

Thottoli, Mohammed Muneerali et al.

Article

Exploring mediating and moderating factors of FinTech adoption for innovations in SMEs

Cogent Economics & Finance

Provided in Cooperation with:

Taylor & Francis Group

Suggested Citation: Thottoli, Mohammed Muneerali et al. (2024) : Exploring mediating and moderating factors of FinTech adoption for innovations in SMEs, Cogent Economics & Finance, ISSN 2332-2039, Taylor & Francis, Abingdon, Vol. 12, Iss. 1, pp. 1-19,
<https://doi.org/10.1080/23322039.2024.2387443>

This Version is available at:

<https://hdl.handle.net/10419/321566>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/4.0/>

Exploring mediating and moderating factors of FinTech adoption for innovations in SMEs

Mohammed Muneerali Thottoli, Md. Aminul Islam, Arif Ahsan, Mohd Faizal Yusof, Md. Sharif Hassan & Rubaiyat Shaimom Chowdhury

To cite this article: Mohammed Muneerali Thottoli, Md. Aminul Islam, Arif Ahsan, Mohd Faizal Yusof, Md. Sharif Hassan & Rubaiyat Shaimom Chowdhury (2024) Exploring mediating and moderating factors of FinTech adoption for innovations in SMEs, Cogent Economics & Finance, 12:1, 2387443, DOI: [10.1080/23322039.2024.2387443](https://doi.org/10.1080/23322039.2024.2387443)

To link to this article: <https://doi.org/10.1080/23322039.2024.2387443>



© 2024 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



Published online: 07 Aug 2024.



[Submit your article to this journal](#)



Article views: 3003



[View related articles](#)



[View Crossmark data](#)



Citing articles: 4 [View citing articles](#)

Exploring mediating and moderating factors of FinTech adoption for innovations in SMEs

Mohammed Muneerali Thottoli^a , Md. Aminul Islam^{b,c} , Arif Ahsan^b ,
Mohd Faizal Yusof^d , Md. Sharif Hassan^e  and Rubaiyat Shaimom Chowdhury^{b,f} 

^aDepartment of Accounting, University of Nizwa, Nizwa, Oman; ^bFaculty of Business and Communication, Universiti Malaysia Perlis, Perlis, Arau, Malaysia; ^cCollege of Business Administration, Prince Mohammad Bin Fahd University, Dhahran, Saudi Arabia; ^dFaculty of Resilience, Rabdan Academy, Abu Dhabi, UAE; ^eFaculty of Business and Law, Taylor's University, Selangor, Subang Jaya, Malaysia; ^fDepartment of Business Administration, Bangladesh University, Dhaka, Bangladesh

ABSTRACT

This article explored the mediating and moderating factors of financial technology (FinTech) adoption for small and medium enterprises (SMEs) innovations. A systematic literature review (SLR) was performed as a study method. The current research involved an in-depth evaluation of 96 articles published in English between 2000 and 2023. The methods were developed from meta-analysis and SLR's indicated reporting items. The articles were collected by carrying out keyword searches on the Scopus-indexed database. The study identified the research gaps in understanding mediating and moderating factors of FinTech adoption for innovation in SMEs. Previous studies, through SLR, have identified a limited mediator or moderator role between FinTech adoption and innovation in SMEs. Due to the limited exploration of mediator or moderator variables, this research offers novel directions for future research about the various FinTech's mediation and/or moderating role for innovation in SMEs. The outlined moderators and mediators in this study are found by combining both intuitive insights and analytical methods. In addition, the study findings will aid SME business owners, professionals, and practitioners to understand how mediating and moderating factors lead to FinTech adoption for innovation in their businesses.

IMPACT STATEMENT

Overall, this research has the potential to drive significant positive change in the SME sector by enhancing their ability to innovate and thrive in a digital-first economy, thereby contributing to broader economic growth and development.

ARTICLE HISTORY

Received 28 November 2023
Revised 20 June 2024
Accepted 11 July 2024

KEYWORDS



Mediation; moderation;
FinTech; innovations; SMEs

SUBJECTS

Finance; Information
Technology; Business,
Management and
Accounting

1. Introduction

Financial technology (FinTech) is the umbrella term for several financial technologies intended to automate functions within the finance sector, ranging from manual, repetitive tasks to cognitive, non-routine decision-making (Das, 2019). FinTech innovation in small and medium-sized enterprises (SMEs) refers to the innovative financial access available to SMEs through alternative financing sources, such as online lending platforms, crowdsourcing, peer-to-peer lending and other platform-driven supply chain finance. SMEs are typically family-owned and face significant financial constraints (Tian et al., 2023) and risk factors (Nugraha et al., 2022). However, FinTech has improved SMEs' performance and significantly contributed to the digital economy (Karim et al., 2022). FinTech adoption by SMEs and financial literacy are not directly related, but adopting FinTech is required for innovation among SMEs (Nugraha et al., 2022). Recent developments in FinTech technology appear to address several issues where FinTech-led business models like crowdfunding, peer-to-peer lending, invoice trading, mobile wallets and payments and platform-driven supply chain

CONTACT Md. Aminul Islam  amin@unimap.edu.my  Faculty of Business and Communication, Universiti Malaysia Perlis, Perlis, Arau, Malaysia

© 2024 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.

finance are changing the environment for SMEs. Despite efforts, there appears to be a lack of knowledge regarding how SMEs have reacted to the opportunities provided by FinTech (Sharma et al., 2023).

When the article title, abstract and keywords were examined, the authors found in the Scopus list that research about FinTech among SMEs started in 2016. However, a limited mediator or moderator role between FinTech adoption and innovation in SMEs has been observed. Systematic literature reviews (SLRs) on FinTech's mediating and moderating roles in fostering innovation among SMEs are significant as they provide a comprehensive and unbiased synthesis of existing research (Petticrew & Roberts, 2008). These reviews identify patterns, gaps, and inconsistencies, offering insights into how FinTech facilitates innovation by improving SMEs' financial access, operational efficiency and market reach. Additionally, it highlights the conditions under which FinTech's impact is most pronounced, guiding policymakers and practitioners in leveraging FinTech effectively. This systematic approach ensures that conclusions are evidence-based and actionable, fostering a deeper understanding of FinTech's potential to drive SME innovation.

The banking channels can provide the necessary funding to help the transition to environmentally friendly business processes in the case of SMEs, who face financial constraints yet may be crucial in reaching net zero emissions (Mirza et al., 2023). In the financial services sector, with the promise of providing individuals and companies with easily accessible, reasonably priced, and secure financial products and services, FinTech is altering the world's economic environment (Coffie et al., 2021). However, providing FinTech services to SMEs in specific sectors is risky and fraught with issues. Technology's emergence contrasts with the conventional bank-firm connection, which is built on social contacts and soft data from SMEs (Fasano & Cappa, 2022). FinTech frequently involves the creation of web-based financial platforms, which have significant advantages: enabling capital raises (Allen et al., 2021), remote banking operations to remove geographical, physical and social barriers and allowing banks to collect standardized information about their customers continuously. However, those advantages can potentially conceal possible risks that might endanger the equilibrium of financial markets (Fasano & Cappa, 2022). In addition, regulatory oversight dampens the FinTech adoption (Cumming & Schwienbacher, 2021). Academic institutions internationally are starting to assess FinTech readiness, with some trying to develop curricula that aim to bridge the skills gap (Earls, 2019).

There is plenty of literature looking into the factors that influence FinTech innovation where data were collected from the Stock Market (Li et al., 2023), a case study done by Lu (2018). Similarly, Nugraha et al. (2022) investigated the drivers of FinTech adoption and innovation for SMEs using the Technology Adoption Model (TAM). Pandey et al. (2023) used a sample of 366 Scopus-indexed articles to highlight the publication patterns in FinTech literature in banking and finance. According to the authors' limited knowledge, studies on the direct relation between FinTech and innovation in SMEs are prevalent. However, research on the mediating and moderating factors of FinTech Adoption for Innovations in SMEs does not exist using structured literature review (SLR) with bibliographic analysis.

This study adds considerably to the body of contemporary literature. First, examine the mediating and moderating factors of FinTech adoption for innovations in SMEs. Further, this study develops a model showing FinTech's mediation or moderation role for innovation in SMEs as a potential future research direction. By examining the mediating and moderating effects of FinTech, the research findings of the study add to the body of the existing literature. Additionally, this study guides policymakers, FinTech providers, regulatory bodies, and SME managers on how to encourage innovation in the financial sectors of SMEs. The study variables (such as Fintech and SMEs) have been considered using search criteria made in the Scopus Database, in which the authors were only focused on relevant articles where those variable terms were used in the article titles of previous authors.

This research tries to answer the following questions by examining the above research challenges.

Research questions:

RQ1. What are the key mediating factors in the relationship between FinTech adoption and innovation in SMEs?

RQ2. What are the key moderating factors in the relationship between FinTech adoption and innovation in SMEs?

The remaining sections of this research are organized as literature review, methodology, results and discussion, conclusion and future research directions, implications and limitations.

2. Review of literature

2.1. FinTech adoption for SME innovation

FinTech represents integrating technology with financial services to enhance business operations, customer experiences and economic performance. For SMEs, adopting FinTech solutions offers significant opportunities for growth, efficiency and innovation. FinTech and SMEs are increasingly attracting global scholarly attention due to their rising importance (Verma et al., 2023). The adoption of FinTech provides substantial benefits to SMEs (Najib et al., 2021). Fintech enables SMEs to use FinTech tools to streamline financial processes such as payments, accounting and financial management, reducing the time and cost associated with traditional methods. In addition, FinTech platforms offer alternative financing options, such as peer-to-peer lending and crowdfunding, which can be crucial for SMEs that struggle to obtain loans from traditional banks. Moreover, FinTech adoption drives innovation by enabling SMEs to leverage advanced technologies like block chain, artificial intelligence and big data analytics. However, there are certain challenges. Many SMEs are unaware of the available FinTech solutions and their potential benefits. In addition, it has been observed that several SMEs are not willing to adopt FinTech (Coffie et al., 2021). Several studies have been conducted on FinTech adoption and SME innovation (Li et al., 2023; Najib et al., 2021). For this study, FinTech adoption is considered the independent variable for SME innovation, which is the dependent variable.

2.2. Mediating and moderating factors of FinTech adoption for innovations in SMEs

In the context of SME innovation, it is imperative to consider how FinTech factors may exhibit both mediating and moderating effects in the adoption process. For instance, Najib et al. (2021) examined what influences SMEs' adoption of FinTech and how such adoption affects the viability of the business. Tian et al. (2023) aimed to know the roles of FinTech innovation and green transformational leadership in improving corporate environmental performance using the ecological modernization theory. Perceived usability, perceived security and ease of use all significantly affect SMEs' intentions to use peer-to-peer financing platforms, and the impact of COVID-19 did not considerably moderate that intent (Chin et al., 2021).

According to Abbasi et al. (2021), the relationship between FinTech and SME efficiency is positively moderated by masculine societies. Subsequently, the connection between perceived behavioral control and intention to use is essential only mediated by attitude and purpose. Thus, it was shown that users' perceptions of the FinTech service's complexity level remained unchanged when FinTech was used (Irimia-Diéguez et al., 2023). FinTech could bridle financial inclusion, allowing SMEs with lesser financial literacy to access economic goods and services through FinTech adoption (Nugraha et al., 2022). It has been partially established that the environmental context moderates the relationship between the technological setting and SMEs' inclination to adopt FinTech (Moreira-Santos et al., 2022).

According to Nugraha et al. (2022), user innovativeness mediates between financial literacy and FinTech adoption. According to Tian et al. (2023), green innovation acts as a mediator in the relationships between the adoption of FinTech and environmental performance, as well as between green transformational leadership and environmental performance. The intention to employ P2P finance is stronger among SMEs with lower leverage and total assets (Chin et al., 2021). The critical findings about the mediating role of SMEs' attitudes toward their plan to employ P2P finance came next. Based on the study's findings, policymakers should be able to devise strategies that better capture SMEs' interest in peer-to-peer lending (Chin et al., 2021). However, Abbasi et al. (2021) observed that long-term-oriented cultures negatively moderate FinTech and SME efficiency.

This research used bibliometric analysis and an SLR technique to identify global advancements. It then investigated the mediating and moderating factors influencing FinTech adoption for innovations in SMEs. It developed a model that included FinTech's mediation or moderating role for innovation in SMEs. No studies have used bibliometric analysis and SLR techniques to investigate the mediating and moderating elements of FinTech adoption for innovations in SMEs. Pandey et al. (2023) conducted research through SLR utilizing bibliometric and content analysis methods to show the publication trends in FinTech literature in banking and finance. In contrast, Sanga and Aziakpono (2023) employed an SLR

with bibliometric analysis on FinTech and SME financing. Literature reviews using SLR and bibliometric methodologies are more appropriate for contemporary fields of accounting and business management (Al Mazroui et al., 2023; Thottoli, 2022). Verma et al. (2023), Thottoli (2022) and Zupic and Cater (2015) conducted investigations using contextualized SLRs coupled with bibliometric analysis. They felt that including bibliometric research, meta-analyses and qualitative SLR would be much more effective. According to Verma et al. (2023), SLRs offer a practical approach to analyzing the FinTech effect in SMEs. This method is particularly beneficial when working with many disparate articles published over an extended period. Bibliometric analysis is a valuable and well-liked technique for examining and evaluating vast scientific data. According to Donthu et al. (2021), it provides insight into the developing fields within a given topic and helps to analyze the subtle evolutionary aspects of that field. In recent years, SLRs have employed advanced bibliometric analytic techniques (Aria & Cuccurullo, 2017; Gagolewski, 2011).

3. Methodology

3.1. Database and selection of journals

Selecting the appropriate database and then carefully choosing articles with relevant keywords are the first steps in an organized strategy for the research topic (Al Mazroui et al., 2023). This strategy attempts to explore mediating and moderating factors of FinTech adoption for innovations in SMEs. This study utilized the Scopus database to find relevant articles for SLR. To quickly identify and access large amounts of literature, Scopus is an all-science abstracting and indexing database with enhanced sorting and refining features (Boyle & Sherman, 2006). The authors chose the Scopus database because it is the largest bibliographic resource for peer-reviewed articles, conference proceedings and book chapters in the fields of science, technology, medicine and social sciences (including the arts and humanities) (Bar-Ilan, 2008).

3.2. Data collection

A bibliometric analysis is carried out to add visual maps and tables that could potentially be employed to investigate mediating and moderating elements of FinTech adoption for innovations in SMEs after completing a SLR that may be extended to a significant and pertinent number of valid publications. This research used the bibliometrix R package, an exceptional open-source option for scientific computing, according to Aria and Cuccurullo (2017).

Boolean operators, such as 'AND' and 'OR' have been operated to produce query strings for the data search, in which 100 articles from the Scopus databases retrieved since 2003 were obtained. The authors' keywords of the investigation are TS = (FinTech) AND (adoption) AND (SME); and (financial) AND (technology) AND (adoption) AND (SME). According to Kreimeyer et al. (2008), there are generally a lot of Boolean operators, including the operators AND, XOR and OR. The article title, abstract and keywords were the only criteria for searching was allowed to do. Upon applying inclusion and exclusion criteria encompassing the topic, document type, language and publication years spanning from 2003 to 2023, a total of (n) 96 relevant articles were detected and selected for the research. The identified 96 articles as per the authors' keywords mentioned above help to derive various probable moderators and mediators using a hybrid approach, combining intuitive insights and analytical methods.

3.3. Inclusion and exclusion criteria

3.3.1. Inclusion criteria

According to Davies and Crombie (1998), there are specific guidelines for SLR inclusion and exclusion criteria and search design for selecting pertinent topics. The search was restricted to the article titles, abstracts and keywords, such as 'FinTech adoption SME, and FinTech adoption.' The research follows an empirical approach, and the articles were selected only after an in-depth assessment of peer-reviewed publications available in English, which are all indexed in the Scopus database. Because FinTech adoption in SMEs is significant for every discipline, the authors included subjects' area, such as business,

Table 1. Main information about data.

Details	Results	%
Timespan	2003:2023	
Sources (Journals, books, etc.)	85	
Documents	96	
Annual growth rate %	15	
Document average age	5	
Average citations per doc	16	
References	1	
Document contents:		
Keywords plus (ID)	502	
Author's keywords (DE)	374	
AUTHORS		
Authors	299	
Authors of single-authored docs	8	
Authors collaboration:		
Single-authored docs	8	
Co-authors per Doc	3	
International co-authorships %	28	
Document types:		
Article	59	61
Book chapter	4	4
Conference paper	31	32
Review	2	2
Total (n)	96	100

management and Accounting, computer science, engineering, social sciences, economics, econometrics and finance, decision sciences, mathematics, environmental science, energy; psychology; physics and astronomy; medicine; and materials science.

3.3.2. Exclusion criteria

Some articles that are not relevant were excluded in order to fulfill the exclusion criteria for the study. Articles were eliminated because the primary focus of those studies was not on the adoption of FinTech, particularly by SMEs – the data repository contained only journal articles published between 2003 and 28 October 2023. The search criteria limited the document type to journals, conference proceedings, book series and books and only considered the article title, abstract, and keywords. Four duplicate articles had been eliminated as a last step. Other than English-language documents, they were also not included. Ultimately, 96 articles were considered for analysis (see Table 1). SLR, widely used in business and management research, has been applied in this study coupled with bibliometric analysis by Linnenluecke et al. (2020) and Al Mazroui et al. (2023). Contextualized SLR overview of the strategic search protocol is simplified and presented in Figure 1.

3.4. Analysis

Although bibliometric analysis has been used for a few years, its use in the social sciences, business, management and economics domains has increased recently, as seen by its increasing popularity in the Scopus database. Leveraging quantitative methods, bibliometric analysis is a popular and rigorous way to analyze vast amounts of scientific data. This study employed bibliometric software (Aria & Cuccurullo, 2017) to evaluate the data after collecting data using the SLR approach and doing a complete literature review.

4. Results and discussion

Table 1 shows the primary information. Ninety-six peer-reviewed articles, comprising 85 books, journals and other intellectual resources, have been found in the Scopus database between 2003 and 2023. A 4.72-year average document age and 15.79 citations per document reveal an annual growth rate of 14.87%. A wide range of pertinent terms, 374 authors' names and 502 keywords are displayed. With 31.8 co-authors per document and 28.12% of collaborations spanning internationally, the 299 authors

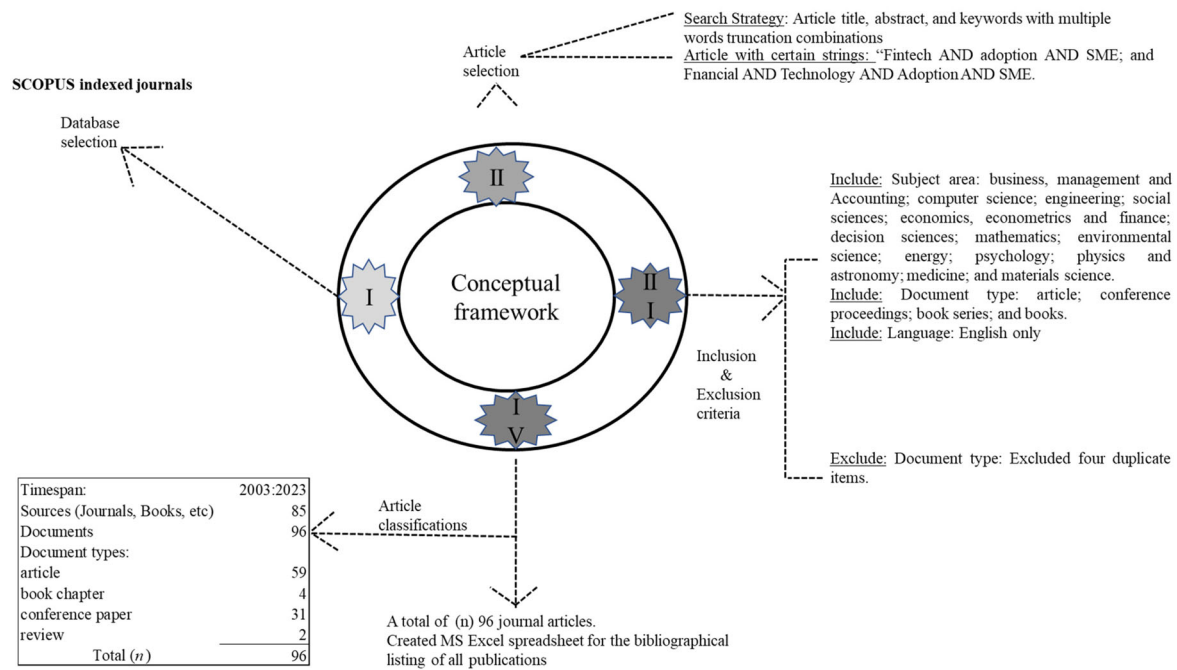


Figure 1. Conceptual framework for SLR (Linnenluecke et al., 2020; Al Mazroui et al., 2023).

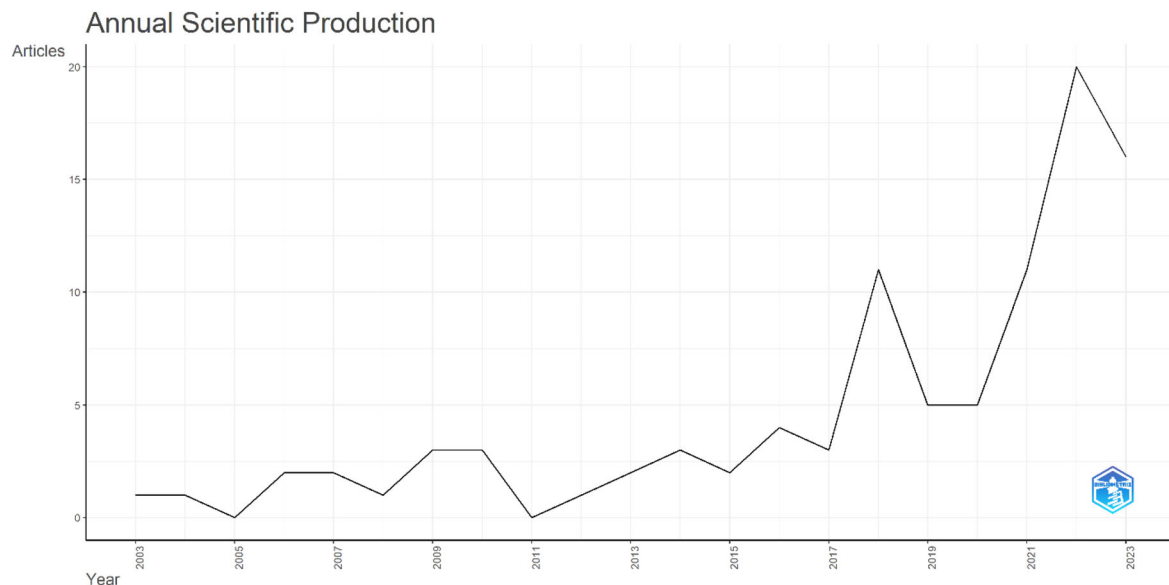


Figure 2. Annual scientific production.

demonstrate the strength of their collaboration. The following document types represent a broad spectrum of literature: 61% articles, 4% book chapters, 32% conference papers and 2% review articles.

The first and second research questions, RQ1. What are the key mediating factors in the relationship between FinTech adoption and innovation in SMEs? and RQ2. What are the key moderating factors in the relationship between FinTech adoption and innovation in SMEs? are focused on this section:

4.1. Annual scientific research output

Figure 2, Annual Scientific Production, shows a fluctuating trend in the number of articles published between 2003 and 2023. However, the number of publications ranges from zero in 2005 and 2011 to a substantial increase in 2018, 2019 and 2020. The highest number of publications occurred in 2022, with 18 articles. In 2023, the number of articles published remained high at 15, showing a continued active

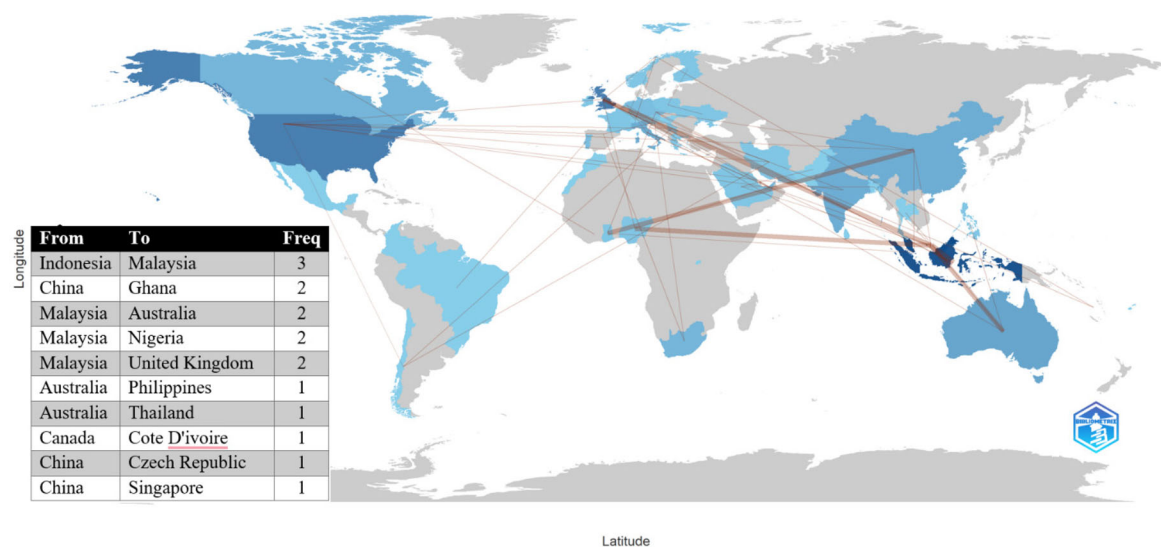


Figure 3. Country collaboration map.

and productive period for publishing articles related to FinTech adoption factors for innovations in SMEs.

4.2. Country collaboration map

Figure 3 shows the global collaboration map on FinTech adoption by SMEs. The country collaboration map indicates the six most collaborative countries: China to Ghana, Malaysia to Australia, Nigeria and the United Kingdom, Australia to the Philippines and Thailand, Canada to Cote D'Ivoire, and China to the Czech Republic, and Singapore are the next most collaborative countries. Indonesia has the most collaborations overall. This highlights how FinTech adoption by SMEs is spread out within the regional or cultural contexts of the research, including North America, Europe, Asia and Africa.

4.3. Most globally cited documents

Table 2 presents the titles, objectives, and main findings of the five most globally cited documents. It also highlights the absence of studies about mediating and moderating factors of FinTech adoption for innovation in SMEs based on total citations (TC), TC per year and normalized total citations (NTC).

4.4. Clustering by coupling

The analyzed component in Figure 4 is specified as documents. The coupling is measured by keyword plus, and the impact measure is a global citation score. The cluster labeling uses the author's keywords, and the number of units is 250. The minimum cluster frequency is 5, the label per Cluster is 3 and the label size is 0.3. The first group, shown in pink, demonstrates a moderate frequency and a balanced influence on chatbots, SMEs and the Asia-Pacific region; the second, shown in blue, indicates a greater frequency and a significant impact on blockchain. The third (green) shows how to balance the emphasis on barriers to and use of technology. Research on specific FinTech mediation and moderation aspects of SME innovation is also lacking, as evidenced by this.

4.5. Co-occurrence network

The co-occurrence network metrics (Figure 5) show a network diversity among terms related to SMEs, technology and business. For example, 'adoption' stands out with a high Cluster coefficient of 13.44021463 and a substantial PageRank of 0.048356806, implying its effective interrelation and significance in the network.

Table 2. Most global cited documents – highlighted gap.

Authors	Title	Objectives	Findings	Gap (considering this study)	TC	TC per year	NTC
Masood and Sonntag (2020)	Industry 4.0: Adoption challenges and benefits for SMEs	Examined the advantages and disadvantages of the adoption of the Internet of Things (IoT) and Cyber-Physical Systems by SMEs	It has been determined that the main benefits of Industry 4.0 adoption for SMEs are flexibility, cost, effectiveness, quality and competitive advantage. Financial and knowledge limitations are determined to be the main barriers, even though many SMEs express a wish to use Industry 4.0 technologies for those factors	No mediating and/or moderating factors of FinTech adoption for innovations in SMEs	259	64.75	4.36
Gupta and Barua (2018)	A framework to overcome barriers to green innovation in SMEs using BWM and Fuzzy TOPSIS	To determine hurdles to green innovation in SMEs and possible solutions, they used a 3-phase methodology	Seven primary group hurdles, 36 subcategory hurdles, and 20 ways to overcome those hurdles were found through extensive literature analysis	No mediating and/or moderating factors of FinTech adoption for innovations in SMEs	180	30.00	5.64
Ruiivo et al. (2014)	Examine ERP post-implementation stages of use and value: Empirical evidence from Portuguese SMEs	The goal was to empirically measure and analyze the factors that influence ERP use and value of SMEs	One of the conclusions indicated that adopting ERP among Portuguese SMEs is primarily driven by technological, organizational, and environmental factors rather than training and competitive forces. Those factors include compatibility, complexity, highest standards, and efficiency	No mediating and/or moderating factors of FinTech adoption for innovations in SMEs	107	10.70	2.94
Johnston et al. (2007)	Does e-business matter to SMEs? A comparison of the financial impacts of Internet business solutions on European and North American SMEs	Analyze the use of Internet business solutions by SMEs worldwide, evaluate the effects, and provide practical recommendations	Adopting IBS was essential and provided SMEs in all the countries under study with real financial benefits. But not every location, as well as industry, technology, or size category, benefitted equally from those advancements	No mediating and/or moderating factors of FinTech adoption for innovations in SMEs	77	4.53	2.00
De Jesus Pacheco et al. (2018)	Eco-innovation determinants in manufacturing SMEs from emerging markets: Systematic literature review and challenges	They sought to determine the elements necessary for Brazilian SMEs to adopt eco-innovation successfully.	The adoption of an eco-innovation strategy by SMEs can be facilitated by several strategies, including fleeing the immediatism mindset, joining cooperation networks, taking into account laws and regulations relevant to the industry in which the SMEs operate, investing in the research and development of innovative technologies in collaboration with outside parties, hiring experts to plan and carry out eco-innovation projects, and supporting the SMEs' financial well-being.	No mediating and/or moderating Factors of FinTech adoption for innovations in SMEs	76	12.67	2.38

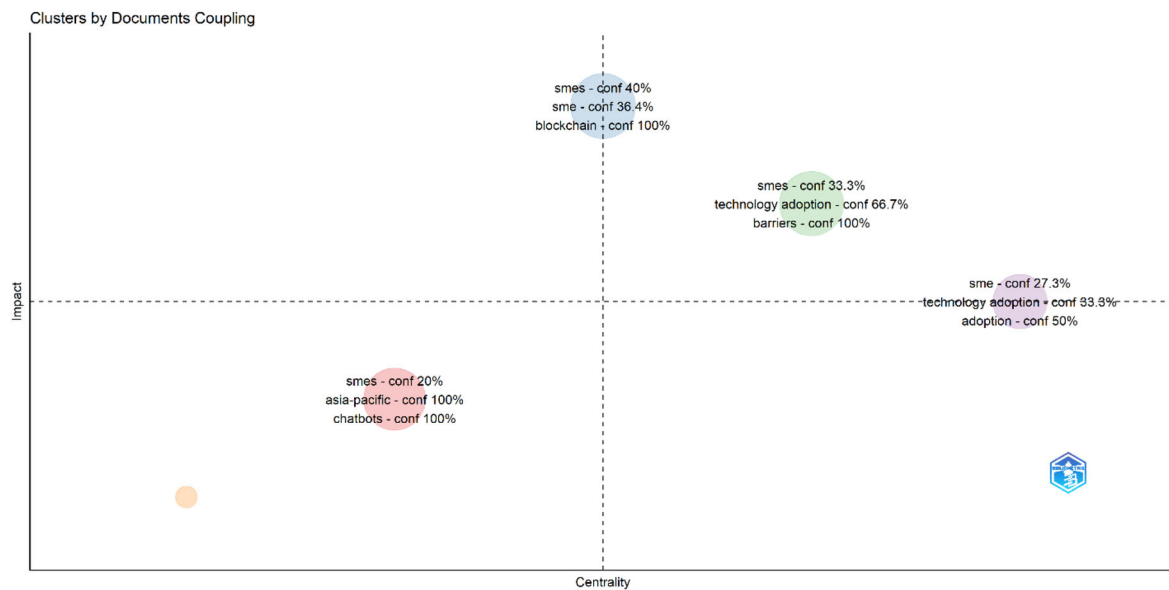


Figure 4. Clustering by coupling.

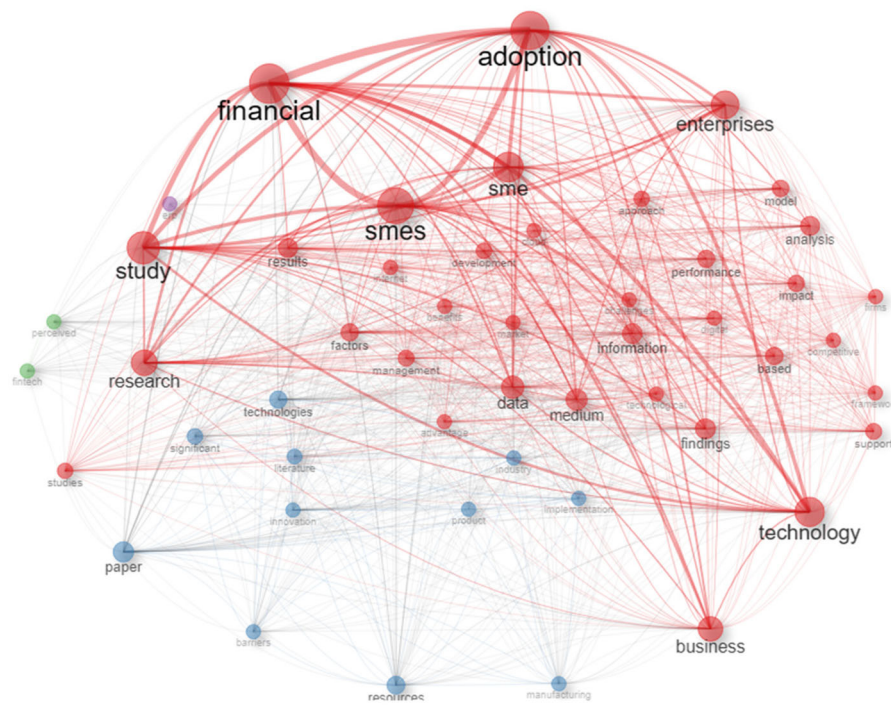


Figure 5. Co-occurrence network.

Likewise, 'financial' and 'technology' show a prominent betweenness centrality value of 13.24171825 and 5.833072915, correspondingly indicating their roles as ties linking different network divisions. Conversely, terms, such as 'cloud' and 'ERP' have a PageRank close to zero, implying a smaller significance in the network. This diversity in metrics underlines the intricate nature of the topics under consideration, indicating several degrees of centrality, connectivity and magnitude in the studied perspective.

4.6. Thematic Map

As can be seen from Figure 6, there is a considerable centrality indicator for 'technology adoption' in the Cluster. 'Technology adoption' originated as a significant and influential idea inside its Cluster, with

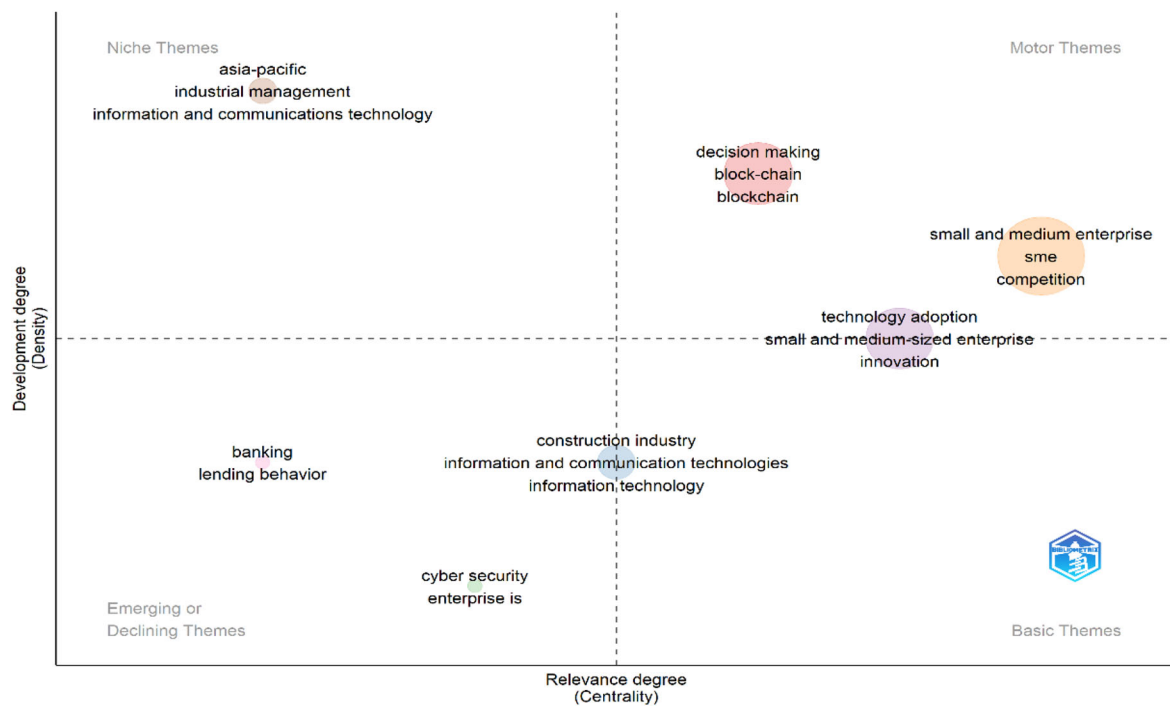


Figure 6. Thematic map.

Betweenness centralities of 4796.504106, Closeness centralities of 0.002403846, and a dominant PageRank centrality of 0.027069645. The statement suggests that some phrases are crucial in initiating connections with other terms in the network and hold a significant place in the overall structure. A unified theme surrounding technology adoption in the context of SMEs is further demonstrated by the Cluster's inclusion of related phrases like 'innovation' and 'SMEs.' According to the data, it is crucial to comprehend how technology adoption dynamics work and how they relate to related concepts in the network under consideration.

While considering SMEs' FinTech adoption, the present bibliometric analysis from above highlights the importance of 'technology adoption,' which is entangled with concepts, such as 'innovation.' This is significant because it highlights some of the most recent technology applications, including chatbots and blockchain. Further study on FinTech's mediation and/or moderating effect on SME innovation is necessary to improve understanding and progress in the ever-evolving landscape of SMEs' technology adoption.

Hence, this study has further proposed a model that shows the possible mediation (Table 3 and Figure 7) and/or moderation (Table 4 and Figure 8) role of FinTech for innovation in SMEs, which offers potential avenues for further research.

The outlined moderators and mediators (Figures 7 and 8) in this study are found by combining both intuitive insights and analytical methods.

5. Conclusion

This article explores mediating and moderating factors of FinTech adoption for SMEs innovations. For this, the authors used the Scopus database for an SLR and an in-depth evaluation of 70 articles published between 2000 and 2023. The prior research, however, focused on the direct relationship between FinTech and innovation in SMEs; by contrast, no studies employing SLR and bibliographic analysis (Aria & Cuccurullo, 2017) have been conducted on the mediating and moderating factors influencing FinTech adoption for innovations in SMEs. There is a limited exploration of mediating and moderating factors of FinTech adoption for innovation in SMEs. This research offers novel directions for future research about the various FinTech's mediation and/or moderating role for innovation in SMEs. Table 2 above lists the top five internationally cited documents. The Clustering by coupling, Co-occurrence network and

Table 3. Proposed mediation role.

Title	Citation	Proposed mediation role	
		IV	DV
Role of financial technology on poverty alleviation in Asian countries: mediating role of institutional quality	Liu and Chang (2023)	Factors of FinTech adoption	Innovations in SMEs
The effect of big data governance on financial technology in Jordanian commercial banks: The mediation role of organizational culture	Al-Afeef et al. (2023)	Factors of FinTech adoption	Innovations in SMEs
Can the financial industry 'Anchor' Carbon Emission Reductions? – The mediating and moderating effects of the technology market	Wang and Yi (2023).	Factors of FinTech adoption	Innovations in SMEs
Impact of digital finance on green technology innovation: The mediating effect of financial constraints	Tang et al. (2023)	Factors of FinTech adoption	Innovations in SMEs
Effect of financial technology on SME performance in Cameroon amid COVID-19 Recovery: the mediating effect of financial literacy	Lontchi et al. (2023)	Factors of FinTech adoption	Innovations in SMEs
Impact of XBRL technology on quality of financial data: mediating through various reporting Aspects in India	Abhishek et al. (2023)	Factors of FinTech adoption	Innovations in SMEs
The impact of Blockchain technology on financial services: mediating role of big data analytics	Mamo Drury (2019)	Factors of FinTech adoption	Innovations in SMEs
The effect of information technology (IT) on household income among farmers in Ghana: How does access to financial services serve as a mediator	Siaw et al. (2023)	Factors of FinTech adoption	Innovations in SMEs
The effects of financial and technology literacy on the sustainability of Indonesian SMEs: mediating role of supply chain practice	Hamdana et al. (2022)	Factors of FinTech adoption	Innovations in SMEs
Mediation effect of financial education between financial stress and use of financial technology	Heo et al. (2021)	Factors of FinTech adoption	Innovations in SMEs
Enterprise risk management and performance of financial institutions in Iraq: the mediating effect of information technology quality	Kurdi et al. (2019)	Factors of FinTech adoption	Innovations in SMEs
A mediating effect of the business correspondent model toward adopting mobile banking technology roadmap for achieving financial inclusion	Bhuvana and Vasantha (2017)	Factors of FinTech adoption	Innovations in SMEs
Using the health belief model to explore users' perceptions of 'being safe and secure' in the world of technology-mediated financial transactions	Davinson and Sillence (2014)	Factors of FinTech adoption	Innovations in SMEs
Financial information mediation: a case study of standards integration for electronic bill presentment and payment using the COIN mediation technology	Jayasena et al. (2004)	Factors of FinTech adoption	Innovations in SMEs

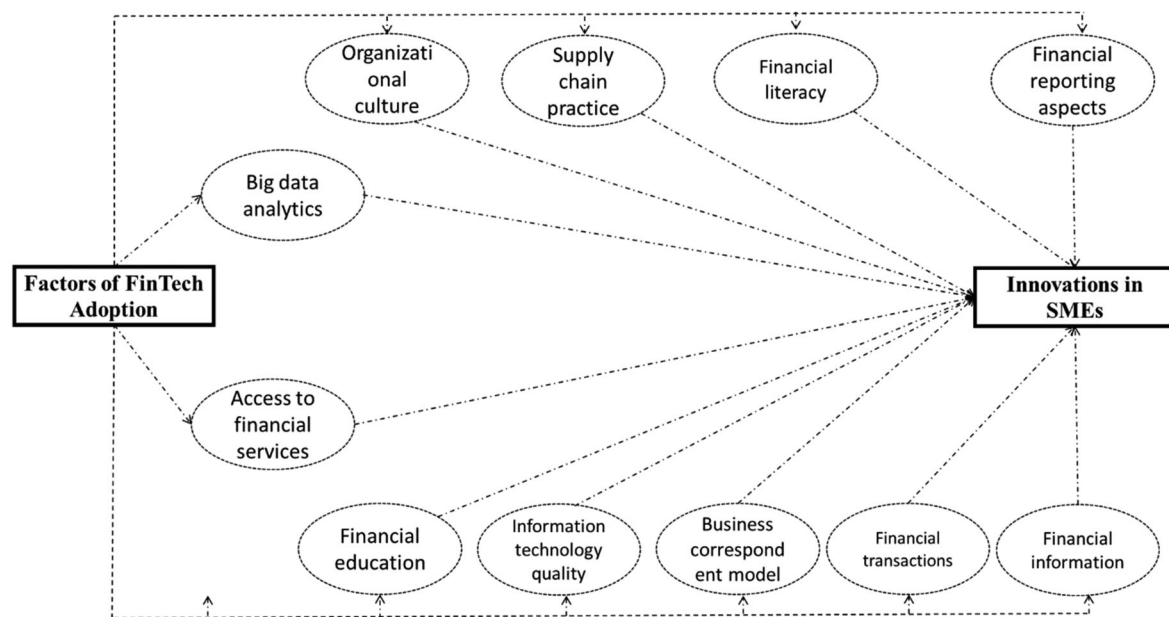


Figure 7. Proposed mediation role.

Thematic Map also revealed a significant deficiency in FinTech's mediating and moderating factors for innovation in SMEs.

Later, the authors are focused on future research directions in the realm of FinTech adoption for innovation within SMEs. The authors first searched the Scopus database to find trending topics. Figure 9 below illustrates the results after filtering the trend topics where the article title, unigrams, and word stemming were chosen. Sector counts remained largely unchanged between 2007 and 2010, increasing in 2018. From 2015 to 2018, the theme 'Management' appeared five times in a row.

On the other hand, the topic of enterprises indicates a growth trend, peaking in 2021 at 12 and 5 in 2013. From 2013 to 2018, the topic of e-commerce shows a steady increase. The number of topics on SMEs increased from 54 in 2014 to 2022. However, although topics about adoption and technology peaked between 2016 and 2022, topics about factors increased gradually between 2016 and 2021. Topics related to innovation, business and performance exhibit steady growth, demonstrating dynamic trends. It indicates the absence of research on particular FinTech mediation and moderation aspects of SME innovation.

6. Implications and limitations

6.1. Theoretical implications

Future research can employ the mediation and moderating role of FinTech adoption for SMEs identified in this study in various ways. Numerous studies have examined the direct relationship between SMEs' adoption of FinTech and innovation (Li et al., 2023; Lu, 2018; Nugraha et al., 2022; Pandey et al., 2023). These studies center on the relationship between FinTech and performance in SMEs. Therefore, this study can add to the body of literature by offering some evidence about the mediation and moderating impact of FinTech adoption for SMEs. This will help guide future research aimed at understanding the processes involved in successful innovation. In the SME innovation literature, both viewpoints – the mediation effect of FinTech and the moderation role of FinTech in which effective innovation occurs – are now enriched for future studies. In particular, this study provides researchers with opportunities to explore the complex interactions between the most recent technology and how SMEs adopt it. These interactions, in tandem with other innovation processes, will enhance theoretical frameworks with deep insights.

Table 4. Proposed moderation role.

Title	Citation	Proposed moderation role	
		IV	DV
How does risk-taking affect the green technology innovation of high-tech enterprises in China: the moderating role of financial mismatch	Qu et al. (2023)	Factors of FinTech adoption	Innovations in SMEs
The effects of information technology adoption on financial reporting: moderating role of audit risk	Hadi et al. (2023)	Factors of FinTech adoption	Innovations in SMEs
Examining the effect of financial accounting services on the financial performance of SME: the function of information technology as a moderator	Gyamera et al. (2023)	Factors of FinTech adoption	Innovations in SMEs
The effect of blockchain technology as a moderator on the relationship between big data and the risk of financial disclosure (analytical study in the Egyptian and Iraqi stock exchange)	Sabour and Al-Waeli (2023)	Factors of FinTech adoption	Innovations in SMEs
SMEs' innovativeness and technology adoption as downsizing strategies during COVID-19: the moderating role of financial sustainability in the tourism industry using structural equation modeling	Shwedehe et al. (2022)	Factors of FinTech adoption	Innovations in SMEs
The moderating role of information and communication technology in the nexus between financial development, economic growth, and energy consumption	Ahmed et al. (2022)	Factors of FinTech adoption	Innovations in SMEs
Asymmetric linkages between renewable energy consumption, financial integration and ecological sustainability: moderating role of technology innovation and urbanization	Zhang et al. (2022)	Factors of FinTech adoption	Innovations in SMEs
Financial performance and supply chain dynamic capabilities: the moderating role of Industry 4.0 technologies	Eslami et al. (2021)	Factors of FinTech adoption	Innovations in SMEs
Impact of COVID-19 on financial constraints and the moderating effect of financial technology	Ling et al. (2021)	Factors of FinTech adoption	Innovations in SMEs
Effect of process innovation and market innovation on financial performance with moderating role of disruptive technology	Muharam et al. (2020)	Factors of FinTech adoption	Innovations in SMEs
The moderating effects of knowledge characteristics of firms on the financial value of innovative technology products	Liu et al. (2014)	Factors of FinTech adoption	Innovations in SMEs
Technology strategy and financial performance: Examining the moderating role of the firm's competitive environment	Zahra (1996)	Factors of FinTech adoption	Innovations in SMEs

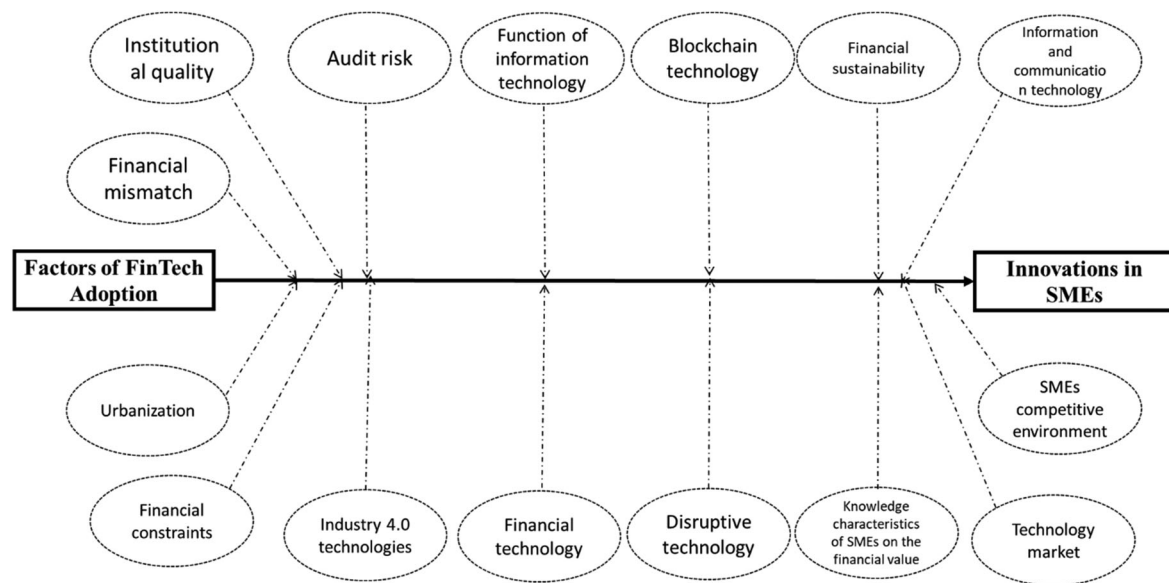


Figure 8. Proposed moderation role.

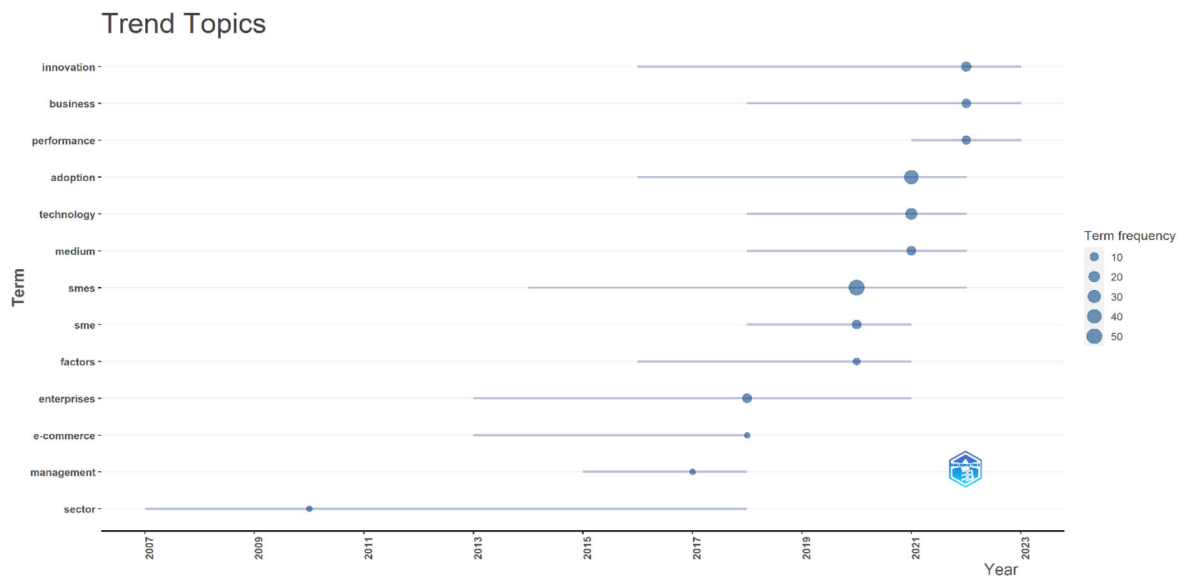


Figure 9. Trend topics.

6.2. Practical implications

In addition to outlining the main inferences, this study breaks into the management implications from the perspective of FinTech providers and users. FinTech providers should look into the necessary moderating and mediating factors. FinTech service providers can also offer creative incentives that entice SMEs to adopt new technology, as well as more robust regulatory frameworks that facilitate the integration of FinTech solutions. FinTech service providers gain insights to provide customized software solutions for various SMEs through using the proposed mediating and moderating factors. *Via* unique FinTech applications, SMEs will be able to adopt a greater level of financial innovation initiatives, which will improve their financial performance. SME providers will undoubtedly need to implement FinTech-enabled financial processes within their constrained business scope, particularly for the latter. Reaching out to new mediating and moderating factors may enable providers to deliver innovative FinTech solutions to SMEs. This article additionally proposes 15 moderation roles and 11 mediation roles of FinTech adoption for innovation among SMEs. This encompasses novel directions for future research and identifying

mediators and moderators through established and current research. It is recommended that FinTech pay particular attention to these important aspects. To encourage SMEs to adopt FinTech, the government and policymakers might take suitable initiative and invest in FinTech training and development programs. Further, the mediators and moderators of the suggested study can be strategically implemented by managers of SMEs to improve business operational performance. Managers of SMEs can comprehend the key factors that affect FinTech adoption in their financial services.

6.3. Limitations and future research directions

The analysis only included 96 English-language papers from the 2000–2023 Scopus database. Data from the SME sector can be used in future research to test the suggested framework (Figures 7 and 8). Additionally, this study uses a quantitative method by counting the number of articles, journals, authors, etc., but it has certain drawbacks when converting to a qualitative framework. However, the article presents a highly intriguing research subject. It illustrates different FinTech adoption gaps related to mediation and/or moderation, which can serve as a valuable resource for future researchers. The study's distinguishing feature is that it reviews pertinent literature that shows how SMEs have adopted FinTech and identifies the 15 moderation and 11 mediation roles of FinTech adoption for innovation among SMEs that impact SME establishment. Another limitation of this study is its restricted literature search, which prevented the authors from using more widely used FinTech terminology like peer-to-peer payments, crowdfunding, mobile banking and automated portfolio managers, which can be used in future research to broaden the findings of existing studies. Further research might also look more closely at how the availability of external finance including banks, angel investors, venture capital funds, stock markets and related sources can affect the adoption of FinTech solutions and drive FinTech innovation. Future research can focus on the financial operations of SMEs who use FinTech and the implications of this adoption on global markets.

Author's contributions statement

Mohammed Muneerali Thottoli = Conception and design; analysis and interpretation of the data
 Md. Aminul Islam = Conception and design; revising it critically for intellectual content
 Arif Ahsan – drafting of the article; analysis and interpretation of the data
 Mohd Faizal Yusof = Conception and design; drafting of the article;
 Md. Sharif Hassan = analysis and interpretation of the data; drafting of the article
 Rubaiyat Shaimom Chowdhury = analysis and interpretation of the data.

Disclosure statement

The authors declare no conflict of interest.

Funding

No funding was received.

About the authors

Dr. Mohammed Muneerali Thottoli is working as a Lecturer in the Accounting Department at the University of Nizwa, Oman. He completed his Ph.D. from Bharathiar University, India. His research interest areas include Fintech, Accounting, Auditing, and Technology Management.

Dr. Md. Aminul Islam is a professor in Finance at the Faculty of Business & Communication, Universiti Malaysia Perlis, Malaysia. He completed his Ph.D. in Finance from Universiti Sains Malaysia. His research interest areas include Fintech, Finance, Accounting, and entrepreneurship.

Arif Ahsan is a doctoral researcher at the Department of Business, Faculty of Business and Communication, Universiti Malaysia Perlis (UniMAP), Malaysia. He also served as an Assistant Professor (currently on study leave) at

the College of Business Administration (CBA), IUBAT-International University of Business Agriculture and Technology, Bangladesh. His research interest areas include Fintech, behavioral finance, and financial management.

Mohd Faizul Yusof is an Assistant Professor at the faculty of resilience, at Rabdan Academy, UAE. He completed his MBA in Technology Entrepreneurship. His research areas include Blockchain technology, Fintech for the Unbanked & Underbanked, Cryptocurrency, and Non-Fungible Tokens (NFT).

Dr. Md. Sharif Hassan is a FinTech Lecturer at Taylor's University, Malaysia. He completed his Ph.D. in Finance from Universiti Malaysia Perlis. His research interest areas include Fintech, Behavioral Finance, Technology Management, and Islamic Finance.

Rubaiyat Shaimom Chowdhury is an Assistant Professor of Finance at Bangladesh University. He is also pursuing his Ph.D. in Finance from Universiti Malaysia Perlis. His research interest areas include Finance, Fintech, Econometrics, and Banking.

ORCID

Mohammed Muneerali Thottoli  <http://orcid.org/0000-0003-2195-7226>

Md. Aminul Islam  <http://orcid.org/0000-0001-6516-2463>

Arif Ahsan  <http://orcid.org/0009-0007-2101-0602>

Mohd Faizal Yusof  <http://orcid.org/0000-0001-8464-3932>

Md. Sharif Hassan  <http://orcid.org/0000-0001-8418-7578>

Rubaiyat Shaimom Chowdhury  <http://orcid.org/0000-0002-4858-8769>

Data availability statement

The data that support the findings of this study are available from the corresponding author, Md. Aminul Islam, upon reasonable request.

References

- Abbasi, K., Alam, A., Du, M. A., & Huynh, T. L. D. (2021). FinTech, SME efficiency, and national culture: Evidence from OECD countries. *Technological Forecasting and Social Change*, 163, 120454. <https://doi.org/10.1016/j.techfore.2020.120454>
- Abhishek, N., Rahman, H. U., Kulal, A., Kambali, U., Lobo, V. S., Bindu, D., & Divyashree, M. S. (2023). Impact of XBRL technology on quality of financial data: Mediating through various reporting aspects in India. *Artificial intelligence (AI) and finance* (pp. 228–239). Springer Nature Switzerland.
- Ahmed, J., Farooq, U., Subhani, B. H., & Raies. (2022). The moderating role of information and communication technology in the nexus between financial development, economic growth, and energy consumption. *OPEC Energy Review*, 46(4), 399–412. <https://doi.org/10.1111/opec.12262>
- Al Mazroui, T. S. S., Thottoli, M. M., Al Alawi, M. M. S., Al Shukaili, N. T. H., & Al Hoqani, D. S. A. (2023). Bibliometric analysis of value-added tax research: A comparative study between European Union and Gulf Cooperation Council countries. *International Journal of Law and Management*, 65(6), 560–585. <https://doi.org/10.1108/IJLMA-01-2023-0016>
- Al-Afeef, M., Ali, O., Al-Tahat, S., Malkawi, A., Kalbounhe, N., & Al-Azzam, Z. (2023). The effect of big data governance on financial technology in Jordanian commercial banks: The mediation role of organizational culture. *International Journal of Data and Network Science*, 7(3), 1283–1294. <https://doi.org/10.5267/j.ijdns.2023.4.010>
- Allen, F., Gu, X., & Jagtiani, J. (2021). A survey of fintech research and policy discussion. *Review of Corporate Finance*, 1(3–4), 259–339. <https://doi.org/10.1561/114.000000007>
- Aria, M., & Cuccurullo, C. (2017). Bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959–975. <https://doi.org/10.1016/j.joi.2017.08.007>
- Bar-Ilan, J. (2008). Informetrics at the beginning of the 21st century—A review. *Journal of Informetrics*, 2(1), 1–52. <https://doi.org/10.1016/j.joi.2007.11.001>
- Bhuvana, M., & Vasantha, S. (2017). A mediating effect of the business correspondent model towards adopting mobile banking technology-a roadmap for achieving financial inclusion. *Journal of Advanced Research in Dynamical and Control Systems*, 7, 247–253.
- Boyle, F., & Sherman, D. (2006). Scopus™: The product and its development. *The Serials Librarian*, 49(3), 147–153. https://doi.org/10.1300/J123v49n03_12
- Chin, K. Y., Zakaria, Z., Purhanudin, N., & Pin, C. T. (2021). A paradigm of TAM model in SME P2P financing. *International Journal of Economics & Management*, 15(3), 397–414.

- Coffie, C. P. K., Hongjiang, Z., Mensah, I. A., Kiconco, R., & Simon, A. E. O. (2021). Determinants of FinTech payment services diffusion by SMEs in Sub-Saharan Africa: Evidence from Ghana. *Information Technology for Development*, 27(3), 539–560. <https://doi.org/10.1080/02681102.2020.1840324>
- Cumming, D. J., & Schwienbacher, A. (2021). Fintech venture capital. *The Routledge handbook of FinTech* (pp. 11–37). Routledge.
- Das, S. R. (2019). The future of fintech. *Financial Management*, 48(4), 981–1007. <https://doi.org/10.1111/fima.12297>
- Davies, H. T., & Crombie, I. K. (1998). Getting to grips with systematic reviews and meta-analyses. *Hospital Medicine (London, England: 1998)*, 59(12), 955–958.
- Davinson, N., & Sillence, E. (2014). Using the health belief model to explore users' perceptions of 'being safe and secure' in the world of technology mediated financial transactions. *International Journal of Human-Computer Studies*, 72(2), 154–168. <https://doi.org/10.1016/j.ijhcs.2013.10.003>
- De Jesus Pacheco, D. A., ten Caten, C. S., Jung, C. F., Navas, H. V. G., & Cruz-Machado, V. A. (2018). Eco-innovation determinants in manufacturing SMEs from emerging markets: Systematic literature review and challenges. *Journal of Engineering and Technology Management*, 48, 44–63. <https://doi.org/10.1016/j.jengtecman.2018.04.002>
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285–296. <https://doi.org/10.1016/j.jbusres.2021.04.070>
- Earls, E. M. (2019). *Preparing students for a future in fintech: The role of Massachusetts public universities*. White Paper No. 194. Pioneer Institute for Public Policy Research.
- Eslami, M. H., Jafari, H., Achtenhagen, L., Carlbäck, J., & Wong, A. (2021). Financial performance and supply chain dynamic capabilities: The Moderating Role of Industry 4.0 technologies. *International Journal of Production Research*, 59, 1–18. <https://doi.org/10.1080/00207543.2021.1966850>
- Fasano, F., & Cappa, F. (2022). How do banking fintech services affect SME debt? *Journal of Economics and Business*, 121, 106070. <https://doi.org/10.1016/j.jeconbus.2022.106070>
- Gagolewski, M. (2011). Bibliometric impact assessment with R and the CITAN package. *Journal of Informetrics*, 5(4), 678–692. <https://doi.org/10.1016/j.joi.2011.06.006>
- Gupta, H., & Barua, M. K. (2018). A framework to overcome barriers to green innovation in SMEs using BWM and Fuzzy TOPSIS. *The Science of the Total Environment*, 633, 122–139. <https://doi.org/10.1016/j.scitotenv.2018.03.173>
- Gyamera, E., Abayaawien Atuilik, W., Eklemet, I., Adu-Twumwaah, D., Baba Issah, A., Alexander Tetteh, L., & Gagakuma, L. (2023). Examining the effect of financial accounting services on the financial performance of SMEs: The function of information technology as a moderator. *Cogent Business & Management*, 10(2), 2207880. <https://doi.org/10.1080/23311975.2023.2207880>
- Hadi, A. H., Ali, M. N., Al-Shiblawi, G. A. K., Flayyih, H. H., & Talab, H. R. (2023). The effects of information technology adoption on the financial reporting: Moderating role of audit risk. *International Journal of Economics and Finance Studies*, 15(1), 47–63.
- Hamdana, H., Murwani, F., Sudarmiatin, S., & Hermawan, A. (2022). The effects of financial and technology literacy on the sustainability of Indonesian SMEs: Mediating role of supply chain practice. *Uncertain Supply Chain Management*, 10(4), 1449–1456. <https://doi.org/10.5267/j.uscm.2022.6.011>
- Heo, W., Lee, J. M., & Rabbani, A. G. (2021). Mediation effect of financial education between financial stress and use of financial technology. *Journal of Family and Economic Issues*, 42(3), 413–428. <https://doi.org/10.1007/s10834-020-09720-w>
- Irimia-Diéguez, A., Velicia-Martín, F., & Aguayo-Camacho, M. (2023). Predicting FinTech innovation adoption: The mediator role of social norms and attitudes. *Financial Innovation*, 9(1), 36. <https://doi.org/10.1186/s40854-022-00434-6>
- Jayasena, S., Bressan, S., & Madnick, S. (2004). Financial information mediation: A case study of standards integration for electronic bill presentment and payment using the COIN mediation technology. *International workshop on technologies for e-services* (pp. 152–169). Springer Berlin Heidelberg.
- Johnston, D. A., Wade, M., & McClean, R. (2007). Does e-business matter to SMEs? A comparison of the financial impacts of Internet business solutions on European and North American SMEs. *Journal of Small Business Management*, 45(3), 354–361. <https://doi.org/10.1111/j.1540-627X.2007.00217.x>
- Karim, S., Naz, F., Naeem, M. A., & Vigne, S. A. (2022). Is FinTech providing effective solutions to Small and Medium Enterprises (SMEs) in ASEAN countries? *Economic Analysis and Policy*, 75, 335–344. <https://doi.org/10.1016/j.eap.2022.05.019>
- Kreimeyer, M., Gurtler, M., & Lindemann, U. (2008, December). *Structural metrics for decision points within multiple-domain matrices representing design processes* [Paper presentation]. 2008 IEEE International Conference on Industrial Engineering and Engineering Management, IEEE (pp. 435–439). Singapore. <https://doi.org/10.1109/IEEM.2008.4737906>
- Kurdi, I. A., Fareed Naji, A., & Nawar Naseef, A. (2019). Enterprise risk management and performance of financial institutions in Iraq: The mediating effect of information technology quality. *Journal of Information Technology Management*, 11(4), 80–91.
- Li, H., Lu, Z., & Yin, Q. (2023). The development of Fintech and SME innovation: Empirical evidence from China. *Sustainability*, 15(3), 2541. <https://doi.org/10.3390/su15032541>

- Ling, S., Pei, T., Li, Z., & Zhang, Z. (2021). Impact of COVID-19 on financial constraints and the moderating effect of financial technology. *Emerging Markets Finance and Trade*, 57(6), 1675–1688. <https://doi.org/10.1080/1540496X.2021.1904883>
- Linnenluecke, M. K., Marrone, M., & Singh, A. K. (2020). Conducting systematic literature reviews and bibliometric analyses. *Australian Journal of Management*, 45(2), 175–194. <https://doi.org/10.1177/0312896219877678>
- Liu, X. Y., & Chang, L. (2023). Role of financial technology on poverty Alleviation in Asian Countries: Mediating role of Institutional quality. *The Singapore Economic Review*, 68(04), 1251–1270. <https://doi.org/10.1142/S021759082244009X>
- Liu, X., Yeung, A. C., Lo, C. K., & Cheng, T. C. E. (2014). The moderating effects of knowledge characteristics of firms on the financial value of innovative technology products. *Journal of Operations Management*, 32(3), 79–87. <https://doi.org/10.1016/j.jom.2013.11.003>
- Lontchi, C. B., Yang, B., & Shuaib, K. M. (2023). Effect of financial technology on SMEs performance in Cameroon amid COVID-19 recovery: The mediating effect of financial literacy. *Sustainability*, 15(3), 2171. <https://doi.org/10.3390/su15032171>
- Lu, L. (2018). Promoting SME finance in the context of the fintech revolution: A case study of the UK's practice and regulation. *Banking and Finance Law Review*, 33, 317–343.
- Mamo Drury, G. J. (2019). [The impact of blockchain technology on financial services: analyzing the Maltese perspective] [Bachelor's thesis]. University of Malta.
- Masood, T., & Sonntag, P. (2020). Industry 4.0: Adoption challenges and benefits for SMEs. *Computers in Industry*, 121, 103261. <https://doi.org/10.1016/j.compind.2020.103261>
- Mirza, N., Afzal, A., Umar, M., & Skare, M. (2023). The impact of green lending on banking performance: Evidence from SME credit portfolios in the BRIC. *Economic Analysis and Policy*, 77, 843–850. <https://doi.org/10.1016/j.eap.2022.12.024>
- Moreira-Santos, D., Au-Yong-Oliveira, M., & Palma-Moreira, A. (2022). Fintech services and the drivers of their implementation in small and medium enterprises. *Information*, 13(9), 409. <https://doi.org/10.3390/info13090409>
- Muharam, H., Andria, F., & Tosida, E. T. (2020). Effect of process innovation and market innovation on financial performance with moderating role of disruptive technology. *Systematic Reviews in Pharmacy*, 11(1).
- Najib, M., Ermawati, W. J., Fahma, F., Endri, E., & Suhartanto, D. (2021). Fintech in the small food business and its relation with open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 7(1), 88. <https://doi.org/10.3390/joitmc7010088>
- Nugraha, D. P., Setiawan, B., Nathan, R. J., & Fekete-Farkas, M. (2022). FinTech adoption drivers for innovation for SMEs in Indonesia. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(4), 208. <https://doi.org/10.3390/joitmc8040208>
- Pandey, D. K., Hassan, M. K., Kumari, V., Zaied, Y. B., & Rai, V. K. (2023). Mapping the landscape of FinTech in banking and finance: A bibliometric review. *Research in International Business and Finance*, 67, 102116. <https://doi.org/10.1016/j.ribaf.2023.102116>
- Petticrew, M., & Roberts, H. (2008). *Systematic reviews in the social sciences: A practical guide*. John Wiley & Sons.
- Qu, S., Wang, J., Li, Y., & Wang, K. (2023). How does risk-taking affect the green technology innovation of high-tech enterprises in China: The moderating role of financial mismatch. *Environmental Science and Pollution Research International*, 30(9), 23747–23763. <https://doi.org/10.1007/s11356-022-23820-0>
- Ruivo, P., Oliveira, T., & Neto, M. (2014). Examine ERP post-implementation stages of use and value: Empirical evidence from Portuguese SMEs. *International Journal of Accounting Information Systems*, 15(2), 166–184. <https://doi.org/10.1016/j.jaccinf.2014.01.002>
- Sabour, K. A., & Al-Waeli, A. (2023). The effect of blockchain technology as a moderator on the relationship between big data and the risk of financial disclosure (analytical study in the Egyptian and Iraqi stock exchange). *Eastern-European Journal of Enterprise Technologies*, 121(1 (13), 132–142. <https://doi.org/10.15587/1729-4061.2023.274641>
- Sanga, B., & Aziakpono, M. (2023). FinTech and SMEs financing: A systematic literature review and bibliometric analysis. *Digital Business*, 3(2), 100067. <https://doi.org/10.1016/j.digbus.2023.100067>
- Sharma, S. K., Ilavarasan, P. V., & Karanasios, S. (2023). Small businesses and FinTech: A systematic review and future directions. *Electronic Commerce Research*, 24(1), 535–575. <https://doi.org/10.1007/s10660-023-09705-5>
- Shwede, F., Aburayya, A., Alfaisal, R., Adelaja, A. A., Ogbolu, G., Aldhuhoori, A., & Salloum, S. (2022). SMEs' innovativeness and technology adoption as downsizing strategies during COVID-19: The moderating role of financial sustainability in the tourism industry using structural equation modeling. *Sustainability*, 14(23), 16044. <https://doi.org/10.3390/su142316044>
- Siaw, A., Twumasi, M. A., Brako, E. N., Nyamah, E. Y., & Jiang, Y. (2023). The effect of information technology (IT) on household income among farmers in Ghana: How does access to financial services serve as a mediator. *New Medit*, 22(1), 53–66. <https://doi.org/10.30682/nm2301d>
- Tang, D., Chen, W., Zhang, Q., & Zhang, J. (2023). Impact of digital finance on green technology innovation: The mediating effect of financial constraints. *Sustainability*, 15(4), 3393. <https://doi.org/10.3390/su15043393>
- Thottoli, M. M. (2022). Trending technology hashtags in the field of accounting: A bibliometric analysis. *LBS Journal of Management & Research*, 20(1–2), 34–56.

- Tian, H., Siddik, A. B., Pertheban, T. R., & Rahman, M. N. (2023). Does Fintech innovation and green transformational leadership improve green innovation and corporate environmental performance? A hybrid SEM-ANN approach. *Journal of Innovation & Knowledge*, 8(3), 100396. <https://doi.org/10.1016/j.jik.2023.100396>
- Verma, S., Shome, S., & Hassan, M. K. (2023). FinTech in small and medium enterprises (SMEs): A review and future research agenda. *European Management Journal*, 41(6), 950–971. <https://doi.org/10.1016/j.emj.2023.07.003>
- Wang, S., & Yi, X. (2023). Can the financial industry 'Anchor ' carbon emission reductions? The mediating and moderating effects of the technology market. *Energy & Environment*, 34(3), 533–559. <https://doi.org/10.1177/0958305X211061810>
- Zahra, S. A. (1996). Technology strategy and financial performance: Examining the moderating role of the firm's competitive environment. *Journal of Business Venturing*, 11(3), 189–219. [https://doi.org/10.1016/0883-9026\(96\)00001-8](https://doi.org/10.1016/0883-9026(96)00001-8)
- Zhang, W., Wang, Z., Adebayo, T. S., & Altuntaş, M. (2022). Asymmetric linkages between renewable energy consumption, financial integration, and ecological sustainability: The moderating role of technology innovation and urbanization. *Renewable Energy*, 197, 1233–1243. <https://doi.org/10.1016/j.renene.2022.08.021>
- Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational Research Methods*, 18(3), 429–472. <https://doi.org/10.1177/1094428114562629>