



A review of research on the role of emerging technologies in digital globalization[☆]

Anuj Sharma^a, Satender Pal Singh^{b,*}, Robin Nunkoo^{c,d,e,f}, Rajesh Mahadeva^g

^a Information Systems and Analytics Area, Jindal Global Business School, O.P. Jindal Global University, Sonapat, Haryana, India

^b Department of Operations and Decision Science, T A Pai Management Institute, Manipal Academy of Higher Education, Manipal, India

^c Department of Management, University of Mauritius, Reduit, Mauritius

^d School of Tourism and Hospitality, University of Johannesburg, Johannesburg, South Africa

^e College of Hotel and Tourism Management, Kyung Hee University, Seoul, The Republic of Korea

^f School of Hospitality, Tourism and Events and Centre for Research and Innovation in Tourism (CRIT), Taylor's University, Selangor, Malaysia

^g Department of Computer Science and Engineering, Manipal Institute of Technology, Manipal Academy of Higher Education, Manipal 576104, India

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ABSTRACT

Emerging digital technologies such as blockchain, Internet of Things (IoT), artificial intelligence (AI), and the metaverse, are the core pillars of Industry 4.0. Firms leverage these technologies to innovate and improve supply chain and collaboration coordination and extend their scale of operations rapidly. Existing research on the role of emerging technologies in digital globalization, however, is fragmented theoretically and empirically, making it challenging for research to discern trends. To address this gap, the current study adopts scientometrics and topic modeling to scientifically map the current state-of-the-art and chart the trends of scholarly interest. We present the social and intellectual structure of research on this topic by proving insights on prolific researchers and popular topics using topic modeling. Based on the findings, the study provides important implications for scholars and policymakers.

Introduction

The rapid diffusion of emerging digital technologies (*hereafter*, emerging technologies) across different layers of an economy has given rise to a new wave of globalization that not only involves flows of goods and services, but also artificial intelligence, metaverse services, data, algorithms, and intelligent connectivity (Archibugi and Pietrobelli, 2003; Baldermann et al., 2025). These emerging technologies are the building blocks of Industry 4.0, that has emerged as important catalysts for automation, data-driven decision making, interconnected smart networks, and real time coordination across the global value chain (Kumar et al., 2024). The next evolutionary stage of industrial transformation, Industry 5.0, leverages these technologies to emphasize on the human-machine collaboration, customised production, and circular economy principles, enabling responsive, human centric, personalised, and sustainable global value creation (Mishra et al., 2024; Li and Duan, 2025). Hence, these transformative technologies are redefining the

creation, coordination, and delivery of global values that enables faster, smarter, connected, and more secure form of digital globalisation.

To support secure, transparent, tampered-proof transaction records, and decentralised data exchange among business firms across the borders, blockchain stands out as a pivotal technology in shaping the foundation of digital globalisation (Abumalloh et al., 2025; Patra et al., 2025). Blockchain minimizes information asymmetry, eliminates intermediaries, and strengthens trust in global digital transactions among business firms (Hakkarainen et al., 2023; Naseem and Yong, 2025). It streamlines cross border financial transactions by eliminating the requirements of third parties, such as banks or clearing houses that impose administrative overheads in transactions (Rauniyar et al., 2024). Chang et al. (2020) reports that blockchains have capability to tackle business challenges, such as “traceability, dispute resolution, cargo integrity and security, supply chain digitalisation, maintaining compliance, trust, and stakeholder management”, which are prevalent in global supply chains (Chang et al., 2020). Specifically, blockchain strengthens the global

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* Corresponding author.

E-mail addresses: f09anuj@iimdr.ac.in (A. Sharma), satender.singh@manipal.edu (S.P. Singh), r.nunkoo@uom.ac.mu (R. Nunkoo), rajeshmahadeva15@gmail.com (R. Mahadeva).

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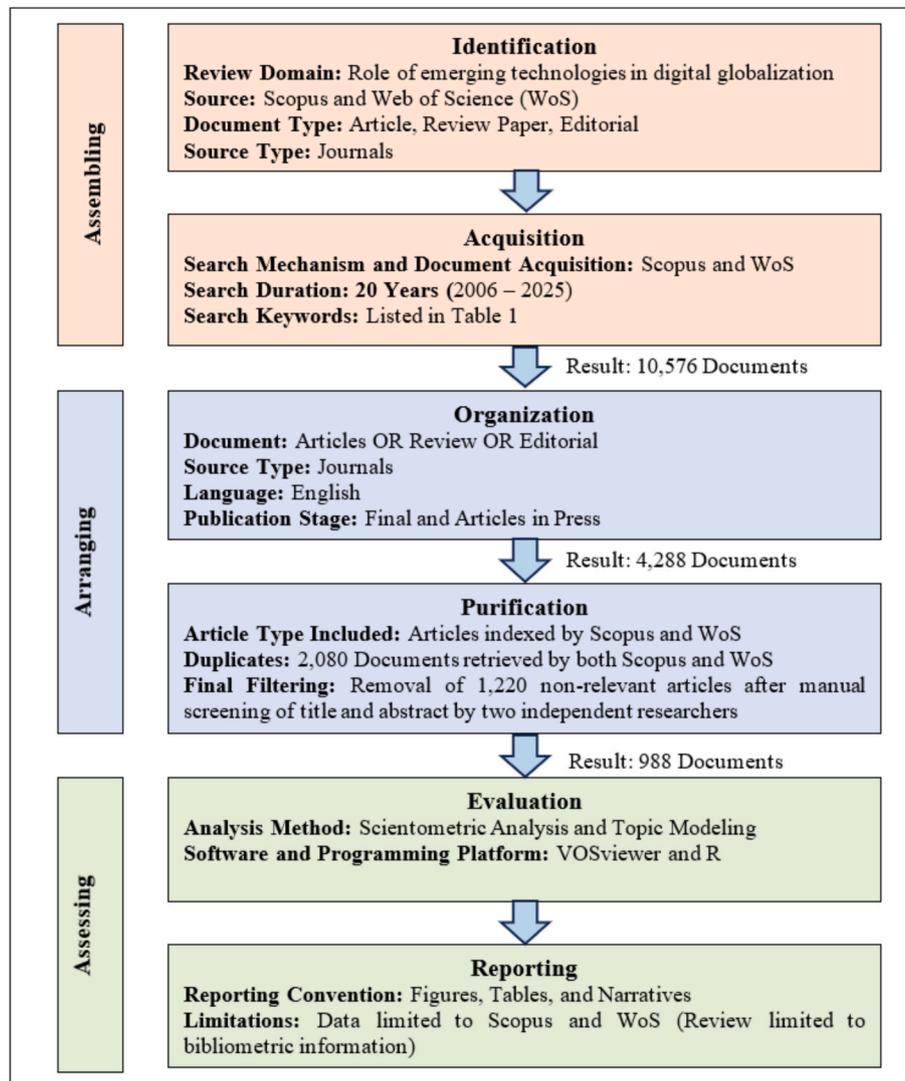


Fig. 1. The search protocol used in the current study.

supply chains by making them resilient, antifragile, adaptive, and sustainable under global volatility and disruptions (Wang et al., 2025). The extant research on blockchain reports its significant applications in various contexts such as food supply chain traceability and safety in agribusiness (Bannor and Kyire, 2021), drugs authenticity and controlling counterfeits in pharmaceutical industry (Abumalloh et al., 2025), and fostering real-time visibility in logistics (Wang et al., 2025).

AI and machine learning (ML) are one of the core pillars of Industry 4.0 that enhances global operations by offering intelligent automation and data-driven decisions across globally distributed business operations (Md Abu Taher, 2024; dos Santos and Williamson, 2024). AI helps organizations to efficiently operate across borders by facilitating multilingual communications, global customer service using bots, and personalize digital experience for users worldwide (Zhang et al., 2024; Li et al., 2025). Moreover, ML algorithms can analyze massive cross-border data to predict global market trends, determine real-time risks, detect frauds, and optimize international supply chains. In this way, AI and ML enables firm to grow digitally across diverse markets (Bosma and van Witteloostuijn, 2024; Chen et al., 2025). Hence, AI and ML serve as key technologies to drive the expansion and integration of the digital global economy.

Internet of Things (IoT) has further strengthened the growth of digital globalization by offering seamless real-time connectivity among physical devices, digital platforms, and global value chains (Zaman

et al., 2025). IoT supports the continuous flow of data across borders by using sensors, radio-frequency identification (RFID), and smart systems to enhance visibility, coordination, and data-driven decision making in globally dispersed operations of business firms (Zhang et al., 2025). Hence, IoT automates inventory management, production systems, demand forecasting, predictive maintenance, and remote monitoring. IoT-enabled smart production system supports globally integrated digital marketplaces (Sirisha et al., 2023; Rahimi et al., 2024).

Metaverse and related technologies have received significant attention in recent years due to their capability to provide deeply engaging and digitally connected virtual space by eliminating geographical barriers (Mirzaye Shirkoohi and Mohiuddin, 2025). Specifically, Metaverse and digital twins supports cross border collaboration, virtual workplaces, remote training, digital product demonstrations, and cross-cultural engagement without any geographical constraints. Emerging technologies such as augmented reality (AR), virtual reality (VR), and extended reality (XR) form the foundation of Metaverse (Mahdikhani and Meena, 2024; Mirzaye Shirkoohi and Mohiuddin, 2025). Similarly, digital twins enhance the coordination in globally dispersed manufacturing and supply chain network by creating virtual replicas of physical objects or processes that can be monitored, analyzed, and optimized before implementing physically (Korepin et al., 2025). Digital twins' technology merges physical and virtual boundaries to enhance the global reach of firms and facilitate digital trade in the international

Table 1
List of keywords for search protocol.

| Theme | Keywords |
|------------------------------|---|
| Emerging Technologies | "emerging technolog*" OR "blockchain" OR "smart contract*" OR "internet of things" OR "IoT" OR "artificial intelligence" OR "AI" OR "machine learning" OR "data analytics" OR "quantum computing" OR "quantum mechanics" OR "extended reality" OR "virtual reality" OR "augmented reality" OR "mixed reality" OR "immersive technolog*" OR "digital twin*" OR "3d printing" OR "additive manufacturing" OR "robot*" OR "cyber-physical system" OR "cloud computing" OR "cloud technology" OR "cloud service*" OR "cloud platform*" OR "on-demand computing" |
| Globalization | "business globalization" OR "firm globalization" OR "organizational globalization" OR "corporate globalization" OR "company globalization" OR "globalization of business" OR "globalization of firm*" OR internationalization OR "firm internationalization" OR "corporate internationalization" OR transnationalization OR "global expansion" OR "global strategy" OR "international strategy" OR "multinational strategy" OR "global competitive strategy" OR "international market entry" OR "foreign market entry" OR "market internationalization" OR "international diversification" OR "global diversification" OR "global market expansion" OR "global branding" OR "multinational corporation*" OR MNC OR "multinational enterprise*" OR MNE OR "transnational corporation*" OR TNC OR "born global" OR "international new venture*" OR "born global firm*" OR "global startup*" OR "foreign direct investment" OR FDI OR "cross-border merger*" OR "cross border merger*" OR "cross-border acquisition*" OR "international joint venture*" OR "strategic alliance*" OR offshoring OR outsourcing OR "global production network*" OR "global value chain*" OR GVC OR "global supply chain*" OR "global HRM" OR "international HRM" OR "global leadership" OR "cross cultural management" OR "export performance" OR "export intensity" OR "international entrepreneurship" OR "digital globalization" OR "digital internationalization" OR "global e-commerce" |

Note- * represents a wild card character in the literature search.

Table 2
Summary of the literature reviewed.

| Description | Results |
|--|-----------|
| Timespan of research on emerging technologies in globalization | 2006:2025 |
| Research articles reviewed in the current study | 988 |
| Publication outlet | 561 |
| Yearly progress (%) of research | 23.66 |
| Mean publication age | 3.41 |
| Mean citation count by 988 articles | 34.11 |
| References used by 988 articles | 8,188 |
| Author's keywords used in 988 articles | 3,017 |
| Authors | 2,918 |
| Solo authors | 146 |
| Mean number of authors per paper | 3.17 |
| Global collaboration ratio | 34.82% |

digital market (Saridakis et al., 2024).

3D printing (or additive manufacturing) is "a process of joining materials to make objects from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing methodologies" (Giacosa et al., 2024, pp. 1). 3D printing has emerged as a disruptive force in digital globalization that supports agile, customizable, and on-demand production resulting in worldwide competitive advantage for firms (Hannibal, 2020). Additive manufacturing reduces the requirements for costly centralized facilities and global procurement as it facilitates the manufacturing of the required tools, products, or spare parts digitally (Laplume et al., 2016; Abeliansky et al., 2020). Due to the digitalization of product designs, rapid prototyping, and manufacturing processes, additive manufacturing is the core driver of global production

ecosystems that are globally connected, flexible, and sustainable (Chen and Cao, 2020; Magnani et al., 2022).

Although several studies have been carried out to examine the role of emerging technologies on globalization of business firms (e.g., Giacosa et al., 2024; Hakkarainen et al. 2023; Meltzer, 2024; Sirisha et al., 2023), the extant knowledge is fragmented and scattered across various publication outlets, making it difficult for scholars to discern interesting theoretical and empirical trends. There is a lack of research that provides a holistic and comprehensive insights on the transformative impact of emerging technologies on digital globalization. Such a research endeavour can better guide researchers, practitioners, and policymakers in identifying synergies, understanding cross-technology impacts, and making strategic decisions. The research questions (RQs) of the study are given as follows:

RQ1: What are the most influential articles, researchers, institutions, and countries contributing to research on emerging technologies and digital globalisation?

RQ2: What are the dominant themes and high impact research topics in this area, and how have their trends changed over time?

RQ3: What are the interesting insights drawn from the collaborative relationships and interconnections among research articles, authors, and topics of scholarly interest?

This study addresses RQ1 using a performance analysis of research. For RQ2, the study adopts advanced text analytics approach based on structural topic modeling (STM). STM provides a deeper understanding of latent topics and the temporal trends related to these topics. Finally, scientometric analysis is used to address RQ3. Specifically, co-citation analysis, keywords analyses, and collaboration analysis are performed to provide insights on scholarly patterns related to intellectual, social, and conceptual structure of research.

Methodology

In this study, we scientifically map the existing literature on emerging technologies in digital globalization. The current study uses the AAA framework under the SPAR-4-SLR protocol (Paul et al., 2021; Tranfield et al. 2003) to collect relevant literature. This framework includes three stages (Assembling, Arranging, and Assessing) and six steps as illustrated in Fig. 1. The AAA framework is a recent and rigorous review protocol widely used in management, information systems, and operations research (Sharma et al., 2025; Singh et al., 2023). The AAA framework is more suitable in the current context due to multiple reasons. Unlike PRISMA, which primarily ensures a transparent procedural reporting of study selection, the AAA framework supports analytical integration of heterogeneous and interdisciplinary literature which is the core objective of current study. Furthermore, the AAA framework enables not only the systematic collection of relevant literature (Assembling) but also the structured organization and classification of knowledge domains (Arranging), and critical evaluation of intellectual structures and research trends (Assessing). Hence, AAA framework ensures procedural transparency as well as it facilitates intellectual structure mapping and knowledge integration. Moreover, given that this study integrates scientometric techniques and STM to map the intellectual and conceptual landscape of emerging technologies research in firm globalization, the AAA under SPAR-4-SLR approach provides a more context-appropriate and analytically aligned framework than PRISMA.

First, an initial literature search was conducted to collect all the keywords and their synonyms which are used in scholarly works to represent emerging technologies and globalization in general. This resulted in two comprehensive lists of representative terms researchers have used to represent emerging technologies and globalization. These lists were validated by two senior researchers and two practitioners with more than 10 years of experience in this field. After two iterations, the final list of keywords (presented in Table 1) was prepared to access literature from existing databases. The keywords in each theme were

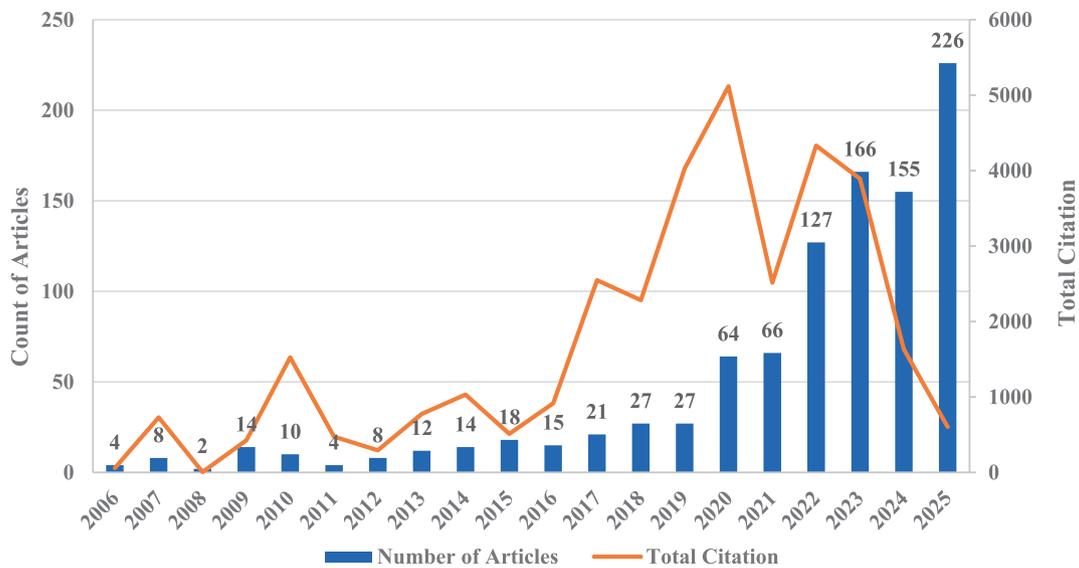


Fig. 2. Annual Growth.

Table 3
Leading authors and their scientific profiles.

| Author | h-index | g-index | m-index | TC | NP | Starting Year |
|---------------------------|---------|---------|---------|------|----|---------------|
| Etemad, Hamid | 3 | 4 | 1 | 37 | 4 | 2023 |
| Zhang, Hao | 3 | 4 | 0.6 | 41 | 4 | 2021 |
| Mohiuddin, Muhammad | 2 | 2 | 2 | 7 | 4 | 2025 |
| Sarkis, Joseph | 2 | 4 | 0.286 | 2924 | 4 | 2019 |
| Singh, Devesh | 2 | 4 | 0.4 | 17 | 4 | 2021 |
| Blome, Constantin | 3 | 3 | 0.5 | 389 | 3 | 2020 |
| Budhwar, Pawan S. | 3 | 3 | 0.6 | 447 | 3 | 2021 |
| Choi, Tsan Ming | 3 | 3 | 0.429 | 501 | 3 | 2019 |
| Giudice, Manlio Del | 3 | 3 | 0.375 | 541 | 3 | 2018 |
| Gupta, Shivam | 3 | 3 | 1 | 139 | 3 | 2023 |
| He, Yi | 3 | 3 | 1 | 64 | 3 | 2023 |
| Magnani, Giovanna | 3 | 3 | 0.6 | 388 | 3 | 2021 |
| Malik, Ashish | 3 | 3 | 0.6 | 447 | 3 | 2021 |
| Shahzad, Muhammad Farrukh | 3 | 3 | 1 | 45 | 3 | 2023 |
| Srikanth, N. R. | 3 | 3 | 0.6 | 447 | 3 | 2021 |
| Wang, Tao | 3 | 3 | 0.6 | 51 | 3 | 2021 |
| Willcocks, Leslie P. | 3 | 3 | 0.25 | 508 | 3 | 2014 |
| Wu, Xiaobo | 3 | 3 | 0.188 | 130 | 3 | 2010 |
| Xu, Shuo | 3 | 3 | 1 | 45 | 3 | 2023 |
| Zhang, Yu | 3 | 3 | 0.75 | 59 | 3 | 2022 |

combined with “OR” Boolean operator and an “AND” operator was used to combine both the themes. This study used the title, abstract, and keywords database fields in Scopus and Web of Science (WoS) for retrieving relevant articles because this approach ensures precision, transparency, and reproducibility in scientometrics-based reviews. Both the databases were accessed on October 15, 2025.

This study limits its scope to articles published during the past two decades (2005-2024) which have witnessed a widespread diffusion, diversification, and convergence of emerging technologies for cross-border digital integration and internationalization of firms (Ahi et al., 2022). Our time frame, therefore, ensures that our work reflects contemporary technological evolution, ensuring a reliable and valid research trends, thematic evolution, and intellectual structures associated with digital globalization. Previous works have also recommended that delimiting the time span to periods of significant technological transformation enhances analytical relevance and interpretive clarity (Donthu et al., 2021; Nunkoo et al., 2025; Vuković, Dekpo-Adza, & Matović, 2025). Thus, the assembling stage focused on identifying and

collecting the relevant scholarly works from established database such as Scopus and WoS using predefined inclusion and exclusion criteria. Then, we applied multiple filters to remove publications of other languages, irrelevant, and duplicates research documents, resulting in the collection of 988 articles. The document type, source type, language, and publication stage filters are given in Fig. 1. We use bibliometric approach (Lim et al., 2024) which combines and cleans data from Scopus and WoS. The bibliometric package in R programming environment automatically removes duplicate articles based on unique identifiers such as DOI.

The final filtering included content screening where we excluded articles if the title and abstract suggested no connection with the scope of current study (Vuković, Dekpo-Adza, & Matović, 2025). Two independent researchers inspected the titles and abstracts to exclude irrelevant articles and conflicts were resolved using cross-checking and discussion. During the arranging stage, we systematically organized the literature after executing a transparent and reproducible search strategy in the assembling stage. Thus, based on the inclusion criteria, we selected only Scopus and WoS-indexed, peer-reviewed journal articles in English published between 2005 and 2024 that examines emerging technologies in the context of digital globalization. Alternately, non-journal publications, non-English or pre-2005 studies, and studies lacking a substantive focus on emerging technologies for international firms or firms’ digital globalization were excluded. Finally, we conducted scientometric analysis and topic modeling in the assessing stage to ensure a structured, comprehensive, and analytically rigorous synthesis of prior research.

Topic modeling based on STM

STM is an effective approach to analyze a text corpus of research articles because it incorporates document-level metadata in constructing topic model that allows scholars to uncover hidden latent topics and observe temporal shift in the content of these topics (Sharma et al., 2025). Unlike human-driven thematic analyses that are prone to subjectivity bias and feasibility constraints, STM is a scalable, inductive and data-driven analytical method that supports thematic discover from a large multidisciplinary corpus without substantial subjectivity bias and feasibility constraints (Sharma et al., 2021).

In this study, text corpus is formed using the title, research keywords of articles, and the abstract of the research articles. In the topic modeling process, publication year is used as a metadata-based variable. We use R tm package (Feinerer et al., 2008) for text mining to clean the text

Table 4
Analysis of the leading seminal studies.

| Rank | Researchers | Study Title | TC | TC per Year |
|------|---|---|------|-------------|
| 1 | (Saberi et al., 2019) | “Blockchain technology and its relationships to sustainable supply chain management” | 2908 | 415.43 |
| 2 | (Attaran, 2017) | “The rise of 3-D printing: The advantages of additive manufacturing over traditional manufacturing” | 1448 | 160.89 |
| 3 | (Weber, 2010) | “Internet of Things – New security and privacy challenges” | 1163 | 72.69 |
| 4 | (Treiblmaier, 2018) | “The impact of the blockchain on the supply chain: A theory-based research framework and a call for action” | 693 | 86.63 |
| 5 | (Zeynep Aksin, Armony, & Mehrotra, 2007) | “The modern call center: A multi-disciplinary perspective on operations management research” | 566 | 29.79 |
| 6 | (Chang, Iakovou, & Shi, 2020) | “Blockchain in global supply chains and cross border trade: a critical synthesis of the state-of-the-art, challenges and opportunities” | 503 | 83.83 |
| 7 | (Strange & Zucchella, 2017) | “Industry 4.0, global value chains and international business” | 479 | 53.22 |
| 8 | (J. Liu, Chang, Forrest, & Yang, 2020) | “Influence of artificial intelligence on technological innovation: Evidence from the panel data of china’s manufacturing sectors” | 464 | 77.33 |
| 9 | (Bumblauskas, Mann, Dugan, & Rittmer, 2020) | “A blockchain use case in food distribution: Do you know where your food has been?” | 441 | 73.50 |
| 10 | (Benlian & Hess, 2011) | “Opportunities and risks of software-as-a-service: Findings from a survey of IT executives” | 428 | 28.53 |
| 11 | (Venkatesh, Kang, Wang, Zhong, & Zhang, 2020) | “System architecture for blockchain based transparency of supply chain social sustainability” | 377 | 62.83 |
| 12 | (Choi, Wen, Sun, & Chung, 2019) | “The mean–variance approach for global supply chain risk analysis with air logistics in the blockchain technology era” | 370 | 52.86 |
| 13 | (Denicolai, Zucchella, & Magnani, 2021) | “Internationalization, digitalization, and sustainability: Are SMEs ready? A survey on synergies and substituting effects among growth paths” | 360 | 72.00 |
| 14 | (Bresciani, Ferraris, & Del Giudice, 2018) | “The management of organizational ambidexterity through alliances in a new context of analysis: Internet of Things (IoT) smart city projects” | 354 | 44.25 |
| 15 | (Bhimani & Willcocks, 2014) | “Digitisation, ‘Big Data’ and the transformation of accounting information” | 334 | 27.83 |
| 16 | (Schuetz & Venkatesh, 2020) | “Blockchain, adoption, and financial inclusion in India: Research opportunities” | 327 | 54.50 |
| 17 | (Aguezzoul, 2014) | “Third-party logistics selection problem: A literature review on criteria and methods” | 313 | 26.08 |
| 18 | (Laplume, Petersen, & Pearce, 2016) | “Global value chains from a 3D printing perspective” | 294 | 29.40 |
| 19 | (K. Li, Kim, Lang, Kauffman, & Naldi, 2020) | “How should we understand the digital economy in Asia? Critical assessment and research agenda” | 276 | 46.00 |

Table 4 (continued)

| Rank | Researchers | Study Title | TC | TC per Year |
|------|-------------------------------|---|-----|-------------|
| 20 | (Autio, Mudambi, & Yoo, 2021) | “Digitalization and globalization in a turbulent world: Centrifugal and centripetal forces” | 245 | 49.00 |

Table 5
Top twenty leading universities recognized as key research hubs.

| Rank | Affiliations | Articles |
|------|---|----------|
| 1 | The Hong Kong Polytechnic University | 20 |
| 2 | Hainan University | 16 |
| 3 | Shandong University | 15 |
| 4 | Tsinghua University | 14 |
| 5 | Università Degli Studi Di Torino | 13 |
| 6 | Shanghai University | 10 |
| 7 | South China University of Technology | 10 |
| 8 | Universiti Putra Malaysia | 10 |
| 9 | University Of Science and Technology of China | 10 |
| 10 | Università Degli Studi Di Pavia | 10 |
| 11 | Vrije Universiteit Amsterdam | 10 |
| 12 | Zhejiang University | 10 |
| 13 | Zhejiang University of Technology | 10 |
| 14 | Copenhagen Business School | 9 |
| 15 | Harbin Engineering University | 9 |
| 16 | Qilu University of Technology | 9 |
| 17 | Singapore Management University | 9 |
| 18 | University of Johannesburg | 9 |
| 19 | Aalto University | 8 |
| 20 | Chongqing University | 8 |

Table 6
Global research productivity.

| Rank | Nation | No. of articles | Proportion | SCP | MCP | MCP Ratio |
|------|----------------------|-----------------|------------|-----|-----|-----------|
| 1 | China | 205 | 20.7 | 140 | 65 | 31.7 |
| 2 | USA | 90 | 9.1 | 65 | 25 | 27.8 |
| 3 | United Kingdom | 54 | 5.5 | 24 | 30 | 55.6 |
| 4 | India | 51 | 5.2 | 31 | 20 | 39.2 |
| 5 | Germany | 32 | 3.2 | 22 | 10 | 31.3 |
| 6 | Italy | 32 | 3.1 | 16 | 15 | 48.4 |
| 7 | Australia | 31 | 2.9 | 16 | 13 | 44.8 |
| 8 | Canada | 20 | 2 | 18 | 2 | 10 |
| 9 | France | 20 | 2 | 7 | 13 | 65 |
| 10 | Korea | 20 | 2 | 14 | 6 | 30 |
| 11 | Spain | 17 | 1.7 | 9 | 8 | 47.1 |
| 12 | Netherlands | 15 | 1.5 | 10 | 5 | 33.3 |
| 13 | Finland | 14 | 1.4 | 7 | 7 | 50 |
| 14 | Malaysia | 14 | 1.4 | 7 | 7 | 50 |
| 15 | Portugal | 13 | 1.3 | 9 | 4 | 30.8 |
| 16 | Iran | 11 | 1.1 | 10 | 1 | 9.1 |
| 17 | Turkey | 11 | 1.1 | 5 | 6 | 54.5 |
| 18 | United Arab Emirates | 11 | 1.1 | 5 | 6 | 54.5 |
| 19 | Saudi Arabia | 9 | 0.9 | 5 | 4 | 44.4 |
| 20 | Brazil | 8 | 0.8 | 5 | 3 | 37.5 |

corpus by removing textual noise from the text such as “punctuations, numbers, special characters, stop words, publisher’s information, etc.”, that can adversely influence the effectiveness of STM. Additionally, we developed an n-gram tokenizer to process the frequently occurring bigrams and trigrams and converted these into a single term. This process enhances the topics’ semantic quality and protects the important multi-word expressions in the analysis. The stm package in R language (Roberts et al., 2019) was used to examine multiple topics solutions ranging from 4 to 30 topics. Subsequently, a six topics-based model was finalized considering semantic coherence and exclusivity scores, as per the prior studies (Das et al., 2023; Sharma et al., 2025). We analyzed the

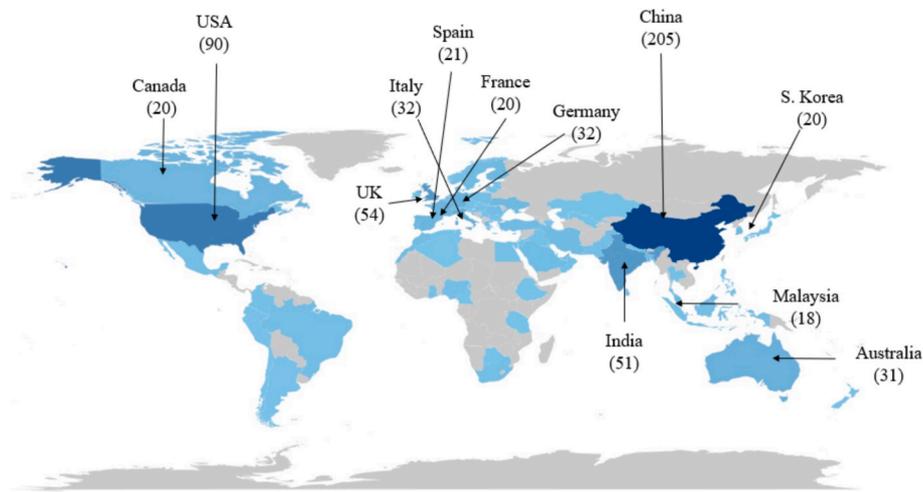


Fig. 3. Representation of the most prolific countries across the world.

Table 7
Topic, key terms, proportion, and seminal studies.

| Topic | Key Terms | Proportion | Seminal Studies |
|---|--|------------|--|
| Topic 1- Blockchain for Global Supply Chain | Blockchain, Global Supply Chain, Sustainability, Resilience, Technology, Adoption, Efficiency, Risk, Traceability, Transparency | 19.77% | (Bai & Sarkis, 2020; Chang et al., 2020; Choi et al., 2019; Saberi et al., 2019; Treiblmaier, 2018) |
| Topic 2- AI, Robotics, Automation, and Digital Transformation | Digital Transformation, Artificial Intelligence, Automation, Robotics, Trade, Labor, Manufacturing, Innovation, Offshoring, Export | 16.67% | (L. Huang, Wang, & Lin, 2025; Jun Liu, Chang, Forrest, & Yang, 2020; Meltzer, 2024; Zheng & Wang, 2025) |
| Topic 3- Machine Learning, Optimization and Decision Support Systems | Optimization, Machine Learning, Deep Learning, Cost, Outsourcing, Service, Logistics, Decision Support System, Heuristic, Computational | 15.64% | (Aguirre-Rodríguez et al., 2024; Ali, Jayaraman, Azar, & Maalouf, 2024; Bosma & Van Witteloostuijn, 2024; Sklias, Gkelios, Dimitriou, Sartzetaki, & Chatzichristofis, 2024) |
| Topic 4- Internationalization of Business Firms | SMEs, Internationalization, Business, Organization, Cloud Computing, International Business, Artificial Intelligence, Barrier, International Business, Emerging Technologies | 22.03% | (Bani Ahmad, 2024; dos Santos & Williamson, 2024; Farndale, Horak, Piyanontalee, Puffer, & Vidović, 2025; Osarenkhoe & Fjellström, 2022; Sahoo et al., 2024; Secinaro, Oppioli, Demarchi, & Novotný, 2025) |
| Topic 5- Sustainability and Sustainable Development in International Business | Sustainability, Trade, Sustainable Development, Foreign Direct Investment, International Business, Risk, Market, Factors, Tax, Environment Regulation | 13.77% | (De Sisto, Ul-Durar, Arshed, Sadaf, & Nazarian, 2025; Fahad, Su, Nassani, & Arshed, 2025; L. Li, Wen, Li, & Mu, 2025) |
| Topic 6- IoT, 3D Printing, and Digital Twins | Additive Manufacturing, Internet of Things, Digital Globalization, Manufacturing, Logistics, 3D Printing, Industry 4.0, Digital Twin, Global Supply Chain, Outsourcing | 12.12% | (Ashraf, Eltawil, & Ali, 2024; Attaran, 2017; Y. Huang, Ghadge, & Yates, 2024; Rahimi, Maghsoudi, & Shokouhyar, 2024; Vass et al., 2018) |

prominent words from each topic along with their associated documents to determine meaning patterns and their temporal dynamics.

Scientometric analysis

Scientometric analysis is a group of several quantitative methods that can highlight the intellectual interconnections within a specific research domain (Singh et al., 2020; Sharma et al., 2023). For example, by examining keyword density visualisation, major research themes can be identified from a corpus of articles. Furthermore, keyword co-occurrence analysis can highlight semantic relationships among research themes. Similarly, keyword overlay networks can be developed for visualizing topical trends related to prevalent research themes. Co-citation analysis is an important method to reveal logical connections among research articles. It uses PageRank algorithm and cluster centrality to map the scientific literature into distinct clusters. Moreover, seminal articles in each cluster can also be discovered using co-citation analysis (Singh et al., 2020). The current study also performs co-authorship analysis to discover most active scientific actors in the current field of research who have formed significant collaborations to advance knowledge. We use the VOSviewer software to conduct scientometric analysis on the research examining emerging technologies in

digital globalization. This analysis provides a holistic view on how technologies collectively shape the evolving landscape of digital globalization.

Results

Performance impact assessment

Table 2 provides a quantitative summary of the existing literature on the topic. Between 2005 and 2024, 988 articles authored by 2,918 individuals have been published in 561 different outlets. These articles borrowed knowledge from 8,188 sources. Around 15% (n = 146 articles) of articles were sole-authored while the rest involved co-authorship. Around 35% of articles involves international collaborations. The annual growth rate of articles on digital globalization is around 23.66%, suggesting a rapid expansion of research on this topic (see Fig. 2).

Author productivity assessment

Author productivity and impact assessment is an important tool to evaluate a researcher's scholarly contributions and benchmark researchers. The h-index, g-index, and m-index are well-known measures

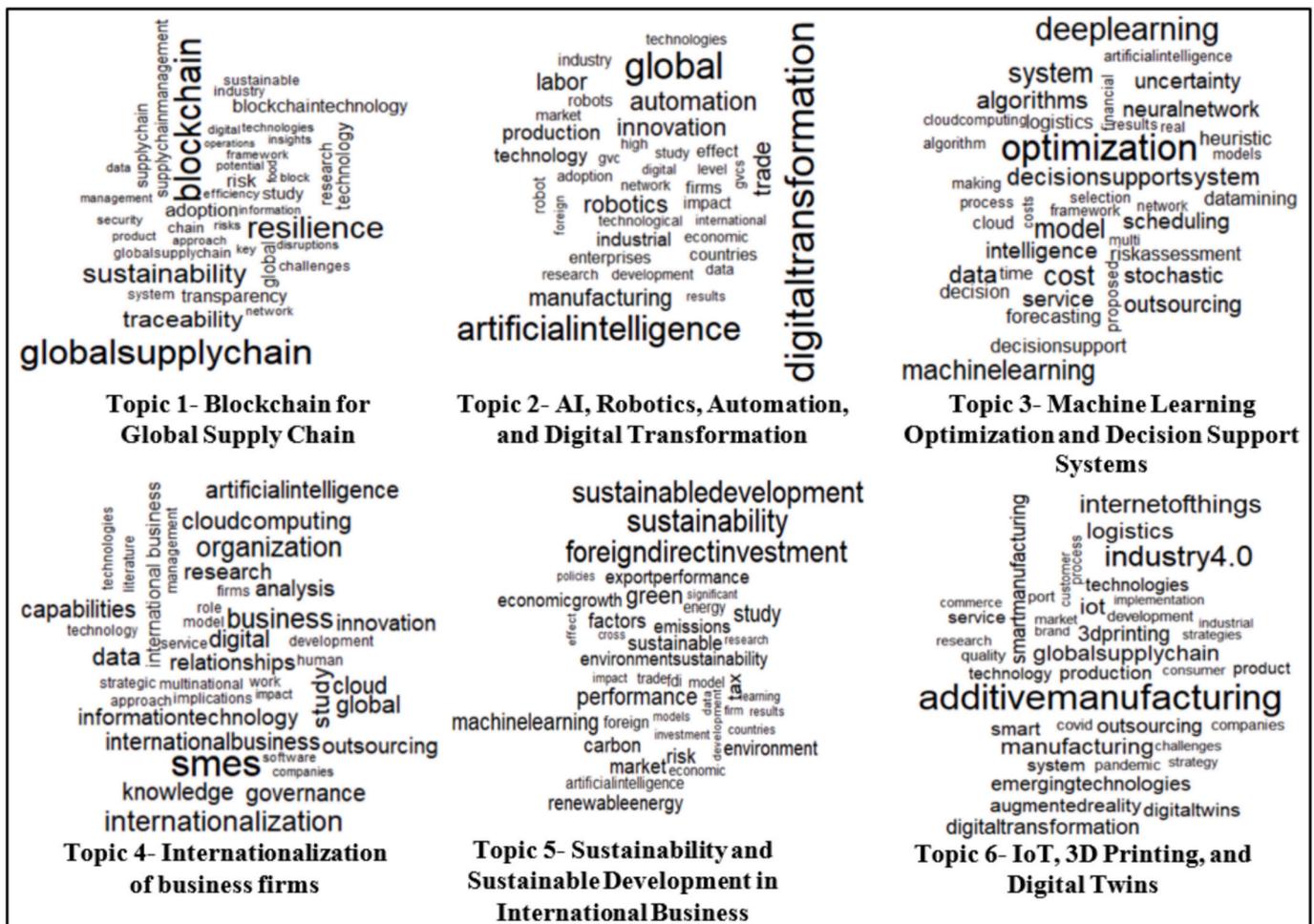


Fig. 4. Word cloud representing each topic.

that represent a researcher's scholarly output and impact from a collection of publications (Sharma, Koohang, Rana, Abed, & Dwivedi, 2023; Singh, Dhir, Das, & Sharma, 2020). Total citations (TC) and number of publications (NP) represent vitality, quality, and impact of research (Sharma, Rana, & Nunkoo, 2021). Table 3 lists the leading authors on the role of emerging technologies in the globalization and internationalization of business firms. Prof. Hamid Etemad from McGill University is a prolific scholar with his path-breaking scholarship on the internationalization of business firms. Furthermore, Prof. Hao Zhang from the School of Management, Zhejiang University, Prof. Muhammad Mohiuddin from Laval University, Canada, and Prof. Joseph Sarkis from Worcester Polytechnic Institute's Business School have significantly contributed to building the core knowledge in this area.

Most impactful articles

The most cited articles are important to report because the accumulated citations represent research impact and quality (Das, Patel, Sharma, & Shukla, 2023). Highly cited articles often provide foundational knowledge related to ideas, concepts, methodology, and methods (Baker, Kumar, Goyal, & Sharma, 2021). Table 4 presents the most cited works on emerging technologies related to the global operations of business firms. The study on blockchain for the global supply chain (Saber, Kouhizadeh, Sarkis, & Shen, 2019) has been a landmark paper receiving 2,908 citations from Scopus-listed articles. The next highly cited works have explored 3D printing (Attaran, 2017) and the Internet of Things (Weber, 2010).

Most productive universities

A unified view of the most productive universities hosting prolific scholars of emerging technologies is crucial for future scholars, as these universities may have access to superior resources, funding, and mentorship opportunities (Sharma, Koohang, & Singh, 2025). Research productivity is often measured by the total number of articles published by a university, which is a proxy for research excellence. Table 5 shows that the Hong Kong Polytechnic University leads the research on emerging technologies for the digital globalization of business firms. Hainan University and Shandong University are also highly productive institutions. In a nutshell, the universities from China have strategically positioned themselves as pioneers in building a strong professional network of scholars.

Scholarly output of nations

Insights on a country's research expertise allows researchers to improve prospects for quality mentorship and collaboration opportunities (Sharma et al., 2023). Table 6 lists the most productive countries, with emphasis on single-country publications (SCP) and multiple-country publications (MCP). A high MCP Ratio indicate more international collaborations. It is worth reporting that although China is the leader in research productivity, countries such as France, the UK, Turkey, and the UAE foster more international collaboration. Fig. 3 represents the most productive nations as a strategic roadmap for potential researchers to target global research patterns and find collaborators for further exploration.

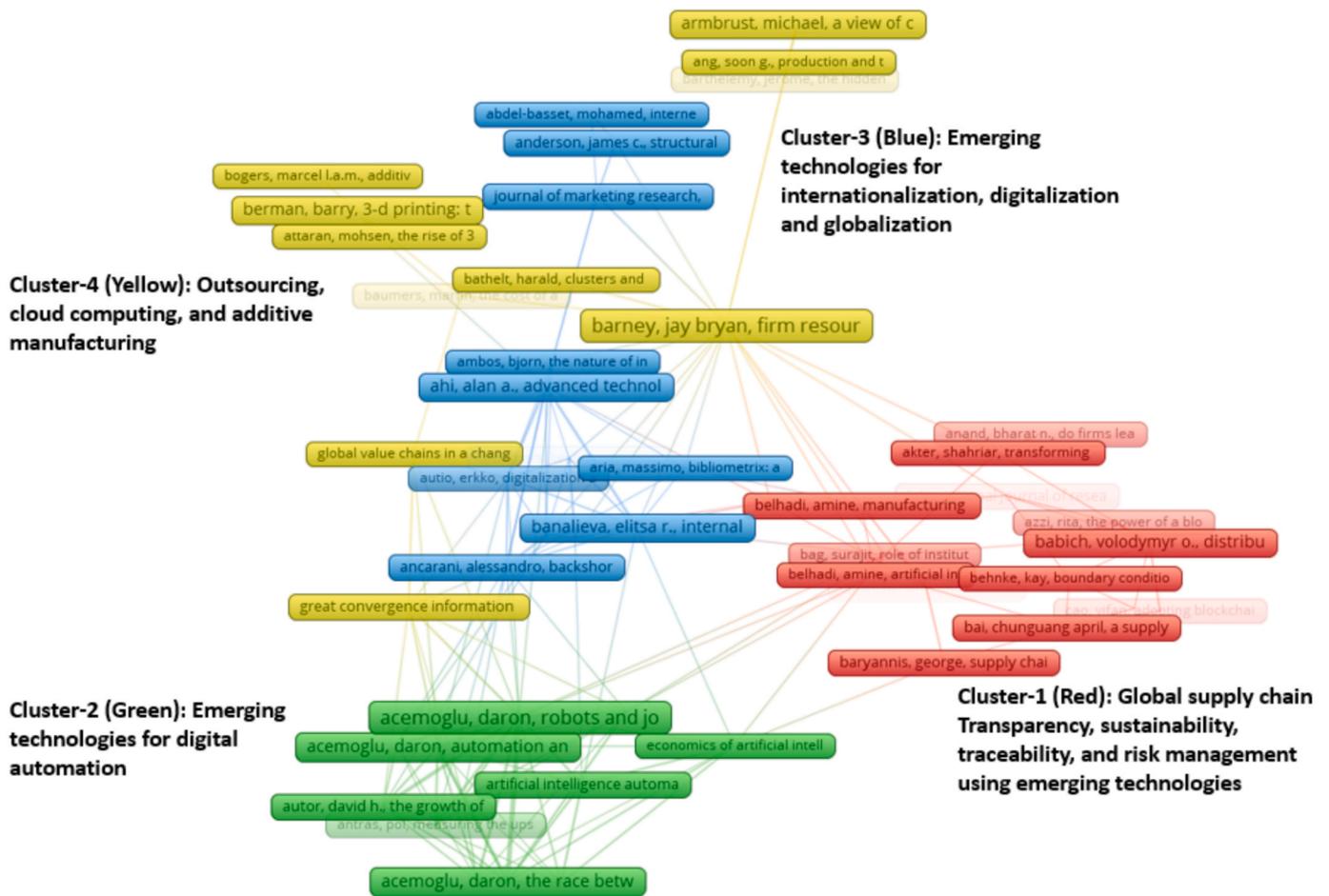


Fig. 5. Clusters based on co-citation analysis.

Key findings from topic modeling

Topic modeling algorithm automatically extracts latent themes from a large volume of text (Nunkoo et al., 2025). Textual terms that frequently co-occur together form a cluster pattern in a corpus which develops into topics. Once the topics are extracted, then each document can be represented as a probabilistic mixture of topics. The current study uses STM (Roberts, Stewart, & Airoldi, 2016) that has several advantages over other topic modeling approaches. STM allows researchers to assess the extent to which an exterior variable (such as time) influences the formation of topics (Sharma et al., 2021). Moreover, the topics extracted by STM may be correlated, which results in more meaningfully interpreted topics (Dwivedi et al., 2023).

The extracted topics, their representative terms, proportion in the document corpus, and related studies are listed in Table 7. The key terms are the most frequent terms that represent a topic. Fig. 4 provides a graphical representation of the top 40 key terms in each topic, and their relative frequency is represented by the size of each key term. Topic 4 (Internationalization of Business Firms) and Topic 1 (Blockchain for Global Supply Chain) are the two most prevalent topics, representing about 40% of all studies on emerging technologies for digital globalization.

Topic 1 (Blockchain for Global Supply Chain) focuses mainly on the globalization of supply chains and on transforming global supply chain management using blockchain technologies. Managing global supply chains is complex and supply chain sustainability is crucial for business firms. The core features of blockchain, such as transparency, traceability, and security, can be exploited to enhance supply chain sustainability (Saberli et al., 2019). Past studies have reported that blockchain

can be instrumental in addressing socioeconomic, geopolitical and technological risks that are related to global supply chains (Chang et al., 2020; Treiblmaier, 2018). Further, research confirms that blockchain technology can make global supply chains more traceable, transparent and secure (Bai & Sarkis, 2020; Behnke & Janssen, 2020).

Topic 2 (AI, Robotics, Automation, and Digital Transformation) deals with the role of artificial intelligence, robotics, automation and digital transformation in global businesses. Research reports that artificial intelligence creates new opportunities for international business trade (Meltzer, 2024) as it significantly promotes technological innovation (Jun Liu, Chang, Forrest, & Yang, 2020). Furthermore, the extant literature confirms that AI technological innovations, such as industrial robots, have a significant impact on enhancing global production networks and promoting intelligent manufacturing in global value chains (L. Huang, Wang, & Lin, 2025; Zheng & Wang, 2025).

Topic 3 (Machine Learning, Optimization and Decision Support Systems) primarily focuses on the application of machine learning and optimization methods in supporting key business decisions related to international business. Digital globalization requires a business firm to expand and compete in global markets. Decision Support Systems have proved their value by supporting strategic decisions related to mergers, acquisitions, outsourcing, supplier selection, and risk management (Aguirre-Rodríguez et al., 2024; Sklias et al., 2024). Moreover, machine learning algorithms improve the predictive accuracy of strategic decisions in international business (Ali et al., 2024; Bosma & Van Witte-loostuijn, 2024).

Topic 4 (Internationalization of Business Firms) represents the extent of literature on strategic and operational transformation of business firms when they internationalize and execute activities such as sourcing

Table 8
Landmark studies in based on co-citations.

| Cluster | Reference | Study Title | Centrality | PageRank |
|---------|---|--|------------|----------|
| 1 | (Bai & Sarkis, 2020) | "A supply chain transparency and sustainability technology appraisal model for blockchain technology" | 57.68 | 0.05 |
| 1 | (Baryannis et al., 2019) | "Supply chain risk management and artificial intelligence: State of the art and future research directions" | 41.75 | 0.04 |
| 1 | (Behnke & Janssen, 2020) | "Boundary conditions for traceability in food supply chains using blockchain technology" | 27.98 | 0.03 |
| 2 | (Acemoglu & Restrepo, 2019) | "Automation and new tasks: How technology displaces and reinstates labor" | 56.25 | 0.05 |
| 2 | (Acemoglu & Restrepo, 2018) | "The race between man and machine: Implications of technology for growth, factor shares, and employment" | 37.82 | 0.03 |
| 2 | (Acemoglu & Restrepo, 2020) | "Robots and jobs: Evidence from US labor markets" | 23.75 | 0.01 |
| 3 | (Ahi et al., 2022) | "Advanced technologies and international business: A multidisciplinary analysis of the literature" | 74.28 | 0.04 |
| 3 | (Alcácer, Cantwell, & Piscitello, 2016) | "Internationalization in the information age: A new era for places, firms, and international business networks?" | 35.72 | 0.03 |
| 3 | (Autio et al., 2021) | "Digitalization and globalization in a turbulent world: Centrifugal and centripetal forces" | 22.98 | 0.01 |
| 4 | (Attaran, 2017) | "The rise of 3-D printing: The advantages of additive manufacturing over traditional manufacturing" | 64.57 | 0.05 |
| 4 | (Baumers et al., 2016) | "The cost of additive manufacturing: machine productivity, economies of scale and technology-push" | 37.17 | 0.03 |
| 4 | (Armbrust et al., 2010) | "A view of cloud computing" | 24.02 | 0.02 |

raw material from overseas or exporting products abroad, setting up foreign offices, forming partnerships or joint ventures with offshore organizations, building global supply chains, and serving international customers (dos Santos & Williamson, 2024; Osarenkhoe & Fjellström, 2022; Sahoo et al., 2024; Secinaro et al., 2025). Emerging digital technologies assist business firms in managing core functional areas such as human resource management (Farndale et al., 2025), accounting (Bani Ahmad, 2024), and marketing (Spilotro, Secundo, & Del Vecchio, 2025).

Topic 5 (Sustainability and Sustainable Development in International Business) addresses the key issues related to sustainability and achieving Sustainable Development Goals (SDGs) in international business. Research confirms that digital transformation and the adoption of digital emerging technologies can lead to better environmental quality (De Sisto et al., 2025) and ESG performance (Jeon, 2025). For example, technologies such as blockchain and IoT facilitate supply chain digitization, which in turn facilitates energy resilience (Fahad et al., 2025). Moreover, AI is also instrumental in promoting energy efficiency and the transition toward renewable energy (L. Li, Wen, Li, & Mu, 2025).

Topic 6 (IoT, 3D Printing, and Digital Twins) concerns the research on the impact of emerging technologies, such as Internet of Things (IoT), 3D printing, and digital twins, on the globalization of business firms. Numerous researchers have confirmed that IoT improves supply chain performance (Vass et al., 2018) and promotes sustainability in global supply chains (Rahimi, Maghsoudi, & Shokouhyar, 2024). Further, digital twins (DTs) are crucial for international businesses and global firms because they can process real-time data and simulate the behavior and performance of global operations (Ashraf, Eltawil, & Ali, 2024; Y. Huang, Ghadge, & Yates, 2024). Furthermore, 3D Printing has transformative potential in optimizing the cost and efficiency of global manufacturing and reducing global supply chain dependency (Attaran, 2017).

Key findings from scientometrics

Co-citation exploration

Co-citation analysis is used to map the core knowledge base of a scientific field by highlighting highly influential or 'landmark' articles that form the intellectual foundation (Singh et al., 2020). The outcome of co-citation analysis is a set of clusters of tightly connected articles that intellectually represent different specialties or sub-disciplines. The core idea is that frequently cited articles can be clustered together to reveal thematic similarity, interdisciplinary connections, and emerging research trends. The current study adapts VOSviewer (Van Eck & Waltman, 2014) to map the top 50 most cited documents in clusters. Fig. 5 shows that the extant literature on emerging technologies for global digitalization can be mapped to four main clusters.

Table 8 examines each cluster and lists the top three landmark articles from each cluster based on centrality and page rank scores. As is evident, the articles in Cluster 1 (red color) mainly focus on the application of emerging technologies for global supply chain transparency, sustainability, traceability, and risk management (Bai & Sarkis, 2020). Similarly, Cluster 2 represents studies focusing on smart automation, robotics, and automated intelligence used by firms to compete on a global scale (Acemoglu & Restrepo, 2019). Furthermore, Cluster 3 represents research that connects digitalization to internationalization (Ahi et al., 2022). Finally, Cluster 4 deals with 3D printing, cloud computing and outsourcing, which are essential for firm globalization, as these emerging technologies support firms in achieving rapid scalability, flexibility, cost efficiency, and access to the latest cutting-edge technology (Armbrust et al., 2010).

Density visualization and key themes

Density visualization of research keywords reveals recurrent central themes that provide a snapshot of core concepts within a body of scholarly literature (Das et al., 2023). Keywords density plots help researchers to quickly understand the conceptual structure of literature and identify under-explored themes for future work. Fig. 6 provides an overview of research on emerging technologies for digital globalization. High-intensity themes such as artificial intelligence, blockchain, cloud computing, automation, additive manufacturing, IoT, and digital transformation, constitute the central themes of this research field. Density visualization is also used to find research gaps, as distant boundary themes with lower color density represent under-explored areas that may become central themes in the near future. Hence, game theory, smart contracts, generative artificial intelligence (GenAI), augmented reality, and software-as-a-service (SaaS) can be explored more in the future.

Keyword co-occurrence analysis

Analysis of co-occurrences of research keywords helps to visualize the thematic structure of a research field based upon semantic association among research terms. The underlying algorithm groups co-occurring keywords into clusters and places the central related keywords in proximity to each other. Fig. 7 depicts the four clusters formed by the most frequent keywords used in articles exploring emerging technologies for the globalization of business firms. The size of the rectangle around the keywords represents the relative frequency of each keyword. Table 9 examines these clusters and lists several crucial details about the keywords that form these clusters. The first cluster represents research that concerns the application of AI, ML, cloud computing, and deep learning to several aspects of firms' globalization. Next, Cluster 2 represents the extent literature on the role of blockchain and smart

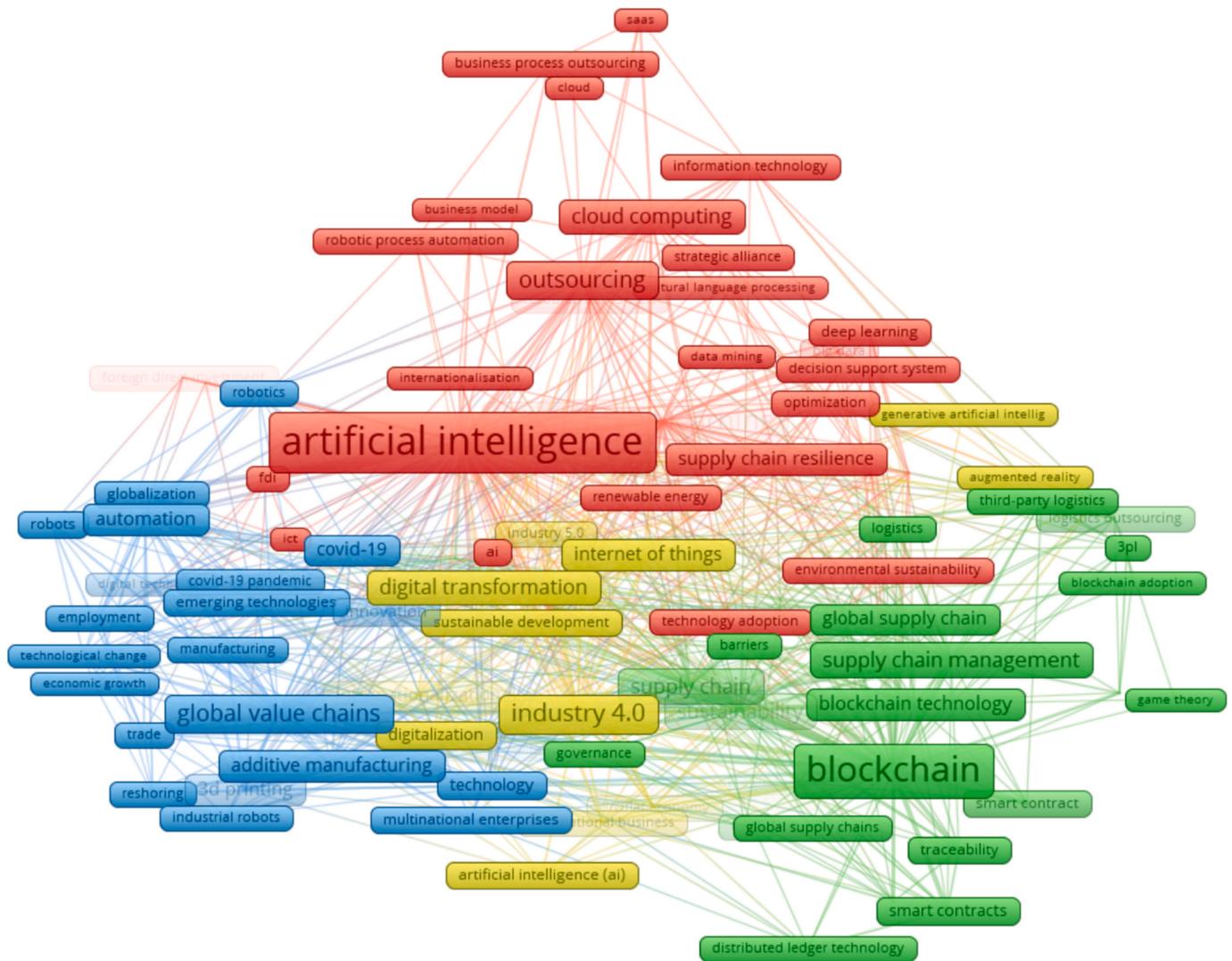


Fig. 7. Network of most frequent research keywords.

research groups who have collaborated to advance the current knowledge in this domain. Table 10 complements the author collaboration network and reveals prolific collaborators in each research group. Future researchers may further examine these research groups to discover potential areas for new collaborations. Finally, Fig. 10 provides insights into how collaboration takes place at global level to advance the knowledge on emerging technologies for global business. The under-representation of countries from Africa, Middle East, and Latin America may attract focus of policymakers to facilitate research on emerging technologies in these geographical segments.

Discussion

Trends from topic modeling

The current study uses STM to uncover the latent themes and visualize their temporal trends. The publication year is modelled as an external variable in the topic modeling process. Moreover, this study also examined the correlation among topic to check if two topics or more are predominantly co-occurred in one or more research articles. Fig. 11 depicts the correlation among the extracted topics. All topics are distinct and represent independent themes. The negative correlations values indicate the heterogeneity of the dataset because emerging technologies are related but fundamentally different due to their interdisciplinary

nature. All the emerging technologies covered in the current study emerge from distinct scientific and engineering domains. For example, artificial intelligence has emerged from computer science and data analytics, while Internet of Things have emerged from traditional electronics, networking, and computing domains. Hence, the topics extracted by the STM belong to different subfields and the entire research can be mapped to separate subject clusters for more research in future.

As STM can reveal temporal patterns related to prevalence of topics, the current study mapped the year-wise topic prevalence to understand patterns of scholarly activity. The prevalence portrays the overall proportion of a topic in the entire corpus. Hence, when a publication year is used as a covariate in the topic modeling process, a rising trend over the years for topic prevalence means that the topic is becoming more popular and research articles published more recently study that topic more often (Dwivedi et al., 2023). Consistent with prior topic modeling research (Nunkoo et al., 2025; Sharma et al., 2021), topic prevalence is interpreted as reflecting shifts in scholarly attention and thematic emphasis within the literature, rather than direct evidence of real-world technology diffusion, adoption, or firm-level impact. Fig. 12 illustrates that Topic 1 (Blockchain for Global Supply Chain), Topic 3 (Machine Learning, Optimization and Decision Support Systems), Topic 4 (Internationalization of Business Firms), and Topic 5 (Sustainability and Sustainable Development in International Business) are showing a rising

Table 9
Key insights from keyword clusters.

| S. No. | Cluster Color | Title | Most Frequent Research Keywords and Frequencies | Average Citation |
|--------|---------------|--|---|------------------|
| 1 | Red | AI, ML, Cloud Computing, and Big Data Analytics | Artificial Intelligence (142), Machine Learning (73), Outsourcing (46), Cloud Computing (34), Supply Chain Resilience (24), Deep Learning (11), Risk Management (11), Decision Support System (9), Big Data (8), FDI (8) | 34.46 |
| 2 | Green | Blockchain and Smart Contracts | Blockchain (118), Supply Chain (40), Supply Chain Management (40), Sustainability (35), Blockchain Technology (27), Global Supply Chain (19), Smart Contracts (15), Traceability (11), Logistics (9), Third-Party Logistics (9) | 63.34 |
| 3 | Blue | 3D Printing, Additive Manufacturing, and Robots | Global Value Chains (42), Additive Manufacturing (29), 3d Printing (25), Automation (25), Robots (21), Innovation (18), Technology (15), Global Value Chain (14), Globalization (13), Multinational Enterprises (11) | 38.77 |
| 4 | Yellow | IoT, Digitalization, and Digital Transformation under Industry 4.0 | Industry 4.0 (49), Digital Transformation (34), Internet of Things (27), Internationalization (20), Digitalization (18), SMEs (15), Sustainable Development (11), International Business (9), Circular Economy (8), Virtual Reality (6) | 29.03 |

trend. Such rising trends confirms that these topics are emerging and attaining prominence in the digital globalization field. Moreover, a sudden rise in the last two to three years highlights a potential long-term research direction indicating the topic becoming a future hotspot of research. Hence, the themes related to blockchain, sustainability, machine learning, and digital technologies for internationalization of business firms reflect growing scholarly attention and may become increasingly prominent over time.

Surprisingly, this study discovers that Topic 2 (AI, Robotics, Automation, and Digital Transformation) and Topic 6 (IoT, 3D Printing, and Digital Twins) have received less scholarly attention during recent years. A deeper exploration of the literature reveals that robotics and automation lead to cost saving for large firms but literature reports that small and medium-sized enterprises (SMEs) do not achieve similar benefits (Zhang, Zhang, & Wu, 2023). Moreover, AI is also reported to result into operational inefficiency (Rana et al., 2022). Hence, the slight decline related to Topic 2 can be attributed to short-term market fluctuations, business firms facing specific implementation challenges, or unrealistic expectations from AI based digital transformations (Lui, Lee, & Ngai, 2022). On the other hand, Topic 6 was prevalent between 2016 and 2018, but decreased in popularity during recent years. This trend may be attributed to a saturation point in the adoption of 3D printing due to limitations related to cost-effectiveness for mass production, material limitations, and quality consistency (Chan et al., 2018; Kamble et al., 2024).

Emerging trends from scientometrics

The authorship and institutional analyses highlight knowledge concentration and intellectual dominance in research on digital globalization. The analysis of the most productive universities reveals a strong concentration of institutions that combine advanced digital technology expertise with established strengths in international business, management, and information systems. The prominence of institutions such as the Hong Kong Polytechnic University, Tsinghua University, Zhejiang University, and Copenhagen Business School reflects their strategic strength in research on digital innovation, global connectivity, and internationalization. Notably, the presence of European and Asian universities alongside universities in emerging economies highlights the role of institutional specialization and international research networks in shaping knowledge production on digital globalization. Furthermore, the most productive countries (China, USA, UK, India, Germany) are also global frontrunners in AI, platform economies, blockchain adoption, and data-driven innovation. Their dominant presence reflects the co-evolution of national digital strategies and firm-level internationalization, making digital globalization a salient research agenda in these contexts. The analysis of country-wise publications reveals a marked underrepresentation of Latin American and African countries in digital globalization research. The readers may note that this pattern does not imply a lack of scholarly potential. However, it reflects structural asymmetries in global knowledge production, including unequal access to advanced digital infrastructure, limited research focus on frontier technologies, and constrained participation in global research networks.

The scientometric analysis encompasses generating co-citation clusters, keywords density plots and co-occurrence networks, and author collaboration maps. Co-citation analysis maps the most frequent articles which are cited together by the research reviewed in the current study. The resulting four cluster reveal relevant latent patterns of scholarly interest. A cursory look at the landmark articles confirms high homogeneity of the clusters as all the clusters share minimal overlap. For example, Cluster 1 retrieved from co-citation analysis represent the research examining the role of

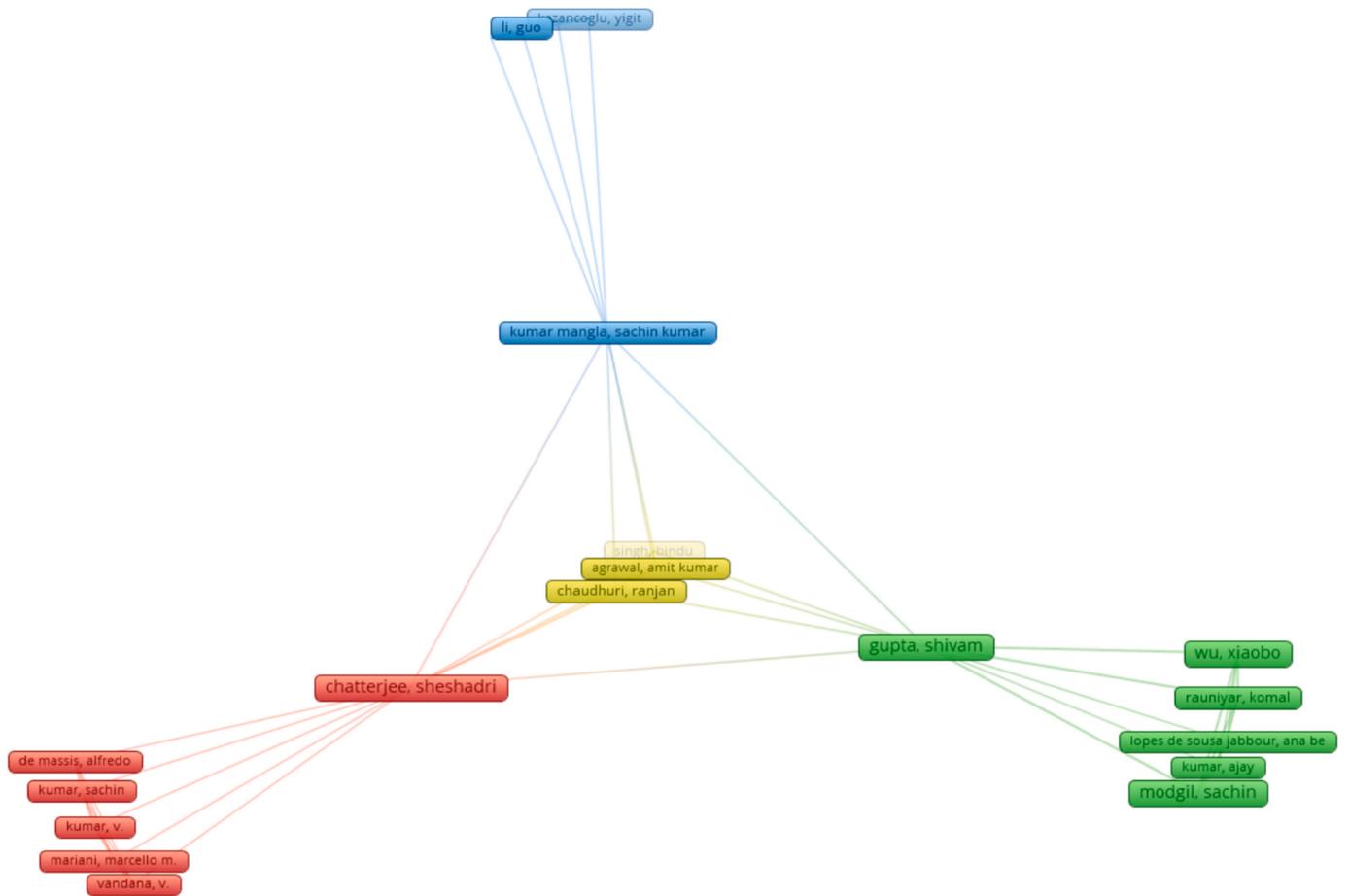


Fig. 9. Co-authorship network (with a minimum of 2 co-authorships threshold).

Table 10

Productive researcher facilitating collaborative networks.

| Cluster | Lead Author | University/Institution | Links | LinkStrength | No. ofArticles | Citations |
|------------|-----------------------|---|-------|--------------|----------------|-----------|
| 1 (Red) | Chatterjee, Sheshadri | Indian Institute of Technology Kharagpur, India | 10 | 11 | 3 | 33 |
| 2 (Green) | Gupta, Shivam | NEOMA Business School, France | 10 | 13 | 3 | 139 |
| 3 (Blue) | Mangla, Sachin Kumar | O.P. Jindal Global University, India | 9 | 9 | 2 | 85 |
| 4 (Yellow) | Chaudhuri, Ranjan | EMLV Business School, France | 5 | 6 | 2 | 31 |



Fig. 10. Global research collaboration network.

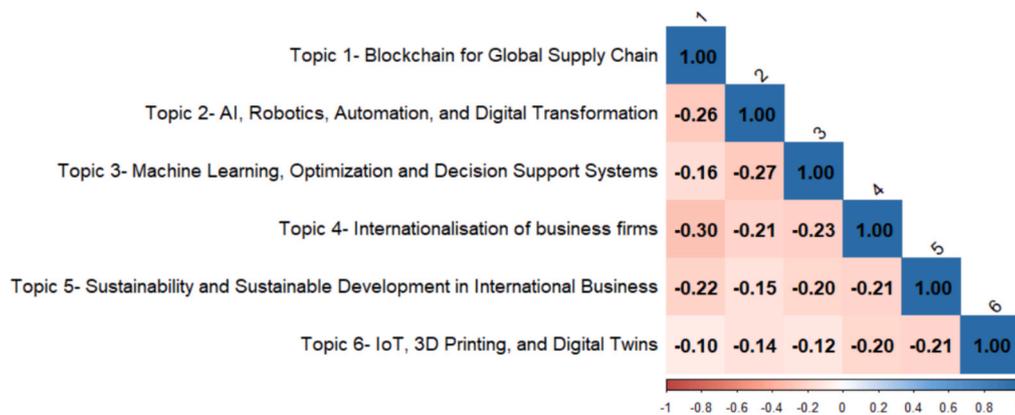


Fig. 11. Inter-topic correlation analysis.

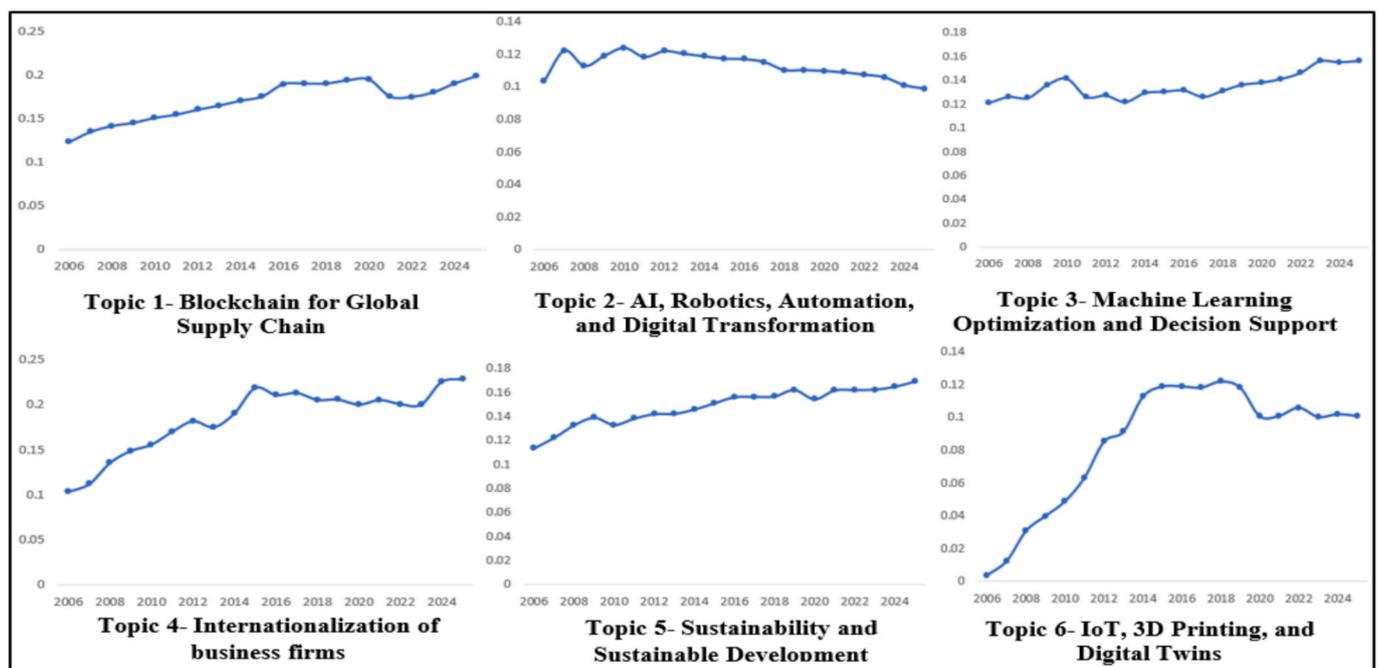


Fig. 12. Trends related to year-wise topic prevalence.

bias of researchers which is a major problem in systematic literature reviews (Singh et al., 2020). Hence, this study has significant implications for future research on the application of emerging digital technologies in globalization of business firms.

The scientometric analyses and topic modeling results presented in the current study can be synthesized into a layered conceptual framework that provides a higher-order structure to the findings. Specifically, the findings from keyword analysis, co-citation analysis, and topic modeling reveals three interlinked layers that conceptualize the role of emerging digital technologies in globalization of firms through capability-building and strategic globalization mechanisms, under specific contextual conditions, leading to firm-level globalization outcomes. The three-layer framework is derived inductively from key findings of scientometric and topic modeling. As evident in Fig. 13, the input layer represents the technological enablers where the emerging technologies act as a scalable infrastructure supporting global expansion, cross-border exchanges, platform-driven asset-light business models, and business intelligence for optimal decision making. This is fairly consistent with the findings of Chen and Dong (2024) who explained the

intricate relationship between AI and export performance using institutional theory and resource-based view. Further, the process layer explains how digital enablers supports various strategic mechanisms that lead to globalization. Previous research also reports that emerging technologies supports globalization processes, such as sourcing raw material from overseas or exporting products abroad, setting up foreign offices, forming partnerships or joint ventures with offshore organizations, building global supply chains, and serving international customers (dos Santos & Williamson, 2024; Osarenkhoe & Fjellström, 2022; Sahoo et al., 2024; Secinaro et al., 2025).

The theoretical foundations behind this layer are drawn from various theories such as organizational information processing (Pan, Zou, Wang, Ma, & Liu, 2025), technology affordance theory (Huang, Sun, & Fan, 2025), internalization theory (Strange, Chen, & Fleury, 2022), to name a few. The contextual moderators explain heterogeneity in outcomes based on several external factors such as global disruptions (Ashraf et al., 2024), economic factors (Audi et al., 2025), and institutional barriers (Autio et al., 2021). Finally, the outcome layer represents the value creation and impact of digital globalization such that supply chain

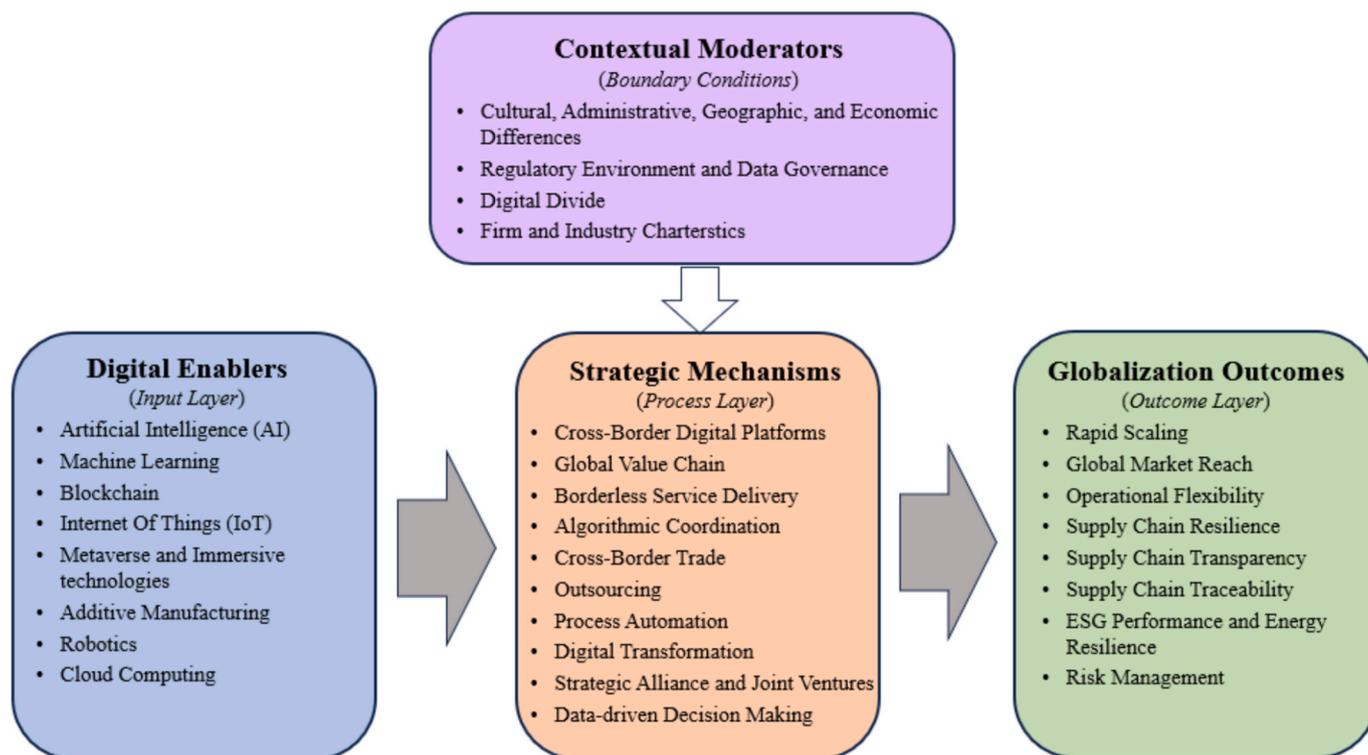


Fig. 13. Emerging technologies-enabled digital globalization framework.

sustainability (Saber *et al.*, 2019), traceability, transparency and security of global supply chain (Bai & Sarkis, 2020), risk management (Aguirre-Rodríguez *et al.*, 2024), data-driven strategic decision making in international businesses (Ali *et al.*, 2024), and optimizing the cost and efficiency of global manufacturing (Attaran, 2017). The framework enables future research to move beyond descriptive mapping by theorizing how emerging technologies are translated into globalization outcomes through digital globalization mechanisms, offering a structured basis for hypothesis development and theory extension in international business and digital globalization research. The digital enablers presented in the framework are explored further and the related literature is explored to develop future research agenda (Table 11) for each enabler.

Limitations and future research

Scientometrics and topic modeling based structured reviews have become a standard practice in business management research. As the current knowledge on emerging technologies is vast, voluminous, complex, and surging rapidly, integrating the scattered knowledge and summarizing it to discover key insights become essential. However, due to the dynamic nature of research on emerging technologies, retrospective literature reviews persistently face issues related to replication and validity of quantitative measures. As the current field is growing rapidly, the number of studies and their citations data change expeditiously. Hence, the emerging themes, citation patterns, collaboration networks, and keyword densities may change in future. This calls for a periodic assessment of the past literature on a timely fashion to understand the dynamics of the research field.

Despite its contributions, this study has a significant limitation due to the use of only two databases. The current study collects research data from two proprietary databases, such as Scopus and Web of Science. While these databases are widely recognized as comprehensive and high-quality sources for business domain research, the exclusion of other

databases may have limited the inclusion of highly technical or domain-specific studies. Moreover, future researchers may include conference papers as well and compare the results while integrating other databases such as Google Scholar and ResearchGate. Finally, as the current study used only English language manuscripts due to the consistency and reliability limitations of text preprocessing and topic modeling approaches, future works may include the literature published in non-English languages to provide a more comprehensive synthesis of knowledge. These limitations provide opportunities for future research to extend and refine the intellectual mapping presented in this study.

Conclusion

In this study, we reviewed a total of 988 studies and reported the influence of emerging digital on digital globalization. Technologies such as blockchain, AI, IoT, additive manufacturing, and cloud computing have become strategically important for both large multinational business firms and SMEs. However, research on these emerging technologies is scattered, fragmented, voluminous, and still evolving. This study has integrated the vast knowledge and provided an overview using a data-driven methodology incorporating scientometrics and topic modeling. The study offers ample implications for scholars, practitioners, and policymakers and hopes that there will be more interdisciplinary explorations on how these technologies continue to transform business processes and operations for global firms and other organizations striving for globalization.

CRedit authorship contribution statement

Anuj Sharma: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Satender Pal Singh:** Writing – original draft, Methodology, Investigation, Funding acquisition, Conceptualization. **Robin Nunkoo:**

Table 11
Future research directions for each emerging technology.

| Emerging technology | Future research agenda for digital globalization |
|---|--|
| Artificial Intelligence (AI) and Machine Learning | AI and ML are facilitating data-driven decision-making for operational excellence and resource optimization, yet much of the literature remains operational rather than strategic (Appiah et al., 2025; Bosma and van Witteloostuijn, 2024). Hence, future work should theorize strategic digital transformation by exploring the role of AI and ML in international strategic decision-making, cross-border expansion, mitigating geopolitical risk, and multinational coordination (Zhang et al., 2024). |
| Blockchain | Although blockchain research in global supply chains has well expanded (Rauniyar et al., 2024), its strategic implications for firm internationalization remain underexplored. Hence, future works may explore how blockchain strategically influence internationalization of business firms where cross-border compliance, ensuring trust and transparency, supply chain visibility, and resilience are crucial, specifically for SMEs. |
| Internet Of Things (IoT) | Future studies should look beyond the operational efficiency perspectives (Rahimi et al., 2024) and explore how IoT enables digital globalization at strategic level. Hence, future researchers may explore the ways in which the IoT impacts global coordination, reconfigures the value chains, and affects internationalization strategies. |
| Metaverse and Immersive technologies | Future research should examine how immersive technologies redefine internationalization business processes by enabling virtual market presence, transforming cross-border collaborations, and reshaping global value creation within digitally mediated ecosystems (Ashraf et al., 2024). |
| Additive Manufacturing | The role of additive manufacturing in reshaping the geography of production, altering global value chain configurations, and enabling sustainable and digitally coordinated globalization strategies, is underexplored and may be established more theoretically (Kamble et al., 2024). |
| Robotics | Very few studies have explored the role of human-robot interaction when business firms adopt robotics in digital globalization. Hence, future works may examine issues such that operational friction, cultural and institutional adaptation, resistance management, and knowledge transfer across borders (Zheng & Wang, 2025). |
| Cloud Computing | Future research should explore how cloud computing is reshaping the way global businesses are structured and operated. In particular, scholars can investigate how cloud-based infrastructures allow firms to scale rapidly, build platform-driven models, leverage data for strategic decisions, and manage international operations without being tightly tied to physical locations. |

Writing – review & editing, Supervision, Data curation, Conceptualization. **Rajesh Mahadeva:** Supervision, Methodology, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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