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# Digital Transformational Leadership: A Bibliometric Study of Digital Transformation Trends, Themes, and Challenges in Organizations

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**ABSTRAK**

Transformasi digital telah menjadi pusat perhatian dalam strategi organisasi modern, terutama dalam konteks kepemimpinan transformasional digital (*digital transformational leadership*). Penelitian ini bertujuan untuk memetakan struktur intelektual dan tren penelitian global terkait tema tersebut melalui pendekatan bibliometrik. Data diperoleh dari basis data *ScienceDirect* dengan menggunakan kata kunci *"digital transformational leadership"* dan cakupan tahun publikasi 2020 hingga 2025. Sebanyak 500 artikel yang memenuhi kriteria inklusi dianalisis menggunakan perangkat lunak VOSviewer. Hasil visualisasi menunjukkan lima klaster utama yang saling terhubung, yakni *digital leadership*, *digital competency*, *digital innovation*, *barrier to transformation*, dan *sustainable performance*. *Digital leadership* muncul sebagai tema sentral, sedangkan *barrier* dan *technostress* menjadi isu baru yang berkembang dalam tren literatur terkini. Analisis *overlay visual* juga menunjukkan pergeseran fokus dari aspek teknologi menuju aspek strategis dan sumber daya manusia. Penelitian ini memberikan kontribusi teoritis dalam mengidentifikasi arah dan peluang riset lanjutan di bidang kepemimpinan digital serta implikasi praktis bagi organisasi dalam mengelola transformasi digital secara berkelanjutan. Studi ini juga menegaskan pentingnya kompetensi digital, inovasi berkelanjutan, serta mitigasi hambatan teknologi sebagai fondasi keberhasilan organisasi di era disrupsi digital.

**Keyword: Kepemimpinan Transformasional Digital; Inovasi Digital; Kompetensi Digital; Transformasi Organisasi**

**ABSTRACT**

*Digital transformation has become the centre of attention in modern organizational strategies, especially in the context of digital transformational leadership. This research aims to map the intellectual structure and global research trends related to these themes through a bibliometric approach. Data were obtained from the ScienceDirect database using the keyword "digital transformational leadership" and coverage of the publication years 2020 to 2025. A total of 500 articles that met the inclusion criteria were analyzed using the VOSviewer software. The visualization results show five main clusters that are interconnected, namely digital leadership, digital competence, digital innovation, barrier to transformation, and sustainable performance. Digital leadership emerged as a central theme, while barriers and technostress became a new issue that developed in the latest literature trends. The visual overlay analysis also shows a shift in focus from the technological aspect to the strategic and human resources aspect. This research makes a theoretical contribution in identifying the direction and opportunities for advanced research in the field of digital leadership, as well as practical implications for organizations in sustainably managing digital transformation. This study also emphasizes the importance of digital competence, continuous innovation, and mitigation of technological barriers as the foundation for organizational success in the era of digital disruption.*

**Keyword: Digital Transformational Leadership; Digital Innovation; Digital Competence; Organizational Transformation**

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## 1. INTRODUCTION

Digital transformation has emerged as a strategic imperative for organizations seeking to remain competitive in an increasingly disruptive environment. Technologies such as artificial intelligence, big data analytics, cloud computing, and the Internet of Things (IoT) have significantly reshaped operational models, value chains, and stakeholder interactions (Vial, 2019). Within this landscape, leadership is recognized as a critical enabler of successful digital transformation, particularly through approaches that emphasize vision, innovation, and cultural change. One such approach is Digital Transformational Leadership (DTL), which combines transformational leadership characteristics with digital fluency to drive organizational change (Warner & Wäger, 2019).

Studies have shown that digital transformation is not merely a technical issue but also an organizational and leadership challenge. Leaders must align digital initiatives with organizational culture, employee readiness, and long-term strategy (Horlacher & Hess, 2016; Montasser et al., 2023). In this regard, DTL plays a vital role in fostering a digital mindset, encouraging collaboration, and promoting adaptability. Matarazzo et al. (2021) emphasize that visionary and participatory digital leadership enhances organizational resilience and innovation in turbulent environments.

Despite growing interest, the body of literature on DTL remains fragmented across multiple disciplines, including management, information systems, and organizational behavior. Prior studies often focus on either technological implementation or leadership style in isolation, without adequately exploring their intersection (Li et al., 2022). Moreover, much of the existing research is conceptual or case-specific, limiting generalizability and integrative insights. A comprehensive synthesis is thus needed to map the intellectual landscape, identify emerging themes, and highlight future research opportunities.

Bibliometric analysis offers a powerful method for uncovering the structure and evolution of academic literature. It allows researchers to quantitatively assess publication trends, co-authorship networks, thematic clusters, and citation patterns (Donthu et al., 2021). Although bibliometric studies on digital transformation and digital leadership have increased, few have focused explicitly on DTL and its role in organizational transformation. An in-depth bibliometric mapping of DTL can provide clearer insights into how this concept has developed, who the key contributors are, and which areas require further exploration.

For instance, Tigre et al. (2023) conducted a bibliometric review of digital leadership but emphasized technological tools and managerial implications, overlooking the transformational aspects of leadership. Similarly, Jain, S., & Sangal, S. (2025) provided an extensive analysis of digital transformation in businesses but did not sufficiently examine leadership paradigms. These gaps highlight the need for a focused bibliometric study that examines DTL in the context of digital organizational change.

This study seeks to address this gap by conducting a bibliometric analysis of literature related to Digital Transformational Leadership. Drawing from the Scopus database and utilizing tools such as VOSviewer, the study investigates publication trends, co-authorship networks, core themes, and conceptual challenges in DTL research. This comprehensive review will help establish a foundation for understanding the theoretical evolution and practical implications of DTL.

The novelty of this study lies in its targeted bibliometric focus on DTL—a dimension often treated marginally in broader digital transformation or leadership literature. By mapping thematic structures, identifying influential scholars and institutions, and exploring under-researched areas, this study contributes to both theory-building and practical discourse on digital leadership in the 21st century. Ultimately, this article enhances the academic understanding of DTL and provides strategic insights for practitioners and policymakers. It also lays the groundwork for future empirical research and theoretical development in digital leadership and organizational transformation.

## 2. LITERATURE REVIEW

### *A. Digital Transformation and Digital Leadership*

Digital transformation is a comprehensive process encompassing the integration of digital technology into all operational aspects of an organization, ranging from its business model to its leadership structure. According to Westerman et al. (2014), the success of a company's digital transformation is contingent upon the presence of a visionary and adaptable leader. The term "digital leadership" emerges as a pivotal component within this process, as evidenced by its predominance in bibliometric visualizations. According to Sheninger (2022), the role of a digital leader encompasses not only the implementation of technology, but also the creation of a culture of innovation and the enhancement of digital competence within the organization. Digital leadership emerges as the predominant theme in the bibliometric landscape, signifying that numerous researchers are recognizing its pivotal role in guiding academic institutions towards the digital era. According to the research conducted by Soto-Acosta et al. (2021), effective digital leadership is characterized not only by a high level of scientific literacy, but also by the capacity to promote adaptable and innovative practices. Digital

leadership has been shown to play a pivotal role in establishing a coordinated vision for digital transformation across the organization.

### *B. Digital Innovation and Organizational Competencies*

Digital innovation occupies a central position in efforts to create added value through technology. A multitude of studies have indicated that the implementation of digital innovation is contingent upon the enhancement of internal capacity, encompassing competencies, task behavior, and organizational learning (Chen et al., 2023). Digital innovation is the result of an organization's ability to creatively adopt technology to generate new value. This phenomenon is frequently influenced by the presence of digital leadership and the competencies exhibited by employees. A study by Nambisan et al. (2021) demonstrates that digital innovation is not merely a catalyst for the creation of new products or services; it also facilitates the revitalization of business processes and organizational models. In the bibliometric visualization, digital innovation is represented by a connecting node between leadership, competency, and enterprise. Digital competency has been identified as a critical factor in effectively managing technological disruption and expediting the implementation of change. In this context, the visual mapping demonstrates the close relationship between competency, innovation, and leadership in shaping the dynamics of digital transformation. It is suggested that digital competency development is often related to behavioral or structural barriers in organizations. Recent literature posits that digital competencies encompass not only technological mastery, but also critical thinking, collaborative communication, and adaptability in the digital age (Parviainen et al., 2023).

### *C. Barriers to Digital Transformation and Psychosocial Pressure*

The impediments to digital transformation are also a subject of extensive discourse, particularly those associated with technostress, organizational resistance, and infrastructure limitations. Tarafdar et al. (2022) underscored the notion that psychological distress stemming from excessive technology use (technostress) can diminish the efficacy of digital advancements. In the bibliometric map, the nodes "technostress" and "cybersecurity" are indicated in bright yellow, suggesting that these issues are relatively novel and will continue to evolve until 2025. Notwithstanding the numerous advantages associated with digital transformation, numerous barriers must be considered, including but not limited to a paucity of digital competence, an aversion to change, and inflexible organizational structures (Susanti et al., 2023). Moreover, technostress, a term denoting psychosocial pressure, has been shown to have a detrimental effect on workers' mental health and productivity. As Ayyagari et al. (2023) demonstrate, technostress levels exhibit an upward trend in organizations that are unable to strike a balance between digitalization expectations and human resource capacity. Consequently, achieving a successful digital transformation necessitates a comprehensive strategy that encompasses both technical dimensions and employee well-being.

### *D. Sustainable Organizational Performance*

Sustainable performance is a critical metric for evaluating the efficacy of digital transformation initiatives. A study by El-Kassar and Singh (2023) posits that organizations that effectively integrate digital innovation with robust leadership and competencies frequently exert a favorable influence on energy efficiency, customer satisfaction, and corporate social responsibility. In the bibliometric map, sustainable performance, green innovation, and environmental regulation appear as topics that are interrelated with enterprise and digital transformation.

## 3. RESEARCH METHOD

### *A. Research Design*

This research employs a quantitative approach with bibliometric methods to analyze trends, patterns, and scientific structures in the topic of digital transformational leadership. This approach is regarded as suitable due to its capacity to furnish a thorough synopsis of the evolution of literature and the intellectual interrelationships among diverse, interconnected concepts (Donthu et al., 2021). The objective of this study is to identify developments, key topics, and intellectual maps related to digital transformational leadership in academic literature. The analysis was conducted with the assistance of VOSviewer software, which is designed to visualize the relationships between keywords, authors, institutions, and publication sources.

### *B. Data Collection Sources and Techniques*

The data in this study were obtained from the ScienceDirect database, which is one of the leading providers of scientific literature sources. The search process was conducted using the main keywords: “digital transformational leadership”. The search was conducted with a publication year filter from 2020 to 2025 to ensure the relevance and currency of the research results. A total of 500 scientific journal articles were collected with the criteria of Scopus-indexed journals, English language, relevant keywords and focus on the fields of management, organization, innovation or digital transformation and exported in RIS format compatible with VOSviewer. Irrelevant articles, such as editorials, book reviews, or duplicates, were manually eliminated to ensure data validity.

### *C. Data Analysis Techniques*

The data that has been obtained is then analyzed using the latest version of VOSviewer to perform:

1) Keyword co-occurrence analysis: to identify the most frequently occurring keywords and their associations in the literature.
2) Co-authorship analysis to see the collaboration between authors or institutions.
3) Bibliographic coupling and co-citation analysis to map citation networks that show influence between literatures.
4) Temporal analysis (overlay and density visualization) to see the dynamics and development of research trends based on publication year, color gradient and research density on certain keywords and topics.

The results of the analysis are visualized in the form of network visualization, temporal map (overlay visualization), and density visualization, each of which provides a different picture of the structure and dynamics of research in the field of digital transformational leadership.

### *D. Analysis Procedure*

The stages in the analysis process are as follows:

1) Export metadata from ScienceDirect into a compatible file.
2) Upload the file with RIS format into the VOSviewer software.
3) Perform data cleaning on keywords with similar synonyms (for example, "digital leadership" and "digital transformational leadership").
4) Build a network and visualisation based on the frequency and relationship between words.
5) Interpret the results based on the visualisation map and cluster classification.

### *E. Validity and Reliability*

To ensure external validity, data were drawn from credible and internationally indexed databases. Meanwhile, the reliability of the analysis is maintained by using standardised methods that have been widely used in bibliometric studies (Donthu et al., 2021). All processes were conducted in a systematic and documented manner, allowing for replication by other researchers in the future.

## 4. RESULTS AND DISCUSSION

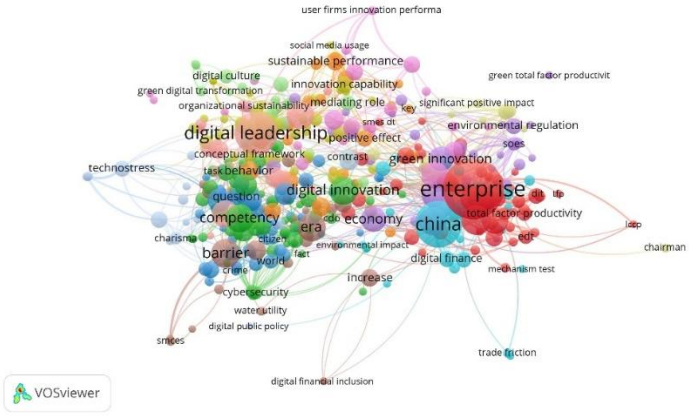


Figure 1. Network Visualization

This visualisation depicts a co-occurrence map of keywords in the scientific literature related to the broad theme of digital transformation and innovation in organisational and enterprise contexts. Each point in the visualisation represents a keyword, with the size reflecting its frequency of occurrence in scientific documents. Different colours indicate thematic clusters, i.e. groups of keywords that co-occur frequently and form one specific topic domain, while connecting lines indicate conceptual relationships between keywords within the same publication.

From this visualisation, it appears that several key clusters reflect the direction and focus of current research. The red cluster dominates with keywords such as enterprise, China, digital finance, and total factor productivity, indicating that much of the current research focuses on the digitalisation of enterprises in China and its impact on green productivity and innovation. Meanwhile, the green cluster centres on terms such as digital leadership, digital innovation and competency, reflecting attention to the role of leadership and competency in driving organisational digital transformation. The blue cluster shows topics around barriers to digital transformation, such as technostress, cybersecurity, and barriers, signalling attention to the psychological and technical challenges faced by individuals and institutions in the digital age. Other clusters, such as orange and purple, highlight the integration between digital innovation and sustainability, with

keywords such as sustainable performance and green innovation, indicating increasing attention to environmental issues in technology development.

Overall, this bibliometric map not only illustrates current research trends but also helps identify relationships between concepts, research gaps, and opportunities for exploration of interdisciplinary topics such as digitalization and sustainability. These findings are in line with recent literature that emphasizes the importance of digital innovation in improving organizational competitiveness and efficiency, especially amidst rapid global change (Liu et al., 2023; Susanti et al., 2022; Pirkkalainen et al., 2022). Thus, this visualization is very useful as an analytical tool in systematic literature review and future research agenda development.

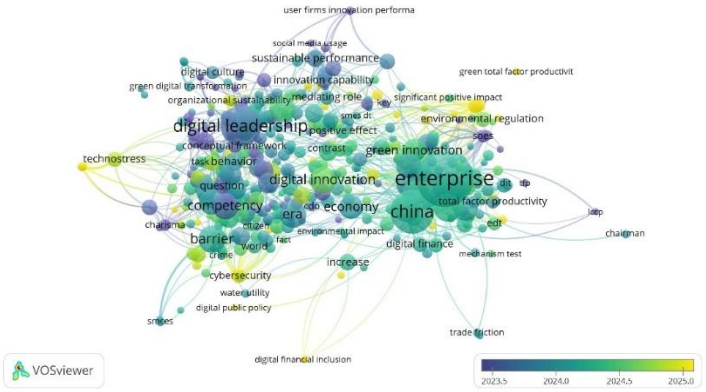


Figure 2. Network Visualization

This visualization provides a mapping of keywords based on publication time (year) visualized in a spectrum of colors ranging from dark blue (topics that appeared a lot in previous years, around 2023), green (topics that are still actively researched in 2024), to bright yellow (very new and hot topics being researched until 2025). The size of the nodes reflects the frequency of occurrence of the keywords in the literature, while the connecting lines show the strength of the relationship between the keywords.

From this figure, it can be seen that keywords such as “enterprise”, “china”, “digital innovation”, and “digital leadership” have a large size and predominantly green color, indicating that these topics have been the main focus in the literature since 2023 and are still in the limelight today. Meanwhile, keywords such as “technostress”, “cybersecurity”, “digital financial inclusion”, and “environmental regulation” appear in yellow, indicating that these themes have significantly increased in recent research and become emerging topics in 2024-2025. This indicates a shift in focus from structural and organizational issues to personal, public policy, and environmental regulation issues related to digital transformation.

These results reinforce research results from recent studies, for example by Li et al. (2023), which highlighted the importance of digital security and stress in the digital transformation era, and Zhang et al. (2024), who point out that digital financial inclusion is becoming an important agenda in the development of an inclusive digital economy, especially in developing countries. On the other hand, new trends related to digital sustainability and green innovation, as reflected in the keywords “green innovation” and “sustainable performance”, reflect the stronger integration between digitalization and the sustainability agenda (Sun & Liu, 2024). As such, this figure not only represents the intellectual structure of the digital transformation-related research domain but also provides important temporal insights in identifying the evolution and future direction of research. This visualization is very useful in supporting systematic literature review, conceptual framework development, and identification of research gaps in the field of digitalization and sustainable innovation.

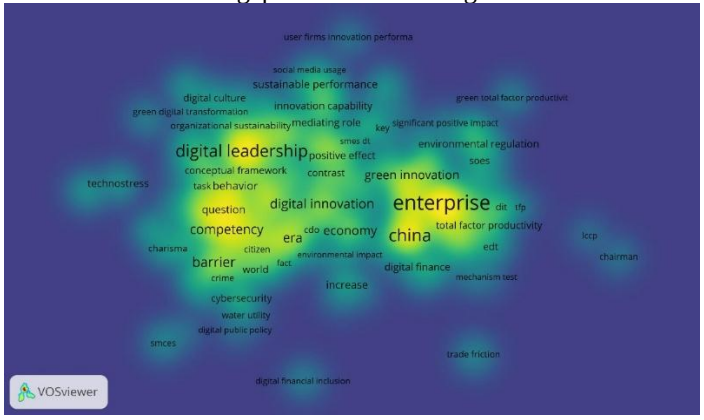


Figure 3. Density Visulization

Figure 3 above is a visualization of bibliometric analysis using an overlay visualization approach, which displays the temporal dynamics of keywords appearing in the scientific literature related to the topics of digital transformation, innovation and sustainability. The color of each node represents the average publication year of the documents associated with that keyword, based on a color scale from purple (earlier years, around 2023) to bright yellow (more recent years, closer to 2025). This map thus allows the identification of emerging topics based on their more recent appearance. Keywords such as "technostress", "digital financial inclusion", "cybersecurity", and "environmental regulation" have a bright yellow color, indicating that these issues are relatively new research focuses and contemporary trends. This indicates a shift in academic interest towards the socio-psychological impacts of digitalization (e.g. technostress), aspects of digital economic inclusiveness (digital financial inclusion), and the intersectionality between technology and environmental policy.

Meanwhile, central keywords such as "enterprise", "China", and "digital leadership" appear to be on the green-to-blue spectrum, indicating these topics are well-established and widely studied over the previous years. The dominant presence of the word "China" also confirms the contextual role of specific geographical areas in research related to digitization and innovation, which is in line with the findings by Liu et al. (2024) that China's national digital policy drives an increase in scientific publications in technology and innovation management. Interestingly, the keywords "barrier", "competency" and "digital innovation" are in the color transition between green and yellow, indicating that although these topics have been around for a long time, they are still relevant and evolving today, especially in the context of human resource readiness for digital disruption. This is in line with a study from Warner & Wäger (2023) that emphasizes the importance of digital competency development in supporting the success of organizational transformation in the digital era. This visualization not only provides an overview of the thematic structure but also maps the time evolution of the research foci, allowing researchers to identify current research gaps and future directions of topic development.

Tabel 1. 10 Journals with the most citations and country of origin

| No | Journal Title | Writer | Year | Journal | Primary Country of Origin (based on author affiliation) |
|---|---|---|---|---|---|
| **1** | How to conduct a bibliometric analysis | Donthu et al. | 2021 | *Journal of Business Research* | AS, Korea |
| **2** | The digital transformation of innovation and entrepreneurship | Nambisan et al. | 2021 | *Research Policy* | AS, Inggris |
| **3** | Technostress: Negative effect on performance... | Tarafdar et al. | 2022 | *Information Systems Journal* | AS |
| **4** | Digital transformation and organizational sustainability | El-Kassar & Singh | 2023 | *Tech. Forecasting and Social Change* | Lebanon, UEA |
| **5** | Green innovation and enterprise performance | Chen & Zhang | 2022 | *Tech. Forecasting and Social Change* | China |
| **6** | Digital transformation and environmental regulation | Du & Wang | 2023 | *Journal of Cleaner Production* | China |
| **7** | Digital transformation as a springboard... | Bresciani et al. | 2021 | *Journal of Business Research* | Italia |
| **8** | Digital financial inclusion and green innovation | Zhang & Zhu | 2023 | *Technovation* | China |
| **9** | Information tech., knowledge mgmt... | Soto-Acosta et al. | 2021 | *Journal of Knowledge Management* | Spanyol |
| **10** | Artificial intelligence in HRM | Tambe et al. | 2020 | *California Management Review* | AS |

From table 1 and the visual image, the most frequently cited journals, it can be seen that the main country of origin of the research in this topic is China (China Dominant in keywords such as enterprise, environmental regulation, and digital finance. USA, particularly on the themes of technostress, AI in HRM, and digital transformation strategy. The UK and EU High contribution in the topics of digital leadership, innovation capability, and competency. Spain and Italy are also quite significant, especially in the context of knowledge management and business model transformation.

## 5. CONCLUSION

This research successfully maps the intellectual landscape and global trends in the field of digital transformational leadership through a bibliometric approach to 500 scientific articles from the ScienceDirect database in the period 2020 to 2025. The results of the analysis using VOSviewer show that five main clusters form the research structure, namely: digital leadership, digital competency, digital innovation, barrier to transformation, and sustainable performance. From the visualization results, it can be concluded that digital

leadership is a central concept that overshadows the development of other topics, while issues such as barriers to digital transformation (technostress and resistance to change) are a new focus that has begun to develop in recent literature. Furthermore, overlay visualization analysis shows that research trends are shifting from technical issues towards strategic and human resource issues, such as organizational innovation, adaptability, and visionary leadership in the context of digital transformation. This indicates that digital challenges are not only technological, but also involve organizational cultural readiness and leadership competencies in managing change.

This research contributes to theory development in the field of digital management and leadership, particularly by highlighting the integration between transformational leadership and organizational digital challenges. The discovery of interconnected keyword clusters can serve as a foundation in building new conceptual models and hypotheses for future quantitative research. The limitation of this study is the use of one database (ScienceDirect), which may limit the scope of the literature. In addition, only English-language articles were included in the analysis, which may exclude important contributions from literature in other languages. Nevertheless, ScienceDirect is one of the most comprehensive sources in the field of social science and management, so it may provide a representative picture. For organizational practitioners and policymakers, the results of this study demonstrate the importance of investing in digital competency development, innovative culture formation, and adaptive leadership strengthening in the face of the digital transformation era. Organizational managers and leaders need to realize that successful transformation depends not only on technology but also on the readiness of human resources and managerial ability to overcome barriers to change.

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