

DIGITAL TRANSFORMATION AND ACCOUNTING COMPETENCIES IN MSMES: A BIBLIOMETRIC AND VISUALIZATION STUDY

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Abstract

Background: Micro, Small, and Medium (SMEs) are pivotal drivers of regional and national economies, yet they frequently encounter obstacles in financial management and adapting to technological shifts. As digital transformation becomes increasingly essential, the integration of digital accounting systems is crucial for enhancing accounting competencies and optimizing the utilization of financial information for business sustainability. Objective: This study aims to provide a comprehensive bibliometric analysis and visualization of the research landscape concerning digital transformation and accounting competencies within the SME sector to map the current state of the art and future research directions. Methodology: Utilizing bibliometric methods and visualization tools, this research analyzes the intellectual structure, publication trends, and thematic evolution of global literature. The analysis identifies key clusters, influential contributors, and emerging frontiers in the intersection of digital tools and accounting skills. Findings: The visualization highlights a significant transition from traditional accounting literacy toward digital-based competencies, emphasizing how digital accounting systems improve the quality and usage of financial information for decision-making. The mapping reveals that "accounting competence," "accounting information utilization," and "SME performance" are core thematic clusters that bridge the gap between financial knowledge and business development. Originality/Value: This study offers a strategic roadmap for researchers and practitioners to understand the impact of digital transformation on accounting practices in small businesses. It provides a basis for formulating policies and educational modules aimed at strengthening the financial capacity of SMEs in the digital era.

Keywords: Digital Transformation; Accounting Competencies, SMEs, Bibliometric Analysis, Visualization.

INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) represent the primary engine of national and regional economic growth, contributing substantially to employment absorption and local development (OECD, 2020; Abduh et al., 2024; Martinravi & Krishnasamy, 2025). In Indonesia, MSMEs serve as the backbone of the regional economy, yet many businesses continue to face

significant obstacles in financial management and operational quality (Krisnhoe et al., 2026; Raharjo et al., 2024). Effective financial management requires robust accounting competencies, encompassing the knowledge, skills, and attitudes necessary for systematic transaction recording and financial reporting (Krisnhoe et al., 2026; Mulyani et al., 2021). However, a lack of such competencies often leads to the sub-optimal utilization of accounting information, which hinders strategic decision-making and limits access to formal financing (Krisnhoe et al., 2026; Trisnarningsih, 2021; Puspitaningtyas, 2020).

The rapid emergence of digital transformation has fundamentally altered the global business landscape, necessitating that MSMEs adopt digital technologies to maintain a competitive edge

(Ueasangkomsate, 2025; Lu & Shaharudin, 2024; Anatan & Nur, 2023). This technological shift is no longer merely a survival tactic but a crucial driver for innovation and long-term resilience against economic shocks (Cong et al., 2024; Caon et al., 2025; Sagala & Óri, 2025). Consequently, there is an urgent need to transition from traditional accounting practices toward digital-based systems to enhance financial transparency, data accessibility, and reporting quality (Krisnhoe et al., 2026; Januszewski & Gajda, 2024; Borovykov et al., 2025). Integrating digital tools into MSME operations allows for more efficient resource reconfiguration and adaptive capacity in a volatile market (Shahzad et al., 2026; Setiawan et al., 2025).

Despite the growing academic interest in this field, research that holistically maps the intersection between digital transformation and accounting competencies within the MSME sector remains fragmented (Chotisarn & Phuthong, 2025; Laila et al., 2024). Most existing studies treat accounting literacy and digital adoption as separate factors rather than as an integrated mechanism for business development (Krisnhoe et al., 2026; Herrera et al., 2023). A comprehensive understanding of how digital maturity influences financial performance and sustainable growth is essential for formulating effective policy interventions (Sukrat & Leeraphong, 2024; Tandilino et al., 2025). Therefore, this study employs a bibliometric and visualization approach using tools such as VOSviewer to explore the intellectual structure, thematic evolution, and future research agendas of digital transformation and accounting competencies in MSMEs (Chotisarn & Phuthong, 2025; Shama et al., 2023). This analysis aims to provide a strategic roadmap for researchers and practitioners to bridge the gap between financial knowledge and the digital economy.

LITERATURE REVIEW

Accounting Competence and MSME Development

Micro, Small, and Medium Enterprises (MSMEs) are recognized as the primary engine of regional economic development, yet they consistently face challenges related to financial management. Effective financial management requires accounting competence, which encompasses the knowledge, skills, and attitudes necessary for transaction recording and the preparation of financial statements. Studies indicate that high levels of accounting literacy and competence directly influence a firm's performance and its ability to achieve sustainable growth. Furthermore, accounting competence is a critical determinant in the quality of financial information produced, which serves as a vital tool for strategic planning and evaluating business performance. However, many MSME actors still lack adequate competencies, leading to sub-optimal utilization of financial information and restricted access to formal financing.

The Shift Toward Digital Transformation in MSMEs

In the current global economic landscape, digital transformation has emerged as a central pillar for MSME resilience and competitiveness. Digital transformation in small businesses involves the adoption of digital technologies to reconfigure business processes, improve communication, and expand market reach. Research by Raharjo et al. (2024) demonstrates that digital literacy significantly and positively impacts digital business transformation, allowing firms to adapt to changing consumer behaviors. Visual mapping via VOSviewer confirms that digital transformation is intricately linked to other key research clusters, such as innovation, sustainability, and human capital. For MSMEs to survive economic shocks, such as the COVID-19 pandemic, integrating digital tools is no longer optional but a strategic necessity for long-term survival.

Digital Accounting Systems and Financial Performance

The evolution of accounting practices now focuses on the integration of digital accounting systems, which are expected to enhance the efficiency and quality of financial reporting. Januszewski and Gajda (2024) highlight that digital accounting competencies are crucial drivers of SME performance in the modern era. Furthermore, the adoption of cloud-based accounting offers

MSMEs strategic advantages by enabling more efficient financial data processing and real-time decision-making. The role of external advisors, such as accountants, also remains significant, as their guidance can enhance the digital self-efficacy of business owners in utilizing these advanced tools to improve financial outcomes. As MSMEs move toward Year 4 of the research roadmap, the integration of digital systems will be pivotal in bridging the gap between basic financial literacy and advanced organizational performance.

Mediating Factors: Information Utilization and Strategic Agility

The relationship between accounting competencies and business development is often mediated by the utilization of accounting information. This utilization acts as a bridge, where the ability to understand and apply financial data leads to better resource allocation and performance. In the digital context, strategic agility and digital financial inclusion serve as additional mediators that enable MSMEs to respond rapidly to environmental changes. Tandilino et al. (2025) argue that digital financial inclusion facilitates broader access to financing and increases operational efficiency for culinary MSMEs. Moreover, innovation capability has been found to mediate the influence of digital transformation on economic competitiveness, emphasizing that technology adoption must be paired with the ability to innovate.

Barriers to Digital Adoption in Small Businesses

Despite the clear benefits, MSMEs face various obstacles in their digital transformation journey, including financial constraints, lack of technical expertise, and cultural resistance. Many small traders in developing economies find it challenging to switch from entrenched cash-based habits to cashless payment systems due to high perceived switching costs and organizational inertia. Furthermore, complexity and security concerns remain major barriers that hinder the widespread adoption of digital technologies in rural or informal sectors. Addressing these barriers requires targeted government support, infrastructure investment, and specialized training programs to enhance the digital proficiency of MSME owners. Success in digital transformation ultimately depends on the alignment of technological adoption with the development of human capital and a supportive institutional environment.

RESEARCH METHODS

Research Design

This study adopts a descriptive-quantitative approach using bibliometric analysis and science mapping to investigate the intellectual structure and thematic evolution of digital transformation and accounting competencies in MSMEs. Bibliometric analysis is chosen for its robustness in reducing bias and providing a macro-perspective on a specific research field over a long-term period. The design focuses on evaluating publication trends, collaborative networks, and emerging research frontiers through the visualization of metadata.

Data Collection

The metadata for this study was retrieved from the Scopus database, which offers extensive coverage of high-quality, peer-reviewed literature in the domains of business, management, and accounting. The search strategy employed specific keywords and Boolean operators to ensure relevance. Bibliometric analysis in this study consists of two main approaches: (1) Descriptive statistical analysis identifies publication trends, the most frequently cited authors, and dominant research topics; (2) Network analysis explores research collaborations, co-citation structures, and thematic clusters in digital transformation research.

Data Analysis

This study adopts a bibliometric and science mapping approach to systematically explore the intellectual structure and development of research on digital transformation and accounting competencies in MSMEs. Data were collected from the Scopus database using carefully selected keywords related to digital transformation, MSMEs, and accounting competencies .

The analysis was conducted using VOSviewer and Biblioshiny (R-Bibliometrix) to ensure both quantitative rigor and visual interpretability. The analytical process consisted of three integrated stages.

First, a publication trend analysis was performed to examine the evolution of research output over time. This step provides a temporal overview and identifies research gaps as well as periods of rapid growth, forming the basis for understanding the increasing academic attention to digital transformation in MSMEs.

Second, a keyword co-occurrence analysis was conducted to identify the conceptual structure of the research field. By mapping the relationships among frequently occurring keywords, this analysis reveals dominant themes and their interconnections, which are visualized in the network map.

Third, a co-authorship network analysis was applied to examine collaboration patterns among researchers. This step highlights the structure of scholarly networks, identifies key contributors, and uncovers the level of connectivity or fragmentation within the field.

These three analytical components are designed to complement each other, enabling a comprehensive interpretation of the research landscape that is directly reflected in the results and discussion.

RESULTS AND DISCUSSION

Publication Trend Analysis

In line with the first stage of the data analysis, a publication trend analysis was conducted to examine the development of research over time. As illustrated in Figure 1, the distribution of publications demonstrates a clear temporal evolution in the study of digital transformation and accounting competencies in MSMEs.

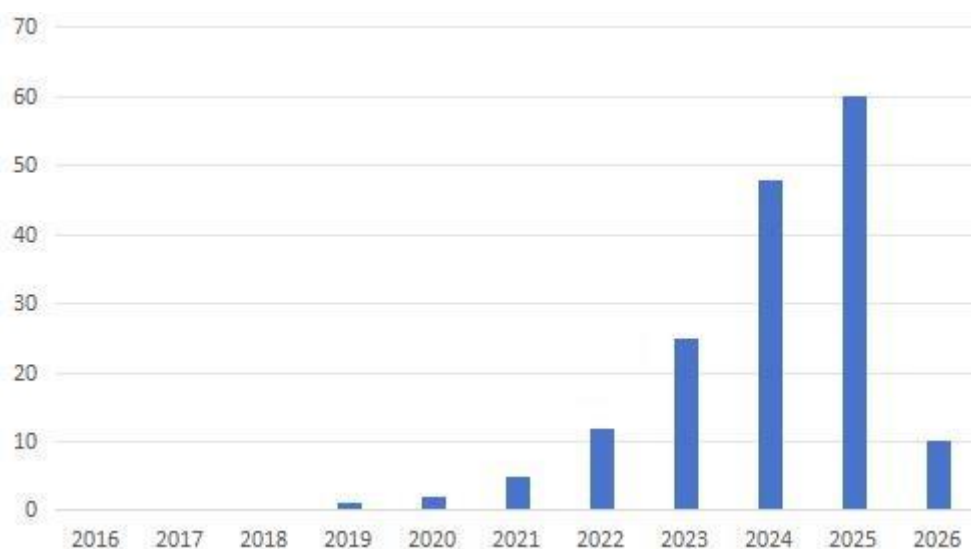


Figure 1. digital Transformation Evolution research Gap

Figure 1 present The bar chart a significant research gap between **2016 and 2018**, where no publications were recorded, followed by a slow emergence of studies from **2019 to 2021** as MSMEs began adapting to digital shifts. Starting in **2022**, there is an **exponential surge** in academic interest, peaking at **60 publications in 2025**, which reflects a growing global focus on digital maturity and business resilience. Although the **2026** figure appears lower as it represents only early access articles, this overall trajectory confirms that the current study is highly timely, effectively bridging historical literature gaps while aligning with the most recent and rapidly accelerating technological trends in the field.

Keyword Co-occurrence Analysis (Conceptual Structure)

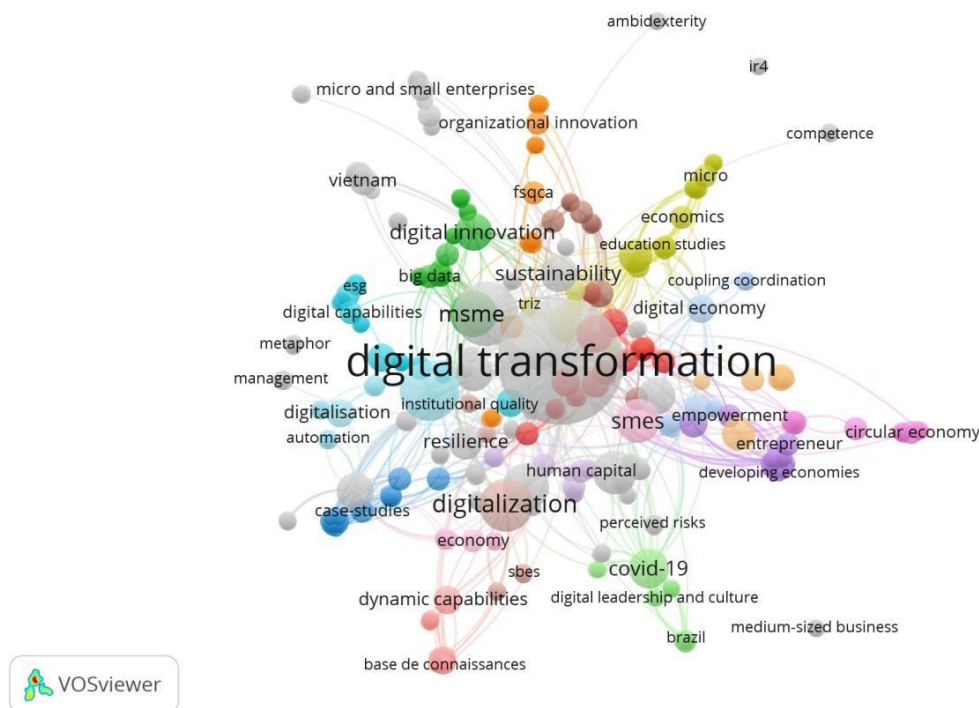


Figure 2. Mapping and Network Visualization

The second stage of analysis employed keyword co-occurrence mapping using VOSviewer to identify the conceptual structure and thematic relationships within the research field. As depicted in the network visualization, “digital transformation” emerges as the most prominent and central node, indicating its dominant role and high frequency of occurrence in the literature.

This central node is strongly connected to several key concepts, including MSMEs, digitalization, innovation, resilience, and human capital. The strength of these linkages suggests that digital transformation acts as an integrative construct that connects multiple dimensions of MSME development. This finding is consistent with previous studies that highlight digital transformation as a strategic driver of organizational adaptation, innovation, and long-term sustainability in small businesses .

Furthermore, the clustering structure generated by VOSviewer reveals several thematic groupings. The first cluster focuses on digital transformation and MSMEs, representing the core research domain. The second cluster emphasizes innovation and sustainability, indicating that digital technologies are closely associated with business innovation and environmentally sustainable practices. The third cluster highlights human capital and competencies, reflecting the importance of knowledge, skills, and capabilities in supporting digital adoption. Another cluster

relates to resilience and crisis response, particularly in the context of external disruptions such as the COVID-19 pandemic.

These clusters demonstrate that digital transformation is not merely a technological phenomenon but a multidimensional process involving organizational capability, strategic agility, and knowledge integration. In particular, the presence of human capital and competence as closely linked keywords reinforces the argument that the effectiveness of digital transformation depends on the ability of MSME actors to understand and utilize digital tools, including accounting systems, for decision-making purposes .

In addition, the network visualization indicates the emergence of new and evolving themes, such as digital capabilities, sustainability, and circular economy, which are positioned at the periphery of the network. These themes represent emerging research frontiers that are gaining attention as the field continues to evolve. Their growing prominence suggests a shift from basic digital adoption toward more strategic and value-driven applications of technology in MSMEs.

Overall, the keyword co-occurrence analysis confirms that the research landscape is becoming increasingly integrated, with digital transformation serving as the central axis that links competencies, innovation, and business performance. This finding provides a strong foundation for the subsequent discussion on how accounting competencies and information utilization contribute to MSME performance in the digital era .

Co-authorship Analysis (Collaboration Structure)

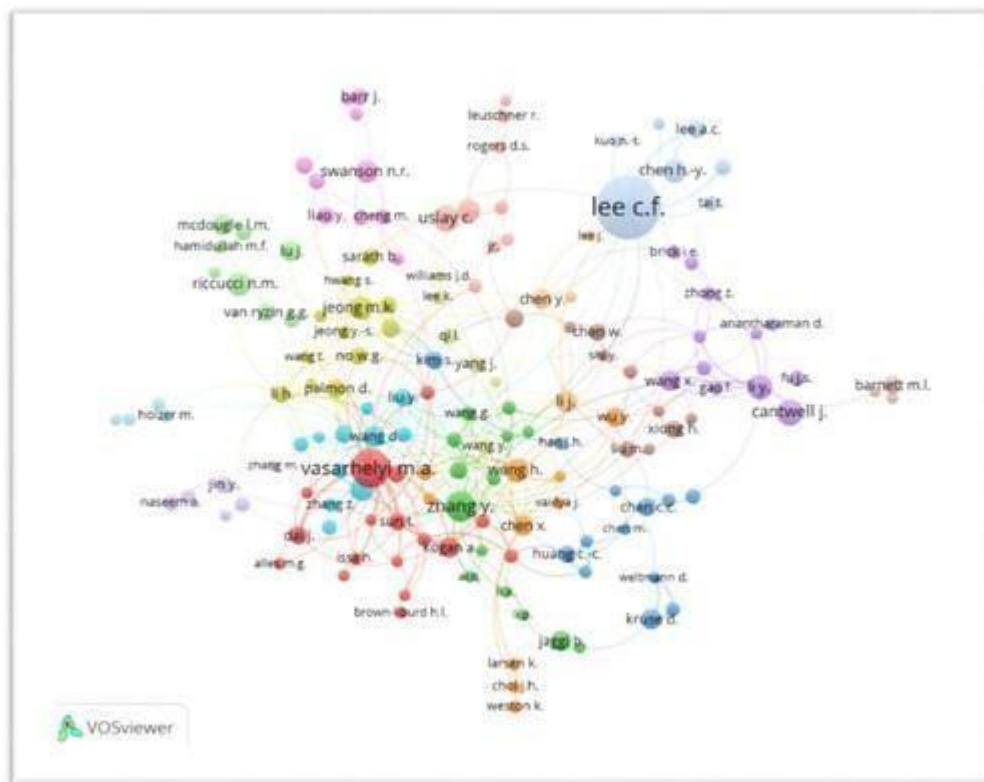


Figure 3. Co-authorship network Visualization

The third stage of analysis focuses on the co-authorship network, which aims to examine collaboration patterns among researchers and identify the structure of scholarly networks within the field. The visualization generated by VOSviewer reveals that the co-authorship network is organized into several distinct clusters, each representing a group of authors who frequently collaborate with one another.

A dominant cluster is observed with relatively dense connections, indicating a high level of collaboration intensity among its members. This suggests the presence of an established research group that actively contributes to the development of literature on digital transformation and MSMEs. In contrast, several smaller clusters appear more loosely connected, reflecting limited collaboration and the existence of isolated research groups.

Importantly, the network also highlights the presence of certain authors who function as bridging nodes, connecting different clusters. These authors play a crucial role in facilitating knowledge exchange and enhancing the integration of research across groups. Their position within the network indicates a higher level of influence, as they contribute to reducing fragmentation and promoting the dissemination of ideas across the research community.

Despite these connections, the overall structure of the co-authorship network still demonstrates partial fragmentation, suggesting that collaboration in this field has not yet reached an optimal level. This finding is consistent with the earlier observation that the research area is still evolving, where knowledge production tends to occur within relatively confined groups rather than through broad, interdisciplinary collaboration.

From a broader perspective, the observed collaboration pattern has important implications for the development of the research field. Limited interaction between clusters may contribute to the persistence of fragmented themes, as identified in previous studies. Conversely, strengthening collaboration networks—particularly across institutions and countries—can accelerate knowledge integration and enhance the quality and impact of future research.

Furthermore, the co-authorship structure complements the findings from the keyword analysis by showing that while the conceptual framework of the field is becoming increasingly integrated, the social structure of research (i.e., collaboration among scholars) still requires further development. This indicates that the advancement of research on digital transformation and accounting competencies in MSMEs depends not only on conceptual progress but also on the expansion of collaborative networks.

Overall, the co-authorship analysis underscores the need for greater academic collaboration, interdisciplinary engagement, and international partnerships to support the maturation of this research domain and to ensure a more cohesive and comprehensive understanding of digital transformation in MSMEs.

CONCLUSION

This study provides a comprehensive bibliometric analysis of digital transformation and accounting competencies in MSMEs by integrating publication trends, keyword co-occurrence, co-authorship networks, and citation analysis. The findings reveal a structured and evolving research landscape that reflects both the growth and maturity of the field.

First, the publication trend analysis confirms that research on digital transformation in MSMEs has experienced significant and exponential growth, particularly after 2022. This indicates that the topic has shifted from a relatively underexplored area to a central focus in contemporary academic discourse.

Second, the keyword co-occurrence analysis demonstrates that digital transformation serves as the core conceptual hub, linking key themes such as innovation, sustainability, human capital, and resilience. This confirms that digital transformation is not merely a technological phenomenon but a multidimensional process involving organizational capabilities and strategic adaptation.

Third, the co-authorship analysis reveals that although research productivity is increasing, the collaboration network remains partially fragmented, with limited integration across research groups. The presence of bridging authors suggests emerging connectivity; however, broader collaboration is still needed to strengthen knowledge integration and advance the field.

Fourth, the citation analysis highlights a declining trend in average citations per year in recent periods, which is primarily attributed to the recency effect rather than a decline in research quality. Earlier publications continue to function as foundational works, while newer studies are still in the process of accumulating citations. This indicates that the field is expanding rapidly but is still in a developing stage of intellectual consolidation.

Overall, the integration of these findings suggests that the research domain is transitioning from a fragmented and exploratory phase toward a more integrated, strategic, and capability-driven field. In this context, accounting competencies play a critical role in supporting the effective utilization of financial information, thereby enhancing MSME performance within a digital environment.

From a practical perspective, this study highlights the need for MSMEs to simultaneously strengthen digital capabilities and accounting competencies to fully benefit from digital transformation. Policymakers are encouraged to support inclusive digital ecosystems through training, infrastructure development, and financial inclusion programs.

For future research, greater emphasis should be placed on interdisciplinary collaboration, longitudinal analysis, and the integration of technological and managerial perspectives to further develop the intellectual structure of the field.

In conclusion, this study contributes by bridging fragmented literature and providing a comprehensive roadmap for understanding the evolving relationship between digital transformation and accounting competencies in MSMEs.

Implications And Future Research

This study contributes to the literature by providing a comprehensive bibliometric mapping of digital transformation and accounting competencies in MSMEs. The findings extend existing knowledge by demonstrating that digital transformation functions as a central integrative construct that connects multiple research streams, including innovation, sustainability, human capital, and business performance.

Furthermore, the results highlight the importance of capability-based perspectives, where accounting competencies and digital capabilities act as key enablers in transforming financial information into strategic decision-making tools. This supports the view that MSME development in the digital era is not solely driven by technology adoption but also by the ability to integrate knowledge, skills, and organizational resources.

In addition, the identification of fragmented collaboration networks suggests that the intellectual structure of the field is still evolving. This provides an opportunity to further develop integrative and interdisciplinary theoretical frameworks that bridge gaps between accounting, information systems, and strategic management research.

From a practical perspective, the findings offer important insights for MSME practitioners, policymakers, and supporting institutions.

First, MSMEs need to strengthen both digital competencies and accounting capabilities to maximize the benefits of digital transformation. The integration of digital accounting systems can improve the accuracy, accessibility, and utilization of financial information, thereby enhancing decision-making and business performance.

Second, policymakers should focus on developing inclusive digital ecosystems by providing infrastructure, training programs, and financial support mechanisms. Special attention should be given to improving digital literacy and reducing barriers to technology adoption, particularly among small and informal businesses.

Third, collaboration between academia, industry, and government should be encouraged to create a knowledge-sharing environment, which can accelerate innovation and improve the practical application of research findings.

Despite its contributions, this study opens several avenues for future research. First, future studies should adopt empirical and longitudinal approaches to examine the causal relationship

between digital transformation, accounting competencies, and MSME performance. This would provide deeper insights into how these variables interact over time.

Second, further research is needed to explore the role of mediating and moderating variables, such as digital capabilities, financial inclusion, and strategic agility, in strengthening the relationship between competencies and business outcomes.

Third, given the fragmented collaboration structure identified in this study, future research should emphasize cross-country and interdisciplinary collaboration to enhance the generalizability and robustness of findings.

Fourth, emerging themes such as circular economy, sustainability, and digital resilience should be explored in greater depth, as they represent important future directions in the research field.

Finally, future studies may integrate advanced bibliometric techniques or mixed-method approaches, combining quantitative mapping with qualitative analysis to provide a more comprehensive understanding of the evolving research landscape.

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