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Influencing factors of West Java higher education digital transformation

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ABSTRACT

Background: Digital transformation, in this sense, means incorporating digital technology into many aspects of higher education, including learning, teaching, administration, and research. **Purpose:** This research aimed to generate a framework that is more knowledgeable than it was by utilizing digital technologies. In education, digital evolution attempts to establish an effective pleasant learning environment for everyone involved in a Smart Learning Environment. **Methods:** It employed an explanatory database analysis with multiple linear regression to examine the influencing factors of West Java's higher education digital transformation. **Results:** The results indicated that digital transformation promotes more efficient work. However, there are also disadvantages, including reduced versatility, increased levels of student participation, and greater interaction among universities. It assures that the technology is dependable, functional, and satisfies stakeholders' requirements. As they must adjust to the digital age and incorporate new methods and practices, higher education institutions play a significant role in the transition of the educational field. **Conclusion:** In education, digital transformation has demonstrated positive impacts, such as faster and more efficient work processes and increased access to information. Digital transformation also presents negative aspects, such as loss of flexibility, increased student involvement, and increased interactivity between universities. **Implications:** The application of technology information systems in higher education is significant for developing the education system. Transforming information technology systems in higher education is a strategic and enlightening vision for organizations, increasing efficiency, productivity, and accessibility.

Keywords: Digital transformation; higher education; technology; innovation; influencing

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INTRODUCTION

Digital transformation is the effort and action of moving towards a smarter system through digital technology intervention. In education, the digital shift aims to create an educational environment that is successful and comfortable for all participants involved (Smart Learning Environment). Transforming digital higher education pertains to an approach of incorporating technological innovations into many parts of the university system, such as learning, teaching, administration, and research.

The development of digital technology has fundamentally changed the way people work, learn, and interact. Universities as higher education institutions play an important role in producing graduates ready to face the challenges of an increasingly complex and technology-based world of work. Therefore, universities in Indonesia need to carry out digital transformation to adapt to the times and produce competent graduates in the digital era.

Digital transformation within Indonesian higher education institutions has become an imperative. Digital technology with increasingly rapid progress, raises higher expectations for every university graduate. The development of the global world of work, expects university graduates to be equipped with strong academic strengths and digital competencies that have continuously developing competitiveness. The creation of a curriculum that is tailored to the needs of the world of work and industry, the use of information technology in teaching, research, and community service, to the completion of administrative tasks are various aspects of digital transformation at universities in Indonesia. Other implementations as real examples of digital transformation at Indonesian universities are also in the form of distance learning using a learning management system (LMS), research supported by artificial intelligence (AI), and the development of libraries to support student learning.

Improving the quality of education, expanding access to learning materials, and efforts to strengthen the education sector on a global scale stimulate the development of digital transformation at universities in Indonesia. Furthermore, various methods of digital transformation at universities give rise to higher relevance between universities and various industries, labor, and society. Increasingly advanced digital technology also encourages various sectors in the field of education to adapt to digital transformation. Improving the quality of education in general and efforts to produce graduates with special competencies and readiness to face the digital era are changes resulting from digital transformation.

Efforts to improve the quality of a country begin with the implementation of professional formal education by preparing and creating superior, quality, and competitive human resources at the national and global levels. The construction of national characteristics is about to be developed from higher education as one of the fundamental and strategic foundations in preparing human resources in Indonesia, especially in facing the challenges of digital transformation. This is achieved by realizing a strategic higher education curriculum, learning facilities, and human resources.

From previous studies, digital transformation in higher education is an essential process facilitated by digital technologies. Digital transformation in higher education promotes improved educational quality, greater achievement of students, and increased institutional retention. Strong leadership, the capacity to overcome hurdles, the implementation of the proper plan, and consistency in execution are critical components of effective digital transformation in higher education (Bisri et al., 2023). In addition, the successful transformation of traditional institutions towards "smart" digital universities requires strong leadership and an encouraging corporate culture. Establishing new values and standards with an executive coalition empowers people and increases the drive for change. Sustainable management of change towards a "smart university" is dependent on culture and leadership being institutionalized as a common mental program (Anggoro et al., 2023). Meanwhile, previous studies by Tungpantong et al. (2022) highlighted six critical components of digital transformation in higher education institutions: strategy, process, product/service, people, data, and technology. The organization's willingness to adapt, good planning and implementation, and initiation of effective digital technology management are key

factors for the success of digital transformation in higher education. Higher education leaders and executives should emphasize information infrastructure, digital skills, and digital policies to help with the digital transformation process. And also, Khurniawan et al. (2022) conducted a study that created a valid and reliable tool for assessing digital transformation performance in a remote education institution. The instrument is made up of five indicators that represent distinct elements of digital transformation. The second-order confirmatory factor analysis revealed that the instrument had a satisfactory goodness of fit, suggesting that it may effectively evaluate digital change in remote education.

The Technology Acceptance Model (TAM) posits that perceived ease of use and perceived usefulness significantly influence users' acceptance of technology. Supported by research from Alenezi (2021), which emphasizes advanced methodologies in higher education. In addition, the digital transformation framework outlines the necessary components for successful digital transformation in organizations, particularly in education. Bisri et al. (2023) provide a systematic literature review revealing key success factors for digital transformation in higher education.

Change management theory addresses how organizations can effectively implement change. Rodr (2021) supports the notion that digital transformation is essential for enhancing communication and competitiveness in higher education institutions. Furthermore, Constructivist learning theory suggests that learners construct knowledge through experiences and interactions. Saranakumar, AR., Ojha, M., Vinod, Malkar (2022) explore how digital transformation can revolutionize teaching and learning processes, enhancing educational access and performance.

Factual conditions of current digital infrastructure indicate that existing technological infrastructure in West Java's higher education institutions meets short-term needs but struggles with long-term demands, as highlighted by a commonality value of 0.848 for challenges faced. Empirical data shows that digital transformation has led to increased student participation and interaction, although it also presents challenges such as reduced flexibility in learning environments. Meanwhile, the ideal scenario involves fully integrating digital technologies across all educational processes, creating a seamless learning environment that enhances teaching, research, and administration. Effective leadership and ongoing training for faculty and students are essential for maximizing the benefits of digital transformation, ensuring that technology is utilized effectively to improve educational outcomes, as supported by Alenezi (2021) and Shrivastava & Shrivastava (2022).

Higher education digital transformation involves the growing prominence of learning through technology spaces (Bygstad et al., 2022). Higher education digital revolution might enhance the accessibility of learning for people from all social backgrounds while providing individuals with the devices and abilities they need to face contemporary global concerns from a multidisciplinary point of view. Digital advancement in colleges and universities can increase certain abilities required in society, such as finding and interpreting information, using digital mediums and socializing, or dealing with information (Aljanazrah et al., 2022).

Digital advancement examines stakeholders' requirements and desires and assures education delivery (Alenezi, 2021). Díaz-García et al. (2022) report that the digital revolution in educational institutions is leading to significant shifts in research. Utilization of technological advances in colleges and universities, in conjunction with digital and educational preparation and resiliency, are critical success elements for digital transformation (Aljanazrah et al., 2022).

Opportunities and challenges in developing skilled, creative, innovative, and professional human resources as a form of educational practice in a dynamic and continuously changing manner increasingly support the needs during the period of digital disruption through the rise of industrialization 4.0. Superior and competitive human resources at the local, national, regional, and global levels are the main prerequisites for this change. One of the consequences is fragmentation in many dimensions of life, including polarization of attitudes, actions, and construction of reality, in the workplace per se, which is becoming increasingly apparent as an effect of the era of disruption.

Technological innovation has a tremendous influence on higher education, altering teaching and learning processes. The advancement of digital technology has assisted colleges and universities by expanding opportunities for education on a larger scale (Okoye et al., 2023). Technology has aided the development of academic abilities such as problem-solving and critical thinking (Haleem et al., 2022). It has accelerated the change in teaching and learning in higher education institutions. This is accomplished via the employment of digital platforms and educational technology (Okoye et al., 2023). Digital innovation drives and underpins technological advancement in educational institutions. This is dramatically transforming the context of education and assisting academic institutions in improving digital teaching and learning. The power of understanding in educational institutions and educational opportunities must be modified so that future young Indonesians may outperform artificial intelligent machines and be sensible in their use of technologies for the good of humanity (Oey-Gardiner, 2018).

According to the Competent Indonesian National Movement (GNIK, 2018), the Global Competitiveness Index ranking shows that Indonesia ranks 36th in 2017, below Malaysia which ranks 23rd. Meanwhile, in the 2017 Human Capital Index, Indonesia is at the bottom, in the 65th place compared to Malaysia at 33rd, the Philippines at 50th, and Vietnam at 64th. And if we look at the 2017 Global Talent Competitiveness Index ranking, Indonesia is in the 77th place, slightly better than Vietnam at 87th, but still below Malaysia in 27th and the Philippines at 54th (INSEAD, 2016-2018; Sumartias, 2019).

To address the times of the Fourth Industrial Revolution, education is required to produce a creative, inventive, and competitive society. Optimizing technological devices as an educational tool is the solution for producing output that can stay up with or alter current trends for the greater good. Without an exemption, Indonesia must increase the quality of its human resources to meet the expectations of the modern workplace and digital technologies.

As independent variables, technological factors (X1) refer to the technological infrastructure and tools available for digital learning. Shrivastava & Shrivastava (2022) highlight the importance of technology in enhancing operational performance in higher education. Organizational factors (X2) involve the governance and management practices within educational institutions. Also, Antonopoulou et al. (2021) advise the need for policy and budget support to facilitate digital transformation. Meanwhile, the degree to which educational institutions embrace and use digital technologies is measured by the dependent variable, digital transformation in higher education (Y). Stakeholder satisfaction and successful education are influenced by technology according to Karpov & Karpova (2022). Data security and open access to appropriate digital learning are aspects of the environmental factor (X3). According to Novovitsyn et al. (2021), technology that comes from a good reputation provides a comprehensive framework that can support digital transformation in higher education. In previous studies conducted by reputable experts, this was used as a reference to capture the phenomenon of the current state of digital transformation.

Higher education needs to make adjustments to strive to remain relevant and competitive in the face of rapid technological developments. This condition makes various studies on digital transformation in higher education important. Various methods in digital transformation in order to improve learning, and the effectiveness of higher education management show that this is important for institutions to pay attention to. Increasing access to education and the quality of graduate output, this study is suggested as part of the ongoing digital transformation of higher education. By having a comprehensive understanding of digital transformation, universities can improve the quality of education and the needs of graduates for the future.

The main focus of this study is the digital transformation of higher education in West Java. This study focuses on how adaptive and prepared higher education institutions are to adapt to new technology. This is explained by analyzing the relationship between organizational and technological aspects as independent variables, and digital transformation in higher education as the dependent variable, this study uses an explanatory survey approach and multiple linear

regression analysis. Data collection was carried out through online surveys, observations, and literature reviews.

RESEARCH METHOD

This study uses an explanatory survey method so that the relationship between different variables can be known and obtained. The statistical data obtained are then processed, reviewed, and analyzed so that the relationship and pattern of the previously determined variables can be seen. The results of the online survey obtained responses from participants, which were then compiled, so that respondents' perceptions and experiences regarding digital transformation in higher education in West Java could be known.

The questionnaires were disseminated to a number of participants as part of the information-gathering project. Different techniques of multiple linear regression were harnessed in the evaluation to explore the effect of independent variables, organizational and technological factors, on the digital transformation process.

These demographic groups were selected with the study objectives to accommodate the need for a comprehensive examination of the factors that determine the influence on digital transformation across different categories of higher education in the specified region as seen on Table 1 and Table 2. The research cohorts included Universitas Pendidikan Indonesia

Table 1 The State Higher Education Institutions of Incorporated Legal Entity (PTN-BH) in West Java

No	University
1	Universitas Indonesia (UI)
2	Institut Teknologi Bandung (ITB)
3	Institut Pertanian Bogor (IPB)
4	Universitas Padjadjaran (UNPAD)
5	Universitas Pendidikan Indonesia (UPI)
	Total 5

Source: Research Data

Table 2 Private Universities in West Java (Bandung City)

No	University
1	Telkom University, (TEL-U) Bandung
2	Universitas Islam (UNISBA) Bandung,
3	Universitas Nasional Pasim, (UNAS PASIM) Bandung
4	Universitas Islam Nusantara, (UNINUS) Bandung
5	Universitas Katolik Parahyangan, (UNPAR) Bandung
6	Universitas Kristen Maranatha, (MARANATHA) Bandung
7	Universitas Bandung Raya, (UNBAR) Bandung
8	Universitas Widyatama, (UTAMA) Bandung
9	Universitas Sangga Buana YPKP, (USB) Bandung
10	Universitas Sali Al-Aitaam (UNISAL) Bandung
11	Universitas Komputer Indonesia, (UNIKOM) Bandung
12	Universitas Jenderal Achmad Yani, (UNJANI) Cimahi
13	Universitas Kebangsaan, (UNKE) Bandung
14	Universitas Langlangbuana, (UNLA) Bandung
15	Universitas Nurtanio, (UNNUR) Bandung
16	Universitas Al-Ghifari, (AL-GHIFARI) Bandung
17	Universitas Pasundan, (UNPAS) Bandung
18	Universitas Bandung, (UNBAN) Bandung
19	Universitas Muhammadiyah Bandung (UMB), Bandung
20	Universitas Islam Pasundan, (UNIPAS) Bandung
21	Universitas Informatika dan Bisnis Indonesia (UNIBI), Bandung
22	Universitas Advent Indonesia (UNAI), Bandung
23	Universitas Hadatuon (UNHAD), Bandung
24	Universitas Logistik & Bisnis Internasional (ULBI), Bandung
	Total 24

Source: Research Data

Table 3 Determining Total of Sample

PTN/PTS	Population		Sample	
	Lecturer	Student	Lecturer	Student
Universitas Pendidikan Indonesia	1.537	34.721	90	96
Universitas Pasundan	553	18.989	82	96
Subtotal			172	192
Total			364	

Source: Research Data

(UPI) and Universitas Pasundan (UNPAS). Simple random sampling was employed in this study to guarantee that each individual within the designated research population possessed an equivalent opportunity to be incorporated into the sample (Table 3).

Various data collection strategies were used in this study to obtain comprehensive information about higher education digital transformation. These strategies included sending out questionnaires to participants to acquire quantitative data on their experiences, perceptions, and attitudes toward digital transformation in their organizations. Field observations were conducted to gather qualitative data on the actual implementation and use of digital technologies within educational settings. A review of existing literature was performed to support the research findings and provide a theoretical framework.

The multiple linear regression model was applied to identify both the direction and degree of influence of the independent variable effect on the dependent variable. Researchers utilized the following formula for their multiple linear analysis models:

Y= a+b1 x1+b2x2+b3x3

Y: Value of the relationship between the dependent variable and the independent variable

a = constant value as the intersection points

b = coefficient of regression

X1 = Technological Factors

X2 = Organizational Factors

X3 = Environmental Factors

RESULTS AND DISCUSSION

Organizations influence the transformation of higher education, which requires universities to change their governance. Challenges faced by universities were data or information that is not necessarily accurate and necessarily reliable, lack of the technological infrastructure that meets the increasing needs for the short and long term period, application of online learning methods by the lecturers. They implement it differently according to the commitment and strategy of the higher education leaders.

Demographic profile of respondent: The demographic profile of the respondents includes a fair sample of academics and students from two West Java institutions, Universitas Pendidikan Indonesia and Universitas Pasundan. The research involved 364 people, including 172 lecturers and 192 students. This diversified sample included a wide range of academic fields. The inclusion of both groups is critical for comprehending the many perspectives and ramifications of digital activities across the educational environment to ensure that the findings are relevant and applicable to a large audience.

Impact of digital technologies: The integration of digital technologies has significantly increased student and lecturer engagement. The shift towards digital solutions has immensely increased the reach of educational tools, enabling learners to obtain information anytime and anywhere.

Digital technologies facilitate collaborative interactions among students and between academic institutions. It nurtures partnerships aimed at research and the exchange of knowledge. These effects highlight the

transformative potential inherent in digital technologies for enhancing educational outcomes and operational efficiency within higher education institutions located in West Java.

Barriers to digital adoption: Many organizations endure redundant or insufficient technology resources. Insufficient resources make academia difficult to effectively adopt digital tools and platforms. Faculty and staff may exhibit reluctance to adopt new technologies and teaching methodologies, stemming from a lack of familiarity or fear of the unknown, which can hinder progress.

Among educators and students, there are still individuals who do not have the necessary competencies to be directly involved and effectively support digital transformation. The expected consistency has not been shown by subjects in the digital transformation in higher education. This is an obstacle that also hinders the transition of higher education in the field of digital technology in West Java.

Correlation Analysis: The study indicates substantial connections between independent variables such as technological, organizational, and environmental factors, and the dependent variable, digital transformation success in higher education. The regression coefficients show the degree and direction of each independent variable's effect on digital transformation.

The findings show that some characteristics, notably technical preparedness and faculty training, have a statistically significant impact on the efficacy of digital transformation activities, which can help guide future improvement methods. This correlation research sheds light on the factors driving digital transformation in higher education institutions in West Java.

Opportunities for digital transformation in higher education in West Java: The use of digital technology may occur in more effective and interesting learning settings, fostering a Smart Learning Environment that is beneficial to both students and lecturers. The adoption of technology can improve access to education. By embracing digital technology, universities may better coordinate their curriculum with the requirements of society and business to ensure that graduates acquire the necessary skills for the age of technology. These prospects emphasize the potential for considerable improvements to the quality and accessibility of higher education in West Java.

Table 4 Analysis of commonalities of opportunity variables

Commonalities		
X3	Initial	Extraction
	1.000	.882

Extraction Method: Principal Component Analysis.

Source: Research Data:

Table 4 is usually utilized in conjunction with factor analyses or principle component analysis (PCA), both of which are types of statistical approaches to decrease data dimensionality. In simpler terms, it helps identify underlying patterns or factors within a set of variables. This column shows the initial commonality of each variable. Communality refers to the proportion of variance in a variable shared with other variables. In other words, it measures how much a variable is explained by the underlying factors. An initial commonality of 1.000 means that the variable is perfectly correlated with itself.

The column displays the commonality of each variable after the extraction process. Extraction refers to the process of identifying the underlying factors or components. The extraction method used is Principal Component Analysis (PCA). The extracted communality indicates how much of the variable's variance is explained by the extracted factors.

In this specific example, we only have one variable, X3. The initial commonality is 1.000, which makes sense as a variable is perfectly correlated with itself. After the extraction process, the extracted commonality is 0.882. This means that 88.2% of the variance in X3 is explained by the extracted factors. This shows that the opportunity variable commonalities have a significant correlation between the components developed. The table shows that the probability variable can explain the factors because the variable extraction value is greater than 0.50.

In factor analysis, a variable's commonality represents the proportion of variance it shares with other variables. A higher commonality indicates that the variable is more strongly

related to the underlying factors. When the extracted commonality for the opportunities variable is high, the opportunities variable is likely strongly related to other factors crucial for digital transformation in West Java's higher education. This could refer to factors like technological infrastructure, faculty readiness, or institutional culture.

The opportunities variable shares a significant amount of variance with other variables, which indicates its relations to similar underlying constructs or concepts. Also, it might have a substantial impact on the process of digital transformation in higher education institutions in West Java.

The advancement of technology has profoundly altered practically all facets of our lives, particularly education. It has changed the educational scenario in educational institutions by improving teaching and learning, research, and governance. In higher learning, digital evolution encompasses alterations in organizations through digital technology and industrial models to increase an institution's operational performance (Shrivastava & Shrivastava, 2022). Digital transformation for higher education organizations entails creating innovative techniques and practices that have proven more creative and successful in achieving the objective of higher learning. Digital learning is an integral part of the current higher education environment (Alenezi, 2021).

This research shows that lecturers and students can learn without being limited by space and time. Digital transformation allows lecturers and students to access information on digital platforms so the application of technology information in learning settings is more interesting and effective. Digital transformation allows people with varied social situations to access education and equip them with the skills necessary to address global problems (Kaputa et al., 2022). Besides, students can access learning materials, data, content, and information on digital platforms. Digital transformation opens up opportunities for lecturers and students to collaborate with national and international universities so that they can strengthen research (Abd-Rabo, A.M., Hashaikeh, 2021). It underscores the significance of the digital revolution for enhancing communication, and expenditure of resources, as competitive settings in higher education organizations.

Transformative opportunities on digital technologies explore how work in higher education can be done more quickly and efficiently with the adoption of information technology. Digital transformation has opened up opportunities for collaboration between geographically separated universities so that access to information is easier to obtain.

Digital transformation in higher education involves students, lecturers, and academics skilled at using information technology applications or systems. Apart from that, adequate expertise is required from a technical perspective and the use of digital platforms so that they are open-minded towards digital transformation. Furthermore, the results of this research can enrich similar research by Kreydenko et al. (2021), which discusses the need to optimize human resource development in higher education to increase research, innovation, and entrepreneurial activities.

Higher education's digital revolution cannot operate effectively despite an alteration of resources, including students, professors, and the academic community willing to increase competence to support digital transformation. Human resource challenges dealing with higher learning in the 4th industrial revolution changes in employment opportunities, increasing demand from companies, and the need for human resource development strategies in colleges and universities are essential for accomplishing educational institutions (Dung, 2021).

The information technology system is another key aspect influencing higher education's change. Universities have information technology systems as a reference for developing digital transformation which creates a digital ecosystem to support the application of digital technology. The above discussion is consistent with the research by Liu et al. (2022), which focuses on the evolution of contemporary technology approaches in higher educational management.

The opportunity to improve the quality of education that integrates innovative teaching resources and methods is part of the digital transformation of higher education. The implementation of the use of digital technology in higher education opens access to unlimited

programs and materials, allowing lecturers and students to participate in broader education, teaching, and service in education.

By leveraging digital transformation, higher education institutions can better align their curricula and training programs with the evolving demands of the job market. It ensures graduates are equipped with relevant skills for the digital economy. These opportunities are essential for fostering a competitive and responsive higher education system in West Java.

Challenges of West Java higher education digital transformation: Many institutions face inadequate technological infrastructure, which hampers the effective implementation of digital tools and resources necessary for transformation. There may be resistance from faculty and staff to adopt new technologies and teaching methods, leading to inconsistent application of digital practices across institutions.

Both students and educators may lack the necessary digital skills to fully engage with and utilize new technologies, which can hinder the effectiveness of digital transformation. These challenges must be addressed to facilitate a successful transition to a digitally enhanced higher education system in West Java.

The total variance value of the challenge variable has a commonality of 0.848. This value shows that the variance of the challenge variable extracted is 84.8%, while the remaining 15.2% is under variance in that variable (Table 5). This indicates that the challenge variable commonalities hold an established connection with the factors generated. The table above shows that the challenge variable can explain the factors because the variable extraction value is greater than 0.50.

The specific interpretation of X4's commonality depends on the exact nature of the challenge variable and the other variables included in the analysis. However, a few possible interpretations include: 1). Strong association with other factors: X4 might be strongly associated with other factors. that are crucial for digital transformation in West Java's higher education. This could be technological infrastructure, faculty readiness, or institutional culture. 2). Shared.variance with other variables: X4 might share a significant amount. of variance with other variables, indicating that it is related to similar underlying constructs or concepts. 3). Impact on. digital transformation: X4 might have a substantial impact on the process. of digital transformation in higher education institutions in West Java.

Table 5 Analysis of commonalities of challenge variable

Commonalities		
X4	Initial	Extraction
	1.000	.848

Extraction Method: Principal Component Analysis.

Source: Research Data:

Institutional impact presents technological transformation problems for higher learning organizations. It strains the need to implement new technology and techniques to fulfill the evolving requirements of the age of technology. The findings of the present study are consistent with the research by Alenezi (2021), which emphasizes the importance of advanced methodologies and practices in attaining the purpose of higher education institutions. Rodr (2021) supports the notion that digital transformation is a realistic requirement for companies, especially higher education institutions, to increase communication, resource usage, and competitiveness.

Other research explores how digital transformation can revolutionize teaching and learning processes, expand access to education, and improve operational performance (Saranakumar, AR., Ojha, M., Vinod, Malkar, 2022). This study's conclusions are consistent with the previous research findings which emphasize the need for a digital culture in harmony with technological advances and fosters innovative education in higher institutions (Branch et al., 2020).

Adoption is one of the obstacles that come with the digital transformation of automation changing the level of work in universities. With the large amount of data generated by universities and transferred via digital networks, data security becomes a serious issue, and the level of data privacy owned by universities from digital transformation becomes more vulnerable. Each university has different

security standards to protect data, and digital transformation creates an imbalance among professional and private life.

Infrastructure challenges the form of easy and well-connected digital learning access and online learning supported by stable data transfer speeds, and student, lecturer, and higher education academic community data stored safely in data centers. It shows how technological innovation has brought changes in business models and infrastructure planning in higher education. These findings are similar to those of research by Field & Merrill (2010) that highlights the impact of changing state/ university relationships, economic and social changes, and policy interventions on the higher education system.

Storage service facilities such as Google Drive provided by universities are good, and data storage capacity for the digital needs of students, lecturers, and the academic community is adequate, showing that this strengthens the research by Jarvis (2000), which argues that higher education needs to respond to the new infrastructure of global society produced by capitalism and information technology. Also, leadership support plays a critical part in the new age of university education. As the digital shift becomes one of the strategic visions and is included in the road map and Organizational Structure and Work Procedures of higher education, Shaheen (2018) found that digital communication technologies enhance leaders' ability to communicate effectively, increase productivity, and provide accessibility within organizations. However, leaders also face challenges, such as time management, and cybersecurity.

The challenge for higher education leaders is to become role models for the application and use of digital technology in activities on and off campus. It is in line with the research by Gruzina et al. (2020), which suggests the need for a generative leadership model that embraces digitalization and encourages interaction between layers and between clusters in the educational environment. The governance of the usage of systems that utilize technology can help support the goals and purpose of higher education (Nogovitsyn et al., 2021). Higher education leaders are committed to providing policy and budget that supports digital transformation to strengthen studies (Antonopoulou et al., 2021).

Although digitalization brings benefits such as flexibility, increased student involvement, and increased interaction between universities, digitalization also poses social risks and changes in the roles of lecturers and students. Changes in the management of higher education institutions and adaptation are needed to minimize failures that can have negative impacts, this is needed as a form of shifting towards digital learning and creating a virtual educational environment based on technology by Karpov & Karpova (2022). Furthermore, a study by Rodr (2021) shows that competent but excessive leadership, cultural transformation, and a deficiency in innovation and financial resources make higher education decelerate significantly behind other fields in digital technology initiation and adaptation.

Inadequate infrastructure and resistance to change are obstacles faced in digital transformation. Identifying real obstacles when implementing digital transformation in higher education facilitates the interventions needed and targeted to address these challenges. Furthermore, the results of this identification are then used to formulate effective policies and strategies that support the transformation to a smoother digital environment and ensure that institutions will be equipped with infrastructure that supports future digital technology advancement.

The skills and availability of devices needed to support excellence in the digital field provided to lecturers and students in universities. From the challenges defined in the study, university leaders can effectively prioritize resource allocation and provide training program development. This is important as part of responding to the challenges and successful implementation of digital transformation of higher education in West Java.

CONCLUSION

The urgent need for universities to adapt to the changing technology landscape is becoming a major focus of current research. Higher education institutions are actively adapting in response to the digital evolution to improve

accessibility, education quality, and relevance to the needs of industry and employment that absorb graduates as part of the global trend with a focus on digital solutions.

The positive impact of digital technology on higher education educational methods is one of the main conclusions obtained from this study. Digital instruments implemented in higher education are used as a capacity for changing current basic pedagogical practices. The encouragement of self-learning and collaborative efforts is carried out by students and lecturers who benefit from the increased accessibility of digital resources and information on campus. In addition, it opens up the possibility for universities to engage with a wider demographic, as a result of the ability to use digital platforms in higher education.

Furthermore, this study found that universities in West Java face obstacles when trying to make changes in the digital field. There are still universities with challenges in the form of ownership of technology that is not up to date which hinders the implementation of more effective technological advances. This finding also underlines the obstacles faced in the form of resistance to technological adaptation shown by human resources in universities. The growth of the environment towards a supportive digital transformation needs to be addressed further, although there is still a reluctance to adopt new digital methods and technologies.

Technology readiness and development in management and policy in the faculty are important elements to achieve success in analyzing the relationship between various factors that influence the digital transformation of higher education. Providing educators and students with the competencies needed to navigate the digital ecosystem on campus is one of the priorities and support in the form of a budget to support the implementation of digital technology. Increasing digital efforts and ensuring that all parties involved on campus are ready to face change and adapt for a better future.

The formulation of policies and strategic frameworks specifically targeted to face the challenges of digital transformation are prepared by leaders in the university environment, which include increasing collaborative efforts between faculties, between work units on campus, developing a progressive and appropriate institutional culture, and encouraging the involvement of all stakeholders in the digital transformation process. Higher education institutions can provide facilities that are more in line with the needs of digital transformation by building a supportive and conducive campus environment.

Thus, it can be concluded that this study presents a combination of opportunities and challenges in the digital transformation of higher education in West Java. For active implementation, universities need to continue to overcome obstacles, even though the quality of education has increased, increased accessibility has been felt, and alignment with the demands of graduates and industry is increasingly synergistic. Higher education institutions navigate as a form of preparation for digital transformation in the form of an emphasis on technological readiness, strategic planning, and faculty development. In the end, embracing these significant transformations will improve the educational environment in West Java and nurture the development of a skilled and competitive workforce equipped for the digital age. The outcomes of this research provide a foundational basis for forthcoming inquiries and initiatives aimed at urging digital transformation within higher education to remain relevant and responsive to the evolving needs of students and society as a cohesive entity.

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