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The Impact of Digital Transformation on Institutional Growth. A Case of Zimbabwean Universities.

Research Paper

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Abstract

The pressure for institutions to digitally transform has been building, and COVID-19 accelerated the transition in developing countries. The study evaluated the impact of digital transformation on Zimbabwean universities. The Microsoft digital transformation framework guided the study. Thematic analysis was used to extract meaning and generate themes from qualitative data from Zimbabwean University ICT Directors. Results show that digital transformation positively impacted institutional growth and efficiency. Most universities invest in digital technology to increase service reliability and availability. Digital transformation teams were bolstered to support student processes and create personalised learning journeys. The digital transformation led to the adoption of several revenue collection streams, fostering institutional growth. Employees were equipped with skills to support digitisation. Implementation barriers include resistance to change, skills gaps, high costs, infrastructure and legacy systems. The government should upgrade the telecommunications infrastructure to support the digital trajectory and set policies to create a conducive environment for digital transformation.

Keywords

Digital transformation, Higher Education Institutions, Microsoft digital transformation framework, Automation, Operational efficiency

INTRODUCTION

Digital transformation is a fundamental technology-centred strategy that must permeate all levels of the institution by adopting efficient, streamlined, innovative and sustainable ways that foster growth. The knowledge economy demands institutions to be agile and adaptive to harness new opportunities for competitiveness and improved customer experience. Digital technologies are causing extraordinary disruption in business, society, education, work, and lives in ways no one could predict (Vial, 2019). COVID-19 disrupted every aspect of human life and triggered the unprecedented adoption of digital platforms in the Global South; this has improved digitisation efforts in every sector of the global economy, especially in developing countries (Maphosa, 2022). Artificial intelligence (AI), the Internet of Things (IoT), mobile technology, 5G, cloud computing, big data, machine learning and virtual reality enable institutions to evolve their processes and operations to remain competitive (Kiryakova et al., 2017).

Digital transformation generally re-aligns and reimages operations in response to 21st-century information needs. Vial (2019) defines digital transformation as creating new operations or modifying existing organisational processes and culture using digital technologies to improve performance. According to Ebert and Duarte (2018), digital transformation concerns the strategic adoption of digital technologies. The educational goals of educators have been consistent, including improving the learning environment, enhancing operational efficiency, using advanced computing to support research and stimulating innovation (Alenezi, 2021). Universities use digital transformation to retain a competitive advantage by offering dynamic services to students and other stakeholders. Talin (2020) posits that digital transformation should solve institutional problems by coining new ways that align technology with institutional goals. Applying new digital technologies to improve customer experience, optimise operations, increase reliability and availability, and generate new business models is called the digital transformation (Ebert & Duarte, 2018).

To achieve fundamental digital transformation, leadership at higher education institutions (HEI) must have a vision and enact policies that champion the automation of internal processes, foster collaboration, integrate social media applications, and adopt learner-centred pedagogies. Digital transformation is a paradigm change and a technical revolution (Mendonça & Andrade, 2018). Digital transformation affects organisational culture, activities, processes, competencies, and models, leading to sustained growth (Vogelsang, 2018). Institutions embrace digital platforms to bypass intermediaries, realise the potential of connectedness, and adopt new digital business models that are data-driven, increase agility, and retain customers (Van Veldhoven & Vanthienen, 2022).

Only now, digital transformation has been trending among academics and professionals, but grasping the transformational processes accompanying institutional growth is still lacking (Ebert & Duarte, 2018). The education system is witnessing tremendous changes, such as intelligent tutors, virtual reality, recommender systems, AI and chatbots (Maphosa & Maphosa, 2023). Learning institutions embrace chatbots, intelligent tutoring systems and portals that enable parents to interact with the teachers and become involved in the learning process.

According to research from an industrial sociological perspective, the creation, diffusion, and deployment of new technologies in digital transformation encounter numerous challenges, particularly in African countries (Heavin & Power, 2018). Research in South Africa proved that the country had adopted digital transformation to promote growth. However, it highlighted the

influence of inconsistent policies, poor coordination, fragmentation, and poor implementation among departments (Manda & Backhouse, 2017). The study aims to investigate the impact of digital transformation in Zimbabwean universities. The study had three research questions: What are the opportunities for growth brought by digital transformation in Zimbabwean universities? What is the impact of digital transformation on Zimbabwean universities? What are the significant barriers to digital transformation?

DIGITAL TRANSFORMATION FRAMEWORK

Digital transformation should embrace technologies and create structural and financial changes (Alenezi, 2021). Several frameworks have been proposed to support digital transformation in higher education: the Google framework, the KPMG blueprint and Microsoft's framework. The study adopted the four-dimensional Microsoft framework that covers student achievement, teaching and learning, leadership, policy and the intelligent environment (Microsoft, 2022). It provides an extensive digital transformation blueprint to augment the institution's vision and mission. The framework ensures that leadership provides strategy and policies, invests in technology and promotes a culture of digital innovation that supports educational delivery. The framework covers the main focus areas in higher education. As shown in Figure 1, student achievement focuses on providing digital services that attract top-class students. The teaching and learning quadrant ensures institutions invest in technology and train staff and students to improve educational outcomes. Leaders evaluate emerging technology's affordances and risks before adoption. An intelligent environment is a secure and connected campus where digital technologies are employed to optimise and efficiently manage institutional resources. Rodríguez-Abitia et al. (2020) proposed a similar framework that evaluates the infrastructure, facilities, processes and personnel to determine digital transformation within Spanish universities.

Figure 1

Education Transformation Framework for Higher Education (Microsoft, 2022)



LITERATURE REVIEW

The economic, political and contextual constraints shape the digital transformation of higher education (Rodríguez-Abitia & Bribiesca-Correa, 2021). Digital transformation enables

organisations to operate efficiently due to reduced overheads and improved communication (Verhoef, 2021). Digital transformation involves strategically aligning organisational processes with emerging technologies (Rodríguez-Abitia & Bribiesca-Correa, 2021). Almaazmi et al. (2020) acknowledged that digital transformation was not all about technological changes but highlighted the importance of cultural differences in the organisation for successful implementation. Digital transformation is an organisational strategy for responding to technological changes (Drechsler et al., 2020). Contemporary HEIs embrace digital technologies to transform and develop new practices and effective methods for achieving their mission (Alenezi, 2021). Universities use digital transformation for operational efficiency and competitiveness (Matt et al., 2015). Adopting digital tools fosters organisational change in work delivery, communication, and providing services but requires changes in the structure and culture of an organisation (Laukkanen, 2020). Digital transformation is fundamental to institutional growth and reputation by influencing changing business models (Reis, 2018).

Institutions wishing to enjoy growth through new technologies must invest more in ICT infrastructure (Hunter, 2020). Rodríguez-Abitia et al. (2020) highlighted that infrastructure, facilities, educational technologies, processes and people determined the digital transformation trajectory of universities. Other scholars note that technological infrastructure is critical to successfully implementing digital transformation (Hunter, 2020; Ahmad, 2021). IoT, mobile technologies, cloud computing, big data, augmented reality, blockchain, and social media disrupt traditional processes (Zimmermann et al., 2018). The digital age has seen universities mapping strategies to exploit IoT to achieve the characteristics of smart towns (Hashim, 2022).

Fletcher and Griffiths (2020) concluded that HEIs should focus on their digital maturity; those at the lower levels are vulnerable, while those who have reached mature levels are adaptive and enjoy flexibility and agility. Those who lack consistency, inadequate hardware and Internet capabilities, and lack clarification of the roles and responsibilities of different team members will fail to realise the benefits of digital transformation (Heavin & Power, 2018). Kane (2017) states that institutions should utilise digital technologies to break geographic boundaries, innovate course delivery and overhaul traditional systems. Eden et al. (2020) highlighted that digital transformation allows institutions to support teaching and learning, research, and student support services in line with technological and social changes.

Ndemo and Weiss (2017) examined Africa's emerging digital transformation. The study concluded that Africa still needs to invest in technologies that enable the continent to participate in the digital revolution. Madichie et al. (2021) explored digitalisation in West Africa. The study found inadequate technological infrastructure and low Internet penetration as the main challenges to fostering success. Van Dyk and Van Belle (2019) concluded that it was important for governments and organisations to craft ICT policies that accommodate new technology for the efficient operation of institutions. The Zimbabwean ICT environment remains challenging; the low levels of ICT diffusion limit the potential for digital solutions to enhance sustainable development. In most developing countries like Zimbabwe, learners struggle to participate in online learning (Maphosa, 2022). Zimbabwe's policy and regulatory environment require significant strengthening for the country to realise the full potential of ICTs in enhancing sustainable development (Kusena & Zhou, 2021).

Rodríguez-Abitia and Bribiesca-Correa (2021) lamented that HEIs always lag businesses and other institutions in digital transformation. Universities in developing countries do not have adequate technology to collect all the data generated by students, thus limiting decision-making

capabilities. They lack the skills to utilise AI concepts such as data analytics due to a lack of data science skills to interpret the data and gain insights into relations between learners, course throughput and programmes (Maphosa & Maphosa, 2021).

METHODOLOGY

The study adopted qualitative research methodology to gain a deeper understanding of the concepts under investigation, where the participants in the survey explain why major issues occur. The target population for the study was ICT Directors from Zimbabwean universities. Semi-structured interviews were used for data collection, allowing the researcher to gather highly personalised data from small sample sizes and probe individuals to find more information. The survey was conducted in July 2020. The researcher planned the semi-structured interviews at times convenient for the participants, and the interviews lasted 15-30 minutes. The interview guide was developed based on the Microsoft digital transformation framework to obtain information on the effect of digital transformation. The researcher used Microsoft Teams to record the interviews, which were transcribed using NVivo.

DATA ANALYSIS

Thematic analysis was used to analyse qualitative data by grouping responses into themes. The researcher combed through the information to find recurring themes, concepts, and patterns. The researcher established the credibility and trustworthiness of the study by engaging participants in iterative questioning and allowing them to review the data acquired to verify the accuracy of information and meaning.

Results

The interpretation of the findings and discussion about digital transformation are presented. The participants were drawn from 21 universities in Zimbabwe. Of the 21 scheduled interviews, 15 were successfully conducted, giving a response rate of 71.43%.

Demographics

The participant's demographic information, such as age, gender, educational qualification, work experience, and institution size, was collected. As shown in Table 1, the majority (80%) were male, while slightly over half (53.3%) were aged 31-40. Almost three quarters (73.33%) had a master's degree, the majority (40%) had 5-10 years in IT management, and 40% had a student and staff complement of over 10,000. The demographics show that IT management is male-dominated, and over 70% of the Directors are under 40.

Table 1

Characteristics of the respondents

Characteristics of the respondents			
Variable	Category	Frequency	Percentage
Gender	Male	12	80%
	Female	3	20%

Age	20-30 years	3	20%
	31-40 years	8	53.3%
	41-50 years	4	26.67%
Education	First Degree	3	20%
	Master's Degree	11	73.33%
	PhD	1	6.67%
Years of experience in IT management	Below 5	2	13.33%
	5-10	6	40%
	10-20	5	33.33%
	Above 20	2	13.33%
Staff and student population	Below 1000	2	13.33%
	1001-5000	3	20%
	5001-10000	5	33.33%
	Over 10000	6	40%

Coding of Themes

Similar trends and commonalities of participant responses were organised using a coding technique. The first step was open coding, labelling known patterns or grouping expressions, splitting them into distinct components, and analysing common and contrasting themes in the data (Kiger & Varpio, 2020). The next step was identifying patterns and grouping meanings with internal convergence and external divergence. The following main themes emerged from the coding process.

Bolstering Digital Transformation Teams

To support digital transformation, university leaders should craft a clear vision, raise awareness, employ personnel with various digital skills, and invest in the right technology. Responses from participants 1, 10 and 12 are recorded below:

“Our institution has crafted a strategy to support digital transformation and is raising awareness across the university.”

“Management formed digital transformation teams to lead in implementing digital change projects across the campus to enhance operational efficiency.”

“Digital transformation is deployed unequally, and our institution adopted schemes to assist students with the devices and improved Internet access.”

A clear vision from the executive is vital in harmonising and aligning digital transformation aspirations. These teams are internal change agents who drive the technological implementation and inspire staff to spread the change across the institution.

Skilled Labour Force

Participants noted that hiring skilled personnel and training led to effective digital transformation. Participants 7 and 11 stated the following during the interview.

“Hiring skilled personnel has enabled institutions to embrace digital transformation and quickly adapt to new initiatives.”

“The institution continued operating during disruptions such as the Covid-19 era due to adopting digital technologies.”

During COVID-19, institutions were forced to transform and deliver customer experience in line with unprecedented customer needs. As universities adopt digital transformation technologies, teaching staff have low digital skills, and their training becomes a priority. This aligns with Trifonov and Shorokhova (2019), who observed that the faculty struggled to embrace new teaching methods.

Creating Personalised Learning Journeys

Universities integrated learning management systems with management information systems. Universities invest in technologies that collect and analyse student data to provide personalised learning paths and create interactive platforms for students, such as virtual campus tours.

Participant 2 noted;

“Digital transformation has allowed the institution to offer convenience to the students such as online application and registration, online payment and reservation.”

Participant 6 had this to say;

“Due to adopting learning management systems, students can learn at their own pace and time.”

Participant 9 responded;

“The institution has adopted blended learning across all the courses to enable students to work from home, thus efficiently utilising teaching space at campus.”

The responses show that institutions invest in digital technologies to foster personalised learning and support emerging student needs. Valdés et al. (2021) noted that institutions adopted e-learning and video streaming to support digital transformation. This means the digital transformation process involves cost-saving techniques, thereby growing the business by either minimising costs or increasing revenue (Kim, 2021).

Pioneering New Technologies

Universities automate most processes to bring operational efficiency (Maphosa, 2020). AI and data analytics are applied to enhance student engagement and decision-making. Some institutions invest in intelligent teaching systems and chatbots to respond timeously to student enquiries.

Participant 9 added;

“Digital transformation has seen the institution investing in technology that supports student-centred learning.”

Also, Participant 10 mentioned that;

“Authorities have access to information regarding student performance at their fingertips due to the adoption of technologies such as big data, data analytics and predictive analysis.”

Participant 13 added;

“The institution has streamlined its operations, which assisted in decision-making and anticipating problems.”

Educators are using AI-driven technologies to support decision-making. These assist organisations in predicting the future needs of students and other stakeholders. There is an improvement in the deployment of emerging technologies in the classroom, replacing traditional educational technologies.

Improved Revenue Collection

The participants in the survey highlighted improved revenue collection due to digital transformation. The following responses from the interviews support digital transformation.

“Our institution embraced digital transformation; we adopted various online payment platforms, integrated our enterprise resource planning systems with payment gateways, allowing students to pay through online platforms, and improved revenue collection.”

Participant 1.

Participant 6 also expanded;

“The introduction of online payment systems has improved our revenue collection by 40% as these methods offer students convenience.”

More so, participant 14 explained;

“Improved payment systems as part of digital transformation have seen students paying anytime and anywhere.”

These findings indicate that digital transformation contributes to the growth of universities through increasing revenue collection. The feedback conforms to the conclusions of Scuotto (2021), who noted that institutions that appreciate digital transformation in their operations enjoy increased revenues due to their ability to reach out to customers conveniently. Wang et al. (2020) also established that digital transformation leads to several revenue collection streams, fostering institutional growth.

Acquiring Cloud Services and Automation Software

The participants indicated that embracing digital transformation requires institutions to guarantee the availability of services.

Participant 3 responded;

“We have acquired cloud services to ensure that our systems are always available and are not affected by power losses and hardware failure.”

Participant 5 had this to say;

“Utilising software packages like Office 365 ensures that teams can work remotely and collaborate on certain projects, enhancing productivity.”

These findings are similar to Hunter et al. (2020), who argued that digital transformation requires the right tools to coordinate processes. Madichie et al. (2021) posited that institutions investing in modern technologies enjoy sustained growth due to operational efficiency.

Upskilling IT Staff

It also emerged from the responses that institutions train staff to embrace and adapt to emerging processes. The following responses were given by participants 4, 5, and 11, respectively;

“We have an IT department responsible for managing acquired technologies and training other employees to cope with the process.”

“Our institution regularly trains IT staff to cope with the new operational changes, and since the IT department leads the process, they also train other staff members to familiarise themselves with the new initiatives.”

“Carrying out regular workshops and certification is a norm we adopted in teaching our staff digitisation concepts to improve operational efficiency.”

The responses reveal that upskilling staff is one of the strategies institutions embrace to enjoy the benefits of digital transformation. Kiryakova et al. (2017) emphasised the importance of training employees to use digitisation to grow their institution. Digitisation allows employees to be productive as they are now mobile and can work from anywhere. In addition, participants highlighted that regular workshops were necessary as they keep staff up to date on the developments in the digitisation market, which works for the institution's success.

CHALLENGES FACING DIGITAL TRANSFORMATION INITIATIVES IN ZIMBABWE

The study also sought to identify challenges affecting digital transformation in Zimbabwean universities. The sub-themes that emerged are resistance to change, skills gap, infrastructure, and legacy systems. Universities should train students for future jobs and competencies in this technological era and knowledge economy.

Resistance to change

Participants indicated that resistance to change limited the university's capacity to grow and efficiently manage its processes. The responses given by participants 1, 6 and 10 are shown below, respectively;

“We have challenges with employees who want to keep using old ways of doing business like sticking to the physical holding of meetings rather than online meetings, which save resources.”

“Some employees do not pay attention to the changes emerging in the market and do not appreciate the need to embrace the new digital tools.”

Chen's (2021) study also supports resistance to change, and the author argues that the fear of losing current jobs is the crucial reason employees do not want to welcome change.

Skills Gap

The skills gap was identified as one of the barriers to effective digital transformation, as explained by participants 11 and 14, respectively.

“The university always incurs training and retraining costs because digital transformation is an ongoing process which always brings in new developments and the employees need to be familiar with.”

“To achieve the desired results from digital transformation, the institution trained students on the new skills and competencies required in this new digital trajectory.”

These responses show that employees require training to acquire new skills. These findings are similar to those of Sainger (2018), who found that institutions are sometimes limited in effectively using inventions due to a lack of resources to train and constantly retrain employees.

Infrastructure and Legacy Systems

All participants pointed out that infrastructure and legacy systems hampered digital transformation. Institutional data is being held in legacy systems; over the years, these systems have defined some process flows influencing process execution. This calls for constantly upgrading existing systems as a transformation process (Laukkanen, 2020).

RESULTS AND DISCUSSION

Digital transformation has brought simplification and improvement of processes within the university. The Microsoft digital transformation framework guided the study. Thematic analysis was used to review the responses to the study’s research questions. The responses reveal that digital transformation positively impacts institutional growth by reducing operational costs and increasing revenue. All participants indicated that digital transformation improved resource management efficiency and customer satisfaction. The findings are supported by Scuotto (2021), who also found the same results. The participants showed that revenue collection improved by adopting online payment systems. Results show an improvement in deploying emerging technologies in the classroom, replacing traditional educational practices. The digital transformation brought convenience to students through personalised learning supported by e-learning and business intelligence systems. It has brought convenience to the employees and increased productivity as they can now work from anywhere. The adoption of AI improved the decision-making and effectiveness of the institutions. Digitisation reduces stationery costs and brings convenience through teleworking. These findings are similar to those of Valdés et al. (2021) and Matt et al. (2015), who argued that institutions that use digitisation in their operations enjoy flexibility.

Participants identified the acquisition of tools that facilitate digital transformation, staff training and employing a skilled labour force as barriers to digital transformation. Digitalisation usually involves using ICT-related tools to reduce costs and meet the needs of students, staff and stakeholders. The findings are supported by empirical literature (Hunter, 2020; Ahmad, 2021). Other barriers include resistance to change, skills gaps, infrastructure and legacy systems. Sometimes, the staff want to avoid accepting the change that comes with digitisation, fearing losing their jobs when the innovation is labour-saving. Infrastructure becomes a processing bottleneck, while legacy systems have defined process flows and stored information in formats that might not support data analytics and business intelligence. This means that digital transformation requires universities to upgrade the skills of their employees, which is costly. The results show that digital transformation has some challenges that need to be addressed for the institutions to realise the benefits of the process.

CONCLUSION

The paper presented literature on digital transformation in higher education. The Microsoft digital transformation framework guided the study to provide an overview of digital transformation in Zimbabwean universities. Primary data was collected through interviews and employed a qualitative analysis. The interviews were conducted from a sample of 21 participants with a response rate of 71.43%. Through thematic analysis, the study established critical themes from the responses given. The study shows that digital transformation positively impacts institutional growth. Institutions wishing to remain competitive in the market and grow should be ready to incur the necessary costs.

The responses highlight that digital transformation positively influences institutional growth by reducing operational costs and increasing revenue. Institutions are investing in automation software to effectively and efficiently run their operations. When institutional leaders embrace the digital transformation vision, they drive the entire institution to a common destiny of real and tangible impact. Institutions bolstered their IT teams and engaged digital transformation teams to support operational efficiency. Universities are creating personalised learning journeys by embracing student-centred learning, collecting and analysing student data and creating interactive platforms such as virtual tours. Some universities are pioneering new technologies such as AI, data analytics and predictive analysis to enhance student engagement and decision-making as part of their digital transformation strategy. Training of staff and employing a skilled labour force influenced digital transformation. Institutions acquired cloud services to support digital transformation, ensuring services are available 24/7. Implementation barriers included resistance to change, skills gaps, infrastructure and legacy systems.

The study recommends that universities invest in the digital transformation processes by providing the necessary tools, including exploring new and efficient ways of supporting operations. Institutions with no internal capacity should carry out digital transformation projects with the support of consultants. The government should support institutions to meet digital transformation targets and enact policies that create a conducive environment. The country should establish national broadband blueprints for high-speed networks, including investments in solar power to supplement unreliable electricity supply. These plans should be reviewed regularly to support the digital transformation trajectory. The study contributes literature on digital transformation in developing countries such as Zimbabwe and provides policy recommendations for supporting the process. The study's main limitation was using video conferencing instead of face-to-face to conduct interviews. For better results, the study should have involved more end users, such as students and staff.

REFERENCES

- Ahmad, A.A. (2021). Factors that impact organization digital transformation and organization decision making during Covid19 pandemic. *The Effect of Coronavirus*, 95-104. https://doi.org/10.1007/978-3-030-67151-8_6
- Hunter, D. R. E. (2020). Reflecting on the launch of a digital transformation project in a construction company. *Industrial Marketing and Purchasing group – Working Paper IMP Conference 2020*, 1-7.

https://myresearchspace.uws.ac.uk/ws/portalfiles/portal/20758581/2020_05_20_Hunter_et_al_Construction_accepted.pdf

- Almaazmi, J.A.M. (2020). The Effect of Digital Transformation on Product Innovation: A Critical Review. *Advances in Intelligent Systems and Computing*, 731-741. https://doi.org/10.1007/978-3-030-58669-0_65
- Chen, C.L.Y. (2021). Role of government to enhance digital transformation in small service business. *Sustainability*, 13(3), 19-24. <https://doi.org/10.3390/su13031028>
- Scuotto, V.N.M. (2021). A microfoundational perspective on SMEs' growth in the digital transformation era. *Journal of Business*, 129, 382-392. <https://doi.org/10.1016/j.jbusres.2021.01.045>
- Wang, H.F.J. (2020). The effect of digital transformation strategy on performance. The moderating role of cognitive conflict. *International Journal of Conflict Management*, 31(3), 441-457. <https://doi.org/10.1108/IJCM-09-2019-0166>
- Matt, C., Hess, T., & Benlian, A. (2015). Digital transformation strategies. *Business and Information Systems Engineering*, 5(7), 339-343. <https://doi.org/10.1007/s12599-015-0401-5>
- Kane, G. (2017). MetLife centers its strategy on digital transformation. *MIT Sloan Management Review*, 59(1), 88-95. <https://www.proquest.com/openview/4055abf76e92479a2b594e8a1e6e1215/1?pq-origsite=gscholar&cbl=26142>
- Drechsler, K., Gregory, R., Wagner, H., & Tumbas, S. (2020). At the Crossroads between Digital Innovation and Digital Transformation. *Commun. Assoc. Inf. Syst.*, 47, 521-538. <https://doi:10.17705/1CAIS.04723>.
- Eden, R., Burton-Jones, A., Casey, V., & Draheim, M. (2020). Digital Transformation Requires Workforce Transformation. *MIS Q. Exec.*, 18(1), 1-10. <https://doi.org/10.17705/2msqe.00005>
- Fletcher, G., & Griffiths, M. (2020). Digital transformation during a lockdown. *Int. J. Inf. Manag.*, 55, 102185. <https://doi.org/10.1016/j.ijinfomgt.2020.102185>
- Talin, B. (2020, December 9). *Was is it "Digital Transformation?"* Retrieved from [Wir habens erklärt: https://morehandigital.info/ist-digital-transformation/](https://morehandigital.info/ist-digital-transformation/)
- Rodríguez-Abitia, G., & Bribiesca-Correa, G. (2021). Assessing Digital Transformation in Universities. *Future Internet*, 13(2), 1-16. <https://doi.org/10.3390/fi13020052>
- Rodríguez-Abitia, G., Martínez-Pérez, S., Ramírez-Montoya, M.S., López-Caudana, E. (2020). Digital Gap in Universities and Challenges for Quality Education: A Diagnostic Study in Mexico and Spain. *Sustainability*, 12, 1, 14-22. doi:10.3390/su12219069.
- Maphosa, V., & Maphosa, M. (2021). The Trajectory of Artificial Intelligence Research in Higher Education: A Bibliometric Analysis and Visualisation. *International Conference on Artificial Intelligence, Big Data, Computing and Data Communication Systems (icABCD)* (pp. 1-7). Durban: IEEE. <http://doi.org/10.1109/icABCD51485.2021.9519368>

- Valdés, K., Alpera, S., & Cerdá-Suárez, L. (2021). An Institutional Perspective for Evaluating Digital Transformation in Higher Education: Insights from the Chilean Case. *Sustainability*, 13(17), 1-27. <https://doi.org/10.3390/su13179850>
- Microsoft. (2022). *Microsoft Education Transformation Framework for Higher Education*. Retrieved November 2022, from <https://tinyurl.com/y5tskf49>
- Alenezi, M. (2021). Deep Dive into Digital Transformation in Higher Education Institutions. *Education Sciences*, 11(12), 770-780. <https://doi.org/10.3390/educsci11120770>
- Trifonov, V., & Shorokhova, N. (2019). University Digitalization—A Fashionable Trend or Strategic Factor of Regional Development? *The European Proceedings of Social & Behavioural Sciences EpSBS* (pp. 1003–1013.). London, UK: Future Academy.
- Maphosa, V. (2022). Delivering a Drug Information App to Underserved Communities: A User-Centered Design Approach. *Journal of Global Information Technology Management*, 25(4), 286-301
- Sainger, G. (2018). Leadership in Digital Age: A Study on the Role of Leader in this Era of Digital Transformation, *International Journal on Leadership*, 6(1), 1-6. <http://www.publishingindia.com>
- Zimmermann, A., Schmidt, R., Bogner, J., Jugel, D., & Möhring, M. (2018). Software Evolution for Digital Transformation. *ENASE*, (pp. 205-212). Madeira, Portugal. <https://www.scitepress.org/Papers/2018/68157/68157.pdf>
- Ebert, C., & Duarte, C. (2018). Digital Transformation. *IEEE Softw*, 35(4), 16-21. https://www.researchgate.net/profile/Carlos-Henrique-Duarte-2/publication/326241618_Digital_Transformation/links/5b4d14f3aca27217ff9b05e4/Digital-Transformation.pdf
- Heavin, C., & Power, D. (2018). Challenges for digital transformation—towards a conceptual decision support guide for managers. *Journal of Decision Systems*, 27(1), 38-45. <https://doi.org/10.1080/12460125.2018.1468697>
- Kiger, M., & Varpio, L. (2020). Thematic analysis of qualitative data: AMEE Guide No. 131. *Medical teacher*, 42(8), 846-854. <https://doi.org/10.1080/0142159X.2020.1755030>
- Kusena, B., & Zhou, M. (2021). Digital historical research and the repositioning of Africa in knowledge production. *Journal of the British Academy*, 9(s1), 243-255. <https://doi.org/10.5871/jba/009s1.243>
- Madichie, N., Bolat, E., & Taura, N. (2021). Digital transformation in West Africa: a two country, two-sector analysis. *Journal of Enterprising Communities: People and Places in the Global Economy*, 15(2), 246-257. <https://doi.org/10.1108/JEC-06-2020-0114>
- Manda, M., & Backhouse, J. (2017). Digital transformation for inclusive growth in South Africa. Challenges and opportunities in the 4th industrial revolution. *2nd African conference on information science and technology*, (pp. 1-11). Cape Town, South Africa.
- Maphosa, V. (2021). COVID-19 and the Digital Ecosystem: Using a Mobile App to Connect a Rural Community, *Aquademia*, 5(1), 21002. <https://doi.org/10.21601/aquademia/9580>

- Maphosa, V., & Maphosa, M. (2023). Adoption of Educational Fourth Industrial Revolution Tools Pre and Post-COVID-19 and the emergence of ChatGPT. In Reimagining Education - The Role of E-learning, and Technology in the Post-pandemic Era. IntechOpen. <https://doi.org/10.5772/intechopen.1001612>.
- Matt, C., Hess, T., & Benlian, A. (2015). Digital transformation strategies. *Business & information systems engineering*, 57(5), 339-343. <https://doi.org/10.1007/s12599-015-0401-5>
- Reis, J., Amorim, M., Melão, N., & Matos, P. (2018). Digital transformation: a literature review and guidelines for future research. *World conference on information systems and technologies* (pp. 411-421). Springer, Cham.
- Van Dyk, R., & Van Belle, J. (2019). Factors influencing the intended adoption of digital transformation: a South African case study. *2019 Federated Conference on Computer Science and Information Systems (FedCSIS)* (pp. 519-528). Leipzig, Germany: IEEE.
- Van Veldhoven, Z., & Vanthienen, J. (2022). Digital transformation as an interaction-driven perspective between business, society, and technology. *Electronic Markets*, 32(2), 629-644. <https://doi.org/10.1007/s12525-021-00464-5>
- Verhoef, P., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, 122, 889-901. <https://doi.org/10.1016/j.jbusres.2019.09.022>
- Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The journal of strategic information systems*, 28(2), 118-144. <https://doi.org/10.1016/j.jsis.2019.01.003>
- Vogelsang, K., Liere-Netheler, K., Packmohr, S., & Hoppe, U. (2018). Success factors for fostering a digital transformation in manufacturing companies. *Journal of Enterprise Transformation*, 8(1-2), 121-142. <https://doi.org/10.1080/19488289.2019.1578839>
- Maphosa, V. (2020). Using MyLSU app to enhance student engagement and promote a smart town at a rural university in Zimbabwe. *Cogent Education*, 7(1), 1823143. <https://doi.org/10.1080/2331186X.2020.1823143>
- Mendonça, C., & Andrade, A. (2018). Elements of digital transformation in dynamic capabilities in a Brazilian capital. *Journal of Information Systems Engineering & Management*, 3(3), 1-8. <https://doi.org/10.20897/jisem/2654>
- Laukkanen, I. (2020). People, Competencies, and Capabilities Are Core Elements in Digital Transformation: A Case Study of a Digital Transformation Project at ABB. *Data Analytics and AI*, 183-210. Auerbach Publications
- Ndemo, B., & Weiss, T. (2017). Making sense of Africa's emerging digital transformation and its many futures. *Africa Journal of Management*, 3(3-4), 328-347. <https://doi.org/10.1080/23322373.2017.1400260>
- Kim, S. (2021). Sustainable growth variables by industry sectors and their influence on changes in business models of SMEs in the era of digital transformation. *Sustainability*, 13(13), 1-21. <https://doi.org/10.3390/su13137114>

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