Higher Education Digital Transformation Readiness: A Systematic Literature Review

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Abstract
Digital transformation has become concern for various organization, including universities worldwide. These processes require a well identification on critical issues that universities encounter to attain a successful digital transformation. This study aims to identify the critical issues, including the advantages and the challenges arises in Indonesian universities digital transformation processes. This research was conducted using PRISMA approach for systematic literature review framework. The citation and co-authorship analysis were conducted for the selected sample articles from the Dimension journal database. Finally, this research use the annotated bibliography to identify the issues on digital transformation processes from the universities stakeholder's perspective, especially managers of higher education institutions during 2018 to 2023. This research found 79 articles for the initial analysis. From the co-authorship analysis, we found 4 articles which conform our research context. The annotated bibliography found the critical use of the framework which identify several priority issues in universities digital transformation processes, namely contextual, technical, and cultural issues. The critical use of digital transformation framework would be beneficial in responding obstacles during the transformation processes. This research suggest the empirical examination on using the framework for universities digital transformation readiness. The empirical evidence would generate opportunities for further framework improvement.
Keywords: Digital Transformation, Readiness, Universities.

Introduction
Along with the development of technology, innovations have occurred in various areas of life. This innovation focuses on increasing knowledge, skills, and competencies to develop

technology that can make human life easier. The process of spreading the use of digital technology in society is called digital transformation. Limani et al (2019) stated that digital transformation can be interpreted as a strategy to change activities, processes, competencies, and models in digital technology.

Digital transformation has lately attracted worldwide attention. Iivari et al (2020) stated that digital transformation is utilizing digital technology and interpreting digital technology into everyday life to get its benefits. Digital transformation can also mean changes in the digital environment in all of life, such as social, business, entertainment, and education. But we need to emphasize that changing the use of digital devices is not digital transformation.

Digital transformation is more related to changes in mindset, way of working, and management in the digital environment (Sklyarov et al., 2020). Digital transformation is a process of acceleration and integration of digital technology spread in society. This process changes lifestyles by utilizing a combination of information technology, communication, compilation, and connectivity. Although digital transformation has become a worldwide topic lately, there is still little research discussing it in Indonesia.

Digital transformation has indeed occurred in Indonesian universities. Education is the main target for the development of digital transformation. Educational institutions can adjust and design the education system according to current conditions. Furthermore, digital transformation moves in line with the development of the education system (Oz & Balyer, 2018). The face-to-face education system can now be implemented with distance learning methods by utilizing digital transformation.

This study aims to analyze the readiness of universities in Indonesia in facing digital transformation. Digital transformation in universities aims to determine the needs of universities in organizing education, research, and community service by utilizing digital technology for all stakeholders (Hakan, 2020). This means with digital transformation services; The university hopes that lecturers and students can adapt and have advanced digital level capabilities. Digital transformation services in universities include the internet, social media, Internet of Things, Big Data, cloud computing, fast and high-capacity connections, and artificial intelligence. After all, the ultimate goal of digital transformation in higher education is to create a digital university.

Digital transformation is also happening in Indonesian higher education. However, there have not been many studies that discuss the phenomenon of digital transformation in higher education in the context of Indonesian higher education. This can be seen from several articles discussing digital transformation in education with the scope of Indonesian research contained in the Scopus database. Using the keywords digital transformation and education and Indonesia, only 19 articles were found. Likewise, in Southeast Asia, research related to digital transformation is also lacking. Even though in the Scopus database there are hundreds of articles that discuss research on digital transformation in education. That's why the question arises. How are Indonesian universities ready to face digital transformation?

Literature Review
Digital Transformation Framework

Since it was first created in the 1990s, there has been a trend of digital transformation in recent years. Digitalization or digital transformation means the process of converting all kinds of information (writing, sound, images, videos, and all kinds of data) into digital language (Machekhina, 2017). Turning a whiteboard into a projector or a book into PDF is a change using digital tools, not digital transformation. This statement follows what was stated by (Iivari et al., 2020) that digital transformation is about utilizing digital technology and the ability to interpret digital technology into everyday life so that we get the benefits. Digital transformation is more related to changes in mindset, way of working, and management in the digital environment (Sklyarov et al., 2020).

Digital transformation has been recognized as a systemic change involving four entities: people, hardware, software, and infrastructure (Schallmo, 2017). From the statement, digital transformation readiness is related to stakeholder influence. In universities, stakeholders are students, teachers, and educational institutions, where students are implementers, lecturers, and institutions are the main contributors. Higher education is the main contributor in realizing digital transformation in education. After all, the existence of digital transformation in a university depends on the will of the university. Plotnikova (2019) stated that universities that play an active role in digital transformation must prepare for three things: the provision of ICT infrastructure, the creation of educational platforms, and staff training. Universities can do these three things by creating online courses. In online classes, students and teachers can interact directly with IT equipment. However, universities need considerable funds to develop online systems. The IT skills of teachers and ICT equipment are major factors in creating online courses. Considerable funds are needed to provide ICT equipment and to train teachers. By creating online courses, universities must also create educational platforms. These platforms are usually the main goal of digital transformation in universities.

Strategi increase working capacity and competitiveness (Makarova et al., 2018). Trained teachers can focus on creating content and learning media long-term. Although there are still few articles discussing it, digital transformation has indeed occurred in Indonesia. This study aims to analyze the readiness of Indonesian universities in facing digital transformation. This study contributes to understanding digital transformation readiness in Indonesian universities, focusing on students, teachers, and institutions. This statement is in line with the concept of digital transformation in education, where learning is flexible. Learning flexibility means that learning is carried out according to student wishes without being limited by space and time (Abd-Elhafiez & Amin, 2021). This system eliminates the constraints of time and place in the learning process. Learning does not have to be done in school, nor does it have to be done during school hours.

Research Methods
This research uses *library research* methods carried out by collecting information relevant to the topic to be studied. The literature method uses secondary data in the form of scientific articles, books, and internet sites that contain information or data used in research (Mann, 2015)

Data analysis was carried out using *annotated bibliography* techniques. This technique is done by searching, analyzing, making interpretations and generalizations of facts that are the opinions of experts in a problem using literature data used to produce inductive conclusions. This analysis aims to collect ideas or works that have been written from previous researchers who can provide interpretations and generalizations in accordance with the problem studied. The data analyzed in the form of findings or research results are then integrated with other research results to form a close relationship and contribute to a discipline. Bibliographic annotations are carried out with due regard to the following (Mann, 2015)

1. Identity of the referenced source
2. Qualifications and goals of the author
3. Simple conclusions about the content of the writing
4. The usefulness / importance of the referenced source in answering the problem.
5. The literature data used in this study was obtained by accessing the popular literature *database* Dimensions. The choice of this database is done by considering the completeness of analytical features that are already available on the database.

This study used the following literature data collection strategy

1. Systematic search of literature data in the form of articles, scientific publications, and books through *Google Scholar* using the keyword "*Digital Transformation*" and its equivalent. Keywords used in literature data search for mining industry segments, initial keywords combined with the keywords "*Higher Education*" and its word equivalents as well as "College" and "University" for literature data search at national scope.
2. Reviews of articles and books obtained from the first strategy are further explored to get a slice of the list of references and authors who are most influential on the topic of *Digital Transformation*, *Higher Education* or Colleges and Universities. The review continued with a follow-up search in popular article databases (Elsevier, and Proquest) to validate the adequacy of the literature data criteria for this study

The next stage after the systematic search is to limit the range of period writing/publication and grouping themes based on the data obtained. The period for writing/publication of literature data used in this study was limited after 2010. This limitation is based on the range of emerging dissemination of ideas about the Digital Transformation paradigm shift that simultaneously occurs both at the national and global levels.

Analysis and Results
The *queries* in the Dimension database are displayed in the following sections. Searches/*queries* are carried out using the keywords "*digital transformation*" and "*higher education*". The range of research applied in this study is the range between 2018 to 2022. In the first query, 216 literature data were obtained. Furthermore, we use the consideration of data types in the form of research articles, so that other types of data in the form of book chapters, proceedings articles, monographs, etc. are excluded from the sample research. At this selection stage, 79 articles were obtained as research data, with details based on year as follows:

Table 4.1
Year of Research

Category	Publications (total)
2018	1
2019	5
2020	8
2021	21
2022	34
2023	9

Publications in each year. (Criteria: see below)

- Publications (total)

Source: https://app.dimensions.ai
Exported: March 28, 2023
Criteria: "university", "digital transformation readiness" in full data; Publication Type is Article.

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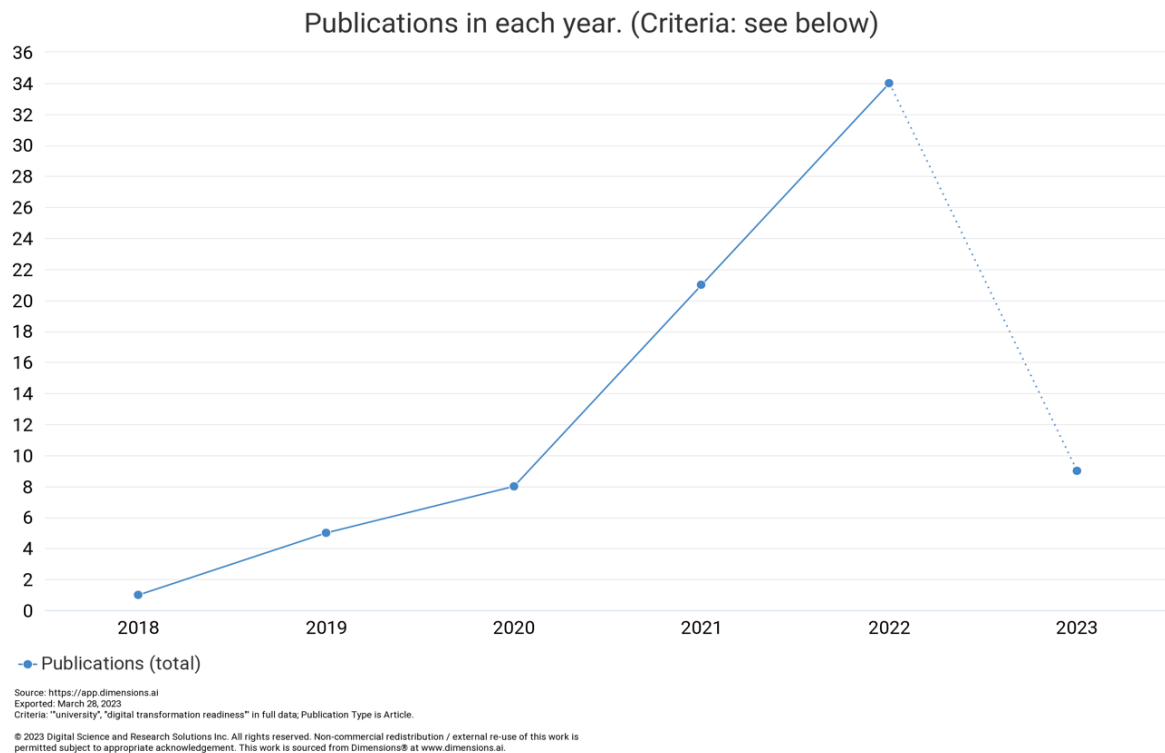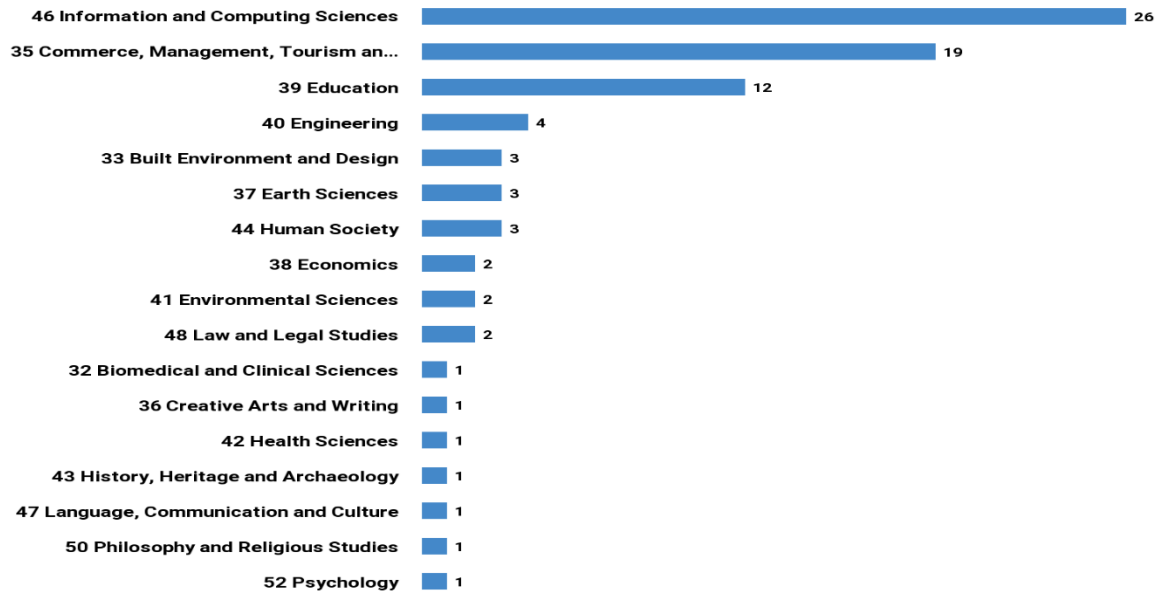
Figure 4.1. Number of Research

Based on the group/field of research, the sample of this research is presented as follows:
Table 4.2
Research Category

Category	Fields of Research (ANZSRC 2020)
Information and Computing Sciences	26
Commerce, Management, Tourism and Services	19
Education	12
Engineering	4
Built Environment and Design	3
Earth Sciences	3
Human Society	3
Economics	2
Environmental Sciences	2
Law and Legal Studies	2
Biomedical and Clinical Sciences	1
Creative Arts and Writing	1
Health Sciences	1
History, Heritage and Archaeology	1
Language, Communication and Culture	1
Philosophy and Religious Studies	1
Psychology	1

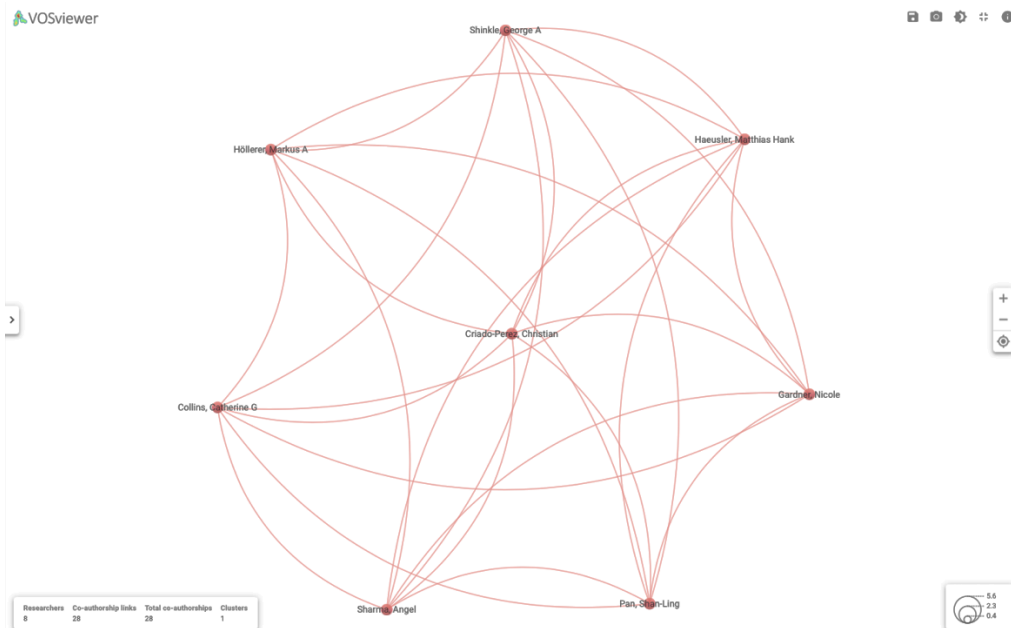number of publications in each research category. (Criteria: see below)

Source: https://app.dimensions.ai
Exported: March 28, 2023
Criteria: '"university", "digital transformation readiness"' in full data; Publication Type is Article.

Figure 4.2. Publication Category

The results of *network analysis* are presented in the following figure:

Gambar 4. 3. Co-Authorship Analysis

Based on the results of the co-authorship analysis presented in figure 4.3, there is 1 main cluster that has a co-authorship strength of more than 7 articles. The main cluster contains 8 researchers who produce publications referred by other researchers.
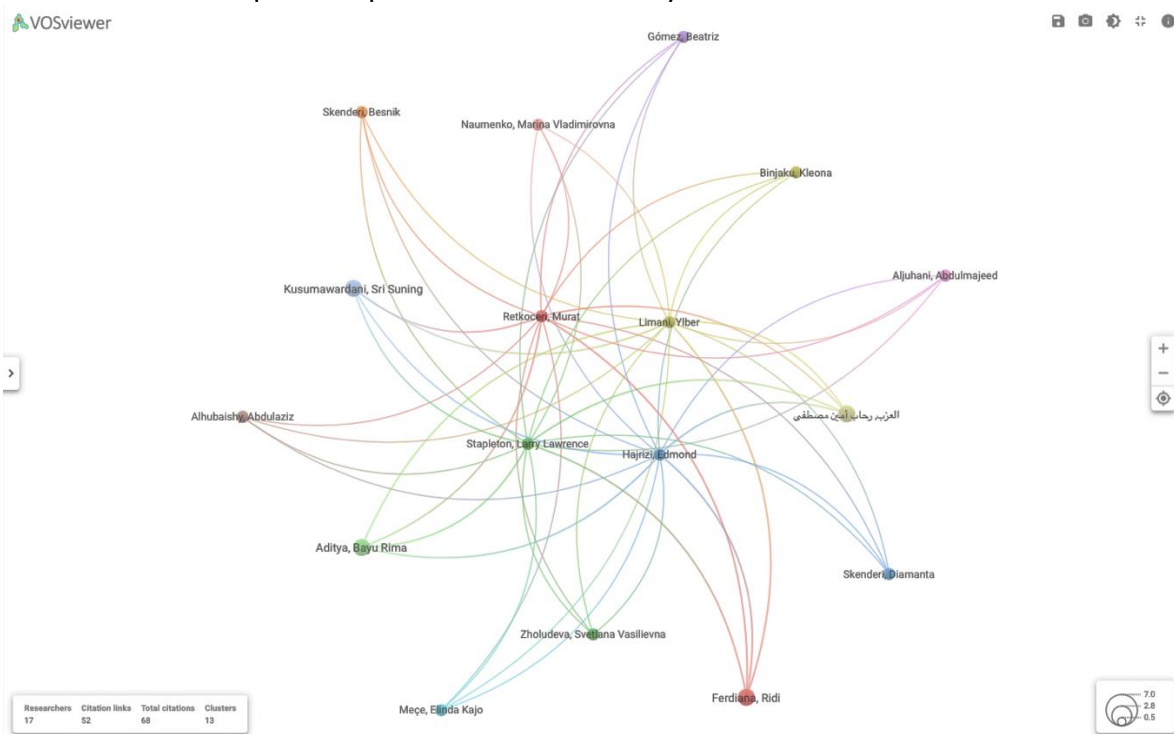

Figure 4. 4. CitationAnalysis

Based on the results of citation analysis presented in figure 4.4, there are 4 publications that have citation strength of more than 10 citations. The main cluster in the citation analysis is in the middle of the network containing 4 researchers whose publications are referenced by other researchers.

In the next section, this research focuses on the context of digital transformation in the national scope. Interesting results are shown by the emergence of 4 publications that discuss the digital transformation of universities in Indonesia. Researchers for the publication are Sri Suning Kusumawardhani, Rini Rahmawati and Ridi Ferdiana (Gadjah Mada University) and Bayu Rima Aditya (Telkom University). However, only 2 article is relevant to the context of higher education, so the focus of further analysis of this research will be the selected 2 articles.

Advanced analysis is carried out with bibliographic annotations. Bibliographic annotation is an analytical method that identifies the main focus of research consisting of research context, research method, and research results. A summary of bibliographic annotations to selected publications is presented as follows:

a) Annotated bibliography 1

Researcher Name	Bayu Rima Aditya, Ridi Ferdiana, Sri Suning Kusumawardhani
Research Title	Identifying and Prioritizing Barriers to Digital Transformation in Higher Education: A Case Study in Indonesia
Journal Name	International Journal of Innovation Science, 14(3/4), 445-460 - May 2021
Research Scope	The research was conducted to test the theoretical framework of digital transformation readiness in the national scope in Indonesia
Research Methods	Survey with questionnaires and using priority matrix analysis.
Research Results	This research identifies the main obstacles in the implementation of digital transformation in universities in Indonesia including eight contextual issues, one technical issue and two cultural issues with different levels of importance and difficulty. Based on the constructed matrix, the study also presents a list of the top 11 priority obstacles. The practical implications of this research lay the foundation for a practically useful theoretical framework for carrying out the identification and prioritization of barriers. In addition, the results discussed in this study provide some direction for policymakers in devising sensible strategies to overcome such barriers. The main contribution of this study is an empirical study that systematically identifies and prioritizes barriers to digital transformation in higher education
Limitations	Results are based on the context of a specific region.

b) Annotated bibliography 2

Researcher Name	Bayu Rima Aditya, Ridi Ferdiana, Sri Suning Kusumawardhani
Research Title	A Barrier Diagnostic Framework in Process of Digital Transformation in Higher Education Institutions
Journal Name	Journal of Applied Research in Higher Education, 14(2), 749-761 - July 2021
Research Scope	The research was conducted to test the theoretical framework of digital transformation readiness in the national scope in Indonesia

Research Methods	This research was conducted by mixed method with survey on quantitative analysis and expert opinion in *problem-centered design science research*.
Research Results	The study proposes a systematic analysis of three sets of components: (1) the initial set of obstacles; (2) obstacle rating scheme and (3) obstacle assessment matrix. The three components of the framework are identifying and prioritizing barriers to the successful implementation of digital transformation in higher education. The practical implications of this research provide the basis for a practically useful theoretical framework for carrying out the identification and prioritization of barriers. In addition, the results discussed in this study provide some direction for policymakers in devising sensible strategies to overcome such barriers. The main contribution of this study is an empirical study that systematically identifies and prioritizes barriers to digital transformation in higher education
Limitations	Results are based on the context of a specific region.

Conclusion

The results of this research analysis show that the topic of digital transformation readiness has received a lot of attention at the global level. However, in the context of universities at the national scope, there have not been many studies on the topic. 2 Publications that became the findings of this study show that the development of The theoretical framework to assess the readiness of universities is getting major attention in the digital transformation process in universities. The conclusion from the results of the bibliographic annotation analysis shows that the digital transformation of universities in Indonesia faces several obstacles. The success of universities in identifying barriers and understanding of theoretical frameworks as a basis for setting transformation goals is a focus that deserves attention from stakeholders interest in college.

This research makes a practical contribution to the development of theories used in research related to the topic of digital transformation in universities. Digital transformation is not solely a process of adopting the use of technology in the management of higher education, further digital transformation is an effort to generate sustainable value in management of universities through the use of information technology.

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