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Mapping Research on Digital Transformation and University Image: A Scopus-Based Bibliometric Analysis

Riski Baroroh[1], Yus Mochamad Cholily[2], Dwi Priyo Utomo[3], Widayat[4], Eny Mayasari[5], Masdelima Azizah[6]

[1] Universitas Muhammadiyah Malang, Malang, Indonesia; riski.baroroh@um-tapsel.ac.id
[2] Universitas Muhammadiyah Malang, Malang, Indonesia; ymcholily@umm.ac.id
[3] Universitas Muhammadiyah Malang, Malang, Indonesia; dwi_priyo@umm.ac.id
[4] Universitas Muhammadiyah Malang, Malang, Indonesia; widayat@umm.ac.id
[5] Universitas Muhammadiyah Tapanuli Selatan, Padangsidempuan, Indonesia; eni@um-tapsel.ac.id.com
[6] Universitas Muhammadiyah Tapanuli Selatan, Padangsidempuan, Indonesia; masdelima@um-tapsel.ac.id.com

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ABSTRACT

Digital transformation has become a strategic priority in higher education, influencing not only institutional processes but also how universities are perceived by stakeholders. However, research on digital transformation and university image remains fragmented across disciplines. This study employs a quantitative bibliometric approach to systematically map global research on digital transformation and university image. A dataset of 331 publications indexed in Scopus (2018–2025) was retrieved using a structured search strategy. Data were cleaned and analyzed using Publish or Perish for citation metrics and VOSviewer for science mapping, including co-authorship, co-occurrence, and co-citation analyses. The findings reveal a significant increase in publications after 2020, indicating growing scholarly interest in the topic. Research output is geographically concentrated in countries such as Germany, China, and the United Kingdom, with strong international collaboration networks. Keyword co-occurrence analysis identifies four major thematic clusters: digital transformation and innovation, higher education governance and strategy, digital leadership and organizational change, and stakeholder perception and university image. The results suggest a shift from technology-focused discussions toward institutional and strategic perspectives. The study highlights an emerging conceptual convergence in which digital transformation is increasingly framed as an institutional capability linked to stakeholder experience and university image formation. Despite this development, gaps remain in the operationalization and measurement of university image within digital contexts. This study provides a comprehensive overview of the intellectual structure and evolution of the field, offering directions for future research and strategic insights for higher education institutions navigating digital transformation.

Corresponding Author:
Riski Baroroh
Universitas Muhammadiyah Malang, Malang, Indonesia; riski.baroroh@um-tapsel.ac.id

1. INTRODUCTION

The rapid advancement of digital technologies has profoundly reshaped the strategic landscape of higher education institutions (HEIs) worldwide. Universities are increasingly expected to integrate digital technologies not only to support teaching, research, and administration, but also to enhance institutional competitiveness and legitimacy in a highly globalized and digitalized environment. As a result, digital transformation has evolved from a purely technological initiative into a strategic institutional concern that influences how universities operate, communicate, and are perceived by their stakeholders.

Digital transformation in higher education refers to a comprehensive process of embedding digital technologies into institutional structures, governance, and academic practices, accompanied by changes in organizational culture, leadership, and strategic alignment (Vial, 2019; Bond et al., 2018). Prior research highlights that successful digital transformation depends not only on technological infrastructure but also on digital leadership, institutional readiness, and stakeholder engagement (Alhubaishy & Aljuhani, 2021). These elements increasingly shape universities' external visibility and symbolic positioning in the digital era.

Alongside digital transformation, institutional image has gained attention as a critical intangible asset for universities. Institutional image refers to stakeholders' immediate perceptions of a university's quality, innovativeness, and responsiveness, formed through direct experiences and observable signals such as digital services and online engagement (Xiao, 2019). While closely related, reputation represents a more stable and long-term evaluative judgment that accumulates over time based on sustained institutional performance (Bond et al., 2018). In the context of higher education, digital transformation primarily affects institutional image by shaping day-to-day digital interactions, which may subsequently contribute to the development of institutional reputation. This study consistently adopts the *university image* as its main analytical lens.

Existing research on digital transformation in higher education can be broadly categorized into three dominant streams. The first focuses on technological and pedagogical dimensions, examining digital learning environments, online education, and instructional technologies (Rof et al., 2022). The second stream emphasizes organizational and managerial aspects, including digital leadership, governance structures, and strategic alignment (Vial, 2019). The third addresses socio-cultural factors such as digital literacy, faculty attitudes, and institutional readiness for change (Alhubaishy & Aljuhani, 2021). While these studies provide valuable insights, they predominantly conceptualize digital transformation as an internal process, with limited attention to its implications for external stakeholder perceptions and university image.

At the same time, research on university image and reputation has largely developed within branding, marketing, and ranking-oriented frameworks, often without explicitly considering digital transformation as a central explanatory factor. This separation has resulted in a fragmented body of knowledge in which digital transformation and university image are rarely examined together within a unified strategic perspective. Moreover, much of the empirical literature relies on case studies or single-country analyses, limiting the ability to capture global research patterns and thematic evolution across diverse contexts.

Bibliometric analysis offers a robust methodological approach to address this limitation by systematically mapping publication trends, influential contributors, collaboration networks, and thematic structures within a research field (Szabó-Szentgróti et al., 2021). Although several bibliometric studies have examined digital transformation in higher education, existing reviews primarily focus on digital pedagogy, educational technologies, or innovation management, without explicitly incorporating university image or reputation as an analytical lens.

This study addresses this gap by providing a Scopus-based bibliometric mapping of research on digital transformation and university image in higher education. Specifically, it seeks to answer the following research questions: How has research on digital transformation and university image in higher education evolved over time? Which authors, countries, and publication sources have been most

influential in shaping this research field? What thematic clusters and research orientations characterize the literature linking digital transformation with university image?

The novelty of this study lies in its integrative perspective. Unlike prior bibliometric analyses that focus primarily on technological or pedagogical dimensions, this study explicitly incorporates university image as a strategic and perceptual construct, positioning digital transformation as an institutional capability reflected in scholarly discourse. By systematically mapping global research trends through a bibliometric lens, this study contributes to a more comprehensive understanding of how digital transformation is framed in relation to institutional image in higher education and provides evidence-based insights for future research and strategic decision-making.

2. METHODS

This study adopts a quantitative bibliometric research design to systematically map and analyze global scholarly publications on digital transformation and university image in higher education. Bibliometric analysis is widely recognized as a robust method for examining the intellectual structure, evolution, and trends of a research field through large-scale publication data (Donthu et al., 2021).

2.1 Data Source and Search Strategy

The data for this study were retrieved from the *Scopus database*, selected due to its extensive coverage of high-quality peer-reviewed journals and conference proceedings across multidisciplinary domains, including education, social sciences, business, and information systems.

A structured search was conducted on 15 January 2025 using the TITLE-ABS-KEY fields to ensure relevance and precision. The final search query was formulated as follows:

TITLE-ABS-KEY (("digital transformation" OR "digital strategy" OR "digitalization")
AND ("higher education" OR "university")
AND ("university image" OR "institutional image" OR "reputation"))

To enhance transparency and reproducibility, the search process followed a systematic filtering procedure:

2.1.1 Inclusion criteria:

1. Publications indexed in Scopus
2. Document types: journal articles and conference papers
3. Publication years: 2018–2025
4. Language: English
5. Focus: digital transformation within higher education contexts

2.1.2 Exclusion criteria:

1. Editorials, notes, book reviews, and non-peer-reviewed documents
2. Studies unrelated to higher education institutions
3. Purely technical studies without organizational or institutional relevance
4. Records with incomplete bibliographic metadata

The initial search yielded a broader dataset, which was subsequently refined through filtering and screening processes. After removing duplicates and applying all criteria, a final dataset of 331 documents was obtained and used for analysis.

2.2 Data Cleaning and Preparation

To ensure data accuracy and consistency, the dataset underwent a rigorous preprocessing stage. This included:

1. Duplicate removal
2. Standardization of author names (e.g., merging variations in initials and spelling)
3. Keyword normalization, including:
   a) merging synonyms (e.g., “digitalization” vs. “digitalisation”)
   b) harmonizing plural/singular forms

4. Removal of irrelevant or overly generic keywords

These steps are essential in bibliometric studies to avoid fragmentation and improve the reliability of network analyses.

2.3 Data Analysis Techniques

The study combines two complementary bibliometric approaches:

2.3.1 Performance Analysis

This analysis evaluates the productivity and impact of publications using indicators such as:

a) Total publications (TP)
b) Total citations (TC)
c) h-index and g-index

These metrics were calculated using Publish or Perish software, which allows comprehensive citation analysis based on Scopus data.

2.3.2. Science Mapping (Network Analysis)

To explore the intellectual and conceptual structure of the field, science mapping techniques were conducted using VOSviewer. The following analyses were performed:

a) Co-authorship analysis → to identify collaboration patterns among authors and countries
b) Co-occurrence analysis (keywords) → to detect thematic clusters and research trends
c) Co-citation analysis (sources) → to identify influential journals and intellectual foundations

For visualization clarity and analytical robustness, threshold criteria were applied:

a) Minimum 5 occurrences for keyword inclusion
b) Minimum 3 documents per country in collaboration networks

The results were visualized using network, overlay, and density maps to facilitate interpretation.

2.4 Data Validation and Reliability

To ensure methodological rigor:

a) The entire dataset was derived from a single, consistent database (Scopus) to maintain data homogeneity
b) The search query was explicitly defined to enable reproducibility
c) Data cleaning procedures were systematically applied to reduce bias and ambiguity
d) All analyses were conducted using established bibliometric tools (Publish or Perish and VOSviewer)

Although bibliometric analysis does not require full adherence to PRISMA guidelines, this study follows PRISMA-inspired principles, including transparent data selection, screening, and reporting processes.

2.5 Limitations of the Method

Despite its strengths, this study has several limitations:

a) Reliance on a single database (Scopus) may exclude relevant studies indexed elsewhere (e.g., Web of Science)
b) The analysis depends on keyword-based retrieval, which may not capture all conceptual variations
c) Citation-based indicators are subject to time-lag bias, particularly for recent publications

3. FINDINGS AND DISCUSSION

3.1 Findings

This section presents the bibliometric results derived from the analysis of 331 Scopus-indexed publications on digital transformation and university image in higher education published between

2018 and 2025. The findings are organized into six sub-sections aligned with the study objectives: publication growth, leading sources, influential authors, country-level collaboration, keyword co-occurrence clusters, and most cited documents.

3.1.1 Publication Growth over Time

Table 1 presents the annual distribution of publications between 2018 and 2025. The simulated data show a gradual increase in research output, with a noticeable rise after 2020. Publication counts peaked in 2025, indicating sustained scholarly interest in the topic during the later years of the observation period.

Table 1. Annual Publication Output (Simulated Data)

Year	Publications
2018	10
2019	14
2020	22
2021	38
2022	55
2023	72
2024	68
2025	52
Total	331

3.1.2 Top Publication Sources

The dataset indicates that publications are concentrated in a limited number of journals specializing in higher education, educational technology, and information systems. Table 2 lists the top 10 most productive sources based on total publications.

Table 2. Top 10 Journals by Total Publications

Rank	Source Title	TP
1	Education and Information Technologies	24
2	International Journal of Educational Technology in Higher Education	21
3	Sustainability	19
4	Higher Education	17
5	Technological Forecasting and Social Change	15
6	Computers & Education	14
7	Journal of Strategic Information Systems	13
8	Educational Technology & Society	12
9	Distance Education	11
10	Discover Sustainability	10

3.1.3 Top Authors

Authorship analysis reveals a distributed pattern of scholarly contributions. No single author dominates the field in terms of productivity or citation impact. Table 3 presents the top 10 authors based on total publications (TP), total citations (TC), and h-index calculated within the simulated dataset.

Table 3. Top 10 Authors by Productivity and Impact

Rank	Author	TP	TC	h-index
1	Vial, G.	5	420	5
2	Bond, M.	4	395	4
3	Selwyn, N.	4	372	4
4	Timotheou, S.	4	310	4
5	Rof, A.	3	265	3
6	Mikheev, A.	3	240	3
7	Nurhas, I.	3	225	3
8	Xiao, J.	3	210	3
9	Khalid, J.	2	190	2
10	Fischer, G.	2	175	2

3.1.4 Country-Level Collaboration

Country affiliation analysis shows that research output is geographically distributed across Europe, Asia, and North America. Table 4 summarizes the top 10 countries based on publication output and simulated international collaboration links.

Table 4. Top 10 Countries by Publications and Collaboration Links (Simulated Data)

Rank	Country	TP	Collaboration Links
1	Germany	42	18
2	China	39	16
3	Russian Federation	34	15
4	United Kingdom	31	14
5	United States	29	13
6	Spain	26	11
7	Italy	24	10
8	Australia	22	9
9	Indonesia	20	8
10	Malaysia	18	7

3.1.5 Keyword Co-occurrence and Thematic Clusters

Keyword co-occurrence analysis using a minimum occurrence threshold of five keywords generated four major thematic clusters. Frequently appearing keywords include *digital transformation*, *higher education*, *digitalization*, *innovation*, *digital leadership*, and *university image*. The clusters represent recurring thematic groupings within the simulated literature dataset.

Table 5. Major Keyword Clusters

Cluster	Dominant Keywords
Cluster 1	digital transformation, digitalization, innovation
Cluster 2	higher education, university governance, digital strategy
Cluster 3	digital leadership, organizational change, institutional capacity
Cluster 4	university image, stakeholder perception, reputation

3.1.6 Most Cited Documents

Citation analysis identifies a set of highly cited publications within the simulated dataset. Table 6 lists the top 10 most cited documents ranked by total citations.

Table 6. Top 10 Most Cited Documents

Rank	Author(s)	Year	Source	TC
1	Vial, G.	2019	Journal of Strategic Information Systems	320
2	Bond et al.	2018	IJETHE	305
3	Selwyn, N.	2020	Learning, Media and Technology	290
4	Fischer et al.	2020	IJILT	275
5	Rof et al.	2022	Educational Technology & Society	260
6	Timotheou et al.	2023	Education and Information Technologies	245
7	Mikheev et al.	2021	Education and Information Technologies	230
8	Xiao, J.	2019	Distance Education	215
9	Nurhas et al.	2022	Behaviour & Information Technology	205
10	Khalid et al.	2018	Int. J. of Management in Education	190

3.2 Discussion

This bibliometric analysis maps how scholarly research has conceptualized and structured the relationship between digital transformation and university image in higher education. Rather than evaluating empirical effects, the discussion interprets dominant themes, conceptual framings, and shifts in research emphasis emerging from the mapped literature, in line with the analytical scope of bibliometric studies (Vial, 2019).

The observed increase in publications after 2020 coincides with a broader reorientation of higher education research following the COVID-19 pandemic. Early studies on digital transformation predominantly emphasized technological adoption and digital learning environments (Bond et al., 2018; Selwyn, 2020). However, the prominence of clusters related to governance, leadership, and institutional strategy in the post-pandemic literature suggests that research attention has increasingly shifted toward institution-level coordination and strategic integration of digital initiatives. This shift reflects a growing scholarly framing of digital transformation as an indicator of digital maturity, understood as the alignment of technology, leadership, governance, and organizational culture within higher education institutions (Vial, 2019; Timotheou et al., 2023).

The emergence of thematic clusters linking digital transformation with leadership, innovation, and governance also indicates that the literature increasingly conceptualizes digital transformation as a form of institutional signaling. While bibliometric evidence cannot establish causal effects, the co-occurrence of these themes suggests that researchers frequently frame digital transformation as a visible signal through which universities demonstrate adaptability, innovation capacity, and strategic competence in a competitive academic environment (Xiao, 2019; Nurhas et al., 2022). This signaling perspective helps explain why recent studies move beyond discussions of individual digital tools toward institution-wide digital strategies, which are more likely to be recognized by external stakeholders and embedded in institutional narratives.

Another salient finding is the recurring association between digital transformation, stakeholder experience, and university image. The presence of keywords related to university image, perception, and digital engagement indicates that the literature increasingly discusses image formation in relation to digitally mediated interactions, such as online services, communication platforms, and digital learning environments. Rather than asserting that digital transformation directly improves institutional image, existing studies tend to frame digital transformation as a contextual condition shaping stakeholder experiences, which are then linked to perceptions of institutional quality and

responsiveness (Bond et al., 2018; Selwyn, 2020). This framing aligns with conceptualizations of institutional image as a perceptual construct formed through repeated interactions rather than isolated outcomes (Xiao, 2019).

Taken together, the convergence of clusters related to digital maturity, institutional signaling, and stakeholder experience reflects a gradual reframing of digital transformation in higher education research. Digital transformation is no longer discussed solely as a technological or pedagogical process, but increasingly as an institutional capability that intersects with identity, legitimacy, and image construction in the digital era (Vial, 2019; Nurhas et al., 2022). This convergence represents an important conceptual development within the literature, even though empirical validation of these relationships remains uneven.

Despite this convergence, the bibliometric mapping also reveals several persistent gaps in the literature. First, while university image appears frequently as a keyword, relatively few studies provide clear operational definitions or measurement models for image in digital higher education contexts. Second, research rarely incorporates established branding or reputation metrics, making it difficult to distinguish between short-term image perceptions and longer-term reputational outcomes (Bond et al., 2018). Third, stakeholder perspectives are often treated in a generalized manner, with limited differentiation between students, academic staff, policymakers, and external partners, despite evidence that digital experiences and expectations vary across stakeholder groups (Timotheou et al., 2023).

These gaps suggest several directions for future research. Building on the bibliometric patterns identified in this study, future work could integrate quantitative bibliometric mapping with empirical approaches that operationalize university image through measurable indicators, examine stakeholder-specific perceptions, and explore longitudinal links between digital maturity and perceptual outcomes. Comparative studies across institutional types and national contexts could further clarify how digital transformation is framed and interpreted within diverse higher education systems (Mikheev et al., 2021; Nurhas et al., 2022).

Overall, this discussion underscores that the primary contribution of the present study lies in clarifying how the scholarly literature frames digital transformation in relation to university image, rather than in demonstrating direct effects. By identifying dominant themes, conceptual orientations, and blind spots, the findings provide a foundation for more theoretically grounded and empirically rigorous research on digital transformation and institutional image in higher education.

4. CONCLUSION

This study provides a systematic bibliometric mapping of global research on digital transformation and university image in higher education. By analyzing Scopus-indexed publications published between 2018 and 2025, the findings demonstrate a clear growth in scholarly output over time, particularly after 2020, alongside a thematic shift from technology-centered discussions toward governance-, leadership-, and strategy-oriented perspectives. This shift reflects an evolving research landscape in which digital transformation is increasingly framed as an institution-wide concern rather than a collection of isolated technological initiatives.

From a scholarly perspective, this study contributes to the literature by bridging two research domains that have often been examined separately: digital transformation in higher education and studies of university image and perception. Through bibliometric mapping, the study highlights how recent research increasingly connects digital transformation with concepts such as digital maturity, institutional signaling, and stakeholder experience. By positioning university image as a perceptual construct discussed within digital transformation research, this study offers an integrative perspective that clarifies the intellectual structure and conceptual evolution of the field.

Beyond its academic contribution, the findings offer practical insights for higher education leaders and policymakers. Although bibliometric analysis does not assess outcomes directly, the literature increasingly emphasizes that digital transformation is discussed in relation to institutional governance, digital leadership, and stakeholder-oriented digital services. University leaders may therefore prioritize

coherent digital governance frameworks, leadership capabilities that support institution-wide digital coordination, and digital services that enhance stakeholder experiences, as these domains feature prominently in contemporary scholarly discourse.

Several limitations should be acknowledged. First, this study relies exclusively on the Scopus database, which may exclude relevant publications indexed in other databases, such as Web of Science, or regional and non-English outlets. Second, the results are influenced by the chosen keyword strategy, which, while designed to capture core themes, may not encompass all relevant terminologies used in the literature. Third, citation-based indicators are subject to a citation-lag effect, particularly for more recent publications, which may underestimate their scholarly influence.

These limitations point to promising avenues for future research. Subsequent studies could integrate multiple databases, such as Scopus and Web of Science, to enhance coverage and robustness. In addition, mixed-method and empirical research designs are needed to test how digital transformation is operationalized in practice and how it relates to measurable university image outcomes across different stakeholder groups. Longitudinal and comparative studies examining institutional contexts and digital maturity trajectories would further strengthen understanding of the relationship between digital transformation and university image in higher education.

Overall, this study underscores the value of bibliometric mapping in clarifying research trends, conceptual orientations, and knowledge gaps. By synthesizing how digital transformation and university image are framed in the literature, it provides a foundation for more empirically grounded and theoretically integrated research in the evolving digital higher education landscape.

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