BIS HUMANITIES AND SOCIAL SCIENCE

Volume 2 2025 | DOI: 10.31603/bishss.294
6th Borobudur International Symposium on Humanities and Social Science (BIS-HSS) 2024

UNIMMA PRESS
Universitas Muhammadiyah Magelang

Digital transformation for sustainable development: A systematic literature review

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Abstract

Digital transformation cannot be separated from sustainable development, which is happening in many countries. Indonesia is one of the countries that uses digital technology, such as artificial Intelligence, for sustainable development. This research aims to map and compare scientific publications in Indonesia and other countries in Asia, such as Japan, South Korea, and China. The study combines qualitative and quantitative research methods using bibliometric procedures. The research was conducted through several stages: (1) data preparation by determining the eligibility criteria for information sources, (2) searching for Scopus-indexed journals from 2021 to 2024 using Publish or Perish, including titles, abstracts, and authors. By using several key terms such as digital transformation, artificial Intelligence (AI), sustainable development, Indonesia, Japan, South Korea, and China, (3) the process of selecting research journals was carried out by synthesizing data in Mendeley's bibliographic management, resulting in the selection of 497 articles, (4) data analysis using VOSviewer. The study results show the importance of publishing scientific papers on a country's digital transformation, which encourages using technologies such as artificial Intelligence, subsequently stimulating sustainable development. Future studies can focus on digital platforms or assessment frameworks in Indonesia or the Asian region.

Keywords

Digital transformation, Sustainable development, Sustainable development goals, Indonesia, Artificial intelligence

Published:
May 30, 2025

Selection and Peer-review under the responsibility of the 6th BIS-HSS 2024 Committee

Introduction

Digital transformation is a culture, organization, and strategic and planned operational change of an organization, industry, or ecosystem by integrating all digital technology devices, processes, and competencies at all levels and functions [1] [2] [3]. Digital transformation is now considered important for organizations or industries because they must be able to survive in any condition or situation. In times like these, especially post-pandemic, organizations or industries must adapt quickly due to supply chain disruptions, market pressures, and frequently changing customer expectations [4].

Digital transformation is now used in the industrial sector and in almost all aspects of human life [5]. In its development, digital transformation has also begun to be used in daily life and dramatically assists human work [6] [7]. For example, the use of Artificial Intelligence (AI) in agriculture, health, and education [8] [9]. Therefore, many countries are also optimizing the use of AI for sustainable development needs [10].

Indonesia is one of the countries that uses digital transformation, one of which is using AI for sustainable development [11]. Regarding AI, the Indonesian government has designed the National Artificial Intelligence Strategy for 2020-2045 as the national AI technology policy direction. This strategy has four focuses, including ethics and policy, talent development, infrastructure and data, and industrial research and innovation, which have been aligned with the vision of Indonesia Gold 2045 [12].

The Indonesian government has prepared policies and strategies to achieve sustainable development. However, research on the use of AI and digital transformation for sustainable development in Indonesia is still minimal. This research will examine the mapping of studies on digital transformation used by Indonesia for sustainable development and compare it with developed Asian countries such as Japan, South Korea, and China.

Method

This research combines qualitative and quantitative research methods using bibliometric procedures. Bibliometric analysis is part of the bibliometric analysis toolkit developed by scientists, which consists of (1) performance analysis, which includes metrics related to publications, citations, and citations and publications; (2) science mapping, which includes analysis of bibliographic coupling, co-authorship, co-occurrence, and co-citation; and (3) enrichment techniques, which include clustering, visualization, and network metrics [13]. This research was conducted in several stages: (1) data preparation by determining the eligibility criteria for information sources, (2) searching for Scopus-indexed journals from 2021 to 2024 through Publish or Perish, including titles, abstracts, and authors. This study uses several keywords: digital transformation, artificial Intelligence (AI), sustainable development, Indonesia, Japan, South Korea, and China. Then (3) the process of selecting research journals was carried out by synthesizing data in Mendeley bibliographic management, resulting in 497 selected articles; (4) analysis using VOSviewer to analyze issues related to digital transformation, AI usage, and sustainable development in Indonesia compared to Japan, South Korea, and China. The VOSviewer platform was chosen for meta-analysis because it allows for the rapid and easy handling of multiple papers, including adding annotations and citations. Furthermore, the data can be easily analyzed to produce summaries that enhance the value of the study (Figure 1) and network visualization on co-occurrence can be seen on Figure 2.

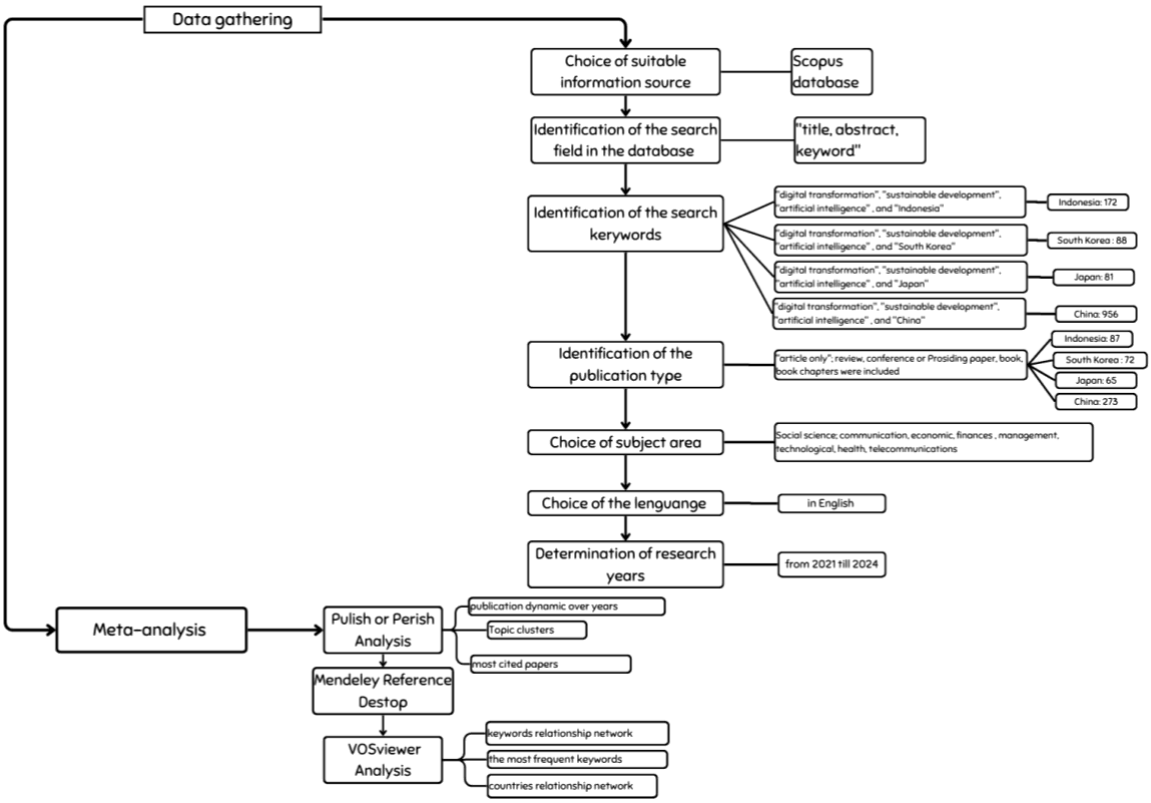

Figure 1. Flow chart of research method

Results and Discussion

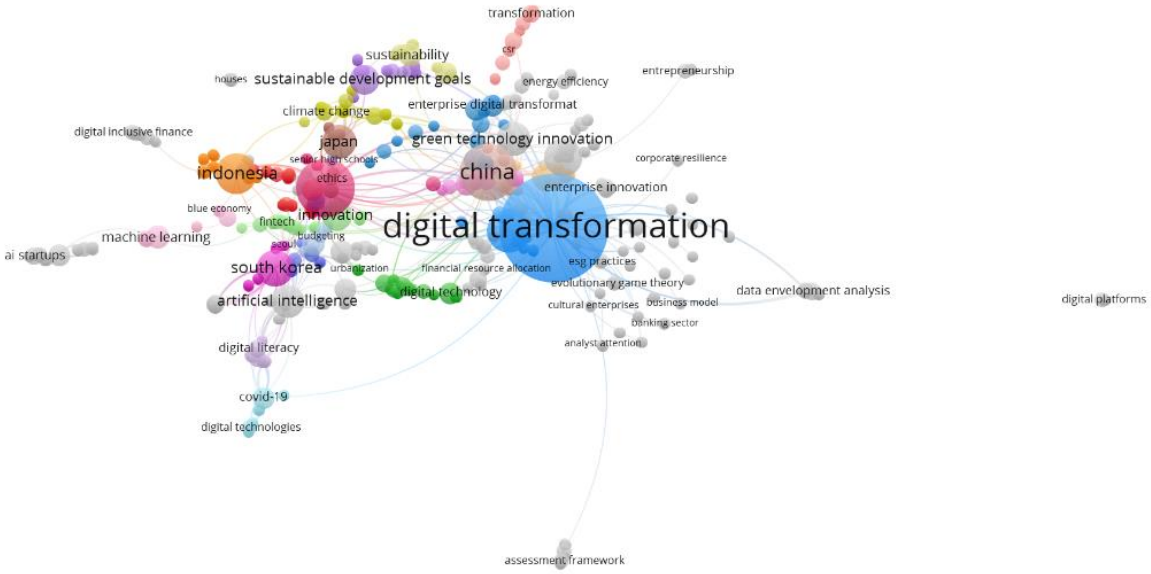

Figure 2. Network visualization on co-occurrence

This analysis found several clusters caused by the simultaneous appearance of keywords in the articles. From the main keywords related to digital transformation and sustainable development, Indonesia, Japan, South Korea, and China, research on the theme of digital transformation to achieve sustainable development in each country has been extensively conducted. As seen in Figure 2, the search results are based on keywords or co-occurrence. The keywords found in the journal search are related to "digital

transformation," which is connected to "sustainable development" and then linked to "sustainable development goals." Upon further observation, it can also be seen that the keywords are interconnected. For example, topics related to digital transformation will connect with "digital technology," "sustainability," "Artificial Intelligence (AI)," "South Korea," "Japan," "China," "Indonesia," "SDGs," "economic development," "innovation," "transportation," "digital literacy," and "digital technologies."

Six significant clusters of key terms are created by the VOSviewer algorithm, each of which constitutes a grouping of research activity and subsequent publication. The author suggests a simplified interpretation and label for each cluster in Table 1 and verify selected keywords can be seen on Figure 3.

Table 1. Interpretation of co-occurrence clusters displayed in Figure 1.

Cluster	Color	Label
1	Blue	Digital transformation, green technology innovation, enterprise digital transformation
2	Red	China, transformation, Japan, Inovation, digitalization
3	Green	Digital technology, Fintech,
4	Purple	Sustainable development goals, South Korea, digitalization
5	Orange and Sand	Indonesia, sustainability, economic development
6	Grey	Artificial Intelligence, digital literacy

Selected	Keyword	Occurrences	Total link strength
☑	digital transformation	101	347
☑	sustainable development	29	127
☑	china	28	101
☑	south korea	12	72
☑	indonesia	15	69
☑	green innovation	16	57
☑	artificial intelligence	9	50
☑	digital economy	13	49
☑	japan	10	48

Figure 3. Verify selected keywords

Based on its occurrence, this research found keywords related to digital transformation 101 times, sustainable development 29 times, sustainable development goals 8 times, China 28 times, Indonesia 15 times, South Korea 12 times, green technology innovation 10 times, digital economy 13 times, Japan 10 times, and green innovation 16 times. For more details, please refer to Figure 3. Overlay visualization on co-occurrence can be seen on Figure 4.

From the selected keyword findings above, the research development results from 2021 to 2024 can also be seen, as shown in Figure 4. There are four colors representing each year. First, the dark blue color represents research in 2021 related to digital technologies. Second, the light blue to emerald green color indicates research in 2022, which is the second most researched keyword related to sustainable development. These keywords are connected to "sustainable development goals," "rural development," "energy intensity," "education," "Japan," "South Korea," "public health," "economic development," and "digital government." Third, 2023 is marked by bright green with the keyword "digital transformation." These findings are evident from the most

extensive circle and are highly connected with other keywords. Moreover, the yellow color indicates the year 2024. It appears that the keywords "digital platform" and "assessment framework" still have a significant opportunity for research because they are not yet connected with "digital transformation," "sustainable development," "sustainable development goals," or "artificial intelligence."

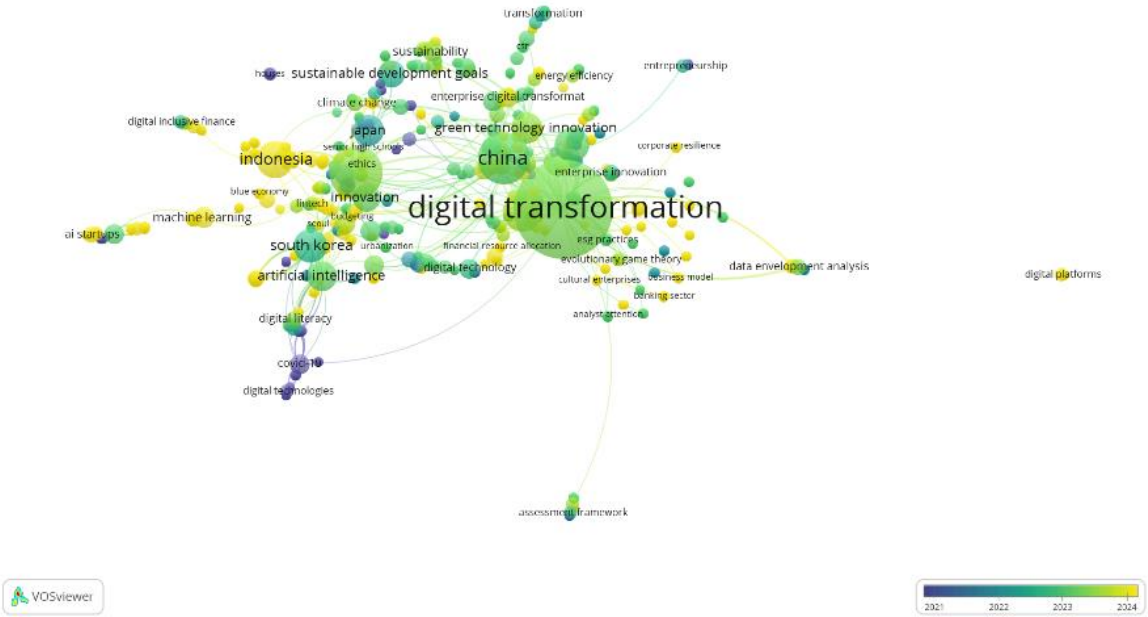

Figure 4. Overlay visualization on co-occurrence

The analysis results show that: 1) Indonesia's publication activities related to digital transformation for sustainable development are still lagging behind China; 2) regarding articles, authors from the four countries highlight issues of digital transformation and sustainable development; 3) the central cluster is formed around the keyword "digital transformation"; 4) for the four countries, activities from digital transformation are connected to sustainable development. As a systematic literature review, this study finds that the concepts of digital platforms and assessment frameworks are still in the developing study stage and have great potential for further research.

Conclusion

Research shows that publication data from comprehensive databases can be analysed to investigate the relations between concepts in any research field with VOS viewer software. Research shows that Indonesia still faces challenges in achieving sustainable development goals, especially in digital transformation and artificial Intelligence. Therefore, the experiences and knowledge from other countries, such as South Korea, Japan, and China, can help develop maps and innovation strategies for Indonesia to realize sustainable development. This research is still limited by the capacity of the database from which the research materials were obtained.

Further research could delve into the impact of digital transformation, artificial Intelligence related to digital platforms, and assessment frameworks on sustainable

development through a review of publications in other databases to obtain more beneficial scientific results in Indonesia and the Asian region.

Acknowledgement

Authors would like to thank to all who supports this research.

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