The Academic Environment's Contribution to the Digital Transition – a Comparative Study of Romania and Eastern Europe

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Abstract

The COVID-19 pandemic significantly increased the use of social communication platforms and electronic information exchange. Technology has thus transformed society and individuals—from how we socialize and communicate to how we govern, work, trade, learn, teach, and research. Digitalization enables universities to fulfill their mission more effectively, simplifying tasks, increasing efficiency, enhancing interaction, conserving resources, and boosting performance. This study aims to identify the efforts made by the Romanian and Eastern European academic environments in initiating, continuing, and implementing institutional digitalization processes after the COVID-19 pandemic.

Key words: Digital transformation, COVID-19 pandemic crisis, higher education institutions
J.E.L. classification: I21, I23

1. Introduction

The COVID-19 pandemic has exposed the global digital divide. In extremely challenging circumstances, it accelerated digital transformation and triggered rapid large-scale changes. Developments that could have taken years took place in just a few weeks. In Romania in 2020, COVID-19 highlighted the lack of adaptation of the domestic digital system to crisis situations. The prolonged lockdown significantly increased the demand for digital public services for citizens and businesses, leading to the need for a national acceleration of digital transformation efforts. In this context, in December 2020, the government established the Ministry of Research, Innovation, and Digitalization, under which the Authority for the Digitalization of Romania (ADR) operates. This institution is tasked with developing strategies and public policies in the field of digital transformation and the information society, coordinating their implementation, and ensuring monitoring and control over compliance with internal and international regulations in these areas. Although among the digital priorities/projects included in the National Investment and Economic Recovery Plan initiated in 2020 are: a) creating an interoperability node, along with identifying and connecting key data registers; b) using electronic signatures in public administration; c) creating a single contact point; d) introducing the electronic identity card; e) migrating public services to a government cloud; f) developing open data systems that allow private sector access to public administration-held data assets; g) investments to increase cybersecurity risk management capacity and connect fiscal electronic cash registers, by October 2024, Romania has made no significant progress.

From reviewing the DESI reports for the period 2020-2022, it is easy to see the progress Romania has made, which, from 26th out of 28th place in 2020, fell to 27th out of 27th (in 2021, the United Kingdom officially left the European Union, so it is no longer included in this ranking). After the COVID-19 pandemic crisis, the fundamental deliverable of investments in the National

Recovery and Resilience Plan (PNRR) for Romania's digital transformation is the Government Cloud. From 2020 to the present, none of the digital projects included in the National Investment and Economic Recovery Plan (PNIRE) have made significant favorable progress, and in the first half of 2024, referring only to the PDURo project that is part of the "Implementation of the Government Cloud Infrastructure" investment, it can be noted that only the implementation contract has been signed.

Digital transformation is an area in which Romania ranks last in Europe despite some notable punctual performances, such as connectivity speed and the existence of innovation and digitalization hubs. Today, there is an urgent need to inform and efficiently manage the actors of digital transformation—beneficiaries, service providers, public authorities, innovation centers—because, although it has been established as a priority, digital transformation is only known and understood at a minimal level by these actors.

Universities, considered engines of digitalization both in Romania and internationally, play an important role in promoting digitalization. In this context, we aimed to identify, at the level of Romanian universities (the top 10 in the national Metaranking) and Eastern European universities, the developments recorded on this winding path of digitalization. The general objective of the paper is to provide an overview of the evolution of innovation capacity after the COVID-19 pandemic period.

2. Theoretical background

In The crisis caused by the COVID-19 pandemic put countries around the world in a situation where there were very few options available for providing education and training outside of digital technology (Wang *et al*, 2020, p. 946), (Valverde *et al*, 2021, p. 2). Governments and citizens became aware of the urgent need to improve the use of technology in education and training (Jan, 2020, p. 2), (Edem and Jibril, 2022, p. 2), to adapt pedagogies, and to develop digital skills.

In order to sustainably and effectively adapt the education and training systems of EU member states to the digital era, and as a response to the crisis caused by the COVID-19 pandemic, the EU adopted the Digital Education Action Plan for the period 2021-2027. The following two strategic priorities were set: a) the use of a wide and growing range of digital technologies (applications, platforms, software) to improve and expand education and training; b) acquiring digital skills—knowledge, skills, and attitudes—by all learners, which are necessary to live, work, learn, and thrive in a world strongly influenced by digital technologies. Later, in March 2021, the European Commission proposed a compass to the Digital Decade, aiming to translate the EU's digital ambitions for 2030 into concrete provisions (Decision EU 2022/2481), with clear objectives, structured around four pillars:

- a population with solid digital skills and highly qualified digital specialists;
- sustainable, secure, and high-performance digital infrastructures;
- digital transformation of businesses;
- digitalization of public services.

The 2030 Digital Decade policy program establishes an annual cooperation cycle to achieve common objectives and targets. This governance framework is based on an annual cooperation mechanism involving the Commission and member states. The Commission first outlines the EU's projected trajectories for each goal in collaboration with the member states, which, in turn, propose national roadmaps to achieve the goals.

The cooperation mechanism includes: a) a structured, transparent, and common monitoring system based on the Digital Economy and Society Index (DESI), which allows measuring progress toward each of the 2030 objectives; b) an annual report on the status of achieving the Digital Decade objectives, in which the Commission evaluates progress and provides recommendations for actions to be taken; c) the adjustment of national strategic roadmaps for the Digital Decade every two years, where member states highlight the measures adopted or planned to achieve the objectives for 2030; d) a mechanism to support the implementation of multinational projects. By 2026, the Commission will review the established objectives to account for technological, economic, and societal developments.

In 2024, for the first time, member states presented their national roadmaps to the Commission, detailing the planned actions to achieve the 2030 Digital Decade objectives. The Commission then published specific recommendations for each country, outlining measures to address identified deficiencies related to connectivity infrastructure, cybersecurity, sustainability, and the cloud.

Romania's roadmap demonstrates that the country considers digital transformation important, although it is making only some efforts to reach the goals and targets of the Digital Decade. Among the identified deficiencies, the lack of basic digital skills in over 72% of the population stands out, with the Commission recommending continued efforts to improve workforce reskilling and upskilling, as well as continuous improvement of the quality and relevance of digital skills courses and teaching.

Given this reality, higher education institutions play a central role in the acquisition and development of digital skills. During the COVID-19 period, these institutions were forced to rethink their teaching and learning practices by integrating digital tools into already existing traditional systems [8], with online learning helping students continue their education/training [9], [10]. Initially, it might have been imagined that learning processes would be supported by technology, but it became clear that the effort should rather focus on embedding digitalization skills into the educational process [11]. The challenge lies in identifying those methods, techniques, and tools specific to the digital domain that, when applied to the educational/research/ administrative process, can lead to the improvement of higher education activities, becoming a source of inspiration and a model of good practices for other sectors of economic and social life.

3. Research methodology

This study uses the exploratory research method, by consulting strategic plans, operational plans, general strategies, rector reports, digitalization strategies, etc., in the post-pandemic period, 2021 – 2024. These documents were accessed from university websites, aiming to model and measure actions and activities meant to contribute to achieving digitalization targets. As an exception to the temporal scope, some digitalization strategies have been developed for longer time intervals, such as 2021 – 2027.

The research began with the following research question: did the COVID-19 pandemic crisis, through the strategic reexaminations regarding digital transformation conducted at the level of higher education institutions, contribute to the development of their innovation capacity?

When accessing the digitalization solutions of the universities included in our study, we identified the following working hypothesis: the proposed and later implemented changes in the strategic plans/digitalization strategies after 2020 contributed to strengthening the digital expertise of the academic environment.

To validate the working hypothesis, we analyzed the correlations between the strategic objectives assumed by each higher education institution, the targets to be achieved in the corresponding development areas, and the activities proposed to achieve those targets. We chose a comparative study between Romanian universities and Eastern European universities to capture the developments in digitalization tools, methods, and techniques, as well as the skills/competencies that can be acquired by the human resources in the European academic environment, which is generally more developed than the domestic one.

The Romanian higher education institutions selected for the study are the top 9 ranked universities according to the national metaranking for 2023 [OME no. 4299/18 April 2024], with the 10th university being the "Valahia" University of Târgoviște, where the authors are affiliated. The foreign universities were selected based on two criteria: the number of students and specializations similar to those of Romanian universities (see Annex no. 1). It should be mentioned that, although in the national metaranking the 9th university is the Bucharest University of Economic Studies, the failure to meet both of the above criteria at an international level led to the selection of the next university – the Technical University of Cluj-Napoca.

Annex no. 1 Selection of Romanian and Eastern European Universities

No. crt.	Romanian University	Foreign University
1.	„Babeș – Bolyai" University Cluj	University of Ljubljana
2.	University of Bucharest	Jagiellonian University
3.	University POLITEHNICA of Bucharest	Wroclaw University of Science and Technology
4.	"Carol Davila" University of Medicine and Pharmacy Bucharest	Medical University of Lodz
5.	"Iuliu Haţieganu" University of Medicine and Pharmacy Cluj – Napoca	Poznan University of Medical Sciences
6.	„Transilvania" University of Braşov	University of Split
7.	„Alexandru Ioan Cuza" University of Iași	Sofia University
8.	West University of Timișoara	Vilnius University
9.	Technical University of Cluj – Napoca	Brno University of Technology
10.	"Valahia" University of Târgoviște	Vytautas Magnus University

Source: Author's selection

In validating the working hypothesis, our approach aims to select the priority areas, strategic objectives, and activities/initiatives for achieving the proposed objectives, with our primary focus being the identification of how the digitalization process is integrated into the curriculum/research /administrative activities of universities. The priority areas identified in the general strategies/digitalization strategies include: excellence in teaching and learning; support for research – development and innovation; institutional digitalization (Smart Governance); digital services for students; and community and digital presence. For each university, a priority area has been selected, along with the proposed strategic goals and the corresponding activities/initiatives (see Tables 1 and 2), to capture the influence of the digitalization process on the institution's activities.

Table no. 1 Key strategic area, strategic goals, strategic initiatives – European Universities

No. crt.	University	Key strategic area, strategic goals, strategic initiatives
1.	University of Ljubljana	*Key strategic area:* Develop education, integrated in the home and international environments, to improve creativity, innovation, critical thinking and social responsibility. *Strategic goals: 1.* Develop and update study programmes (*Strategic initiatives*: Implement IT – supported system solutions that simplify electivity and interdisciplinarity: a unified information system for the preparation of timetables at the UL, digital and professional support for various e-teaching techniques – e.g., recorded lectures, virtual campuses, etc.); *2.* Promote teaching excellence (*Strategic initiatives*: technologically supported teaching and learning – digitalisation).
2.	Jagiellonian University	*Key strategic area:* A sustainable research university, a leading research centre recognised in Europe and the world. *Strategic goals:* Organization of the research process, based on modern infrastructure, digital solutions, efficient organisation and a scientist-friendly research system. (*Strategic initiatives:* Develop and implement a database and software license purchase policy, including the coordinated purchase of key tools and digital resources; Modify, simplify, adapt and continue digitalising administrative procedures related to research management and continuously develop the competences of administrative, engineering and technical staff; Update scientific policy, taking into account the research activity of the University and research and innovation strategy within Una Europa and other university networks.)
3.	Wroclaw University of Science and Technology	*Key strategic area:* Cooperation with the environment. *Strategic goals: 1.* Strengthening partnerships with the business sector to enhance research and education vital to technological progress and the development of both local and global economies – this includes engaging in collaborative research and inviting partners to contribute to shaping the educational offer; *2.* Facilitating technology transfer and the commercialization of research results, and building a supportive network around the University to foster innovative entrepreneurship and support new start-up or spin-off projects, especially in the realm of deep tech (*Strategic initiatives:* Creating and expanding partner networks linking academic centres, business, and regional self-government, based on collaboration, engagement, and trust – for example, the consortium "Institute of Technology and Innovation Highway" or the macro cluster "Technologies in Public Security"; Advancing the activities of Wroclaw Centre for

		Networking and Supercomputing, as well as establishing and developing research centres focused on technology innovation.)
4.	Medical University of Lodz	*Key strategic area:* Management and organisational development. *Strategic goals:* Support of the employees' engagement and effectiveness. (*Strategic initiatives:* Increasing the competences of the managerial staff in the area of management, leadership and innovative approach promotion in the employees; Developing competences of the teaching staff.
5.	Poznan University of Medical Sciences	*Key strategic area:* Educating medical personnel for the country, Europe and the world. *Strategic goals: 1.* Revision and adjustment of curricula taking into account increased student freedom in the implementation of the curriculum and greater use of medical simulation techniques and distance learning methods; *2.* Internationalisation of education at the PUMS. (*Strategic initiatives:* Increasing the integration of clinical and primary teaching; Systematic expansion of the database of e-learning resources within the PUMS course repository; Increasing student engagement in the learning process; Optimizing the principles of student learning in the area of practical skills outside of clinical units; Implementing modern methods of evaluating the quality and effectiveness of the educational process; Organization of postgraduate courses using distance learning techniques and methods, including English; Training for didactic staff aimed at improving the quality of education with the use of modern distance learning techniques; Supplementing the clinical didactic database with systems that enable distance learning.)
6.	University of Split	*Key strategic area:* Science, art and innovation. *Strategic goals:* Open science and digital transformation. (*Strategic initiatives:* Build digital transformation strategy for research and development; Establish a strategic European digital innovation hub in blue-green economy through networks of all sectors and regions.*)*
7.	Sofia University	*Key strategic area:* Scientific research and development. *Strategic goals: 1.* Improving the environment for science and innovation and motivating researchers. (*Strategic initiatives:* Improve access to modern scientific infrastructure, scientific databases and up-to-date information sources; Supporting researchers' work processes through convenient and efficient systems based on modern technological solutions; Implement a new pay system that is attractive, fair and flexible, and helps to attract and retain talent.) *2.* Improving the training and career development of researchers. (*Strategic initiatives:* Conducting periodic surveys of researchers to explore their needs for additional knowledge and skills; Stimulating a diverse research career, including experience in other sectors and abroad, including collaboration with industry.) *3.* Effectiveness and efficiency of human resources support activities in science and innovation. (*Strategic initiatives:* Enhancing the capacity of the Research and Projects Unit to provide effective expert support and advising the researchers in the preparation of science and innovation projects; Introduction of periodic survey among the academic staff as a tool for continuous improvement of activities in support of researchers and for the formation of the image of Sofia University "St. Kliment Ohridski" as an excellent place to work.)
8.	Vilnius University	*Key strategic area:* Sustainable. *Strategic goals: 1.* Motivated employees and engaged students. (*Strategic initiatives:* Increased evaluation of job and studies involvement as well as satisfaction with the organization, work, departments compared to the evaluation of 2020). *2.* Infrastructure that meets the future needs. (*Strategic initiatives:* Development of the Sauletekis and Santana VU campuses, HSS infrastructure; Improvement of the effectiveness of operational support –community satisfaction with operational support at least 4 out of 5; Green University: 50% emission reduction, research and education). *3.*Financial growth through income diversification. (*Strategic initiative*: A change of 25% in the revenue from R&D solutions and services and lifelong learning activities compared to the previous five-year period.)
9.	Brno University of Technology	*Key strategic area:* Develop competencies directly relevant to life and practice in the 21st century. *Strategic goals: 1.* Support the building of infrastructure for interactive education methods of student integration. (*Strategic initiatives:* Analysis of current interactive teaching equipment of faculties and components; subsequent retrofitting of components for this type of teaching.*) 2.* Increase the use of distance learning methods in full-time study programmes. (*Strategic initiatives*: Preparation of methodological materials for distance forms of teaching and testing; support and motivation for teachers in creating teaching aids for distance teaching of individual subjects; Analysis of existing software equipment for remote testing of knowledge, acquisition of other

		necessary equipment; Preparation of methodological materials for using the acquired equipment.)
10.	Vytautas Magnus University	*Key strategic area:* University impact on societal development. *Strategic goals: 1.* Establish the identity of the University. (*Strategic initiatives:* Create digital and social progress and implement sustainable application and societal transformations through the implementation of T4E activities; Shape the society of the future by increasing learning opportunities through open studies.) *2.* Aspire to community sustainability and synergy by respecting the community's diversity and the personal autonomy of its members. (*Strategic initiatives:* Prepare a module of non-formal physical and distance Lithuanian studies and establish VMU's leadership in the field of non-formal Lithuanian education.) *3.* Seek leadership in the training of agricultural specialists and in the development of Agriculture, Forestry, Aquaculture and Rural Development Policies. (*Strategic initiative*: Initiate, develop and implement interdisciplinary study programs for sustainable development, agribusiness and public interest in bio economy, digitalization of agriculture, bio systems management, as well as continuing education and training projects.)

Source: Author, by using general strategies or digitalization strategies information's

Table no. 2 Key strategic area, strategic goals, strategic initiatives – Romanian Universities

No. crt.	University	Key strategic area, strategic goals, strategic initiatives
1.	„Babeș–Bolyai" University Cluj	*Key strategic area:* Relationship with society. *Strategic goals: 1.* Administrative innovation. (*Strategic initiatives*: Restructuring and redefining workflows, with a focus on simplification and de-bureaucratization.) *2.* Efficient use of existing spaces. (*Strategic initiatives:* Auditing the existing space; Optimizing space usage.) *3.* Digital transformation. (*Strategic initiatives:* Continuing the implementation of already initiated measures; Teaching and research activities supported by technology and digitalization.) *4.* Sustainable university, environmentally friendly. (*Strategic initiatives:* Continuing the implementation of measures already initiated under the UBB Goes Green program.)
2.	University of Bucharest	*Key strategic area:* Innovation, adaptation, and digital transformation. *Strategic goals: 1.* Increase the degree of internationalization. (*Strategic initiative:* Ensuring support and assistance services for publishing: translation, proofreading, editing, consulting.) *2.* Encourage efficient innovation, adaptation to environmental changes, and particularly to labor market shifts. (*Strategic initiatives:* Activities aimed at increasing the number of participants in UB innovation promotion events; Adopting and implementing measures to increase the number of patents contracted through agreements with third parties; Conducting activities to increase the number and value of projects run by the ABACUS innovation hub.) *3.* Digital transformation of academic and administrative processes. (*Strategic initiatives:* Introduction of new study programs with a digital component or revised from the perspective of digital transformation; Operationalization of electronic registry – one stop shop; Electronic circulation of documents and electronic archive.)
3.	University POLITEHNICA of Bucharest	*Key Strategic Area:* Community and Digital Presence. *Strategic goal:* Strengthening the UPB community and its relationships with society through digital technologies, and increasing the university's presence and visibility nationally and internationally. *(Strategic Initiatives:* Improving the university website, centralizing, and providing direct access to all digital resources on the site, and facilitating access to the educational offerings; Offering the community online learning modules tailored to different categories of users; Transforming UPB into a Smart Campus, inspired by the Smart City concept.)
4.	"Carol Davila" University of Medicine and Pharmacy Bucharest	*Key Strategic Area:* Scientific Research. *Strategic Goals: 1.* Strategies to Increase the Visibility of University Research. *(Strategic initiatives:* Presenting research activities on the university website through a dedicated portal, highlighting fields, disciplines, researchers, teams, projects, and results achieved; Encouraging publication in high-impact journals. *2.*Implementing Research Activities to Support Precision Medicine Research. *(Strategic initiatives:* Investing in equipment and bioinformatics technologies for processing experimental "big data"; Enhancing the research capacity of the center. *3.* Infrastructure Development for the Genomics

		Center. (*Strategic Initiatives:* Expanding research infrastructure with state-of-the-art equipment; Supporting innovation and technology transfer.)
5.	"Iuliu Haţieganu" University of Medicine and Pharmacy Cluj – Napoca	*Key Strategic Area:* Innovation, Adaptation, and Digital Transformation. *Strategic goals: 1.* Establishing a Strategic Framework for Supporting and Promoting Digitalization at UMFCD. (*Strategic Initiatives:* Identifying opportunities to enhance access to technology for educational and research programs within the university; Encouraging research projects focused on developing IT solutions for e-health/m-health and integrating these solutions into UMFCD's IT platforms.) *2.* Accelerating the Digitalization of Teaching and Research Activities at the University. (*Strategic Initiatives:* Equipping disciplines with IT tools and licenses for both in-person and online activities; Operationalizing and modernizing software for evaluating teaching staff; Implementing and modernizing a program for managing and reporting research projects and outcomes.) *3.* Accelerating the Digitalization of University Support Processes. (*Strategic Initiatives:* Implementing and operationalizing an electronic document management platform; Operationalizing software for electronic inventory management; Modernizing the student management system software; Updating software for housing and scholarship management.)
6.	„Transilvania" University of Braşov	*Key Strategic Area:* Internationalization of the University. *Strategic Goal:* Increasing the level of internationalization at the university. (*Strategic Initiatives:* Establishing and activating the International Advisory Council; Developing at least one program in each faculty taught in foreign languages; Supporting the improvement of language skills for academic staff, administrative personnel, and students; Encouraging annual participation of each faculty member and researcher in at least one scientific event abroad and funding university-specific programs for training/documentation/work placements abroad, as well as for developing international educational and scientific cooperation; Promoting the involvement of international experts in the university's teaching, research, and administrative processes through funding for specific dedicated programs.)
7.	„Alexandru Ioan Cuza" University of Iaşi	*Key Strategic Area:* Excellence in Education. *Strategic Goals: 1.* Strengthening the E-Learning System and Increasing the Use and Diversification of Information and Communication Technologies in the Educational Process. (*Strategic Initiatives:* Expanding the use of the Moodle platform across all faculties, for both distance learning (ID/IFR) programs and components of online teaching activities for full-time (IF) students; Increasing the utilization of technologies in the design and delivery of teaching content; Using online counseling platforms such as ICARD and www.career-modules.eu; Providing free training sessions and workshops for students; Developing digital skills in the humanities through the PNRR project, code 127544578, titled *"Framework for the Sustainable Development of the University's Digital Component–Euaic." 2.* Modernizing Data/Voice Infrastructure. (*Strategic Initiatives:* Replacing and upgrading data/voice infrastructure in most UAIC spaces; Providing ITC resources for laboratories and educational facilities.) *3.* Continuous improvement of material resources. *(Strategic Initiatives:* Ongoing enhancement of facilities for teaching and research activities, as well as developing new investment projects for expansion; Ensuring a transparent procedure for allocating resources for students, such as housing, scholarships, and material support.)
8.	West University of Timişoara	*Key Strategic Area:* Performance oriented management. *Strategic Goals:* Participatory, goal-centered management that drives change. (*Strategic Initiatives:* Integrating e-management systems and developing new modules for these systems across all managerial and administrative levels; Improving secretarial and technical-administrative services through full digitalization and encouraging accountability for the quality-of-service delivery.)
9.	Technical University of Cluj – Napoca	*Key Strategic Area:* Digitalization of Educational and Administrative Processes to Enhance Institutional Quality and Performance. *Strategic Goals: 1.* Development of the "Digital Innovation Platform" in Four Main Areas: e-Education, e-Research, e-Administration, and e-Student. (*Strategic Initiatives:* Implementing the e-learning project by developing a teaching-learning-assessment platform, creating and/or improving related teaching materials, and digitalizing support processes; Implementing the e-research project by developing a platform for managing and

9.	Technical University of Cluj – Napoca	conducting scientific research projects and digitalizing support processes; Implementing the e-administration project by expanding the capabilities of the electronic registry, exclusively using electronic signatures for all internal documents, and digitalizing processes within administrative departments/offices to enable efficient, fast, and transparent workflows with minimal reliance on paper-based documents; Implementing the e-student project by developing a platform for managing services and facilities specific to student activities, such as online admissions, issuing certificates, resolving requests, etc.) *2.* Strengthening the "Virtual Campus UTCN" as a Hub for the University's Digital Transformation. (*Strategic Initiative:* Identifying the human, material, financial, and logistical resources needed to strengthen the "Virtual Campus UTCN" Department and operationalizing the "Digital Innovation Platform.")
10.	"Valahia" University of Târgoviște	*Key Strategic Area:* Optimization of Administrative Management. *Strategic Goals: 1.* Improving Human Capital Management through a Transparent Process Based on Performance Criteria for Promoting Faculty, Researchers, and Teaching-Assistant/Administrative Staff. (*Strategic Initiative:* Optimizing communication and action processes between various entities within the university structure, ensuring high-performing staff and developing IT infrastructure.) *2.* Developing a Marketing Strategy and Tools to Enable the University to Communicate Effectively with Relevant Higher Education and Research Institutions and Associations. Promoting Entrepreneurship and Educational Services in the Field. (*Strategic Initiative:* Ensuring IT infrastructure for promoting e-learning teaching materials and online student assessment methods.) *3.* Developing a Marketing Strategy and Tools to Enable the University to Communicate Effectively with Relevant Higher Education and Research Institutions and Associations. Promoting Entrepreneurship and Educational Services in the Field. (*Strategic Initiatives:* Modernizing and updating the university website and promoting the institution on online social platforms.)

Source: Author by using general strategies or digitalization strategies information's

4. Findings

After the COVID-19 pandemic, the digitalization process has rapidly developed both in Eastern European universities and in the Romanian educational landscape. Based on the analysis of strategies, numerous actions promoting/implementing digitalization have been identified in the following priority areas:

- *For education*, notable actions identified include: improving digital learning environments, learning and content management platforms, including the development of personalized teaching techniques that increase student motivation; developing digital courses or course modules available to university students; updating existing programs by revising course syllabi with a focus on digital competencies and emerging professions; developing learning communities and collaborative learning, analyzing discussions in learning communities based on artificial intelligence techniques; assistive technologies for students with special needs; developing digital assessment resources; intelligent learning outcome analysis systems (learning analytics); acquiring equipment for recording courses and interactive teaching methods; increasing the number of rooms equipped with videoconferencing facilities; continuous training for faculty and students in digital competencies required for digital transformation/digital education.
- *For research, development, and innovation*, actions include: multimedia presentations and virtual tours of research centers at universities; creating a virtual Marketplace linking university research outcomes with the business environment; developing fully digitalized entrepreneurship and innovation centers; developing research and technology transfer centers; presenting research activities on the university website (portal), marking fields, disciplines, researchers with their activity teams, projects, results, and publications; encouraging publication in high-impact journals from quartiles 1 and 2; promoting and supporting the organization of large-scale scientific events.
- *For institutional digitalization*, actions include: transferring administrative processes online in the form of document flows for administrative simplification through digitalization; reorganizing university IP address classes to reduce cybersecurity vulnerabilities; creating an electronic registry;

building/accrediting an electronic archive to simplify administrative processes through digitalization; efforts to implement the European Student Card Initiative; implementing an SSO (Single Sign-On) system across the university for digital integration; developing integrated digital institutional management systems, including a Building Management System.

- *For digital services for students*, actions include: providing digital support for professional and personal development; learning performance analysis tools (learning analytics for individual paths); chatbot interfaces for various university services and helpdesk; personalized tutoring based on artificial intelligence techniques; digitalizing timetables and providing access to schedules via mobile devices; mobile navigation assistance on university premises; equipping or resizing data centers to meet institutional needs; Smart Campus, City in City; providing digital versions of services such as the Career Counseling Center, Student Entrepreneurship Center, Culture, Volunteering, Sports, and Recreational Activities Center; digital access to dormitories, cafeterias, and recreational centers.
- *For community and digital presence*, actions include: offering online learning modules for different user categories: a) prospective candidates: preparation for admission and initiation in specific topics of interest; b) educational services for companies, civil society, and public administration employees; c) the general public – videos promoting the university's technological results; automatic monitoring of media presence and social platform engagement; expanding the university's Alumni platform with various digital services.

By reviewing the correlations between the strategic objectives assumed by universities, the targets in the corresponding development areas, and the proposed activities to achieve these targets, it can be concluded that the changes proposed and later implemented in strategic plans/digitalization strategies after 2020 have contributed to strengthening the digital expertise of the academic environment and increasing their innovation capacity.

5. Conclusions

An open and high-performance digital education ecosystem in the EU can contribute to attracting and supporting excellence worldwide, especially as global competition for talent and innovation accelerates. It can help enhance innovation performance within the EU and its member states. By rapidly adapting university curricula, shifting research and administrative activities to meet the requirements of digital transformation, universities can become sources of inspiration and models of best practices for other sectors of economic and social life.

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