

THE MODEL OF DIGITAL TRANSFORMATION OF HIGHER EDUCATION INSTITUTIONS

Matevž Zebec¹, & Mitja Dečman²

¹*Center Digital UL, University of Ljubljana (Slovenia)*

²*Faculty of Public Administration, University of Ljubljana (Slovenia)*

Abstract

Digital technologies are now deeply embedded in both personal and professional lives, prompting institutions to pursue digital transformation (DT). This process extends beyond technological advancement to encompass the reconfiguration of organisational structures, processes, and cultures. Successful DT depends on key foundations such as visionary leadership, strategic planning, effective resource allocation, adequate investment, and a culture that fosters innovation, adaptability, and continuous learning. In higher education, digital transformation is often linked to pedagogical innovation. However, administrative, managerial, and support processes are equally important, as they underpin improvements in educational quality, research performance, and overall institutional effectiveness. As public-sector organisations, universities also face additional pressures related to technological modernisation, regulatory requirements, and organisational restructuring. This study explores the main challenges, opportunities, and strategies that enable digital transformation in higher education, drawing on evidence from four European universities. A theoretical model of DT in higher education is proposed and empirically assessed through qualitative content analysis of institutional digital strategies and semi-structured interviews with university representatives involved in digital transformation initiatives. This approach offers an in-depth understanding of institutional strategies and practices. The findings show that digital transformation in higher education is a multidimensional process, not merely a technological undertaking, involving significant organisational, cultural, and competency-related changes. Effective transformation requires strategic foresight, systemic coordination, and sustained institutional commitment. The results also indicate that a clear digital strategy and active leadership are decisive drivers of digital transformation, while organisational culture, human resource capabilities, and management systems play significant supporting roles.

Keywords: *Digital transformation, higher education, model, institutions, interviews.*

1. Introduction

Digital transformation represents a continuation and deepening of informatization, which refers to the introduction of information technologies into work and social systems to improve efficiency, productivity, and communication (Masuda, 1980). Digital transformation, however, focuses not only on technological upgrades but also on transforming business models, organisational structures, and socio-economic systems in the digital age. It requires the comprehensive integration of digital technologies, such as cloud services, big data, the Internet of Things (IoT), and artificial intelligence (AI), into all aspects of business and social life (Pucihar et al., 2021). This process occurs in both the private and public sectors.

Digital transformation in public sector organisations is complex and multistage, requiring the effective addressing of key challenges such as ensuring data security and privacy, bridging the digital divide, and developing digital skills among public employees and service users. It is also essential to secure stable and long-term funding for digital transformation projects, as short-term approaches often do not enable sustainable solutions. Furthermore, aligning digital transformation with existing legislative and regulatory frameworks can slow the introduction of innovations. Promoting a digital culture within the organisation and overcoming resistance to change among public employees and service users, who may be reluctant to adopt new ways of working, is also crucial. Finally, it is important to ensure that digital services remain accessible to all, including vulnerable groups often marginalised in digital processes. Kitsios et al. (2023) emphasise the importance of change management strategies and continuous training to ensure that the public sector not only keeps up with technological trends but also leverages them effectively to improve public services and democratic processes.

Although higher education institutions, especially in Europe, are considered public institutions providing public services, their digital transformation is based on the same foundations. As described by Kitsios et al. (2023), the best way to achieve successful digital transformation, and thus improve the quality of education, research, and organisational processes, is through the development and implementation of a comprehensive socio-organisational environment for transformation. To this end, our research focuses on developing a comprehensive model of digital transformation for higher education institutions, based on modern theoretical approaches and adapted to the specific needs of these institutions. We set the following research question: What are the key components of the comprehensive digital transformation of higher education institutions?

2. Background

As digital transformation sets new standards in the business environment, it is important to recognise that its success is neither self-evident nor guaranteed. Comprehensive digital transformation depends on solid foundations, including thoughtful and visionary leadership, strategic planning, and the effective use of available resources.

Governance plays a central and decisive role in digital transformation. The foundation of successful digital transformation is a vision from leadership that clearly defines the goals and expectations of the transformation and provides the necessary commitment to overcome the associated challenges. This commitment must be evident at all levels of the organisation, as without a unified vision for digital transformation, it cannot be successfully implemented. Setting the direction and priorities of digital transformation projects is another key aspect (Al Nuaimi et al., 2022; Müller et al., 2024).

Strategic planning with effective project management is the second key element of successful digital transformation. It begins with clearly defined goals and priorities that guide the transformation and ensure that all resources are focused on shared objectives. This step requires a deep understanding of business processes and digital solutions that address the needs of the modern work environment and promote innovation and competitiveness within the organisation. In addition, effective resource management and time planning are essential to ensure that projects are set realistically and implemented in line with expectations and constraints. This involves optimising the use of financial, human, and technological resources and continuously adapting plans in response to changing circumstances and findings during implementation (Al Nuaimi et al., 2022; Pucihar et al., 2021).

The third prerequisite for digital transformation is ensuring sufficient capital. This includes not only financing direct technology investments, such as new information and communication equipment, software, and digital platforms, but also a broader understanding of the cost and benefit implications of digital transformation. Management must assess how investments affect an institution's operational efficiency, market positioning, and long-term financial stability. The key is long-term financial planning, which involves establishing stable budgets to support current and future projects, managing investment-related risks, and ensuring that digital transformation contributes to the organisation's sustainable development (Lafioune et al., 2023; Müller et al., 2024).

At the heart of digital transformation is a workforce whose role extends beyond technical expertise and requires a culture focused on innovation and continuous learning (Opland et al., 2022). Hiring staff with digital skills is essential to bring fresh ideas and approaches that can drive transformation. It is equally important to invest in existing employees to expand their digital skills and encourage adaptability. Creating an environment that fosters continuous learning and experimentation is vital for maintaining organisational dynamism. Strengthening such a culture requires commitment at all levels, from management to individual team members, and highlights the importance of soft skills alongside technical knowledge (Chen et al., 2024).

A strong technological infrastructure, supported by reliable data security and regulatory compliance, is essential for successful digital transformation. Advanced technological infrastructure enables organisations to leverage new technologies to improve efficiency and innovation. Data security and regulatory compliance are fundamental safeguards against cyber threats and ensure data confidentiality. It is also necessary to regularly assess and upgrade technological systems to ensure they are prepared to meet future technological challenges and needs. This process requires a strategic approach to information technology management, focusing on long-term performance and security (Garcia-Perez et al., 2023; Gebremeskel et al., 2023).

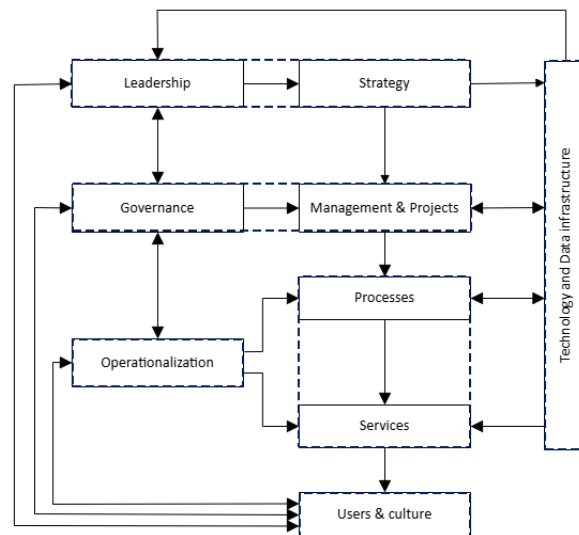
3. The proposed model

The model was developed using four existing digital preservation models: two primarily oriented towards the private sector and two towards the public sector. McKinsey's 7-S model is a theoretical

framework for implementing changes based on a company's organisational design and is not necessarily focused on digital transformation. The model emphasises that mutual influences occur when one of the elements is transformed, requiring an effective balance to be re-established among all the elements (Liu, 2020). It illustrates the relationship between hard elements (strategy, structure, and systems), which represent the formal framework of digital transformation by defining the goals, processes, and technological solutions that enable operational implementation of changes, and soft elements (shared values, leadership style, staff, and competencies), which form the core of organisational transformation by influencing the acceptance of change, ways of working, and the long-term success of digital initiatives (Kimberling, 2023). The PricewaterhouseCoopers (PwC) model covers six key areas: strategy, corporate culture and human capital, development of a digital transformation plan, construction of a digital business platform and operating model, implementation and operational development, and performance review, helping companies transform their business models, operations, and culture (Cozmiuc & Pettinger, 2021). The model proposed by Mergel et al. (2019) provides a comprehensive framework for understanding and implementing digital transformation in the public sector, covering not only technological upgrades but also changes in organisational culture, processes, policies, and citizen relations (Mergel et al., 2019). The model presented by Vial (2019) emphasises the role of digital technologies as sources of disruption, prompting strategic responses through the use of digital technologies to discover new ways of creating value by adapting organisational structures and culture, as well as management and employees, while considering ethics and social implications.

Based on the analysis of these four models, we created a model of digital transformation for higher education institutions, which is a multidimensional and ongoing process requiring simultaneous changes in strategy, organisational management, human resources (people and culture), technological infrastructure, and processes. The proposed model, with six components, emphasises that none of these components should be considered in isolation. The synergy between the components allows each to reinforce the others: leadership and governance establish strategic direction and organisational structures, which are operationalised through management, projects, processes, and services. These directly influence users and organisational culture and generate feedback and data for further strategic and governance-related decisions. Technology and data infrastructure act as a cross-cutting support area, enabling the implementation of all the aforementioned activities.

Figure 1. Suggested model.



4. Empirical research

4.1. Methodology

The model was empirically validated using qualitative research through semi-structured interviews, which provided in-depth insights into the perceptions, experiences, and decision-making practices of key actors in the digital transformation of higher education institutions. The interviews were conducted either in person or remotely (online), depending on the availability and consent of the interviewees. Where interviewees consented, the conversations were audio-recorded and subsequently transcribed. When recording was not permitted, responses were obtained in written form. The interviewees were the Vice-Rector for Digitalisation and Knowledge Transfer from the University of Ljubljana,

Slovenia; a representative of the rectorate from the Technical University Graz, Austria; the Chief Digitalisation Officer from the University of Bern, Switzerland; and the Vice-Rector for Digitalisation from the University of Vienna, Austria. The analysis was based on a predetermined analytical framework derived from the developed model of digital transformation in higher education, which enabled a systematic comparison of the empirical findings with the theoretical assumptions. Furthermore, we analysed the digital transformation strategies of the universities mentioned above and paired them with the interview transcripts.

4.2. Results

A comparative analysis of all semi-structured interviews confirms a high degree of consistency between the developed model and findings from practice. In all cases, it is consistently evident that digital transformation has been systematically supported by a clearly defined digital strategy and the active role of senior management. The University of Bern and Graz University of Technology are particularly consistent examples where strategy and leadership are not only declarative but also operationalized through formally adopted guidelines, dedicated resources, and a clear vision. The University of Vienna also confirms the model's emphasis on a strategic framework linked to investment planning and central steering. The University of Ljubljana further confirms the model, while at the same time providing an empirical example of a key model warning: when management coordination is not established early enough and decisively enough, digital initiatives are scattered into partial solutions at the member level, which directly confirms the model's thesis about the risks of ad hoc digitization.

The interviews also confirm that the model correctly identifies governance, people, and culture as conditions without which technology cannot create lasting value. All institutions need formalized coordination mechanisms that transcend organizational silos. All interviewees confirmed that the human factor is both a systemic constraint and a key accelerator: resistance to change, differences in digital competencies, and a lack of digital talent are present in all cases, but institutions differ in the maturity of their response. TU Graz has demonstrated an upgrade of the model at the level of implementation mechanisms with a special remuneration model, while UL has highlighted the limitations of the public sector in competitive recruitment. The common denominator is clear: competencies, communication, training, stakeholder involvement, and a culture of trust are a central part of transformation management.

The most decisive proof of the model's validity is the recurring finding that the effects of digital transformation only materialize through the redesign of processes and services, with technological solutions being merely an enabling factor. In all cases, the interviews describe standardization, integration, and process redesign, confirming the model's interdependence of components: without resources, there is no technology; without process redesign, there are no benefits; without a culture of change, there is no acceptance; and without management, silos arise. The deviations that occur are not conceptual inconsistencies, but implementation constraints (time, human resources, financial capacity, autonomy of members), which do not contradict the model, but empirically reinforce it. On this basis, we can conclude that the results of the interviews not only confirm the model, but also operationalize it with good practices that show how its components are actually implemented in real higher education environments.

5. Conclusion

The results of the study confirm that a clear digital strategy and active management play a key role in the level of digital transformation in higher education institutions, while organisational culture, human resource factors, and management systems are also important.

The digital transformation of higher education institutions requires overcoming numerous challenges, such as a lack of digital skills among employees, resistance to change, data security and privacy issues, and limited financial resources for sustainable solutions. The key success factors in implementing these changes are appropriate leadership, planning, financing, and human resource management, as these factors directly influence an organisation's readiness for innovation, collaboration, and adaptability in the digital transformation process.

References

- Al Nuaimi, B. K., Kumar Singh, S., Ren, S., Budhwar, P., & Vorobyev, D. (2022). Mastering digital transformation: The nexus between leadership, agility, and digital strategy. *Journal of Business Research*, 145, 636–648. doi:10.1016/j.jbusres.2022.03.038
- Chen, Q., Gong, Z., Wu, J., & Wang, T. (2024). Does digital transformation affect carbon performance through talent? The moderating role of employee structure. *Journal of Cleaner Production*, 435, 140581. doi:10.1016/j.jclepro.2024.140581

- Cozmiuc, D. C., & Pettinger, R. (2021). Consultants' tools to manage digital transformation: The case of PWC, Siemens, and Oracle. *Journal of Cases on Information Technology (JCIT)*, 23(4), 1–29. doi:10.4018/JCIT.20211001.0a7
- Garcia-Perez, A., Cegarra-Navarro, J. G., Sallos, M. P., Martinez-Caro, E., & Chinnaswamy, A. (2023). Resilience in healthcare systems: Cyber security and digital transformation. *Technovation*, 121, 102583. doi:10.1016/j.technovation.2022.102583
- Gebremeskel, B. K., Jonathan, G. M., & Yalew, S. D. (2023). Information security challenges during digital transformation. *Procedia Computer Science*, 219, 44–51. doi:10.1016/j.procs.2023.01.262
- Kimberling, E. (2023). How McKinsey's 7S model can enable successful digital transformations. *LinkedIn*. Retrieved from <https://www.linkedin.com/pulse/how-mckinseys-7s-model-can-enable-successful-digital-eric-kimberling-d5sxe/>
- Kitsios, F., Kamariotou, M., & Mavromatis, A. (2023). Drivers and outcomes of digital transformation: The case of public sector services. *Information*, 14(1), 1. doi:10.3390/info14010043
- Lafioune, N., Desmarest, A., Poirier, É. A., & St-Jacques, M. (2023). Digital transformation in municipalities for the planning, delivery, use and management of infrastructure assets: Strategic and organizational framework. *Sustainable Futures*, 6, 100119. doi:10.1016/j.sfr.2023.100119
- Liu, H. (2020). Research on library data management reform: Discussion on McKinsey 7S system thinking model. In *2020 6th International Conference on Information Management (ICIM)* (pp. 295–298). IEEE. doi:10.1109/ICIM49319.2020.244714
- Masuda, Y. (1980). *The information society as post-industrial society*. World Future Society. Retrieved from <http://archive.org/details/informationssocie0000masu>
- Mergel, I., Edelmann, N., & Haug, N. (2019). Defining digital transformation: Results from expert interviews. *Government Information Quarterly*, 36(4), 101385. doi:10.1016/j.giq.2019.06.002
- Müller, S. D., Konzag, H., Nielsen, J. A., & Sandholt, H. B. (2024). Digital transformation leadership competencies: A contingency approach. *International Journal of Information Management*, 75, 102734. doi:10.1016/j.ijinfomgt.2023.102734
- Opland, L. E., Pappas, I. O., Engesmo, J., & Jaccheri, L. (2022). Employee-driven digital innovation: A systematic review and a research agenda. *Journal of Business Research*, 143, 255–271. doi:10.1016/j.jbusres.2022.01.038
- Pucihar, A., Marolt, M., Vidmar, D., & Lenart, G. (2021). Digital transformation of Slovenian enterprises. In *2021 44th International Convention on Information, Communication and Electronic Technology (MIPRO)* (pp. 1393–1397). doi:10.23919/MIPRO52101.2021.9596708
- Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems*, 28(2), 118–144. doi:10.1016/j.jsis.2019.01.003