

# Digital Transformation in SMEs: A Comprehensive Bibliometric Analysis of Research Evolution, Influential Publications, and Future Directions (2016–2026)

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## Abstract

**Purpose:** The purpose of this study is to provide a comprehensive and systematic bibliometric analysis of digital transformation research in small and medium-sized enterprises (SMEs). The study aims to identify publication trends, influential publications, leading authors, major contributing institutions, key countries, dominant subject areas, core keywords, and emerging research gaps within this rapidly evolving field. **Methodology:** This study adopts a bibliometric analysis approach using advanced tools, including VOSviewer, Biblioshiny, and OpenRefine. Data were collected from the Scopus database based on title searches, then carefully cleaned and harmonized using both automated tools and manual verification. A total of 383 publications were included in the final dataset. Various analytical techniques were applied to extract tables, networks, and visualizations representing publication trends, citation structures, and thematic evolution. **Results:** The findings reveal a significant and rapid growth in digital transformation research in SMEs over the period 2016–2026, with a notable peak in 2025, indicating the increasing importance of this field. The analysis shows that the field is highly interdisciplinary, with a strong concentration in Business, Management, and Accounting. Citation metrics demonstrate a high academic impact, with a total of 14,173 citations and an average of 36.99 citations per document. The results also highlight influential publications and authors, as well as the dominance of China in research productivity and Italy in citation impact. Keyword and thematic analyses indicate that core topics such as “digital transformation,” “SMEs,” and “dynamic capabilities” are central, while emerging themes such as artificial intelligence and digital maturity present new research opportunities. Furthermore, the study identifies a notable gap related to the limited integration of social media within the digital transformation literature. **Limitations:** This study is limited to the Scopus database and focuses only on English-language journal publications. Future studies may expand the analysis by including other databases such as Web of Science (WOS) and exploring additional document types to provide a more comprehensive perspective.

**Originality/Value:** This study provides one of the most comprehensive bibliometric analyses of digital transformation in SMEs, offering valuable insights into the structure, development, and future directions of the field. By systematically mapping research trends and identifying gaps, this study contributes to both academic knowledge and practical understanding, serving as a useful reference for researchers, practitioners, and policymakers interested in digital transformation.

**Keywords:** Digital Transformation, SMEs, Bibliometric Analysis, Digitalization, Dynamic Capabilities

## Introduction

In an environment characterized by rapid technological change, heightened market uncertainty, and intensified global competition, digital transformation has emerged as a central strategic imperative for organizations, including SMEs. This transformation involves more than technological adoption; it is a holistic realignment of strategy, processes, and capabilities to exploit digital resources and create new forms of value (Wu et al., 2024; Cueto et al., 2022). In recent years, digital transformation has become increasingly important for SMEs due to the growing dependence on digital technologies, changing customer expectations, and the increasing need for organizational flexibility, innovation, and competitiveness in dynamic business environments (Huang & Kumarasinghe, 2024; Díaz et al., 2024). Furthermore, the COVID-19 pandemic accelerated the shift toward digital business models and highlighted the necessity of digital readiness and technological adaptability for organizational survival and sustainability (Petropoulou et al., 2024; Ragazou et al., 2022).

Despite their smaller resource bases and narrower strategic horizons, Small and medium-sized enterprises (SMEs) play a vital role in economic development due to their contribution to employment, innovation, and market dynamism. However, unlike large organizations, SMEs often operate under constraints related to resources, expertise, and strategic capabilities. These limitations can make the transition toward digital transformation more challenging, as it requires not only technological adoption but also organizational change and long-term strategic commitment (Lin & Mao, 2023). Moreover, SMEs frequently encounter challenges related to digital infrastructure, technological knowledge, and resistance to organizational change, which may hinder the successful implementation of digital transformation initiatives (Chonsawat & Sopadang, 2020; Hokmabadi et al., 2024).

Despite these challenges, digital transformation presents significant opportunities for SMEs. By leveraging digital tools and platforms, SMEs can enhance operational efficiency, strengthen customer relationships, and expand their market reach. Furthermore, digital transformation can support SMEs in adapting to environmental changes and responding more effectively to external pressures such as market disruptions and technological shifts (Xin et al., 2022). As a result, digital transformation is increasingly viewed as a strategic necessity rather than merely a technological initiative, due to its potential to improve organizational performance, innovation capabilities, and long-term sustainability (Teng et al., 2022; Zhou et al., 2023).

The growing academic interest in digital transformation within SMEs has resulted in a rapidly expanding body of literature (International Telecommunication Union, 2019). However, where a unified clear and comprehensive understanding of the field remains elusive, and

where longitudinal, cross-country. Existing studies have primarily focused on isolated aspects of digital transformation, such as technology adoption, innovation, sustainability, or organizational performance, while comprehensive bibliometric investigations examining the intellectual structure and evolution of the field remain relatively limited (Veldhoven et al., 2021; Rahmanwali, 2025). In particular, there is a need to systematically examine how research on digital transformation in SMEs has evolved over time, what themes dominate the literature, and where future research efforts should be directed (Teng et al., 2022).

Accordingly, this study aims to provide a structured overview of the research landscape on digital transformation in small and medium-sized enterprises. By analyzing existing academic publications, this study seeks to identify key trends, major research areas, and emerging topics within the field. In addition, this study aims to identify influential authors, leading countries, active institutions, and dominant thematic areas that shape the intellectual development of digital transformation research in SMEs. The findings are expected to contribute to a deeper understanding of digital transformation in SMEs and offer valuable insights for researchers and practitioners interested in this domain.

#### *Significance and Utility of the Study*

The significance of this study lies in its ability to provide a comprehensive and structured understanding of the research landscape on digital transformation within small and medium-sized enterprises (SMEs). As the volume of academic publications in this field continues to grow rapidly, there is an increasing need to systematically organize and interpret this body of knowledge to identify key trends, dominant themes, and emerging research directions. This is particularly important because digital transformation has become a strategic necessity for SMEs seeking to improve competitiveness, operational efficiency, innovation, and long-term sustainability in rapidly changing business environments (Teng et al., 2022; Zhou et al., 2023).

From an academic perspective, this study contributes to the existing literature by offering a holistic overview of how digital transformation in SMEs has evolved over time. By applying bibliometric techniques, the study helps clarify the intellectual structure of the field, highlight influential contributions, and uncover research gaps that require further investigation. In addition, the study provides researchers with a consolidated knowledge base that facilitates the identification of influential authors, leading journals, active institutions, and emerging thematic areas within the field. This enables researchers to build on a more solid and organized foundation when developing future studies.

From a practical standpoint, the findings of this study provide valuable insights for business practitioners, particularly those operating in SMEs. By identifying the main focus areas and developments within digital transformation research, decision-makers can better understand how organizations are adapting to technological changes and which strategies are gaining attention in the academic and professional communities. The practical utility of this study lies in helping SME managers and practitioners recognize the importance and effectiveness of digital transformation initiatives in enhancing organizational flexibility, market responsiveness, and innovation capabilities. This can support more informed strategic planning and enhance the effectiveness of digital transformation initiatives.

In addition, the study holds relevance for policymakers and stakeholders involved in economic development. Understanding the trajectory of research on digital transformation in SMEs can assist in designing policies and support mechanisms that encourage digital adoption, innovation, and long-term competitiveness. Such insights may also support governmental and institutional efforts aimed at accelerating digital readiness and reducing technological barriers faced by SMEs. Such insights are especially important in environments where SMEs play a central role in economic growth.

Finally, this study addresses a critical gap by providing a consolidated and systematic analysis of the literature on digital transformation in SMEs. While numerous studies have explored specific aspects of the topic, a comprehensive mapping of the field remains limited. Accordingly, this study not only contributes theoretically to the bibliometric literature but also offers practical guidance for future digital transformation research and implementation within SMEs. By filling this gap, the study offers a clearer picture of the current state of research and outlines potential avenues for future scholarly exploration.

### **Problem Statement**

The last decade has witnessed a rapid acceleration in digital technologies that fundamentally reshapes how firms operate, compete, and create value. Across both scholarly reviews and practitioner reports, digital transformation (DT) is described as a broad, cross-disciplinary phenomenon that permeates strategy, operations, finance, marketing, and governance. This diffusion of technologies—ranging from big data analytics and cloud computing to AI, IoT, and automated financial tools—has redefined competitive dynamics and is increasingly positioned as a central research-practice priority for firms of all sizes, including small and medium-sized enterprises (SMEs) (Veldhoven et al., 2021; Rahmanwali, 2025). In particular, SMEs are recognized as key engines of economic growth, capable of driving innovation and job creation, yet they face distinctive DT challenges rooted in resources, capabilities, governance, and external environments. Moreover, the growing dependence on digital technologies has made digital transformation increasingly essential for SMEs seeking to enhance operational efficiency, innovation capability, customer engagement, and long-term competitiveness. Despite these potential benefits, many SMEs still struggle to understand the strategic dimensions and evolving knowledge structure of digital transformation, which further increases the need for comprehensive and systematic investigations in this field (Teng et al., 2022; Zhou et al., 2023). The literature repeatedly emphasizes that SMEs, while pivotal to economic development, often lag behind larger firms in DT adoption and implementation, underscoring the need for SME-focused DT theories, frameworks, and evidence (Huang & Kumarasinghe, 2024)

Scholars have examined DT in SMEs through multiple lenses—technological adoption, organizational change, performance outcomes, innovation, digital capabilities, and supply-chain integration. This multi-dimensional focus reflects the inherently interdisciplinary nature of the DT phenomenon. Yet this diversity of perspectives contributes to fragmentation: DT in SMEs is studied across different disciplines and research streams, making it difficult to obtain a clear and comprehensive understanding of the field's development and intellectual structure (Veldhoven et al., 2021; , Rahmanwali, 2025; , Huang & Kumarasinghe, 2024)

A striking finding across the literature is the relative scarcity of large-scale bibliometric or scientometric analyses that systematically map the DT-SME landscape. Although a substantial number of empirical and conceptual studies exist, few studies have employed rigorous bibliometric methods to chart the field's knowledge structure, thematic clusters, collaboration networks, and evolution over time. This gap constrains researchers from identifying salient topics, influential authors, key journals, and emergent topics, and it also limits practitioners' ability to extract actionable insights from the literature. Several scholars explicitly advocate for rigorous scientometric or bibliometric mappings as robust, scalable approaches to reveal intellectual structure and to monitor how themes rise, morph, or wane over time (Rahmanwali, 2025; Cao & Alon, 2020; Phogat et al., 2025).

In addition, the dynamic nature of digital transformation requires continuous monitoring of how research themes evolve over time. Understanding these patterns is essential for identifying research gaps, guiding future investigations, and supporting evidence-based decision-making in both academic and practical contexts. However, current research does not sufficiently address this need through large-scale, systematic analytical approaches

Therefore, there is a clear need for a comprehensive bibliometric study that examines the evolution and structure of research on digital transformation in SMEs. Such an analysis can provide a holistic view of the field, uncover hidden patterns, and highlight areas that require further exploration. Accordingly, this study aims to address this gap by conducting a comprehensive bibliometric analysis of digital transformation research in SMEs. Specifically, this study seeks to answer the following research questions:

- What patterns can be identified in the publication trends related to digital transformation in SMEs, and how have these patterns evolved over time?
- Who are the most influential and productive authors in the field, and what are their primary research themes?
- Which institutions and organizations contribute most significantly to the development of digital transformation research in SMEs?
- How does research activity vary across countries and regions in the context of digital transformation in SMEs?
- Which publications have received the highest citation impact, and what key topics do they address?
- What are the most frequently used keywords in the literature, and how have research themes evolved over time?
- What thematic structures can be identified through keyword co-occurrence analysis, and how do these themes cluster within the field?
- What research gaps exist in the domain of digital transformation in SMEs, and which future research directions can be proposed?

### **Literature Review**

This section provides a conceptual foundation for the study by presenting an overview of bibliometric analysis, followed by a discussion of its relevance in examining research domains. It also highlights how such analytical approaches can be utilized to understand the development and structure of contemporary research fields, particularly within the context of digital transformation.

*Bibliometrics Analysis*

The concept of bibliometric analysis provides a quantitative lens through which to understand how knowledge in a given domain evolves over time. Grounded in early discussions of bibliometrics and the formalization of its methodologies, bibliometric analysis examines patterns in authorship, citations, collaborations, and publication trajectories to uncover the structure and dynamics of scientific fields. This conceptual foundation traces back to Pritchard's foundational ideas and subsequent formalization by scholars who chart the roles of citation analysis, co-citation, and information-product evaluation within the broader bibliometric landscape (Bala & Kaur, 2024; Özsoy & Sezgili, 2024). The literature consistently frames bibliometrics as a systematic approach to mapping knowledge production, identifying gaps, and guiding future inquiry through quantitative metrics and visual science maps (Al-Sharaa et al., 2024; , Borges et al., 2022; , Tutar et al., 2022; .

In recent years, bibliometric methods have gained substantial traction in business and management research, driven by both methodological maturation and the expansion of digital data sources. The accessibility of large bibliographic databases (e.g., Scopus, Web of Science) and widely used software tools (e.g., VOSviewer, Bibliometrix, Gephi, Leximancer) has empowered researchers to perform robust analyses that yield high-quality insights about topics, authorship networks, institutional influence, and national collaboration patterns (Al-Sharaa et al., 2024; Verma & Gustafsson, 2020; Ramli et al., 2022). This broadened toolkit supports the examination of complex research ecosystems and the emergence of new domains, including those influenced by digital transformation and information systems.

A recurring framing in the literature concerns the four primary facets of bibliometric inquiry. First, performance analysis concentrates on the descriptive metrics of journals, articles, authors, and institutions, often charting trends in productivity and citation impact. This dimension provides a descriptive backbone for understanding who is contributing, where, and how influence accumulates over time (Erboz et al., 2022; , Tutar et al., 2022). Second, science mapping (or bibliometric mapping) emphasizes the structural relationships among publications, enabling the visualization of intellectual structure, clusters, and thematic evolution via co-authorship networks, co-citation networks, and keyword co-occurrence maps. This approach offers a panoramic view of how ideas cluster and interact within a field (Özsoy & Sezgili, 2024; Borges et al., 2022; ( . Third, bibliographic coupling and co-citation analyses produce similarity measures between documents and journals by shared references, facilitating the identification of emerging themes and converging research streams. Fourth, the broader interpretive synthesis often combines performance analysis and science mapping to triangulate the knowledge base, uncovering both the quantitative performance signals and the qualitative structure of a domain (Tutar et al., 2022; Fauzi et al., 2023).

The relevance of bibliometric analysis to understanding research domains—especially those undergoing rapid change due to digital transformation—has been underscored across multiple streams of the literature. Bibliometric approaches are described as well-suited to capturing the evolution of topics, identifying knowledge gaps, and mapping collaboration patterns among scholars, institutions, and countries. They are positioned as essential for examining how digital technologies, data-driven methods, and information systems influence the development of fields such as strategic information systems, governance of innovation,

and technology-enabled management practices )Verma & Gustafsson, 2020; , Wani et al., 2022, Khan et al., 2023).

### *Digital Transformation in Small and Medium-Sized Enterprises (SMEs)*

Digital transformation (DT) has solidified its status as a central driver of organizational change, enabling firms to enhance operational efficiency, innovation capacity, and competitive positioning in dynamic markets. DT entails the integration of digital technologies into all facets of business operations, fundamentally altering how organizations create value and interact with customers (Zhou et al., 2023; Petropoulou et al., 2024). For SMEs, DT represents not merely a technology upgrade but a strategic necessity for survival and growth in the digital economy (Hokmabadi et al., 2024;Philbin et al., 2022). The broader literature consistently situates SMEs as pivotal to economic development due to their flexibility, adaptability, and contributions to employment and innovation, while also highlighting the distinctive constraints they face compared with larger firms—namely tighter financial resources, limited technical expertise, and greater organizational resistance to change (Petropoulou et al., 2024;Burinskienė & Nalivaikė, 2024).

A recurring theme across the literature is that SMEs' DT is shaped by multiple, interdependent factors. Technological readiness and the development of digital capabilities within the workforce are repeatedly identified as foundational prerequisites for effective adoption and utilization of DT tools such as cloud computing, big data analytics, artificial intelligence, and e-commerce platforms (Philbin et al., 2022; Lewandowska et al.2023). Scholarly work also emphasizes the crucial role of organizational capabilities and leadership, with managerial commitment and strategic orientation highlighted as key enablers of successful transformation initiatives. In addition, external environmental pressures—such as industry dynamics, policy incentives, and market competition—interact with internal factors to influence DT trajectories in SMEs (Hokmabadi et al., Chonsawat & Sopadang, 2020;Yulianti et al. 2023).

From a strategic vantage point, DT in SMEs is frequently framed through the lens of sensing and seizing growth opportunities via digital platforms, data-driven decision-making, and enhanced customer engagement. The literature consistently documents how DT helps SMEs overcome traditional barriers—geographical distance, resource constraints, and limited physical reach—by enabling new channels for market access, collaboration, and service innovation. Yet, the journey is often non-linear and non-deterministic, requiring continuous adaptation, experimentation, and learning. Several reviews note that a lack of a clear strategic vision or insufficient integration of digital initiatives into core business models can impede realized benefits, underscoring the need for coherent DT roadmaps aligned with business strategy (Zhou et al., 2023; Díaz et al.,2024 Ragazou et al, 2022).

Given the growing importance of digital transformation, there is an increasing need to systematically analyze the existing body of literature to better understand the intellectual structure, key themes, and emerging trends in this field. In this context, bibliometric analysis provides a valuable approach for mapping the development of digital transformation research in SMEs, identifying influential studies, and uncovering potential research gaps that can guide future investigations.

## Methods

### *Data Strategy and Collection*

In this study, literature directly related to digital transformation in small and medium-sized enterprises (SMEs) was identified based on the Scopus database. Scopus was selected because it is one of the largest citation databases, covering more than 20,000 peer-reviewed journals across fields such as technology, social sciences, arts, and humanities (Fahimnia et al., 2015).

The data were extracted from the Scopus database on May 1, 2026. The timeline of the current study covers the period from 2016 to 2026, as the first publication explicitly addressing digital transformation in SMEs appeared in 2016. The following search string was used to identify relevant publications:

TITLE ("digital transformation" AND SME OR SMEs OR "small and medium enterprises" OR "small and medium-sized enterprises") AND PUBYEAR > 2016 AND PUBYEAR < 2026

The analysis was restricted to article titles, as they offer a clear and focused representation of the research topic, thereby enhancing the accuracy and alignment with the study's objectives. The initial search produced 619 documents. To maintain the integrity and quality of the bibliometric analysis, only journal articles were included by applying the Scopus source type filter LIMIT-TO (SRCTYPE, "j"), reducing the number of documents to 396. This step was adopted to focus on peer-reviewed journal publications and exclude conference proceedings, books, book chapters, and other publication types.

After limiting the results to articles published in the English language using LIMIT-TO (LANGUAGE, "English"), the dataset was reduced to 384 documents. The retrieved records were then carefully checked for duplication and relevance. One duplicated document was identified and removed. Therefore, the final dataset consisted of 383 documents, which were used for the bibliometric analysis in this study, as shown in Figure (1), the PRISMA flow chart (Moher, 2015).

### *Data Cleaning and Harmonization*

Data cleaning and harmonization represent a crucial stage in bibliometric analysis, as the accuracy and reliability of the results depend heavily on the quality and consistency of the dataset. Any inconsistencies, duplicates, or variations in terms may negatively affect the validity of the findings. Therefore, a systematic data preprocessing procedure was implemented to ensure accuracy and credibility.

The data cleaning and harmonization process was conducted as follows:

**First:** The bibliographic data were extracted from the Scopus database in CSV format, ensuring compatibility with bibliometric analysis tools and completeness of the dataset.

**Second:** The dataset was processed using OpenRefin (<https://openrefine.org/>) (Ahmi, 2023), which was employed to clean and standardize the data. This step involved clustering similar terms and resolving inconsistencies across multiple fields. In particular, variations in authors' keywords (e.g., differences in spelling, abbreviations, and formatting) were unified. Additionally, inconsistencies in countries and institutional affiliations were addressed, where different naming conventions, abbreviations, or alternative spellings (e.g., country

abbreviations or shortened university names) were standardized to ensure uniformity across the dataset.

**Third:** A manual validation process was conducted to further refine the dataset. This included reviewing and standardizing authors' names, affiliations, and country information, as well as identifying and removing duplicated records that were not detected automatically.

**Fourth:** After completing the cleaning process, the refined dataset was imported into Biblioshiny (R-package) for descriptive and performance analysis, including publication trends, authorship patterns, and source analysis.

**Fifth:** Finally, the cleaned dataset was analyzed using VOSviewer to construct and visualize bibliometric networks, such as co-occurrence of keywords, co-authorship networks, and thematic structures, ensuring accurate representation of relationships within the dataset.

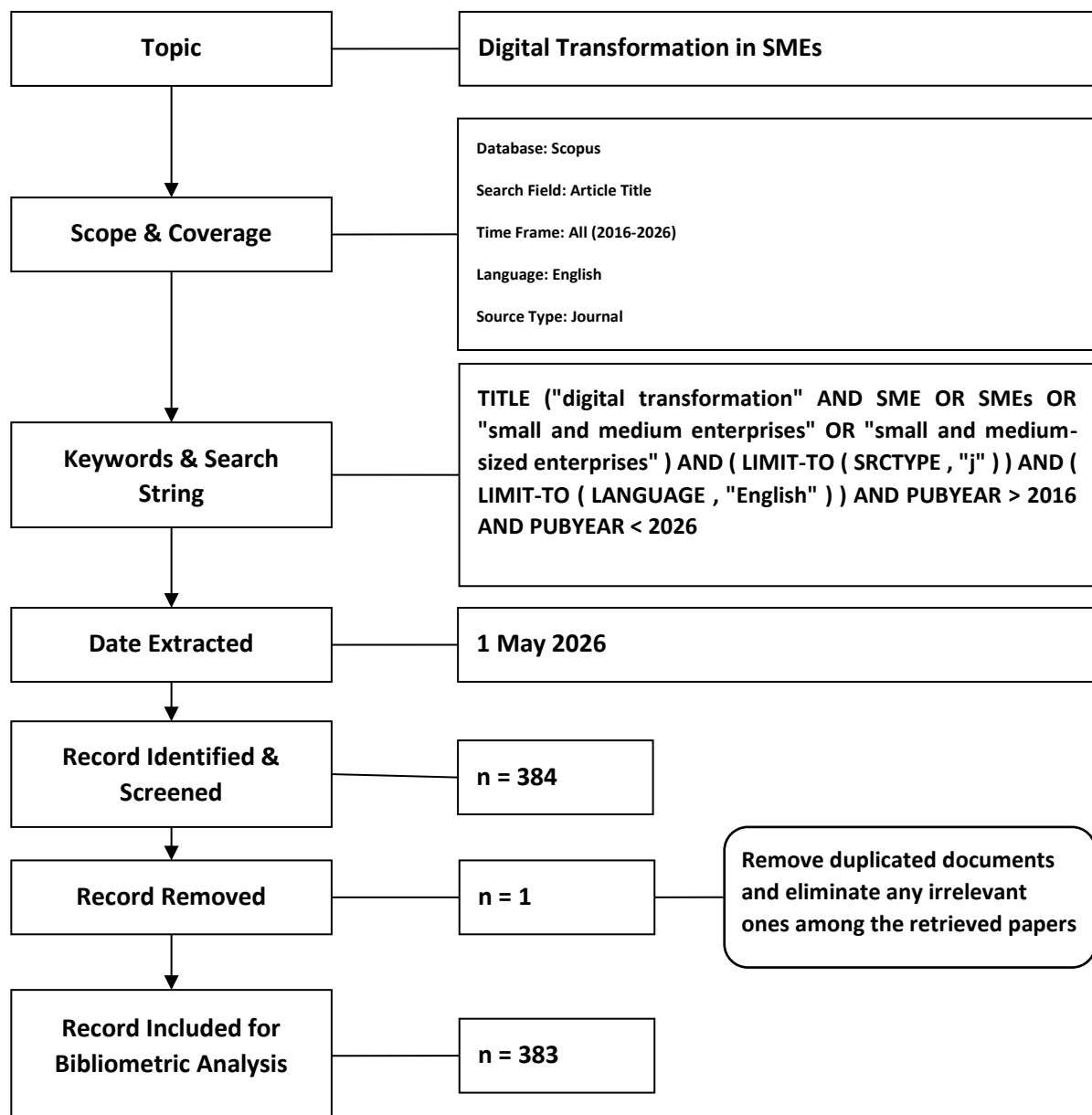


Figure (1): PRISMA Flow Diagram of the search strategy

### *Bibliometric Analysis Tools*

To conduct a comprehensive bibliometric analysis, this study employed a combination of advanced analytical tools, namely Bibliometrix (<http://www.bibliometrix.org>) (via the Biblioshiny interface) and VOSviewer, (<http://www.vosviewer.com>) Van Eck & Waltman (2010) to ensure both quantitative evaluation and visual exploration of the dataset.

Bibliometrix, an R-based package, was utilized through its web interface Biblioshiny to perform performance analysis and extract key bibliometric indicators. This tool enabled the assessment of several important metrics that reflect both research productivity and impact. These include total publications (TP), total citations (TC), number of cited publications (NCP), citations per publication (C/P), citations per cited publication (C/CP), and citations per author (C/A). In addition, impact indicators such as the h-index, g-index, m-index, Highly Cited Documents, Highly Cited Documents, Top 20 productive institutions, Top 20 productive country, and Most Frequent Author keywords. were calculated to provide a more comprehensive evaluation of scholarly influence and consistency over time.

In parallel, VOSviewer (Van Eck & Waltman, 2010) was employed for science mapping and network visualization. This tool played a critical role in identifying and illustrating relationships within the dataset by generating visual maps based on bibliometric networks. Specifically, it was used to analyze keyword co-occurrence, co-authorship patterns, country collaborations, and thematic clustering, thereby revealing the intellectual structure and research trends in the field of digital transformation in SMEs.

The integration of Biblioshiny and VOSviewer allowed this study to combine performance analysis with science mapping techniques, providing both statistical insights and visual interpretations. This dual approach enhances the reliability and depth of the bibliometric findings, enabling a more comprehensive understanding of the research landscape.

## **Results**

### *Document and Source Type*

According to the bibliometric analysis, the dataset consists of 383 publications categorized into different document types. The findings reveal that the vast majority of the publications are articles ( $n = 359$ , 93.73%), indicating a strong orientation toward empirical and peer-reviewed research. Review papers represent a smaller portion of the dataset ( $n = 17$ , 4.44%), while conference papers ( $n = 4$ , 1.04%) and erratum documents ( $n = 3$ , 0.78%) constitute only a minimal share. In terms of source type, all publications are classified as journal articles (100%), as the dataset was intentionally restricted to journal sources. This reflects a high level of academic rigor and emphasizes the importance of peer-reviewed journals as the primary channel for disseminating knowledge in this field. Furthermore, all retrieved publications are written in English (100%), highlighting the dominant role of the English language in scientific communication and its widespread use in the domain of digital transformation research, as presented in Table (1).

Table (1)

*Document Type, Source type, and Languages*

Document Type	TP	%	Source Type	TP	%	Language	TP	%
Article	359	93.73%	Journal	383	100%	English	383	100%
Review	17	4.44%						
Conference Paper	4	1.04%						
Erratum	3	0.78%						
Total	383	100%						

*Subject Area of Digital Transformation Field*

This study classifies the retrieved publications based on their subject areas, as shown in Table (2). The results indicate that digital transformation research is highly interdisciplinary, with a strong concentration in business and management -related fields. The largest share belongs to Business, Management, and Accounting with 227 publications (59.27%), highlighting the strategic importance of digital transformation in organizations. This is followed by Social Sciences with 117 publications (30.55%), reflecting the growing interest in social and behavioral aspects. From a technological perspective, Computer Science (97 publications, 25.33%) and Decision Sciences (78 publications, 20.37%) also contribute significantly, emphasizing the role of digital technologies and data-driven decision-making. Additional contributions are observed in Economics, Econometrics and Finance (17.23%) and Engineering (16.19%), indicating the economic and technical dimensions of the field. Moreover, Environmental Science (12.79%) and Energy (10.18%) show the relevance of digital transformation in sustainability contexts. Other subject areas such as Mathematics, Multidisciplinary studies, Psychology, and Arts and Humanities contribute to a lesser extent, while several scientific fields show minimal engagement. Overall, the findings confirm that digital transformation research is dominated by business disciplines, supported by technological and analytical fields.

Table (2)

*Subject Area of DT Field*

Subject Area	TP	%	Subject Area	TP	%
Business, Management and Accounting	227	59.27%	Psychology	13	3.39%
Social Sciences	117	30.55%	Arts and Humanities	9	2.35%
Computer Science	97	25.33%	Materials Science	6	1.57%
Decision Sciences	78	20.37%	Agricultural and Biological Sciences	4	1.04%
Economics, Econometrics and Finance	66	17.23%	Biochemistry, Genetics and Molecular Biology	3	0.78%

Engineering	62	16.19%	Physics and Astronomy	3	0.78%
Environmental Science	49	12.79%	Chemical Engineering	2	0.52%
Energy	39	10.18%	Chemistry	2	0.52%
Mathematics	19	4.96%	Earth and Planetary Sciences	2	0.52%
Multidisciplinary	19	4.96%			

*Publication Trends*

The dataset in Table (3) provides valuable insights into publication trends within the field of study. An analysis of annual scientific output reveals clear and rapid growth in digital transformation in SMEs research during the study period. This field began with very limited contributions, with only one paper published in 2016, 2017 and 2018. It then gradually increased to two papers in 2019. 2020 marked a significant turning point, with the number of publications rising sharply to 15, representing the beginning of accelerated research activity. This upward trend continued in 2021 with 18 publications, and then more than doubled in 2022 to reach 36. This growth has become even more pronounced in recent years, reaching 57 publications in 2023 and 83 in 2024. The highest level of scientific output was recorded in 2025 with 124 publications, reflecting the peak of research interest in this field. Although the number of publications in 2026 is lower (46 publications), this is expected because the data only cover part of the year up to May 1, 2026. Overall, the results indicate a strong and sustained expansion in research output, supported by a high annual growth rate of 46.65%, confirming the increasing importance and maturity of digital transformation research.

Table (3)

*Publication trends within DT field*

<b>Annual Scientific Production</b>		
Year	Articles	Annual Growth Rate %
2016	1	<b>46.65%</b>
2017	1	
2018	1	
2019	2	
2020	15	
2021	18	
2022	36	
2023	57	
2024	83	
2025	124	
2026 /05/01	46	

*Publication by Source Title*

Analyzing publications by title provides valuable insights into the most influential journals in digital transformation research. Among the sources that published at least five articles, several journals stand out as key knowledge dissemination platforms, as shown in Table 4. The journal (Sustainability) Switzerland is ranked as the most productive source, having published 27 articles and garnered a total of 1,455 citations, demonstrating its high productivity and strong research impact. The (IEEE Transactions on Engineering Management) journal also demonstrates significant influence, having published 8 articles and received 346 citations, reflecting its importance in bridging technological and managerial perspectives.

In terms of citation impact, the (Journal of Business Research) boasts the highest total citations (1,697) despite publishing only 7 articles, highlighting its strong influence in this field. Similarly, the journal (Technological Forecasting and Social Change) demonstrates a significant contribution with 7 articles and 661 citations, underscoring its role in shaping future research discussions. Other relevant sources include MDPI Systems (eight publications, 186 citations) and the (Small Business Strategies) five publications, 268 citations, which contribute to the growing literature on SMEs and digital transformation. Additionally, journals such as the (International Journal of Information Management) and the (Open Innovation) exhibit moderate research output but maintain high citation levels.

Overall, while some journals lead in terms of productivity, others demonstrate a higher impact per publication, reflecting their strong academic influence. These findings highlight the diversity of publishing outlets and offer valuable guidance for researchers in identifying influential journals in the field of digital transformation.

Table (4)

*Most Active Source Titles*

Source Title	TP	TC	h	g	m
Sustainability (Switzerland)	27	1455	18	27	2.57
IEEE Transactions on Engineering Management	8	346	6	8	1.5
Journal Of Business Research	7	1697	6	7	1
Journal Of Small Business Strategy	5	268	5	5	0.71
MDPI Systems	8	186	5	8	1.25
Technological Forecasting and Social Change	7	661	5	7	1
European Journal of Innovation Management	4	101	4	4	1
International Journal of Information Management	4	425	4	4	1
Journal of Open Innovation: Technology, Market, and Complexity	5	540	4	5	0.57
Problems And Perspectives in Management	5	69	4	5	0.8

*Publications by Authors*

The results in Table (5) identify several outstanding authors who have made significant contributions to the field of digital transformation. Among them, Wang S stands out as one of the most influential authors, having published four papers and garnered the highest number of citations at 401, reflecting a strong average citations per paper (C/P = 100). The h and g indices (4 each) also indicate consistent academic impact. Similarly, Lehmann C and

Espina-Romero L each published four papers, although their citation counts were relatively lower, highlighting the variability in research impact among authors with similar productivity. Other authors, such as Gupta S, also demonstrate consistent contributions with four papers each. Several authors with fewer publications also exhibit remarkable citation performance. For example, Petrovska K and Rupeika each have three papers, but their combined citation count is relatively high (311), indicating strong impact per paper. Similarly, Yang Z and Peter M.K. demonstrate a significant impact in terms of citations despite their relatively small publication counts. In contrast, some authors in this field have contributed modest citation records, reflecting emerging or under-citation research contributions. Overall, the findings reveal that while productivity is relatively evenly distributed among a number of authors, citation impact varies considerably, highlighting the presence of both highly influential contributors and emerging researchers in the field of digital transformation research

Table (5)

*Most Productive Authors in DT Field*

Author's Name	TP	NCP	TC	C/P	C/CP	h	g	m
Wang S (57237559800)	4	4	401	100	100	4	4	1
Lehmann C (36573890400)	4	4	92	23	23	3	4	0.8
Espina-Romero L (57496122100)	4	4	28	7	7	2	3	0.7
Gupta S (57211862448)	4	4	24	6	6	2	3	0.8
Parra-Sánchez Dt (57195677014)	3	3	57	19	19	3	3	0.5
Peter Mk (57190076350)	3	3	265	88	88	3	3	0.4
Petrovska K (57191521370)	3	3	311	104	104	3	3	0.6
Rupeika-Apoga R (57191521370)	3	3	311	104	104	3	3	0.6
Yang Z (58017643600)	3	3	200	67	67	3	3	0.8
Akhtar S (57202210523)	3	3	85	28	28	2	3	1
Fliege K (58277755800)	3	3	90	30	30	2	3	0.7
Fodouop Kouam Aw (59477667200)	3	3	8	2.7	2.7	1	2	0.5
Kargas A (55606651900)	3	3	22	7.3	7.3	2	2	0.7
Komisopoulos F (57222262338)	3	3	22	7.3	7.3	2	2	0.7
Sagala Gh (57202453159)	3	3	0	0	0	0	0	0
Saunila M (37013922700)	3	3	0	0	0	0	0	0
Shahzad K (57200124275)	3	3	49	16	16	3	3	1.5
Talero-Sarmiento Lh (57195373615)	3	3	57	19	19	3	3	0.5
Ueasangkomsate P (57194209402)	3	3	43	14	14	3	3	1

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

VOSviewer software was used to create a visual network representation (Figure 2) to study the relationships between authors in the field of digital transformation. The analysis was performed using the fractional count method, where the authors were the units of analysis. A minimum threshold of two documents and five citations per author was applied. Of the 1,142 authors, 53 met this threshold, and the largest interconnected network consisted of 50 authors, who were included in the final visual representation. The total link strength was 500.41, indicating a relatively high level of interconnectedness among the authors. The

results show that the selected authors are categorized into five distinct groups, each represented by a different color. These groups reflect patterns of intellectual collaboration and thematic similarity among the researchers. The first group (red) includes a large number of (15) interconnected authors, such as Appio F.P., Crupi A., and Garzoni A., demonstrating a dense collaborative network. The second group (green) includes (13) authors such as Costa Melo I., Kargas A., and Rupeika-Apoga R., indicating another active research community with strong internal connections. The third group (blue) is centered around (10) authors such as Wang S., Fliege K., and Fodouop Kouam A.W., demonstrating significant interconnectedness and influence within the network. The fourth group (yellow) includes (9) authors such as Lu H. and Ueasangkomsate P., representing a smaller but cohesive group. Finally, the fifth group (purple) consists of a limited number of (3) authors, including Civelek M., Gupta S., and Krajčik V., suggesting a more specialized or emerging research path. Overall, this visual representation highlights a well-organized and interconnected author network, where multiple research groups contribute to the advancement of the digital transformation field with varying degrees of collaboration and influence.

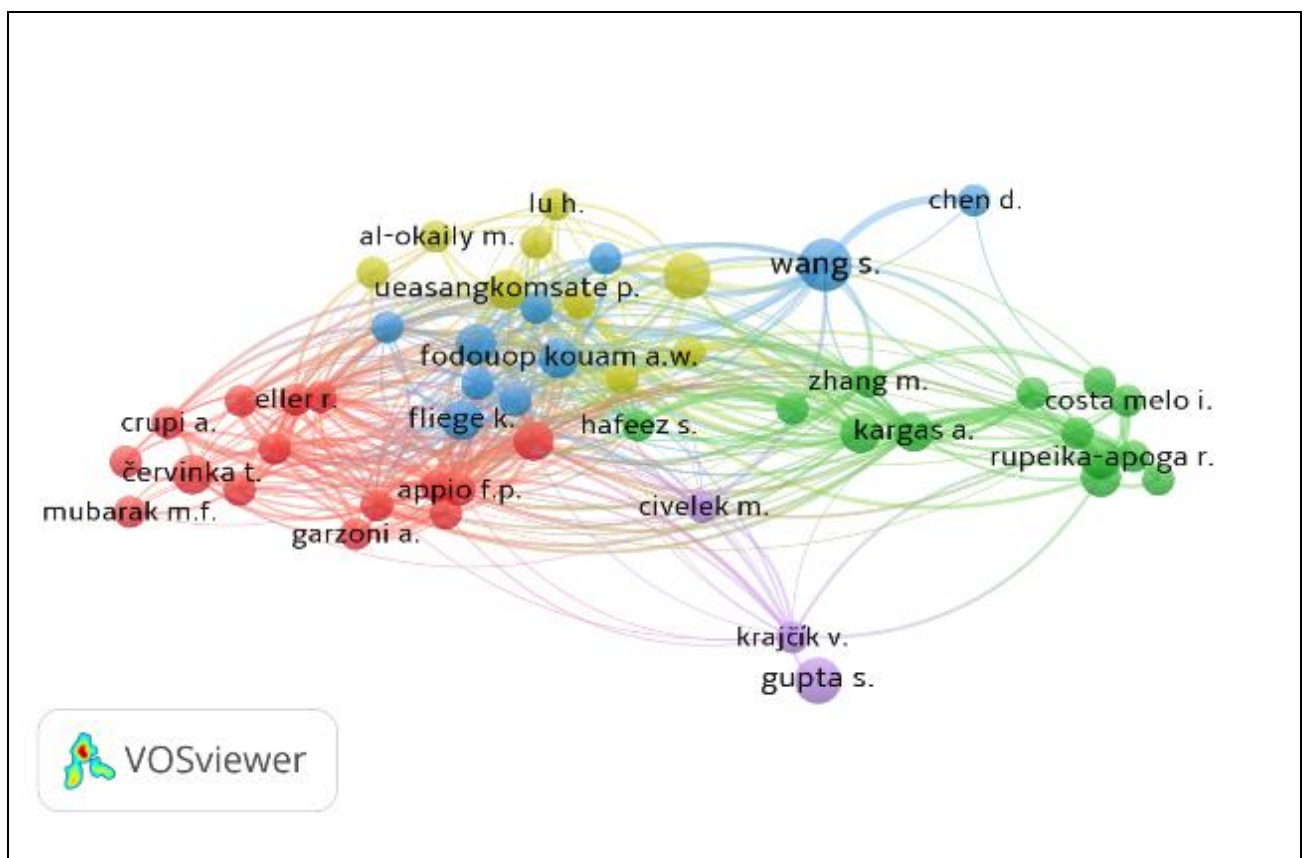


Figure (2): Network Visualization Map of DT Research Co-authors

### *Publications by Institutions*

Table 6 shows the leading institutions contributing to publications in the field of digital transformation. The results indicate that Jiangsu University tops the list of most productive institutions with 16 publications, followed by San Ignacio de Loyola University with 15 publications, and then the University of Western Attica with 12 publications, reflecting its strong research engagement in this area. In addition, Middle East University contributes 10 publications, while the University of Sainsce, Malaysia, has 9 publications, indicating a notable

presence of institutions from diverse geographical regions. Other institutions also contribute regularly, including the Hellenic Mediterranean University, the University of Innsbruck, the University of Latvia, and the University of Minho, each with 8 publications. On the other hand, institutions such as Amity University, the Federal University of Technology – Paraná, Tarbiat Modares University, and the University of Applied Sciences and Arts of Northwest Switzerland each contributed seven publications, followed by Aalborg University, Brno University of Technology, Dongbui University of Economics and Finance, and Harbin University of Science and Technology, each with six publications. Overall, the results reveal a diverse geographical distribution of research output among institutions, highlighting the global interest and collaborative expansion in digital transformation research. The variation in the number of publications reflects varying levels of research productivity, with a few leading institutions driving the majority of contributions in this field.

Table (6)

*Most Productive Institutions with a Minimum of Six Publications*

Affiliation	Articles	Affiliation	Articles
Jiangsu University	16	“George Emil Palade” University Of Medicine	8
Universidad San Ignacio De Loyola	15	Amity University	7
University Of West Attica	12	Federal University Of Technology-Paraná–Utfpr	7
Middle East University	10	Tarbiat Modares University	7
Universiti Sains Malaysia	9	University Of Applied Sciences And Arts Northwestern Switzerland Fhnw	7
Hellenic Mediterranean University	8	University Of Cambridge	7
International University	8	Aalborg University	6
University Of Innsbruck	8	Brno University Of Technology	6
University Of Latvia	8	Dongbei University Of Finance And Economics	6
University Of Minho	8	Harbin University Of Science And Technology	6

*Publications by Countries*

Table 7 shows the distribution of publications in the field of digital transformation across different countries, revealing important patterns. China stands out as the largest contributor with 168 publications and 1,741 total citations, confirming its pivotal role in advancing research in this area. It is followed by Indonesia (86 publications) and Italy (84 publications), with Italy registering a significant impact in terms of citations (2,800) and a strong average number of citations per paper. India also demonstrates a strong research presence with 63 publications, followed by Greece (53) and Spain (47), indicating effective contributions from both Asia and Europe. Meanwhile, Malaysia (41 publications) and the United Kingdom (39 publications) reflect continued participation in the research landscape. Other European countries, such as Germany, Portugal, and the Czech Republic, show moderate contributions, while countries like South Korea, Finland, and Australia demonstrate varying levels of influence based on citation metrics. It is worth noting that some countries, including Saudi Arabia and Poland, show relatively high citation rates despite their limited publications,

indicating high-quality research. Overall, the results highlight a geographical diversity in the research landscape, with a clear dominance of Asian countries, particularly China, alongside strong contributions from Europe. This distribution reflects the growing global interest in digital transformation and its increasing importance across different regions.

Table (7)

*Most Productive Countries Contributed to the Publications*

Country	TP	TC	NCP	C/P	C/CP
China	168	1741	51	10.36	34.14
Indonesia	86	619	18	7.2	34.39
Italy	84	2800	18	33.33	155.56
India	63	553	11	8.78	50.27
Greece	53	249	9	4.7	27.67
Spain	47	301	12	6.4	25.08
Malaysia	41	78	10	1.9	7.8
Uk	39	232	15	5.95	15.47
Germany	36	167	9	4.64	18.56
Portugal	29	134	8	4.62	16.75
South Korea	29	90	10	3.1	9
Finland	25	76	3	3.04	25.33
Jordan	25	220	5	8.8	44
Australia	22	235	6	10.68	39.17
Czech Republic	22	125	6	5.68	20.83
Colombia	21	54	2	2.57	27
Romania	21	23	4	1.1	5.75
Poland	20	144	3	7.2	48
Saudi Arabia	20	277	6	13.85	46.17
Ghana	20	19	4	0.95	4.75

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

International collaboration between countries was then examined using VOSviewer software through an analysis of co-authorship. As shown in Figure 3, the analysis was performed using a partial counting method, with a minimum number of documents per country, resulting in 51 countries (out of 79) meeting the selection criteria. The network representation reveals nine distinct clusters, each representing a group of countries with strong collaborative relationships. The red cluster (Group 1), comprising countries such as Italy, France, Greece, and the Netherlands, reflects a well-established European research network with extensive interconnections. The green cluster (Group 2), including countries such as India, Japan, Sweden, and the United Kingdom, indicates strong regional collaboration between Asia and Europe. Similarly, the blue cluster (Group 3), consisting of Indonesia, Malaysia, Australia, and South Korea, highlights active collaboration within the Asia-Pacific region. The purple cluster (Group 5), comprising Jordan, Saudi Arabia, Iraq, and Portugal, represents emerging collaboration patterns involving Middle Eastern countries. Meanwhile, the Blue Cluster

(Cluster 6), comprising Spain, Brazil, Chile, Colombia, and Peru, reflects the strong links between Latin American and European countries. Notably, China emerges as a central node within the network (Cluster 7), establishing robust collaborative ties with numerous countries, demonstrating its pivotal role in global research collaboration. Furthermore, countries like Italy and Spain occupy prominent positions, characterized by strong connections and extensive collaborative networks. In this visual representation, the distance between nodes and the thickness of the links indicate the strength of inter-country collaboration, with closer nodes and thicker links representing stronger relationships (Fabrikant et al., 2009). Moreover, countries with larger nodes tend to have higher research output and a stronger collaborative influence within the network. Overall, the findings demonstrate that international collaboration plays a crucial role in advancing research related to digital transformation, with leading countries acting as hubs that facilitate knowledge exchange and contribute to the production of impactful research (Mohamed, et al., 2020; Moosa, and Shareefa, 2020).

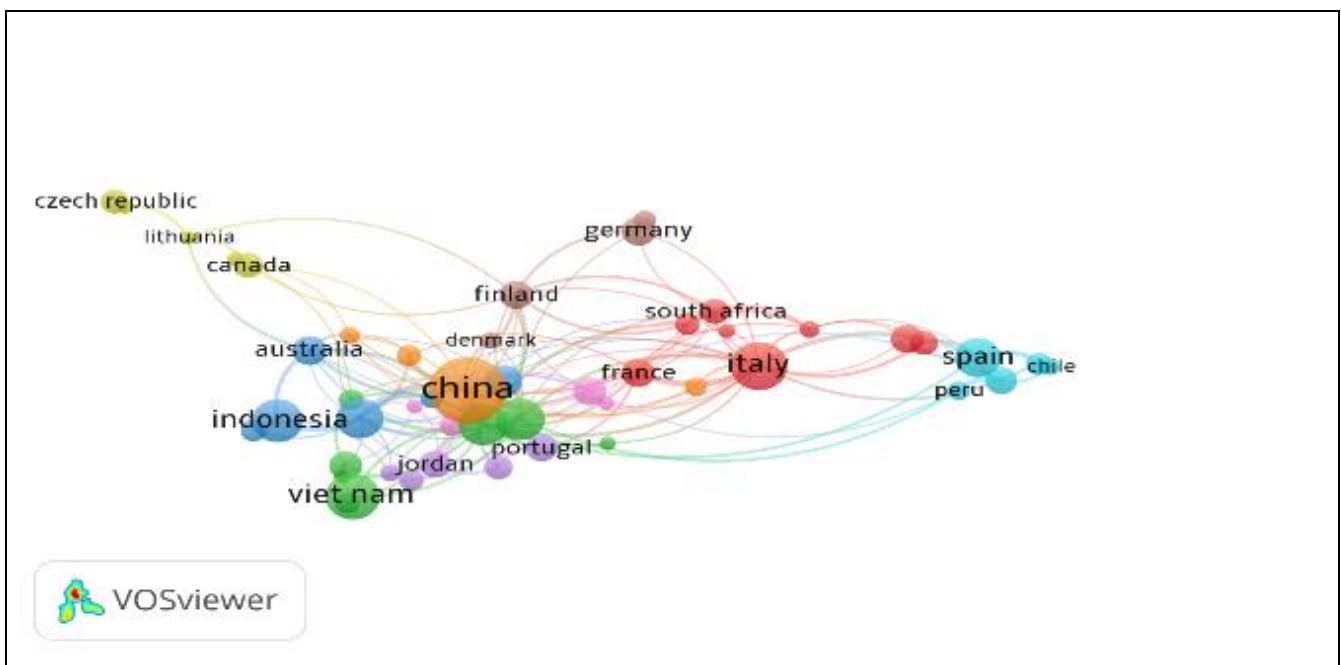


Figure (3). Network Visualization Map of the Co-authorship by Countries

#### *Citation Metrics of DT*

The analysis of citation metrics in the field of digital transformation, as shown in Table (8), reveals important insights into the development and impact of this rapidly growing research area. From 2016 to 2026, this field produced 383 publications, demonstrating a growing academic interest in digital transformation, particularly in recent years as digitalization has become a fundamental element of organizational strategy and competitiveness. In citation analysis, the impact of research is assessed based on the number of times publications are cited in other studies (Baker et al., 2020). The results show that digital transformation research garnered 14,173 citations, reflecting a high level of academic influence. On average, each publication received 36.99 citations, highlighting the importance and widespread reach of this field. This impact is even more pronounced when focusing solely on cited research, where the average number of citations per publication reached 46.47, indicating the presence of highly influential studies in this area. The chronological distribution of citations

highlights the dynamic nature of this field, averaging 1,288.45 citations annually, underscoring the rapid growth and importance of digital transformation research in contemporary literature. Furthermore, the average number of citations per author is 12.23, indicating that researchers in this area are producing valuable and influential scholarly contributions. Collaboration also plays a pivotal role in digital transformation research, as evidenced by an average of 3.4 authors per publication and an international co-authorship rate of 27.15%, reflecting the multidisciplinary and global nature of digital transformation studies. Additionally, the dataset includes 1,159 contributing authors, confirming the breadth and diversity of scholarly engagement in this field.

In general, these citation metrics confirm that digital transformation is not only a highly active research area but also one with significant academic impact. The high citation rates, strong collaboration patterns, and rapid growth rate, taken together, highlight the pivotal role of digital transformation in shaping modern organizational practices, innovation strategies, and sustainable development initiatives.

Table (8)

*Citations Metrics of DT*

Main Information	Data
Publication Years	2016 – 2026
Total Publications	383
Citable Year	11
Annual Growth Rate (%)	46.65
Document Average Age	2.13
Total Citations	14173
Average Citations per Document	36.99
Citations per Author	12.23
Number of Contributing Authors	1159
Number of Cited Paper	305
Citations per Cited Paper	46.47
Citation per Year	1288.45
Citations per Author	12.23
Authors per Document	3.4
International Co-authorship (%)	27.15
References	47967

*Highly Cited Documents in Digital Transformation*

Table (9) presents the most cited documents in the field of digital transformation, highlighting the total number of citations and the annual citation count. The most influential study is "Digital Transformation for SME Entrepreneurs: A Capability Perspective" by Li et al. (2018), which received 1,185 citations and was published in the Journal of Information Systems, demonstrating its strong foundational impact in the field. The second most cited study is "Digital Transformation and Customer Value Creation in Italian Manufacturing SMEs: A Dynamic Capability Perspective" by Matarazzo et al. (2021), which received 936 citations and achieved the highest annual citation count (156). Published in the Journal of Business Research, it reflects its rapid and significant academic impact. Other notable contributions

include the studies by Priyono et al. (2020) and Troise et al. (2022), each with over 470 citations, addresses the pathways of digital transformation and organizational resilience. In general, leading journals such as the Journal of Information Systems and the Journal of Business Research play a pivotal role in disseminating influential research in the field of digital transformation.

Table (9)

*Top 10 Highly Cited Articles*

<b>N o</b>	<b>Author (s)</b>	<b>Title</b>	<b>Source Title</b>	<b>T C</b>	<b>C/ Y</b>
1	Li et al (2018, )	Digital transformation by SME entrepreneurs: A capability perspective	Information Systems Journal	1185	13167
2	Matarazo et al (2021)	Digital transformation and customer value creation in Made in Italy SMEs: A dynamic capabilities perspective	Journal of Business Research	936	1566
3	Priyono et al, (2020)	Identifying digital transformation paths in the business model of smes during the covid-19 pandemic	Journal of Open Innovation: Technology, Market, and Complexity	474	671
4	Troise et al, (2022)	How can SMEs successfully navigate VUCA environment: The role of agility in the digital transformation era	Technological Forecasting and Social Change Journal	472	944
5	Klein et al, (2021)	COVID-19 crisis and SMEs responses: The role of digital transformation	Knowledge and Process Management Journal	334	5567
6	Garzoni et al, (2020)	Fostering digital transformation of SMEs: a four levels approach	Management Decision Journal	319	457
7	Khurana et al, (2022)	SMEs and digital transformation during a crisis: The emergence of resilience as a second-order dynamic capability in an entrepreneurial ecosystem	Journal of Business Research	319	638
8	Ghobakhloo et al, (2021)	Digital transformation success under Industry 4.0: a strategic guideline for manufacturing SMEs	Journal of Manufacturing Technology Management	304	5067
9	Skare et al, (2023)	Digital transformation and European small and medium enterprises (SMEs): A comparative study using digital economy and society index data	International Journal of Information Management	293	7325
10	Wang et al, (2023)	Can digital transformation improve market and ESG performance? Evidence from Chinese SMEs	Journal of Cleaner Production	244	614

*Top Keywords of DT Field*

Author keywords play an important role in identifying key research trends and emerging topics in the field of digital transformation. Following the methodology proposed by Wen and Huang (2012), and after removing duplicate or similar terms, a co-occurrence analysis of authors' keywords was performed using VOSviewer software. As shown in Figure 4, a minimum occurrence threshold of 3 was applied, resulting in 90 keywords grouped into 15 clusters. The graph illustrates the relationships between keywords, where node size reflects frequency, and link strength indicates the degree of correlation between terms (Sweileh et al., 2017). The results show that "digital transformation," "small and medium-sized enterprises," and "dynamic capabilities" represent the core of the research field, appearing as the most prominent and frequently associated keywords. Regarding the cluster analysis, the first cluster (13 items) focuses on topics related to competitive advantage, digital maturity, e-commerce, supply chain, and resilience, particularly in the context of post-COVID-19 environments. The second cluster (12 items) emphasizes innovation, digital marketing, organizational agility, SME performance, and technological innovation, highlighting performance and innovation perspectives. The third cluster (11 items) centers on digital strategy, digital technologies, government support, and organizational resilience, reflecting the strategic and institutional dimensions of digital transformation. The fourth cluster (10 items) includes artificial intelligence, green innovation, sustainability, leadership, and organizational culture, indicating the integration of digital transformation with sustainability and advanced technologies. The fifth cluster (7 items) addresses digital adoption, business model transformation, information systems, and corporate performance, with a focus on implementation and results. The sixth group (5 items) highlights digital capabilities, dynamic capabilities, and shared value creation, which aligns strongly with theoretical foundations such as the dynamic capabilities perspective. Other groups, such as Group 7, focus on digital culture, digital awareness, and emerging economies, while Group 8 focuses on organizational change and entrepreneurial orientation. Group 9 addresses digital innovation, digital transformation, and operational performance, reflecting research trends toward performance. The remaining groups (10-15) cover more specialized topics, including the resource perspective, process models, technology adoption, innovation capacity, sustainable development, and export performance, demonstrating the diversity and breadth of digital transformation research. Overall, the findings show that digital transformation research is multidisciplinary, combining strategy, technology, performance, and sustainability, with a strong focus on SMEs and capabilities-led transformation.

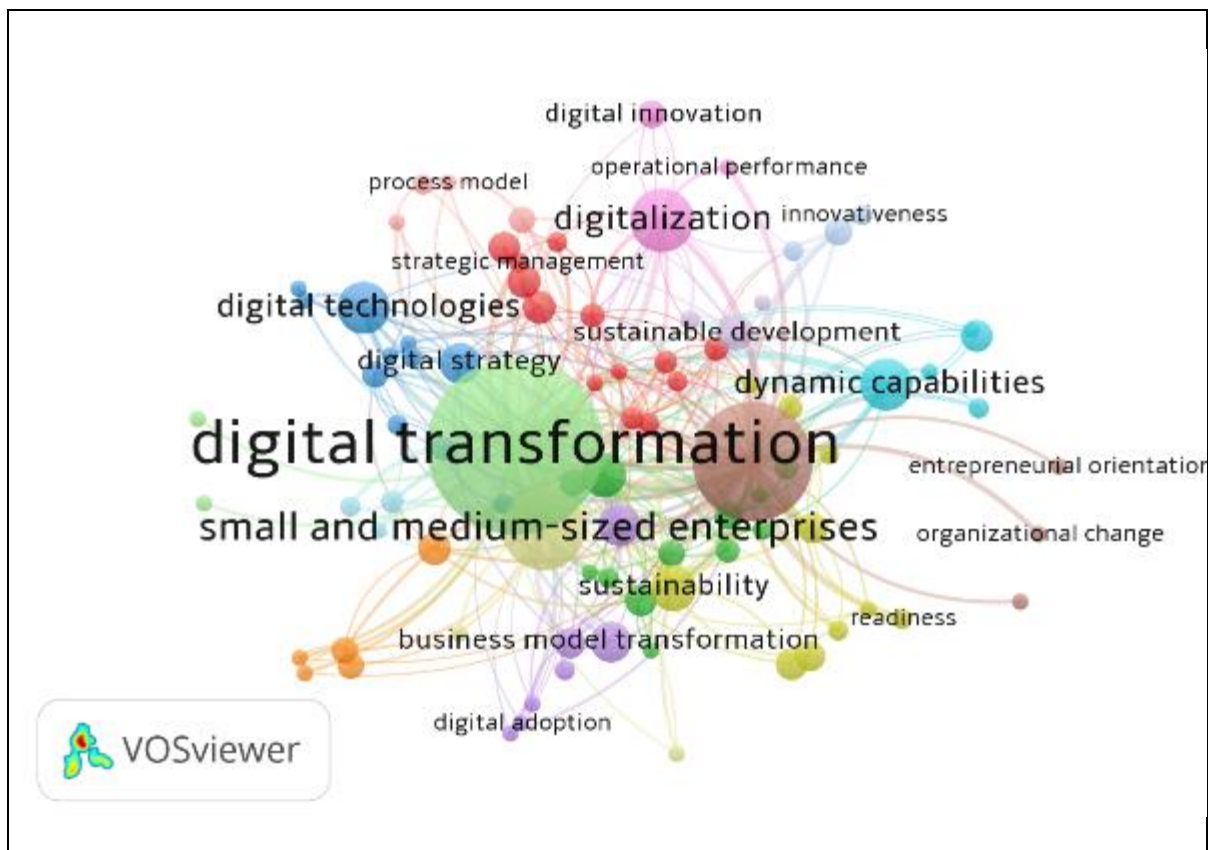


Figure (4). Network Visualization of the Author's Keywords

#### *Thematic Evolution in Digital Transformation*

The Sanky diagram in Figure (5) illustrates the thematic evolution of the field of digital transformation over time using the Biblioshiny software. This visual representation highlights how research topics have evolved and changed across different time periods, as well as the strength of their interrelationships (Aria et al., 2020). Each node represents a research topic, and its size reflects its frequency, while the linking streams indicate the continuity and transformation of topics over time, with thicker links representing stronger relationships (Srivastava, 2021).

In the early period (2016–2021), the field was primarily driven by foundational themes such as “digital transformation,” “digitalization,” “SMEs,” “innovation,” and “the Fourth Industrial Revolution.” This phase reflects the emergence of digital transformation as a key concept, with a focus on technology adoption and its initial impacts on SMEs.

Moving into the middle period (2022–2025), the research focus became more structured and strategic. Key themes such as digital transformation, digitization, and SMEs continued to dominate, while new themes emerged, including digital transformation strategy, organizational culture, and sustainability. This shift indicates a move from the basic adoption of digital transformation to its integration within organizational strategies and its connection to sustainability and cultural change.

In the most recent period (2026), the field demonstrates further progress and diversification. While digital transformation remains the central and most consistent theme across all

periods, it is increasingly linked to advanced concepts such as dynamic capabilities, innovation, and artificial intelligence. Additionally, SMEs and sustainability continue to emerge, highlighting their ongoing importance in digital transformation research.

The inter-period flows clearly demonstrate the continuity of key themes such as digital transformation, digitization, and SMEs, while also revealing their evolution into more complex and integrated topics. For example, early topics related to digital transformation are evolving toward more strategic and capability-based perspectives, such as dynamic capabilities and innovation-driven transformation. Overall, this thematic evolution indicates that digital transformation research has shifted from a technology-centric focus to a more holistic perspective that integrates strategy, capabilities, innovation, and sustainability, reflecting the field's maturation and increasing complexity.

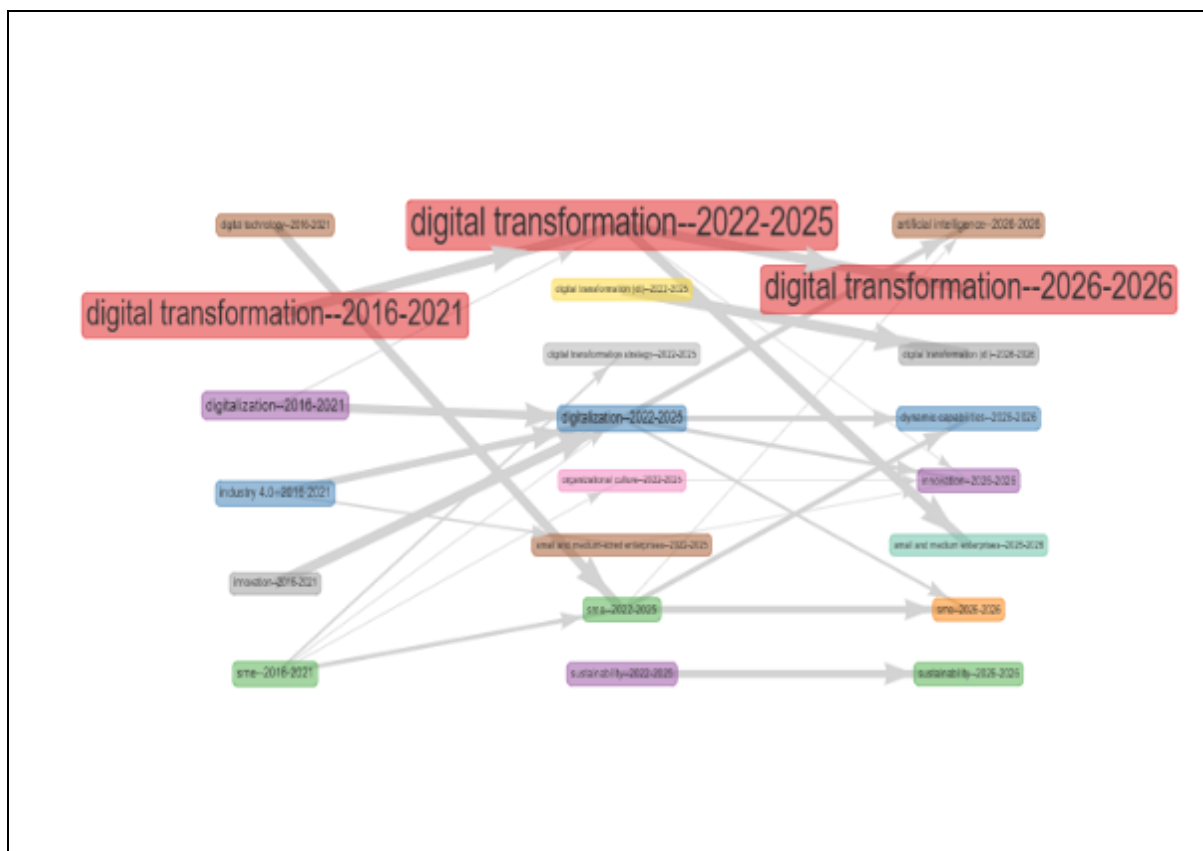


Figure (5): Thematic Evaluation Based on Authors' Keywords

#### *Thematic Map of Digital Transformation Field*

This thematic map depicts the research themes in the field of digital transformation based on two key dimensions: centrality (degree of relevance) and density (degree of development). Centrality reflects the degree of interconnectedness of an theme with others, indicating its importance within the research field, while density represents the axis's development and internal coherence.

According to Figure (6), the thematic structure of the digital transformation field can be interpreted as follows:

- Motor Themes (upper right quadrant): These themes are highly developed and central to the field. The map shows that "digital transformation," "SMEs," and "digital technologies" constitute the main axes and are often linked to organizational resilience and the COVID-19 pandemic. This indicates that digital transformation in SMEs is a mature and dominant research current driving the field forward.
- Basic Themes (lower right quadrant): These themes are important and widely interconnected, but are still under development. The key axes include "digital strategy," "digital culture," "digitization," and "change management." These represent the foundational areas that underpin digital transformation research, but require further theoretical and empirical expansion.
- Niche Themes (upper left quadrant): These areas are well-developed but less centralized, indicating specialized topics. The map highlights areas such as "digital adoption," "digital literacy," "employee digital capabilities," and "export performance." These areas are internally strong but relatively isolated, reflecting focused research areas.
- Emerging or Declining Themes (lower left quadrant): These areas are underdeveloped and marginal within the field. Examples include "digital maturity," "artificial intelligence," and "the quality of accounting information." Their position suggests they are either emerging topics with future potential or areas losing research interest.

All in all, the thematic map reveals that the field of digital transformation is strongly centered on small and medium-sized enterprises (SMEs) and digital technologies, while simultaneously expanding toward strategic, organizational, and capability-based perspectives.

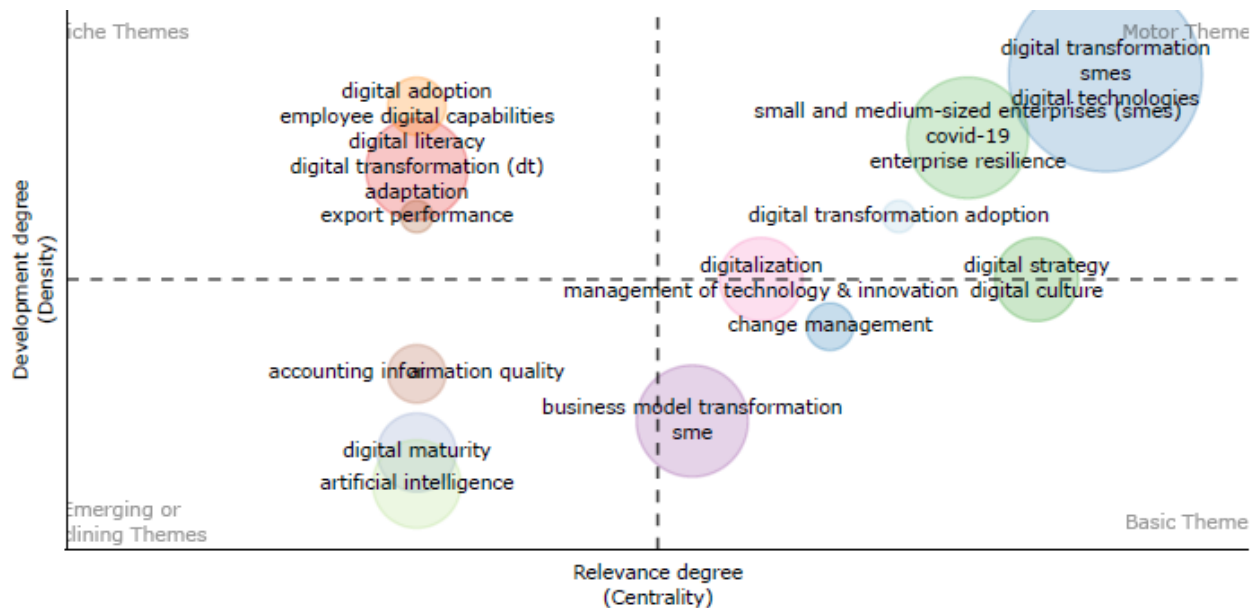


Figure (6): The Strategic Thematic Map of the Author's Keywords

## Discussion

This study aimed to provide a comprehensive bibliometric analysis of digital transformation research in small and medium-sized enterprises (SMEs), addressing the lack of systematic mapping of this rapidly evolving field. The findings offer valuable insights into publication trends, influential contributors, subject structures, and research gaps, directly contributing to the study's objectives.

A key finding was the rapid growth of scholarly output in this area. The results clearly demonstrate that digital transformation research in SMEs has expanded significantly over the past decade. While the field remained relatively underdeveloped in its early years (2016–2019), it experienced a turning point in 2020, with a notable increase in publications, largely driven by the global disruptions caused by the COVID-19 pandemic. This shift reflects how external environmental pressures accelerated the adoption of digital technologies and stimulated academic interest. Importantly, the results indicate that the field peaked in 2025 with 124 publications, representing its highest level of scholarly output. This sharp increase strongly indicates the growing importance, maturity, and influence of digital transformation as a critical research area. Therefore, the publication trend not only reflects this growth but also confirms that digital transformation has become a dominant theme in contemporary research.

From a disciplinary perspective, the results highlight the multidisciplinary nature of this field. However, there is a clear dominance of business-related disciplines, with business administration and accounting accounting for 59.27% of total publications. This underscores that digital transformation is primarily viewed as a strategic and managerial issue rather than a purely technological one. Simultaneously, the presence of computer science (25.33%) and decision science (20.37%) demonstrates the technological and analytical foundations that underpin this field. This integration of management and technology reflects the complex nature of digital transformation in small and medium-sized enterprises (SMEs), where success depends on aligning digital tools with the organization's strategies and capabilities.

Regarding intellectual contributions, the results reveal that while there are numerous contributors to this field, the impact is concentrated among a limited number of high-impact researchers. This observation aligns with Lotka's Law of Scientific Productivity, which states that a small percentage of authors typically produce the majority of influential work (Aytac et al., 2025). For example, Wang S stands out as one of the most influential authors, contributing 4 publications that garnered 401 citations, reflecting her high productivity and strong academic impact. Similarly, Petrovska K., despite contributing three publications, achieved a total of 311 citations, demonstrating the strong impact of her research. Likewise, Rupeika-Apoga R. recorded an identical citation performance with three publications and 311 citations, indicating a comparable level of academic influence. These examples clearly illustrate that influence in this field is not solely determined by the number of publications but is significantly influenced by the quality, significance, and impact of research contributions. This finding directly answers the research question regarding influential authors and underscores the existence of a strong intellectual core within the field.

Geographically, the results indicate a global research landscape, with a clear dominance of certain countries. China ranks first in research productivity, contributing 168 publications, underscoring its leading role in advancing digital transformation research. However, when examining citation impact, Italy stands out as one of the most influential countries, with 2,800 citations and a very high average citation per paper. This disparity indicates that while some countries lead in quantity, others excel in the quality and impact of their research. These findings underscore the importance of distinguishing between productivity and impact when

evaluating research contributions. Furthermore, the strong international collaboration (27.15%) highlights the global and interconnected nature of this research field.

Thematic and keyword analyses provide deeper insights into the intellectual framework of this field. Key concepts such as "digital transformation," "SMEs," and "dynamic capabilities" emerge as central themes, confirming their foundational role. Over time, the field has evolved from a focus on basic digital adoption towards a more holistic and strategic perspective that integrates innovation, resilience, sustainability, and organizational capabilities. Thematic mapping supports this evolution by identifying pivotal themes such as digital transformation and SMEs, which are highly developed and central to the field. Conversely, topics such as digital strategy and change management emerge as core areas requiring further development, while fields like artificial intelligence and digital maturity are categorized as emerging topics with strong future potential.

Citation analysis confirms the significant academic impact of digital transformation, a leading area in this field. With a total of 14,173 citations, averaging 36.99 citations per document, digital transformation research demonstrates a strong presence and influence within academia. Furthermore, the average number of citations per cited paper (46.47) indicates highly influential studies, while the annual citation rate (1,288.45) reflects the dynamic and rapidly growing nature of this field. These metrics confirm that digital transformation is not merely a trending topic, but also a high-impact research area.

Despite these developments, some research gaps remain. First, while the literature extensively addresses the technical and strategic aspects of digital transformation, there is limited focus on the role of social media as a driver or enabler of digital transformation in small and medium-sized enterprises (SMEs). Given that social media platforms facilitate communication, knowledge sharing, and digital interaction, they represent a potentially important but underexplored dimension within the digital transformation ecosystem. Integrating social media into future research will provide deeper insights into how SMEs can leverage digital tools to enhance performance and innovation. Second, more integrated frameworks that combine technological, organizational, and human factors are needed. Third, emerging topics, such as artificial intelligence and digital maturity, require further empirical verification, particularly in developing economies.

From a practical perspective, the findings highlight the need to approach digital transformation in SMEs as a holistic process, not merely a technological initiative. Managers need to focus on building digital capabilities, fostering innovation, and aligning transformation efforts with the organization's strategy. Policymakers can also leverage these insights by developing targeted initiatives that support SMEs in overcoming resource constraints and enhancing their digital readiness.

Overall, these findings demonstrate that digital transformation in SMEs has evolved into a mature, multidisciplinary, and highly influential research area. The strong growth in publications, high citation rates, and clear subject structure underscore its pivotal role in shaping modern organizational practices. At the same time, the identified research gaps provide valuable guidance for future studies, ensuring the continued development and importance of this field.

**Conclusion**

This study provides a comprehensive overview of bibliometric analysis of digital transformation research in small and medium-sized enterprises (SMEs), offering a structured understanding of this rapidly evolving field. Using bibliometric analysis techniques, the study successfully identified key trends, influential contributors, major research areas, and emerging topics. Data were collected from the Scopus database, carefully filtered and standardized, and then analyzed using advanced tools such as Biblioshiny, VOSviewer, and OpenRefine. The analysis encompassed 383 research articles, ensuring a reliable and representative dataset.

The findings confirm that digital transformation has become a highly significant and rapidly growing research area, particularly in recent years. The sharp increase in publications, especially the peak observed in 2025, reflects the growing importance of digital transformation as a strategic priority for SMEs. The results also demonstrate that this field is multidisciplinary, with a strong focus on business and management disciplines, supported by technological and analytical fields. Furthermore, the analysis highlights the presence of influential authors, highly cited studies, and leading journals that shape the intellectual landscape of this field. Key terms such as “digital transformation,” “SMEs,” and “dynamic capabilities” were identified as core themes, indicating the central focus of the literature. Thematic development reveals a clear shift from a purely technical perspective to a more integrated approach that emphasizes strategy, innovation, sustainability, and organizational capabilities.

In addition, the study identified several research gaps that present valuable opportunities for future research. In particular, the role of social media as an enabler of digital transformation in SMEs has not received sufficient attention. This opens new avenues for future research to explore how social media platforms support digital interaction, knowledge sharing, and organizational transformation. Moreover, there is a need for more integrated frameworks that combine technological, organizational, and human factors to better understand the complexities of digital transformation. Therefore, the results of this study confirm that digital transformation in small and medium-sized enterprises (SMEs) is a dynamic, influential, and constantly evolving research area. The insights gleaned from this bibliometric analysis provide a solid foundation for future research and offer practical applications for managers and policymakers seeking to advance digital transformation initiatives. Despite the progress made, this field still holds significant potential for further exploration, particularly in emerging and interdisciplinary areas, making it a promising area for continued academic research.

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