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# Emerging Trends in Digital Transformation and Information Systems by Bibliometric Analysis in the United States

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**Abstract.** This bibliometric analysis examines the evolving trends of digital transformation (DT) and information systems (IS) in U.S. businesses. It explores how technology—focused on strategy, efficiency, innovation, and customer engagement—is reshaping organizations and workplaces. Using a PRISMA-based systematic review and data from Scopus (2016–2026), the study applies the Bibliometrix R package to assess publication patterns. Results show significant growth, with 2,692 documents reflecting a 43.58% annual increase and 18.39% involving international collaboration. Key themes include AI/ML integration in business processes, digital sustainability, and IS as a strategic driver for business model evolution. U.S. businesses are increasingly aligning digital transformation with sustainability goals. This study addresses a key research gap by offering detailed insights into DT and IS impacts on operations and sustainability practices. It underscores the need for integrated socio-technical strategies, responsible data governance, and global collaboration to foster innovation and bridge digital divides.

**Keywords**: Digital Transformation, Information Systems, Business Sustainability, Artificial Intelligence, Bibliometric Analysis

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## 1. INTRODUCTION

Digital transformation (DT) in the United States is an important business innovation and information system (IS) is playing a significant role to change operation strategy. As organizations are recognizing better value of artificial intelligence (AI) and machine learning (ML) and big data technologies that may help us making better decision and operational efficacies and improved customer experience [1]. As companies are becoming faster and more scalable to facilitate rapid business moves, a rethink of the traditional model has been forced [2]. Information systems play an important role since these changes require infrastructure for their support [3]. Despite the quick acceptance of such technologies, the digital transformation does not meet organizational goals and can be integrated with their current system. American businesses are continuing to implement these innovations, and finding out the link between digital transformation and information systems will help achieve a sustained competitive edge in the ever-globalizing world economy [4].

More businesses are becoming aware that digital transformation is essential if they want to enhance operational efficiencies and customer engagement [5]. Many companies are developing the use of advanced technology like artificial intelligence and machine learning. Organizations can now predict users' needs and tailor services to suit every user need in order to maximize user satisfaction and customer loyalty with their solutions [6]. Firms should also modify their business models quickly to changing demands in the market and consumer behavior, Such a measure should turn traditional industry value chains into dynamic ecosystems [7]. Process changes effecting change in competition too, is now the new law. Thus, organizations must change their thinking do not become outdated over time [8].

This change is now evolving traditional industry value chains into new ecosystems, urging to rethink their strategies to 'compete'. Those who want to succeed in a digital world must understand for the importance of digital transformation and emerging trends in information system [9]. This bibliometric analysis will examine these developments to understand how technology and business transformation are changing each other [10]. The themes and patterns in literature, which highlight adaptation to gain an edge in the competition, are going to be explored by the paper.

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With increased technological adoption, organizations are becoming strategically aligned to their particular business objectives [11].

As organizations undergo digitalization, data governance is essential for correct management of the cultivated data generated [12]. Digital transformation driven by technologies such as artificial intelligence (AI) and machine learning (ML) is profoundly reshaping business operations and customer engagement. However, organizations face challenges in adapting their culture and strategies to fully leverage these technologies while addressing critical sustainability and ethical concerns. This study addresses the gap in understanding how socio-technical approaches and sustainability principles can be integrated into digital transformation efforts to support organizational success and responsible innovation [13]. Moreover, as digital technologies become part of their operations, businesses have to make adjustments to ensure that they will remain to comply with the law as they innovate. Organizations can gain a competitive advantage by adopting sustainable data practices and responsible management. It serves as an indication of the future and the benefits that will come as a result of the effort [14].

The existing literature in the area of the digital transformation (DT) and information systems (IS) is highly oriented towards the technological and business lenses, and the integration of the highly advanced technologies such as AI and machine learning and how they might influence their working efficiency [15]. Nevertheless, there is a gap in knowledge on how the socio-technical systems framework would provide a holistic method of incorporating technology in organizations [16]. Although DT is commonly assumed to be a technological driver of an operational improvement, research in the field tends to ignore the importance of IS as a strategic support and direction tool that is necessary to facilitate and lead these changes [17] Digital transformation, powered by technologies such as artificial intelligence and machine learning, is rapidly changing business processes and customer engagement. Organizations face challenges in adapting strategically and culturally to maximize these benefits while integrating sustainability and ethical considerations. However, current research often overlooks the comprehensive integration of socio-technical systems and sustainability principles in digital transformation. This study aims to fill these gaps by exploring how information systems can support sustainable and responsible business innovation[18], and there is no information on the applications of DT in the resource-poor areas [19].

To address these gaps and provide deeper insight into the evolving role of IS in business transformation, this study sets out to investigate the interplay between technology, sustainability, and strategy in digital initiatives. The following research objectives guide the study.

1. To explore the role of information systems as a strategic component in digital transformation efforts.
2. To assess the integration of sustainability principles in digital transformation strategies.
3. To examine the global disparities in digital transformation research and its implications for developing countries.

The following research questions guide the study.

1. How can information systems be integrated as a strategic backbone in digital transformation processes?
2. What are the environmental and ethical implications of digital transformation in the context of sustainability?
3. How does the research output on digital transformation vary across developed and developing countries, and what impact does this have on global business strategies?

## 2. LITERATURE REVIEW

AI and machine learning do not only improve the efficiency of operations, it also requires a cultural change in the organizations to adapt to change and innovation [20]. When AI and machine learning are adopted by a company, it enables the company to run better and smoother. However, the integration also needs a cultural shift inside the company so that the adoption becomes successful. The adaptation of one's culture to maximize technology benefits is termed “cultural adaptation”. According to studies, change management is the most crucial factor affecting digital transformation success [21]. According to Al-Alawi et al. [22], the link between digital transformation and sustainability is increasingly on the radar of many companies. They are called on to not only engage in practices that are profitable for themselves but also beneficial for the planet [23]. Organizations should create a culture that encourages agility, innovation, and responsible management to ensure they are able to thrive in a complex digital

economy. Organizations are working to achieve profitability, but they are also caring for sustainability [24].

Accordingly, businesses have begun using advanced tools and technologies like artificial intelligence (AI) and machine learning (ML) [25]. By utilizing these technologies, organizations can predict what their customer will like offering in real-time on the services making the customers' loyalties and satisfaction levels grow [26] (Islam et al., 2024). Also, the shift to a more integrated digital economy calls for business models that are flexible enough to adapt quickly to market changes and consumer habits [27]. Digital transformation is a developing term that is becoming more and more popular in the business world. It is assisting the organizations in enhancing their efficiency in operations and interaction with customers [28]. Variations in research and development spending on the information and communication technology products are significantly influencing the performances of organizations. Effects of such differentiation vary according to the country [29]. This lack of proper benchmarking impacts on measures that can be adopted by organizations. With these technologies, organizations can process data on a real-time basis and consider predictive intelligence to tailor their services to the personal preferences and needs of the customers [30]. Due to this, companies are able to maximize customer fun and retention. Moreover, they also get responsive and agile towards market response [31]. With the world increasingly going digital, companies need to seek methods to be adaptable and adapt to evolving markets and consumer patterns [32].

This transformation alters internal processes and also competition. And that is why businesses should also reconsider their strategies to survive in a digital world [33]. Businesses are cognizant of the new tendencies in digital transformation and information systems so that they can manage the new environment [34]. This bibliometric paper will seek to explore this trend as it relates to technology and business transformation [35]. When considering some of the themes that were observed in the available literature it is true that to maintain the competitive advantage, the transformation of technology to the business objectives must be well aligned. Moreover, it highlights the importance of a cultural adaptation in organizations to adapt to change and innovation and it is so significant to realize maximum potential of technology [36]. With the growing interconnection between digital transformation

and sustainability, companies should have a holistic strategy of benefiting the bottom line and at the same time, performing social and environmental good [37].

**Table 1.** Publications on Emerging Trends in Digital Transformation and IS

| Source | Focus Area | Key Findings | Contribution to the Field |
|---|---|---|---|
| Chawla & Goyal [38] | Digital Transformation Trends | Identified key trends in digital transformation, including AI, automation, and digital business models. | Provides a bibliometric analysis of emerging trends in digital transformation. |
| Truong et al. [39] | Business Process Management in DT | Reviews how business process management adapts to digital transformation, emphasizing automation and AI. | Explores the intersection of business process management and digital technologies. |
| Delmond et al. [40] | IS and Business Model Transformation | Focus on how IS supports digital transformation by enhancing value co-production in business models. | Explores the role of IS in reshaping business models through digital transformation. |
| Samuels [41] | AI Integration in DT | Investigates AI's role in enhancing supply chain management, focusing on Industry 4.0 to 6.0 transitions. | Analyzes the integration of AI and its role in digital transformation in supply chain management. |
| Khoshroo & Talari [42] | Digital Transformation Strategy in Industry 4.0 | Studies the impact of digital strategies on organizational structures and processes in Industry 4.0. | Identifies strategic drivers of digital transformation and their effects on business practices. |
| Vial [43] | Theoretical Foundations of Digital Transformation | Provides a comprehensive review of theories and frameworks guiding digital transformation. | Highlights gaps in theoretical frameworks related to DT and proposes a research agenda. |

## 3. METHODS

This section describes the process of conducting a literature review on the topics of digital transformation (DT) and information systems (IS) by systematizing the process with the help of bibliometric. The main purpose of this review is to identify the emerging trends, draw themes and technologies and the evolving role of DT and IS in business change in the US. The research is based on a PRISMA (Preferred Reporting Items to Systematic Reviews and Meta-Analyses) research design to guarantee the transparency and consistency of the results [25]. This will make the results more reliable to the review. This technique which has been established encourages accuracy, objectivity and repeatability in addition to offering a structure to create a review protocol and procedure.

### 3.1. Research Design

The PRISMA framework is widely known in the research design of this study follows it. methodology for conducting systematic reviews. We choose this design because it ensures a review that is comprehensive, transparent and reproducible [44]. PRISMA ensures that the study identification, selection, and inclusion process is well-documented and performed consistently. The methodology is a way of ensuring that the produced review will include only those studies which are useful and good quality [29]. This research investigates literature on digital transformation and information systems along with technological trends of AI, machine learning, and use of technology for business transformation. By using this method, we are able to explore all the facets of a topic. As a result, we gain a complete understanding of state of research.

### 3.2. Database Selection and Search Strategy

The Scopus database will be used for the systematic review because it is one of the most comprehensive databases across disciplines. Scopus was selected because it covers many peer-reviewed journals, conference papers, and books specifically in the area of business management technology and digital transformation [25]. The review focuses on the latest and relevant studies, so the search strategy employed keywords like “Digital Transformation,” “Information Systems,” “Small Business Transformation,” and “Digital Technologies.” The search was limited to 2016-2026, in order to capture the recent trends in the area of study. Moreover, English-language publications were

reviewed to make it accessible and globally viable. The results were limited to articles, review papers, conference papers and book chapters that were peer-reviewed and of a high-quality. This search strategy gave a comprehensive selection of 6879 records which was screened and selected in the final dataset. A comprehensive search of the Scopus database initially identified 6,879 records. After removing duplicates and irrelevant records, 6,539 documents were screened by title and abstract. Subsequently, 3,256 documents were assessed for eligibility by full-text review. Following the exclusion of studies not meeting defined criteria, a final set of 2,692 documents was included in the bibliometric analysis.

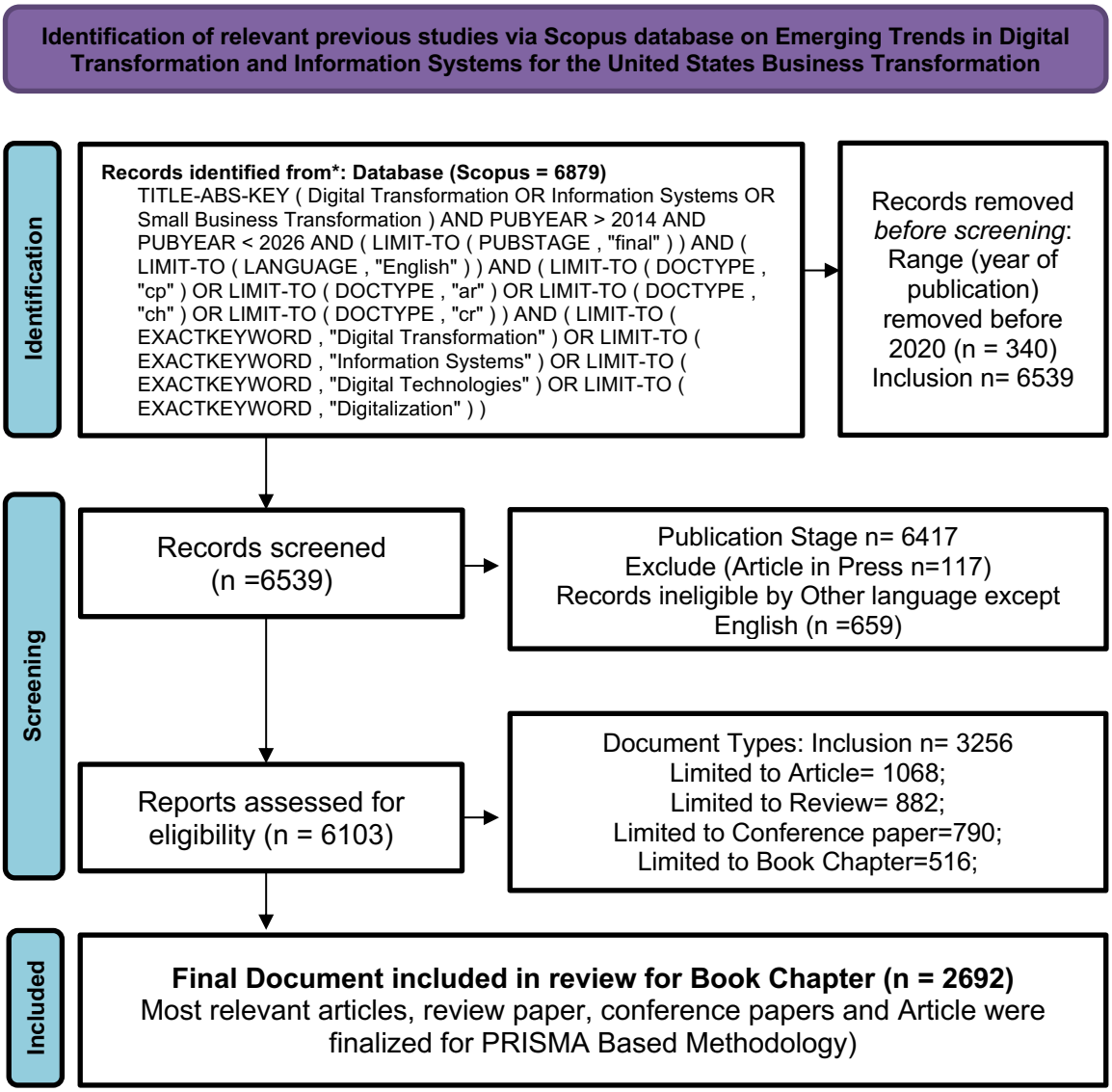


**Figure 1.** PRISMA Based Methodology

### 3.3. Selection Technique

The selection procedure used PRISMA flowchart enabling restriction of relevant studies ensuring the quality of the selected studies [45]. The Scopus database has identified records, which further inspected during the screening process. Studies were excluded during the screening process based on language (the non-English publications were excluded), publication year (studies published before 2016 were excluded). The objective was to concentrate on the most current investigations presenting the latest development on digital transformation and information systems. After screening studies, studies were assessed for suitability based on document type [46]. The last phase produced a selection of 2692 documents consisting of articles, review papers, conference papers, and book chapters [47]. The many levels of filtering studies out in this critical review were conducted first within themselves in terms of content, focus, and if they provide useful data.

### 3.4. Analysis Technique

The analysis method used in this study is qualitative synthesis wherein the key themes, technology solutions and trends from the sample literature are extracted. This method is mainly aimed at development of dimensions [48]. Evaluation of literature would make it easier to see the patterns. In doing that this helps us see the pattern through digital transformation and changing role of information system. A bibliometric analysis was carried out, using the Bibliometrix R package [49]. The input has given information on publishing trends, authors collaborations, citations patterns and the most productive institutions. Also, thematic analysis was performed to identify major themes and developments discussed in the literature such as the use of AI, the contribution of information systems to business model change, as well as sustainability and digital transformation [44]. By using both bibliometric and thematic examination in this analysis, the researcher presents a detailed overview of the study on digital transformation, its technological developments, and new research developments [50].

### 3.5. Data Collection and Synthesis

This bibliometric study was grounded on the extensive search of Scopus to get the appropriate data. The data were analyzed to observe the trends of the publications, collaboration networks and also nature of research [51]. The influence of different scholars and institutions in the field was evaluated with the help of such important

metrics as the number of documents, citation count, and collaboration of authors. The analysis involved the usage of word cloud to present the most frequent words, as well as, author collaboration clusters to represent the major contributors to the literature on library surveillance systems [52]. Besides, a conceptual structure map was developed to demonstrate how the paper-based digital transformation, information systems and sustainability are connected.

## 4. RESULTS AND DISCUSSION

Research on digital transformation spread throughout the years. One way to find out the trend of growth is through bibliometric analysis. The most prolific authors and their networks of collaboration were considered a specific area of focus, showcasing the worldwide nature of the research [53]. Moreover, the geographic distribution of publications showcased various countries and regions' contribution to the development of digital transformation studies.

### 4.1. Overview of Bibliometric Data Collection

The dataset's key bibliometric statistics are shown in Table 3. The analysis covered 2692 documents. A total of 626 sources produced these documents between 2016 and 2024. That was the result of the contribution of 6974 authors showing a high level of collaboration (average 6.65 authors per paper). The data shows an annual growth rate of 43.58%. This suggests increasing scholarly attention in this field.

**Table 2.** Summary of Bibliometric Data Collection

| Description | Results |
|---|---|
| MAIN INFORMATION ABOUT DATA | |
| Timespan | 2016:2024 |
| Sources (Journals, Books, etc) | 626 |
| Documents | 2692 |
| Annual Growth Rate % | 43.58 |
| Document Average Age | 3.42 |
| Average citations per doc | 16.65 |
| References | 20193 |

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| Description | Results |
|---|---|
| DOCUMENT CONTENTS | |
| Keywords Plus (ID) | 9288 |
| Author's Keywords (DE) | 6136 |
| AUTHORS | |
| Authors | 6974 |
| Authors of single-authored docs | 0 |
| AUTHORS COLLABORATION | |
| Single-authored docs | 0 |
| Co-Authors per Doc | 6.65 |
| International co-authorships % | 18.39 |
| DOCUMENT TYPES | |
| article | 875 |
| book chapter | 244 |
| conference paper | 1572 |
| conference review | 1 |

### 4.2. Descriptive Analysis

#### 4.2.1. Trends and Annual Publication

Figure 2 shows the yearly growth of publications from 2016 to 2024 on digital transformation and information systems. At the beginning of the period, there are few research activities were included. In this period only a few studies published each year. From 2018, the number of publications began to rise day by day that was created attention of researcher and institutions. The upward trend continued steady and it reached its peak in 2024 with 578 citations in this field. This figure clearly indicates that digital transformations and information systems has become key concerns in recent year. It also reflecting its importance in business, technology and academic discussions[54].

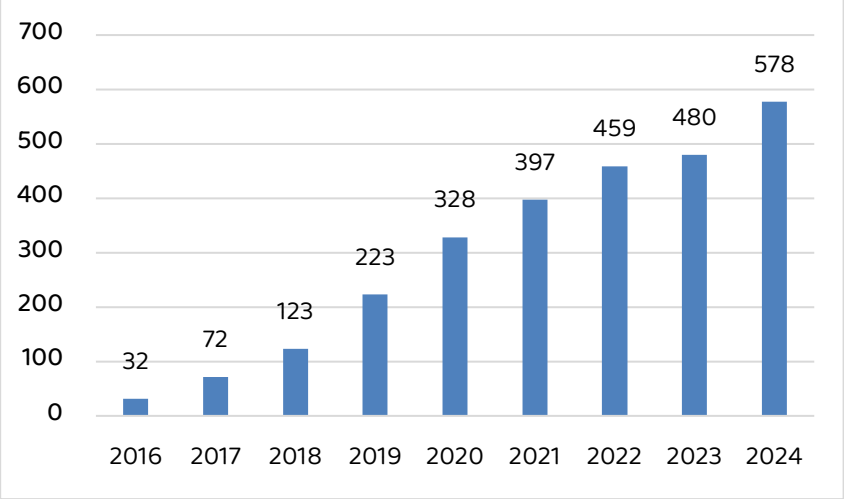


**Figure 2.** Trends and Annual Publication

#### 4.2.2. Most Productive Authors and Influential Networks of Collaboration

Table 3 represents the most productive (2016 to 2024) five researchers in this field. Bogner, Justus are the main contributors. They published 12 publications and 247 citations. In 2017, his strongest publication activity occurred and it made a period of high research power. Jugel, Dierk also showed another productivity which has 11 publications and 140 citations. Bogner and Jugel maintained a strong collaborative partnership between them. This partnership plays a crucial role in shaping the knowledge base. All of these findings indicate that the output of publication is centered in a small group of researchers.

**Table 3.** Top 5 Most Productive and Influential Authors

| Author | year | freq | TC | TCpY |
|---|---|---|---|---|
| Bogner, Justus | 2016 | 3 | 60 | 6 |
| Bogner, Justus | 2017 | 3 | 86 | 9.556 |
| Bogner, Justus | 2018 | 3 | 77 | 9.625 |
| Bogner, Justus | 2019 | 2 | 14 | 2 |
| Bogner, Justus | 2021 | 1 | 10 | 2 |
| Jugel, Dierk | 2016 | 3 | 29 | 2.9 |
| Jugel, Dierk | 2017 | 2 | 6 | 0.667 |
| Jugel, Dierk | 2018 | 3 | 77 | 9.625 |
| Jugel, Dierk | 2019 | 2 | 14 | 2 |
| Jugel, Dierk | 2020 | 1 | 14 | 2.333 |

### 4.2.3. Author Collaboration Cluster

Figure 3 shows the collaborative networks of authors. Here each node represents one author and the size of these nodes represents the number of publications of each author. Lines between nodes represent co authorship and thick lines indicate the strong collaboration between authors [55]. Lite green clusters contain authors like Bogner and Jugel. They work collaboratively and maintain their position at the center in the field. Other small clusters of different colors represent the authors working on some specific topics. This map clarifies that most of the research in this field is team based. Collaborative groups provide more productivity and impact rather than others. New researchers have limited opportunity to grow themself. It can be noted that this picture highlights the strong collaboration and teamwork's.

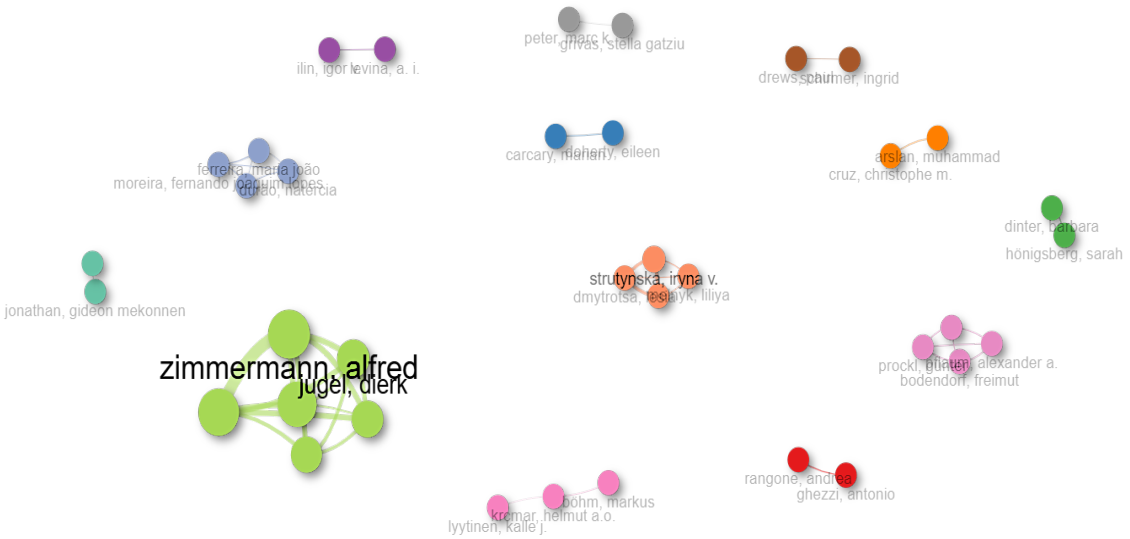


**Figure 3.** Author Collaboration cluster

### 4.2.4. Most Relevant Sources of Publication

Figure 4 shows top 10 sources of publishing research documents between 2016 and 2024. "LECTURE NOTES IN NETWORKS AND SYSTEMS" is the most productive source with 108 publications. Then comes "LECTURE NOTES IN BUSINESS INFORMATION PROCESSING" and "SUSTAINABILITY (SWITZERLAND)".

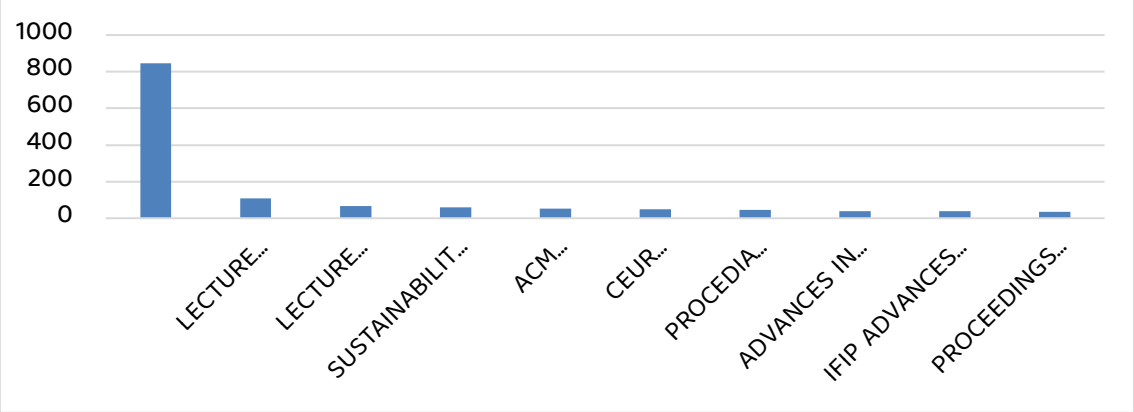


**Figure 4.** Top 10 sources publishing

### 4.3. Publication analysis

#### 4.3.1. Country-wise publication analysis

Figure 5 represents how publications are distributed from 2016 to 2024 among 5 most productive countries. Here Germany leads the top position with 988 publications. Then comes China, Italy, India and Ukraine. It is clear that from this pattern, most of the papers come from developed countries and which countries have strong educational systems[56]. Germany's dominance reflects its focus on research and innovation. This is supported by strong fundings and strong company and industry collaboration. The position of China indicates its rapid educational growth and government support. Then Italy and India also contribute actively. It also shows a strong participation in global research. Ukraine also has some contribution in the top 5 because it indicates sustained research productivity. At last it can be noted that publication trends highlight the North South divide and it also shows that research activities are increasing day by day all over the world [57].

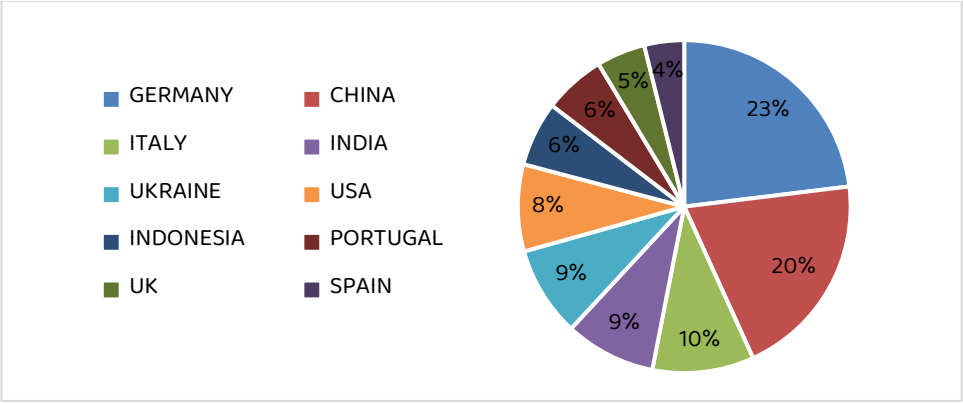


**Figure 5.** Top 05 countries count with papers

### 4.3.2. Geographic Publication

Figure 6 the geographic publication analysis shows that most of the research comes from some leading countries. Germany and China produce the highest number of research papers. Then comes Italy, India, Ukraine, and the USA. Indonesia, Portugal, and the UK contribute in this field moderately. This pattern indicates strong dominance in Europe and Asia. Then North America and other countries participated [58]. This data provides a huge international research network with most active and collaborative clusters.

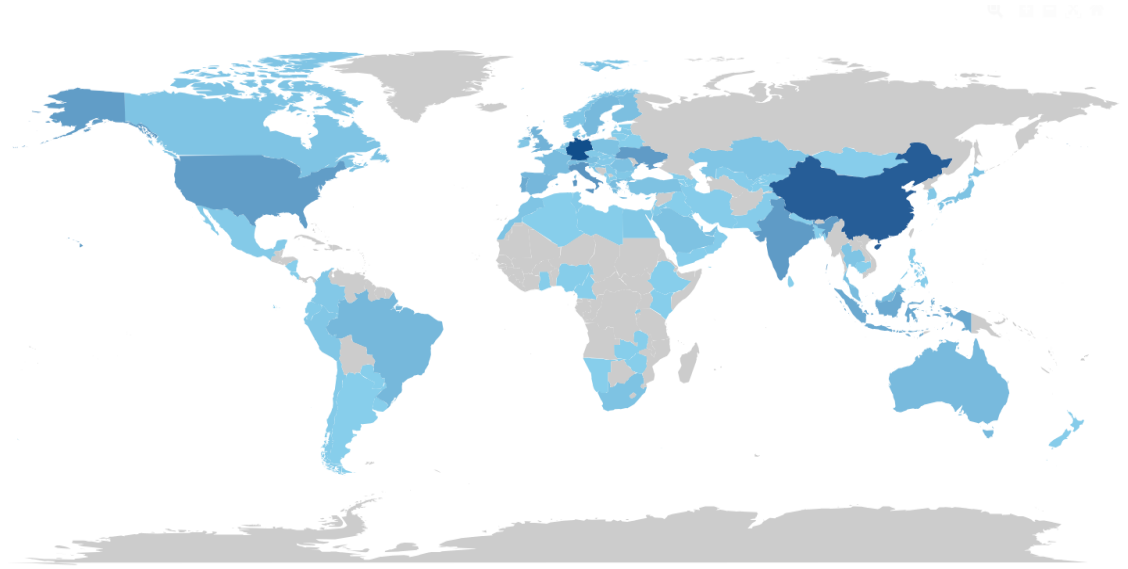

**Figure 6.** Global Collaboration Network among Countries (2016–2024)

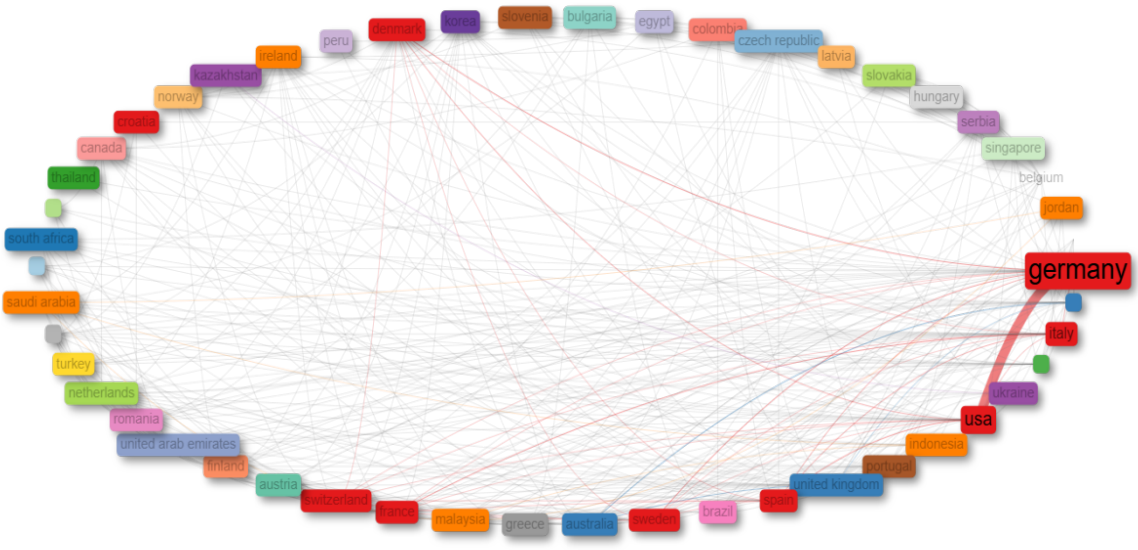


Figure 7: Country Collaboration Network Map (2016–2024)

The collaborative map shows a globally connected network which is led by some major countries. Here Germany is the central hub and the United States and Italy have strong collaboration. It is the core of a dense European cluster. China and India work as representatives of Asian partners which are growing. Australia works as a representative of the Asia Pacific group [59]. At last, it can be said that the field relies on a mix of influential centers and inter regional partnership. It also highlights the importance of international and team-based research.

#### 4.3.3. Academic Institutional Affiliation analysis

Figure 8 shows that Peter the Great St. Petersburg Polytechnic University has the most publications, with over 140 papers. Next come Bina Nusantara University and Politecnico di Milano. Some big German universities are also on the list, showing their earlier strength in research. There is also a Not Reported group with over 160 papers, meaning some data about university names is missing [60]. At last, it can be noted that the results show only a few big universities do most of the research, and there are still problems with missing information in the records.

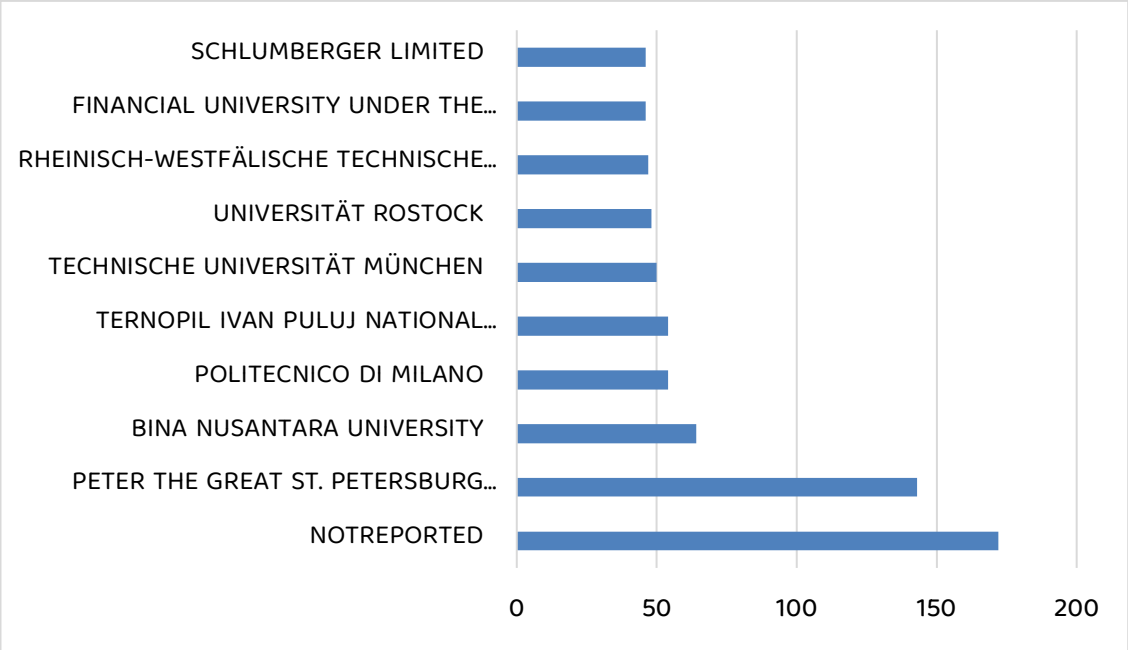


**Figure 8.** Top 10 Most Relevant Affiliations by Number of Articles (2016–2024)

Figure 9 shows how different universities work together based on shared authors in research papers. Bigger circles mean more publications, and thicker lines mean stronger

collaboration. Peter the Great St. Petersburg Polytechnic University is at the center and plays the biggest role, connecting many Russian and international universities. The network has strong national groups as well as global links. This shows that good research teamwork depends not only on how many papers a university publishes but also on its important position in the world research network [29].

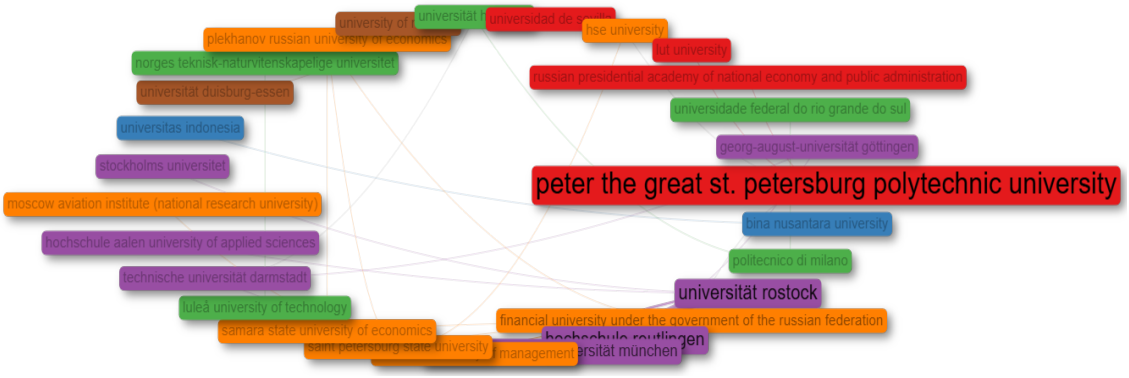


**Figure 9.** Most Effective Joint Network among Institutions (2016–2024)

### 4.4. Keyword Cloud and Author Keywords

#### 4.4.1. Keyword Cloud

Figure 10 shows a Word Cloud which presents the most common keywords in this research area. The largest and most frequent word is "digital transformation". It is the main topic of the studies. Besides, terms like "information systems", "digital technologies", and "digitalization" highlight the close connection between technology and management.


**Figure 10.** Word Cloud of Most Frequent Terms

Other key terms such as "information use", "industry 4.0", and "artificial intelligence" show the increasing use of modern digital tools and industrial progress. At last it can be said that the Word Cloud reveals that while "digital transformation" is the core

theme. Researchers also focus on the technologies, processes, and innovations which can drive change within organizations and larger systems [16] (Bhuiyan & Akter, 2024).

#### 4.4.2. Author Keywords

Figure 11 shows most commonly used key words by authors in publication related to this field. Here the main keyword is digital transformation which shows its importance in this research field. Other most frequently words are digitalization, industry 4.0 and digital technology. These words reflect the technological basis of current research. Artificial intelligence, innovation and sustainability these words indicate the increasing smart technologies and sustainable practices in digital transformation [61]. It can be noted that this figure highlights how different field has shifted in digital economy.

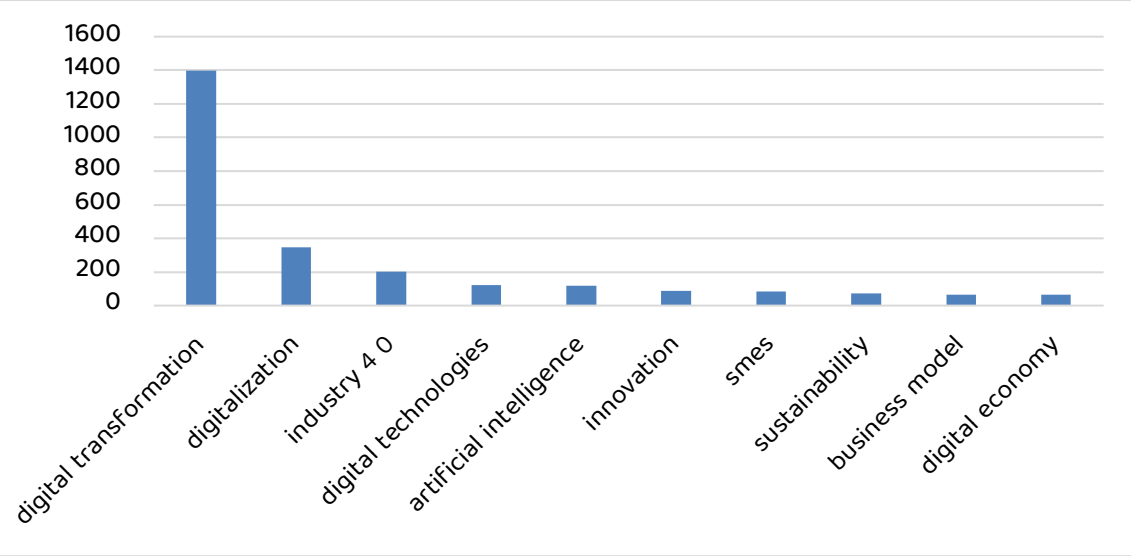


**Figure 11.** Most frequently used author-keywords

#### 4.4.3. Top 10 Title Keywords

This figure 12 shows the most commonly used 10 words in article title related to digital transformation and information systems. The most influential words are digital and transformation. This indicates that these words are the central focus of current research. Other common words are business, management and industry which indicates a strong connection between technology and organizational practices. Then another words are model, system and development highlights the growing focus on designing structures and process to support digital transformation. Overall, this figure suggest that research in this field is mainly directed toward understanding how digital

transformation shapes business strategies, enterprise development and data-driven innovation [55].

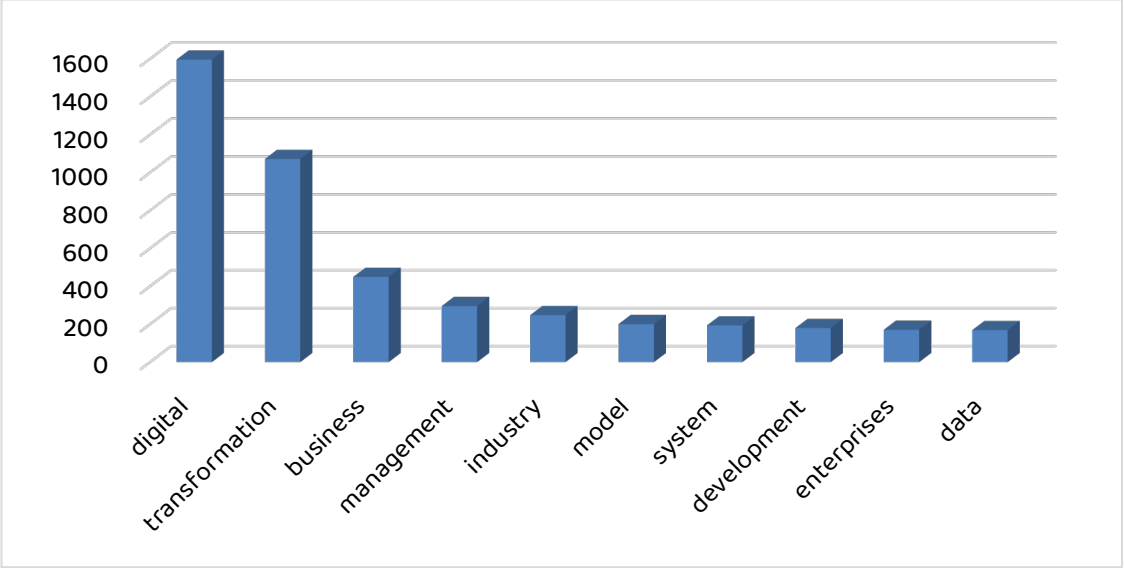


**Figure 12.** Top 10 title keywords

### 4.5. Networks analysis

Figure 13 shows how some research papers connected each other. Because most of the time they are talking about the same things. Here each dot means a paper and if dots look bigger, that paper has received more citation. Lines between dots indicate that these are used with the same source or same idea. The colours are used to show different groups of subjects.

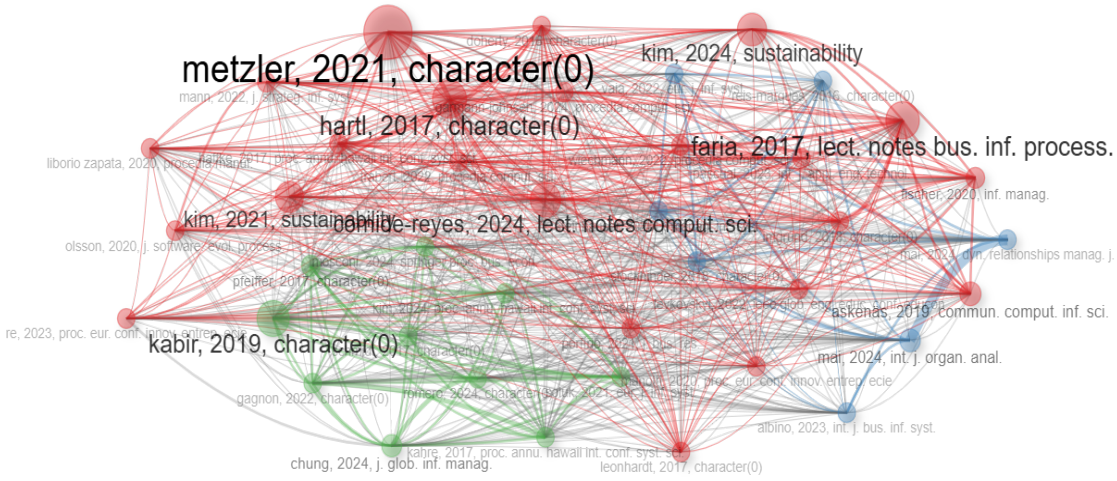


Figure 13. Bibliographic-coupling network of top 40 influential authors

The red cluster is the main and biggest cluster in this picture. It indicates how digital transformation and technology are used in research papers. In this group, there are some main papers such as Metzler (2021) and Hartl (2017). The blue clusters indicate how it can improve in management, information systems and business. Here are Some examples are Faria (2017) and Fischer (2020). The green cluster is the smallest cluster in the field. It works with small and local businesses like Kabir (2019).

Figure 14 shows how research areas are changed day by day. At first it talked about technology then it came into business but now it talks about modern and sustainable innovation. From 2016 to 2018 most of the research is conducted in system design and infrastructure. But here common terms were distributed information systems and microservices. From 2019 to 2021 it focused on business. It can be found from business opportunity and information use. After 2022 it focused on digital transformation, sustainability, SMEs and smart manufacturing.

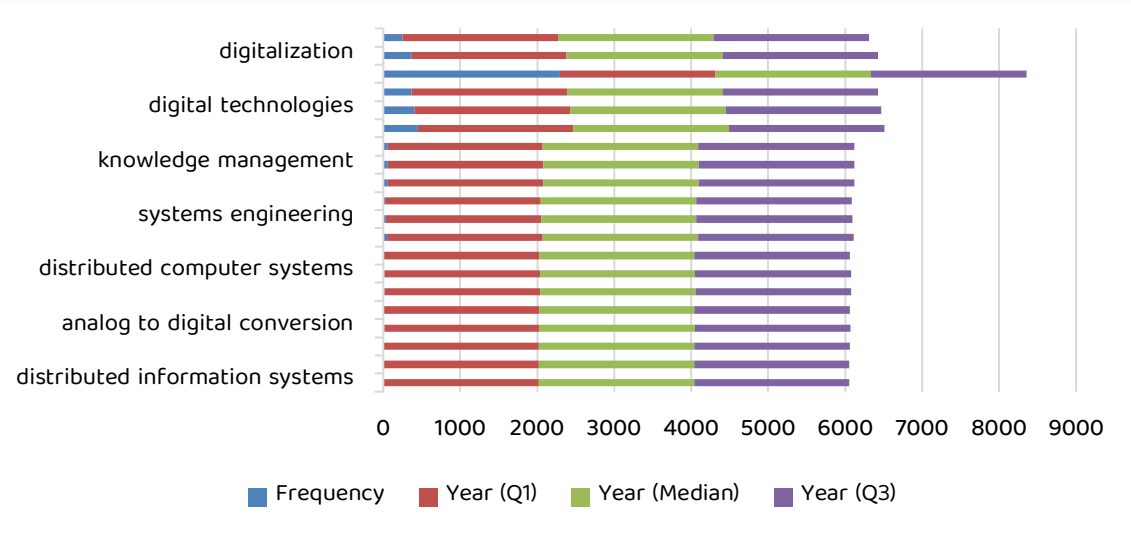


**Figure 14.** research areas are changed day by day

### 4.6. Conceptual Structure Mapping

In figure 15 Conceptual Structure Map is shown. For showing main things in research areas, it divides clusters through keywords. Here two main parts (Dim 1 = 53.96% and Dim 2 = 29.54%) explains 83.50 percent results. It means that its structure is very strong and clear. The red cluster is the main part. It focuses on digital transformation, innovation, industry 4.0 and business modeling[62]. It shows how digital technologies

help organizations to improve their working. The Orange clusters represent new decision-making tools like AI, IoT and E-learning. It also shows how it is used in real life for supporting digital transformation. The blue clusters represent information systems and processing. It works as a foundation for the development of digital innovation [29]. The green cluster represents big data and metadata. It discussed how data is stored, managed and processed. The map shows a complete system. Where red clusters drive innovation, orange clusters are responsible for implementing it and blue clusters and green clusters provide the structure and support for the entire system.

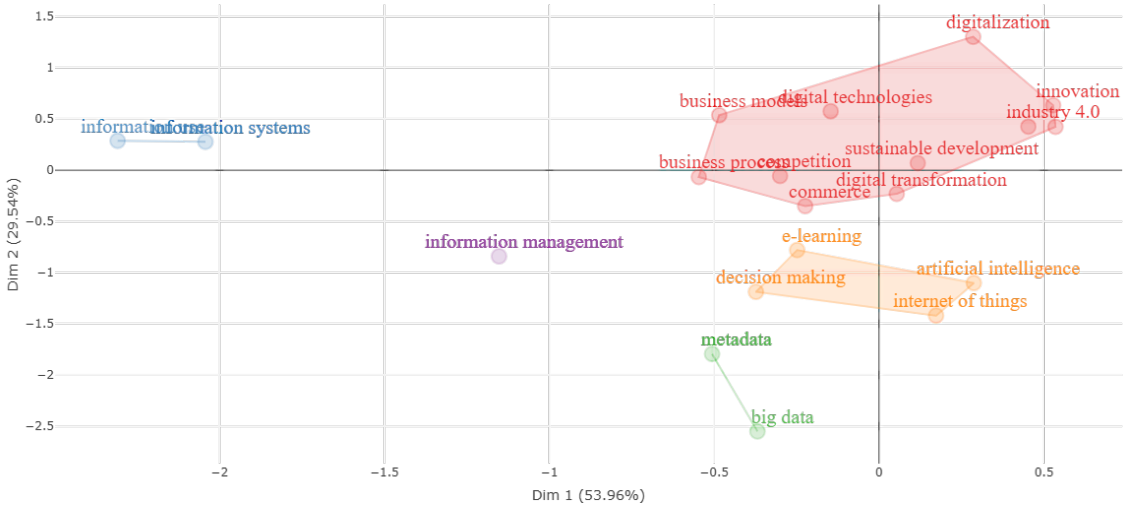


**Figure 15.** Conceptual structure map

### 4.7. Discussions

This study shows that research on Digital Transformation and Information Systems is growing rapidly day by day. From 2016 to 2024, there are 2692 papers with a high annual growth rate which is 43.58 percent. Most of these papers are written by teams with an average of 6.65 authors. Two researchers like Bogner and Jugel are at the center of the main collaboration networks [63].

Digital transformation is the most common theme which is supported by terms of information systems and digitalization. The focus of this research has changed over time. Here early studies looked at technical foundations (2016). Then the focus moved to managerial and business topics (2019). Recently the focus shifted to sustainability and smart manufacturing from 2023 to 2024. The conceptual map shows one main DT

innovation cluster and another technology focused cluster. This means the technical and managerial ideas are not yet fully connected [19].

The number of researchers is highest in Germany and China[64]. The network of Germany is in the strongest position which connects major global research groups. Peter the Great St. Petersburg Polytechnic University is the main collaboration center at the institutional level. But global collaboration is still uneven and many papers have missing affiliation information. This is making it difficult to understand the full research landscape.

This field is highly interconnected and collaborative. It shows the theory of connection between technology and organization [65]. TOE or RBV theories explain only part of the pictures and at this time technology organization evolve faster.

The findings show that digital transformation is not only a set of new technologies but also viewed as a single socio-technical system. Spreading the information system from the core of innovation reveals a gap in the current literature. It is often considered as a technological background tool where DT is mainly discussed in strategic and organizational terms. It should integrate these views in future and IS should be considered as a strategic backbone. These guides and supports transformation [66].

It also shows the change in the field of increasing use of sustainability related keywords. DT is not only about doing things faster or cheaper. It now needs to include caring for the environment, using data responsibly, and creating value. It will benefit society in the long run. This means DT should focus on being resilient, reducing waste through circular practices, and promoting innovation that is responsible and ethical.

This field is very interdisciplinary and highly collaborative. It shows that we need theories that work on multiple levels and link technology with organizational behavior. Recent theories explain only part of the picture. It does not work well when technology is changing faster than organizations can respond [29]. New theories must therefore include these network effects and could explain in this way the dissemination of ideas, influence, and innovations within the research community [63].

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This increasing thrust on management and business processes has shaped both research and writing extensively in this area. How the workforce is organized, the development of skills, and the capabilities of organizations are influenced by it. The way decisions are being made by digital systems calls for industries to give more prominence to learning new skills and enhancing existing ones [67]. These systems represent a connection between traditional management and data-driven operations.

Sustainability is increasingly becoming a key topic driven by social expectations and the belief that digital innovation may serve environmental protection and equitable economic growth [68]. At the same time, inconsistencies in data reporting and incomplete affiliation information reveal existing disparities, which especially affect smaller, resource- and visibility-scarce institutions [29]. These challenges, however, need to be addressed by organizations in order to represent knowledge in a non-discriminatory and inclusive way. In other words, digital transformation models should reflect the diversity of many social and cultural contexts.

Clear policies and funding priorities are provided by Geographic and network analysis. The role of connecting Germany and Peter the Great St. Petersburg Polytechnic University indicates global knowledge flows depend on only some key centers. Intellectual diversity can be increased by international collaboration, co funded programs and inter regional research centers. These efforts could also fill up the global north and south research gap [68]. Most of the recent research only focused on developed and upper income countries. This creates the risk of creating a DT framework and that is biased economic and infrastructural realities. Adding these countries which are not represented can improve DT models. It also helps them work properly in different places. It is also crucial to collaborate with European clusters and rapidly growing Asian countries, which can increase methodological innovation and accelerate intellectual development. It can increase methodological innovation and accelerate intellectual development [69].

Although this research has contributed greatly to the evolving field of digital transformation (DT) and information systems (IS), there are still various limitations with the same which we shall look at next. One limitation of this analysis is the reliance on just one database, Scopus, which, although a comprehensive source, may not include all

the studies of interest, especially those published in less mainstream journals and/or in non-English languages. The study is further restricted to publication years 2020 to 2026 which means that earlier fundamental work and emerging studies were excluded from the time frame. This may create a time bias, from initial studies generating developments for current studies. The second limitation is the lack of gray literature such as industry reports, working papers, and other non-peer-reviewed studies, which could add even more useful insights into the practice of implementation of digital transformation strategies. In addition, the study did not look at the qualitative dimensions of digital transformation, such as showcase examples and interviews, that could yield information related to the organizational and cultural processes impacting such trends.

Future studies may include databases beyond the ones we already used to obtain more studies in our final collection. In future studies, researchers might consider focusing on the socio-technical frameworks governing the digital transformation and the factors that favor the adoption of technology. The intersection of digital transformation and sustainability in particular is still a new area. Researchers could explore how businesses balance profit with environmental and social objectives, especially in resource-constrained settings. In the future, we could look at developing countries and how they applied digital transformation. That would show us how economic context impacts implementation.

## 5. CONCLUSIONS

This study demonstrates the accelerating growth and strategic importance of digital transformation and information systems in driving sustainable business innovation. Key findings underscore the need for organizations to integrate socio-technical frameworks and responsible data governance to address evolving technological and ethical challenges. Strengthening international collaboration and supporting developing countries are essential to achieving equitable digital progress. Future research should continue exploring holistic approaches that align technology adoption with sustainability goals.

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The findings of this study also showcase how essential and key information systems are as a strategic backbone for digital transformation. To realize these benefits, organizations should invest in training and change management to support cultural adaptation, develop comprehensive sustainability strategies aligned with digital initiatives, and foster international research collaboration to leverage diverse expertise. Policymakers are encouraged to support equitable access to digital technologies in developing regions to bridge global disparities[72]. According to the study, we are provided with essential insights into the evolution of digital transformation and directions for future research. In particular, we focus on sustainability, socio-technical systems, as well as global disparities.

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