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IMPACT OF INFORMATION TECHNOLOGY DEVELOPMENT ON THE HIGHER EDUCATION

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Abstract
Advances in information technologies are transforming the whole social and economic scene and changing requirementsnot only for technology-related industries, but also for education in all levels. The Covid-19 pandemic has highlighted awareness of the strategic role that digital technologies play in underpinning the long-term success and sustainability ofhigher education institutions as well as their strengths and weaknesses. Aim of this paper is to analyse, how digital transformation has affected the higher education ecosystem, examine the current challenges and opportunities faced by higher education institutions (HEI) in order to adapt to already available and upcoming technologies.

1. Introduction

The importance of digital transformation and information technology in all areas related to human activity has been discussed for a long time. Technological developments have affected all sectors. Higher education is not an exception. The more pervasive digital becomes in the economy, and the more these disruptive technologies continue to drive change, the more integral they become to the success of higher education institutions (Ernst & Young LLP, 2020). Various studies and reports on this issue has been published as well as policy documents and legislation adopted, however the potential of digitising education was not widely visible and understood (European Commission, 2020).

The Covid-19 pandemic strengthened the role of digitalisation in the organization of the educational process and accelerated the implementation of various technological solutions. As a stateof emergency was declared in many countries and strict restrictions were imposed, face-to-face services including education were limited. Although the process was provided remotely it highlighted several challenges. Analysis of the situation shows that the recent transition to online learning has been as rapid as it has been impressive, however it was mostly about adding new tools to old pedagogyrather than general digitally enabled education across the board. The next big challenge is to integratedigital into the core university strategy (Iosad A., 2020). The following section analyses HEI's internaland external environment and identifies the main obstacles and opportunities for digital transformation.

2. Impact of pandemic and digital technology on the higher education ecosystem

Various studies and reports on higher education for several years have emphasized the need for educational institutions to take into account technological developments and to provide services in line with the opportunities offered by information technology, providing remote, inclusive and onlinelearning opportunities (European Commission,

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2020).

In recent years, there has been talk in sector about blended and flexible learning, however reality has been that online resources have supplemented the dominant mode of delivery (in-person). As highlighted in various reports, the higher education landscape is at the crossroads of an amazing digital shift (Deloitte, 2019). It is expected that the next shift likely will be from mass face-to-face tomass digital learning. In the future courses should be designed through technology - "digital first" – and supplemented by face to face, human support (KPMG International, 2020).

Policy planning documents, legislation and various support instruments in recent planning periodshave been addressed for gradual development of a digitally competent society and environment, including various forms of training. Due to the pandemic gradual planning had to be replaced by the very rapid introduction of remote processes. According to the reports and surveys, the remote availability of the educational service was ensured, though there were aspects in which the quality and accessibility of educational services decreased or was incomplete.

As mentioned above, a pandemic period can be described as emergency remote learning rather than fully implemented distance learning. The decisions that all industries, including the education sector, had to take to ensure access to the service were taken rapidly and not voluntary. Most institutions did not plan to transfer their offer to the digital environment to such an extent in 2020.

The pandemic highlighted a number of shortcomings and challenges for successful online studies:accessibility, skill gaps, methodology and materials adopted for the digital learning. However, reportsand expert opinions also focus on how this represents an opportunity to rethink and reconceptualise the nature and methods of teaching and learning as well create an inclusive environment that fosters equity and diversity, ensures equity of access, participation and completion of higher education, with a special focus on students from underrepresented, disadvantaged and vulnerable groups (Farnell. T.et al., 2021).

In addition to the challenges, the digital transformation also brings long-term benefits to educational institutions and educational ecosystem. In order for HEIs to promote their growth and adaptability to today's changing environment, as well as to be better prepared to respond to various unplanned situations in the future, it is possible to identify several objectives that digital transformation and information technology provide to the higher education ecosystem:

1. Socio economic,
2. Quality assurance,
3. Sustainability,
4. Adaptiveness.

Socio economics. For various reasons, some groups in society currently have limited access to qualitative higher education services. These are, for example, territorial or social barriers that preventthem from studying in a chosen institution. The more distance and online study opportunities will beoffered, the more accessible and inclusive the higher education ecosystem will become.

Quality assurance. Opportunity to receive a distance education service without territorial barriersmeans that HEI compete only on the national but also on the global level. As a result, the competitionis increasing, each institution is forced to constantly upgrade and improve its offer in order to maintain demand. The sector is facing increasing domestic and international competition, the challenges of supporting lifelong and more flexible learning, questions about the cost and efficiency of delivering higher education. In this context, digital as a strategic question is more important than ever (Iosad A.,2020).

Sustainability. HEI provides not only educational services and invests in research and innovation,but is also co-responsible for the wider human-made challenges of the environment, climate, lifestyle,migration, health, democratic stability, etc. areas. Higher education produces economic, social, cultural and environmental impact in the community, be it at the local, regional, national or global level (OECD, 2017). HEI must be more involved and active in processes that reduce the human footprint, promote the circular economy and promote societal equality. Information technology can help achieve these goals.

The integration of digital transformation into the strategies of organizations, as well as its purposeful implementation will enable greater adaptability and resilience. In unexpected situations HEI will be able to provide a well-thought-out and high-quality service. To survive the current and future shocks, digital needs to be part of institution wide strategy rather than a bolt on or afterthought.COVID-19 crisis has strengthened the role of digital workflows for institutional resilience within teaching, research, and professional services (Iosad A ., 2020).

3. Impact of the external environment on higher education

In order to achieve the above-mentioned objectives, it is necessary to have a favourable environmentfor the implementation of digital transformation activities and to overcome the various obstacles thatcurrently exist. The following factors are considered in this paper:

1. Legislative,
2. Infrastructure,
3. Socio-economic context.

On the **legal-political** level the importance of digital environment and competencies has been well recognized. The European Union has developed such a regulatory environment, a number of initiatives and platforms that facilitate the introduction of technologies and the development of digitalcompetences in various fields, including education. One of European Commission's aims is integrating digitisation in all industrial technologies and societal challenges. A European approach to digital transformation means empowering and including every citizen, strengthening the potential ofevery business and meeting global challenges with Europe's core values. (European Commission, 2021 (1)). It is supported by The European Digital Strategy, digital skills initiatives (e.g. The European Skills Agenda, The Digital Education Action Plan) , investments aimed to tackle the digital skills gap (e.g. The Recovery and Resilience Facility, The Digital Europe Programme, Horizon Europe) (European Commission, 2021 (2)).

Infrastructure. Despite the various factors facilitating digital delivery of higher education services, the Covid-19 pandemic has shown that goals cannot be achieved without an infrastructure for a high-quality connectivity. The analysis of the situation shows that, although digital technologiesenabled students to continue learning, it also proved as major barrier for others when access, equipment, connectivity or skills were lacking (European Commission, 2020).

Socioeconomic context. Another issue that should be addressed is the ability of each household to provide the necessary technological equipment as well as psychological support. In this respect, the COVID-19 pandemic showed that there were problems with equipment, access and support at all levels of education, as well as skills shortage. Particular difficulties were encountered when there was more than one student in a

household, who needed to connect to online studies simultaneously.

4. The main factors contributing to the digital transformation of HEI in the internal environment

External environmental processes influence the development of HEI's internal environment. The more pervasive digital transformation becomes in the economy, and the more these disruptive technologies continue to drive change, the more integral they become to the success of higher education institutions. It has become unthinkable that universities would be able to effectively managemost of their biggest challenges without the use of digital whether they be in attracting, retaining andengaging students and alumni; operating efficiently and effectively; driving quality and innovation inteaching and learning; fostering research collaboration; or partnering with employers (Ernst & YoungLLP, 2020).

If the external environment is favourable to the digital transformation of the institution, following challenges of an internal environmental still need to be addressed:

1. Strategy

Although the technologies available to the institution play an important role in the implementation of the digital transformation, a precondition for its successful implementation is the institution's strategy. Digital needs to be recognised as a strategic asset and as a way to help deliver the university's mission(Iosad A., 2020). The recent report on the future of higher education outlines that the strategy shouldinclude the following aspects: borderless, shorter courses, degrees, digitally native cohorts, experimental learning, lifelong learning, competing at scale, lifestyle integration (KPMG International, 2020).

2. Business, operating model

Once the strategic goals have been defined, it is necessary to evaluate which organizational, businessmodel will be the most suitable for achieving these goals, since different business models are suitablefor different strategic priorities.

A digital strategy can underpin expansion into new markets for recruitment and for delivery, internationally and domestically; can create new opportunities for revenue diversification approaches. It enables universities to build on network aggregation effects of digital platforms to massively scalecollaboration with employers to better meet changing student needs and policy priorities, create a stepchange in the way students and staff interact with each other. A more strategic approach, which sees digital innovation as a core element of that experience, will lead to greater buy-in, open up new waysof working and learning, and ultimately produce a clear return on the investment. (Iosad A., 2020)

3. Recourses

The success of digital strategic initiatives will require the allocation of appropriate resources, financial as well as human. Investments in infrastructure will provide an opportunity to take advantage of modern technological opportunities, but the success of the digital components of a long-term strategy will largely come down to the willingness and ability of staff to implement it. The result will depend on the staff's capability, skills, incentives, and behaviours. Therefore, addressing a lack of digital confidence among staff is among the highest priorities in mitigating risks in the delivery ofdigital strategy. This means implementing visible and exciting initiatives that are aligned to the core

mission of the university, providing visibility to departments that are already doing things well, both internally and externally. Establishing and clearly signposting opportunities for staff to develop their digital skills should go hand-in-hand with emphasising digital excellence as a contributor to career progression (Iosad A., 2020).

5. Conclusion

Although the need for digital transformation in the education sector has been under discussion in recent years, still there is a clear need for greater digital awareness and fluency among all representatives of higher education ecosystem. Covid-19 pandemic has accelerated digital transformation in education at the same time highlighting the current shortcomings: 1) territorial, social and economic barriers, 2) outdated pedagogical approach – new tools applied to old approach. The current legislative environment is favourable for the implementation of digital transformation, however, to provide a modern and adaptable services, each HEI must review its strategy, putting thedigital shift at the centre and integrating it into each working area and level.

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