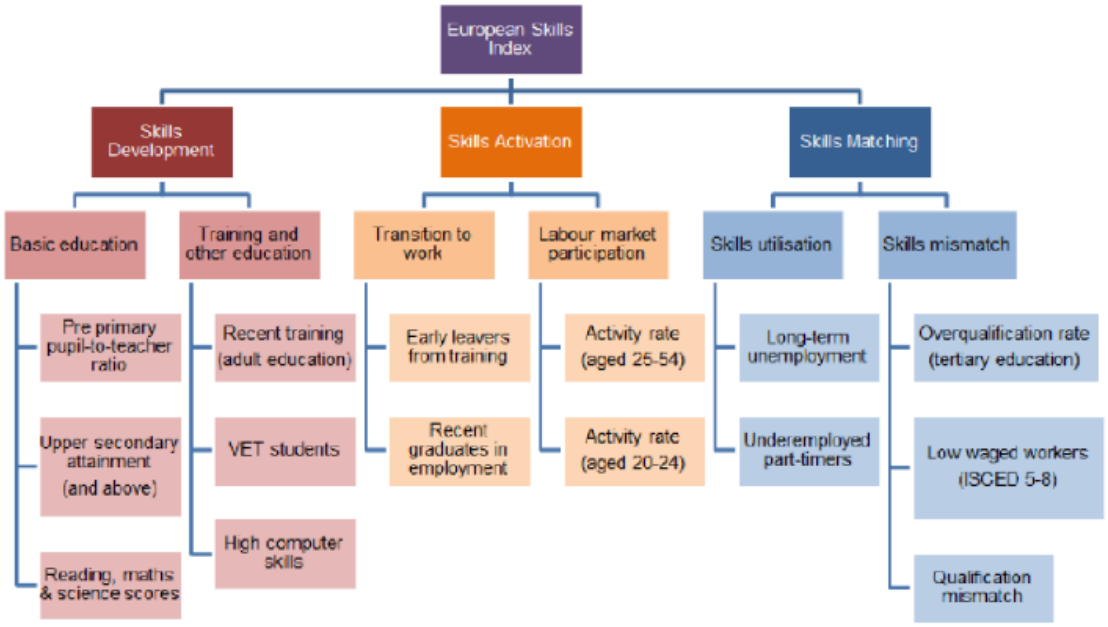
Correlating the offer of studies with the study programs, the curricula they offer, we can say that the educational system of universities prepares in proportion of 70%,of the market needs, unmet being some areas of digital or online marketing, in some cases the curricula do not really correspond to the requirements of skills in the field, more questions however remain at the content level of the programs. As relevant as they are to the labour market, because many of them are presented by older executives, who do not easily adapt to new requirements, and the education system is not attractive to young talent.

Digital capabilities are increasingly important, not only for jobs, but also for social and civic participation in current and future societies. People will not just need basic technical skills but should also be able understand media, be able to search for information, be critical about what is retrieved, and communicate through a variety of digital tools and applications. It is becoming increasingly necessary to rethink the training of economic specialists, as countries are increasingly competing to adapt and use innovative technologies.Many frontier technologies are designed to be used in countries with extensive infrastructure and abundant natural and social resources.

Developing countries will therefore need sufficient technical skills to introduce modifications. Skills can be at four levels of engagement:

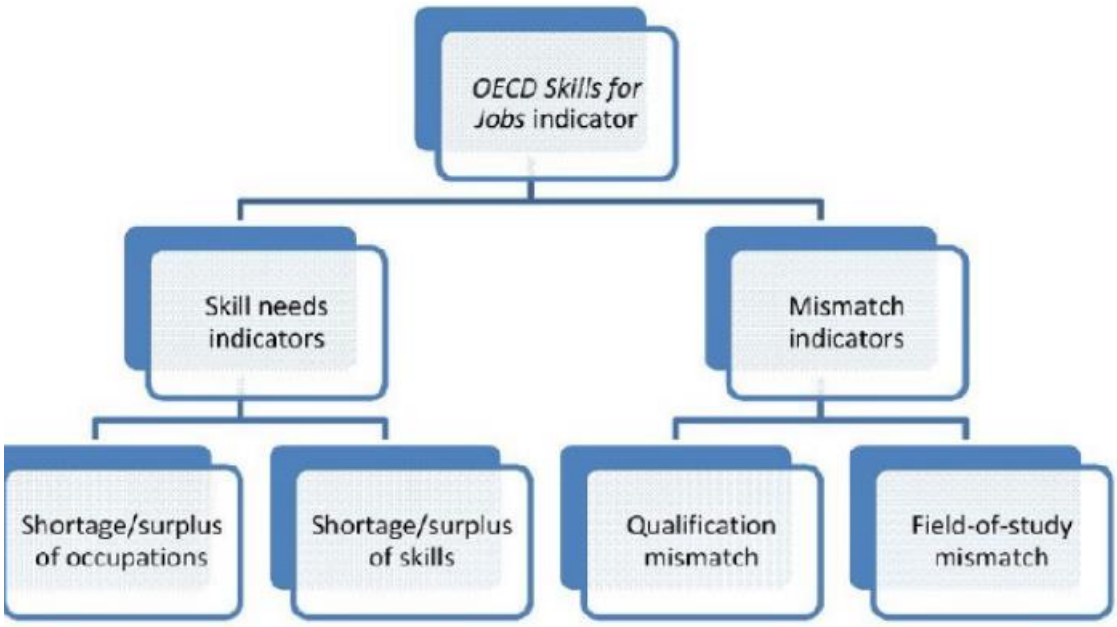
1. Adoption – basic education, literacy and familiarity with technology devices
2. Basic use – understanding of new technologies, knowledge of digital rights, privacy and security, ability to use digital technologies to collaborate and create
3. Creative use and adaptation – basic computing skills and familiarity with algorithms
4. Creation of new technologies – sophisticated programming skills and knowledge of complex algorithms.

Countries where technology development remains in its early stages need basic technical and generic skills. On the other hand, in countries where economic growth is already driven by manufacturing, the workforce must have specialized skills in robotics, automation and the IoT.
In any case, it is critical to recognize that a lot of this learning happens on the job and through interacting with the technology. Building capacity in these skills are part of a broader process to build and strengthen innovation systems that develop productive capacities for industry, manufacturing, services, and higher value-added activities and exports.
It becomes necessary to bring the curricula to the new requirements in order to comply with the global requirements in the field of education. Namely OCDE, Eurostat.
European Skills Index (Cedefop) The European Skills Index (ESI) is developed by Cedefop. It has three pillars to assess how well the skills formation and matching systems of EU MS are performing in relation to the degree to which they are developing, activating and matching skills reserves within their economies. The ESI focuses on these supply and matching aspects of the skills system. Each pillar is broken down further into sub-pillars to further organise the indicators into related groups. In total, ESI has 3 pillars, 6 sub-pillars and 15 indicators.



Sourse: Retrieved from, Margarida Rodrigues, Enrique Fernández-Macías, Matteo Sostero A unified conceptual framework of tasks, skills and competences, JRC Working Papers Series on Labour, education and Technology 2021/02

Eurostat The Eurostat dataset on skills-related statistics contains indicators originating from multiple data sources which focus on the following topics: ● skills supply (the existing skills of the labour force); ● skills demand (the skills needed by employers); ● skills development (the skills developed by participation in education and training activities). Skills supply and skills demand are measured through three different approaches: ● indirect measures, for instance skills assumed to be acquired through formal education; ● direct measures, which are direct assessments of skills through e.g. test scores for skills supply; ● self-reported level of skills, that is people's self-evaluations of skills. Eurostat´s Conceptual Framework on skills along with the different measurement approaches



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World Indicators of Skills for Employment (OECD) The WISE database provides a statistical snapshot of skills development in 214 countries. It contains 64 indicators in five broad areas: ● contextual factors ● skill acquisition A unified conceptual framework of tasks, skills and competences ● skill requirements ● skill mismatch ● economic and social outcomes.

III.Conclusions.

The study shows that the process of technologisation and digitisation is changing the nomenclature of professions, specialisations and skills needed in the labour market. Requirements also stipulated in various reports

Universities recognised for training specialists in economics have taken steps to open new innovative degree programmes, mainly at master's level. Study programmes involving the training of specialists in Big Data, Data Science, etc.

In Eastern European countries such as the Republic of Moldova, efforts have been made to modernise study programmes, but here there are two problems: the content of the programmes leaves a lot to be desired, and in many cases the applicants to the programmes are largely unwilling or do not understand the need for innovative programmes.

However, there are gaps in the skills currently needed in the labour market and what economic studies offer, some specialisations remain uncovered even today, more so in digital marketing.

A simple observation, the specialisations appearing in the programme for 2024, graduates will already be available on the labour market in 2025,2026. But here too there is a risk of further rapid development of innovations, it is not possible to predict future needs, especially by educational institutions, so that they are prepared promptly to react to labour market demand.

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