







E-commerce Adoption and Sustainability with SMEs – An Advanced Bibliometric Analysis

Suraj Kumar* and K Francis Sudhakar



Department of Management Studies, National Institute of Technology, Warangal, Fatimanagar, Warangal, Telangana, India

E-mail/Orcid Id:

SK,  sk720126@student.nitw.ac.in,  <https://orcid.org/0000-0002-8903-6602>; KFS,  kfsudhakar@nitw.ac.in,  <https://orcid.org/0000-0001-7405-8932>

Article History:

Received: 06th July, 2023

Accepted: 12th June, 2024

Published: 30th June, 2024

Keywords:

Bibliometrics, digitalisation, electronic commerce, e-commerce technology, e-commerce adoption in SMEs, small and medium scale industry

How to cite this Article:

Suraj Kumar and K Francis Sudhakar (2024). E-commerce adoption and sustainability with SMEs – An advanced bibliometric analysis. *International Journal of Experimental Research and Review*, 40(spl.), 24-40.

DOI:

<https://doi.org/10.52756/ijerr.2024.v40spl.003>

Abstract: Integrating technology, innovation, and entrepreneurship has been pivotal in reducing business costs and fostering global connections between producers and consumers. E-commerce has become a fundamental part of the modern business landscape, particularly for small and medium-sized enterprises (SMEs). With its unique and innovative approach of conducting a bibliometric analysis of the existing research on e-commerce adoption and sustainability within small and medium-scale industries, this study aims to fill a gap in the current literature. The analysis focuses on identifying critical success factors, assessing the relationship between SME characteristics and e-commerce adoption, and examining the organisational implications of e-commerce in SMEs. The findings of this study, presented with all the scientific data, offer insights that can shape the future of SMEs in e-commerce adoption. Bibliographic data was collected through the Web of Science and Scopus databases between 1999 and May 2024. Both databases were combined using the R-studio application, and Biblioshiny was used for the bibliometric analysis. The bibliometric study of data from 1187 related scientific publications was performed using a structured search algorithm in Scopus and Web of Science databases. Research on adoption factors in specific industries has not been extensively explored, making it a promising area for further research. The implications of this study present a bibliometric analysis of the dimensions of SMEs' e-commerce adoption strategy and propose future research directions. Findings highlight the main authors, publications, and productive countries that can be used for research collaborations. This analysis of e-commerce adoption concludes with some limitations, suggestions, and a research agenda for future research.

Introduction

In today's commercial world, e-commerce is the standard. Small and medium enterprises (SMEs) in emerging nations can substantially contribute to the national economy. These limitations are reduced using e-commerce technology, which enables SMEs to expand into new markets without increasing their physical footprint (Quaddus et al., 2017). E-commerce technologies have become critical entities of interest within business and entrepreneurship literature owing to the effects of e-commerce technology on SMEs (Hossain et al., 2023). However, SMEs in developing nations hesitate to incorporate e-commerce technology into their business operations (Abdulkarem et al., 2021). With the

advent of e-commerce, a new wave of research has emerged examining the role of small business clusters, particularly in SMEs (MacGregor and Vrazalic, 2007; Kuruwitaarachchi and Ali Khatibi, 2020).

Several definitions of "electronic commerce" vary depending on the author and the goals of their study (Grandon and Pearson, 2004). From the standpoint of business processes, E-commerce uses technology to make business transactions and work processes run more smoothly (Ngai and Wat, 2002). E-commerce is revolutionising the way trade operates on a global scale, yet it is happening at varying rates around the globe. E-commerce has made significant progress in developed nations, but it is also being utilised increasingly in



developing countries, where its adoption is rising quickly (Almtiri et al., 2023). It is crucial to comprehend how social and economic factors influence e-commerce technology adoption, which has not yet been researched (Sujatha and Karthikeyan, 2021), to contribute to future studies in this area and to interest the business sector in other entry points into new markets. Also, the e-commerce adoption process, which deals with many steps and the e-commerce platform's rules and regulations, impacts the adoption process's growth rate (Yadav et al., 2022).

It has conducted significant research to understand the factors affecting the adoption of e-commerce and its impact on shaping the future of SMEs. As a researcher, policymaker, or practitioner in this course, you must explore a constantly evolving field. We used bibliometric analysis, a quantitative approach, to examine research developments and policies in a particular field. This study aims to systematically analyse the vast academic literature on the adoption of e-commerce in SMEs and provide a comprehensive and insightful overview of the developments in the field, key issues, availability of staff impact and possible future directions. Given the rapid and multidimensional development of e-commerce acceptance research, a systematic approach that effectively integrates the broad and expanding knowledge base in this area is needed.

Bibliometric analysis gives precious perception into the highbrow climate of the field (Mittal and Jora, 2023; Shafi et al., 2024). This search gives you an overview of crucial traits, influential guides, key authors, and emerging research areas. This observation uses bibliometric evaluation to examine crucial study subjects and traits in e-trade adoption amongst SMEs. This study examines authors, publishers and influential nations that have contributed substantially to this work. In addition, the overview discusses the most noted literature, co-authors, and present research and affords insights into future instructions for studies in this region.

This study explores these areas and provides valuable insights for researchers, policymakers, and practitioners. It promotes a deeper understanding of the factors contributing to SMEs' e-commerce adoption. Determinations regarding adopting technologies like e-commerce are often influenced by factors like the relative newness of these types of breakthroughs and the increased uncertainty associated with adopting new technologies (Kuruwitaarachchi and Ali Khatibi, 2020). Several studies have looked at the factors that influence the spread of e-commerce and have found that the answers vary depending on the nature of the research and

the specific social, cultural, and economic contexts in which e-commerce tools are deployed. Due to the wide range of affecting elements, developing general models that would accurately appraise the problem has been difficult. Because of its relative freshness and rapid expansion, e-commerce is an attractive field for research. This research provides a bibliometric analysis of the literature on e-commerce research between 1999 and May 2024.

The framework we selected represents our interpretation of the adoption of e-commerce with SME literature, highlighting the field's critical elements. We hope they will serve as an e-commerce roadmap for academics and practitioners. A categorisation of e-commerce research demonstrates that the number of published papers has increased exponentially. Many researchers should be interested in the present condition and direction of research issues. The primary purpose of the bibliometric analysis is to assess the significance of earlier research by analysing different publications. When determining a study's academic impact, the number of times other writers have cited it is used as a proxy. Articles are often evaluated using the review strategy of a bibliometric analysis or reference works of art.

Our contribution to this paper is threefold:

1. To enhance knowledge and understanding of SMEs' adoption of e-commerce.
2. To do the advanced bibliometric analysis by merging the Web of Science and Scopus databases.
3. To explore the future research scope in e-commerce adoption to provide sustainability to SMEs.

Conceptual backgrounds

The bibliometric analysis's conceptual framework elaborates on how e-commerce came to be conceived, details its most important historical moments, and stresses its relevance to issues like SMEs' e-commerce adoption and the sustainability of e-commerce platforms.

E-commerce adoption in SMEs

E-commerce is thought to offer many advantages, ranging from modest ones like improved accuracy and reduced communication and administrative expenses to game-changing ones like allowing corporate process reengineering and supporting industry value chains integration efforts like fast response retailing, quick Inventory, and continuous replenishment (Costa & Castro, 2021). However, businesses, especially SMEs, in developing nations confront distinct obstacles than those in wealthy nations, and they adopt and utilise e-commerce quite differently (Nazir & Roomi, 2021).

Table 1. The empirical study on the adoption of e-commerce.

Author	Country	Supporting ideas and significant elements examined	Fundamental research on variables influencing the adoption of e-commerce
(Grandon & Pearson, 2004)	USA	DOI, TAM, Organizational readiness	Perceived ease of usage, perceived usefulness, external pressure, organisational readiness
(Salah & Ayyash, 2024)	Palestinian	TOE Framework	Innovation culture, customer tech-savviness and AI Integration,
(Gao et al., 2023)	Bangladesh	Resource-based view (RBV), PLS-SEM	Impact of e-commerce platforms and strategies of digital marketing on facilitating financial and sustainability performance of MSMEs.
(Bening et al., 2023)	Indonesia	DEMATEL, DOI	Investigate criteria influencing e-commerce adoption by identifying training IT and e-commerce skills.
(Hossain et al., 2023)	Bangladesh	TAM Model	Information and communication adoption, internet connectivity, and business data management
(Yu et al., 2022)	China	Game theoretic model,	The strategic mode selection, platform retailing and brand competition
(Satar, 2022)	Saudi Arabia	DIO, TOE	Entrepreneur's innovativeness, competitive pressure, firm size, and IT savviness
(Ocloo et al., 2020)	China	TOE	TOE factors influence business-to-business levels of e-commerce adoption
(Walker et al., 2016)	Slovakia	Logistic regression.	Differentiating characteristics of e-commerce adopters and non-adopters
(Narayanmoorthi et al., 2016)	Palestine	TOE	Technological and organisational factors influence SMEs adopting e-commerce.
(Al-Bakri & Katsioloudes, 2015)	Jordan	Confirmatory factor analysis	External and internal organisational factors are essential for e-commerce adoption.
(Al-Alawi & Al-Ali, 2015)	Kuwait	Theoretical Model	The environmental context (Government regulations), organisational context (top management support), and technology context (perceived benefits).
(Maryeni et al., 2012)	Indonesia	TOE	Technological and organisational variables influence e-commerce adoption.
(Chan et al., 2012)	China	TOE	Several variables influence the dissemination of e-collaboration throughout the supply chain, and their impacts vary at various process phases.
(Olatokun & Kebonye, 2010)	Botswana	broader adoption of e-commerce literature	Security concerns, expensive expenses, a scarcity of technical personnel, and a poor Internet connection
(Tan et al., 2009)	Malaysia	E-commerce expenses, E-commerce security, and DOI	Helpful information for SMEs policymakers

Most economies depend heavily on SMEs because they produce money, decrease poverty, raise living standards, and create jobs while positively impacting the communities in which they operate (Almtiri et al., 2023). Even while SMEs considerably contribute to the country's economy, they often suffer from a lack of geographical presence and the inability to supply their

services around the clock (Kurnia et al., 2015). Adopting E-commerce technology helps reduce these problems and gives SMEs access to more significant markets without expanding physically (Quaddus et al., 2017).

In this regard, some empirical studies on adopting e-commerce among SME's are-

Table 2. Process of combining two databases.

Step	Objective	Procedures	Action
Step 1	Convert WOS and Scopus databases to bibliographies files	Go to the search result and select all the search item files.	Select the bib file and export the data.
Step 2	WOS.bib and Scopus.bib should be converted to the "BibTeX" file format.	Load the bibliometrix package to use Rstudio.	In Rstudio application: <install.packages("bibliometrix") <library(bibliometrix) <biblioshiny() Upload both the database in Rstudio
Step 3	The two databases should be merged in Rstudio, and duplicate records should be removed.	Go to the console and type the command to combine both databases.	##combined both datasets combined<-mergeDbSources (web_data,scopus_data,remove.duplicated=T)
Step 4	Export the merge database file	Convert the merge file into xtml format and export.	##exporting file write.xlsx(combined,"combineddabs.xlsx")

Objective

This bibliometric study aims to evaluate the effect of papers published between 1999 and May 2024 with the title E-commerce Adoption and Sustainability in SMEs. It also shows that the topic of SMEs has received more interest and attention from academics, funding agencies, and professionals.

Materials and Methods

The Web of Science and Scopus were searched for publications on e-commerce adoption and sustainability in SMEs published between 1999 and 2024. These articles were assessed based on their publication year, place of origin, authors, publication, journal of publishing, etc. Since all the analysed data was publicly accessible via electronic and other means, clearance from an institutional review board was unnecessary.

This bibliometric analysis aims to provide a complete evaluation of the research panorama on adopting e-commerce in SMEs. We will leverage facts from distinguished databases, Scopus and Web of Science, due to their full-size coverage of peer-reviewed literature throughout diverse disciplines. To gain deeper insights from the collected data, we will utilise bibliometric indicators and analysis techniques like years of publication, country scientific production, publication in different journals, relevant authors, highest citations, top cited journals, author collaboration, trending topic, and future direction. We will utilise specialised bibliometric software tools such as R-studio to facilitate these analyses. These tools provide powerful visualisation capabilities, enabling us to create insightful maps and

networks that illustrate the relationships between authors, publications, keywords, and research themes.

This research utilises the database's output to do a detailed bibliometric assessment. WOS and Scopus cannot comprehensively analyse the present trends in this subject for bibliometric investigations, as the fields of the WOS and Scopus databases are different. To ensure the quality of bibliometric analysis, we used a systemic four-step methodology and integrated the data, eliminating duplicate files. We took the entries from both databases from 1999 to May 2024.

The process of combining Web of Science (WOS) and Scopus database

We use the application R-Studio to combine the database and the bibliometric analysis. We reviewed the systemic literature and synthesized the existing research with the PRISMA methodology (Moher et al., 2009). Both databases are combined in four steps: the first is to identify suitable research, the second is to evaluate the search results, the third is to determine whether they meet the criteria, and the fourth is to include them. The specific search phrases used were "e-commerce adoption" AND "SMEs", "adoption of e-commerce in SMEs", OR "small business", OR "small and medium enterprises". In Scopus 1037 and WOS 337, research was found for further analysis.

During screening, two substages were employed. We eliminated duplicate papers from each database during the first step, and then we utilised screening criteria on both databases during the second. Only English-language publications were kept; all other kinds of documents were discarded. We eliminated articles irrelevant to e-

commerce adoption in SME literature during the eligibility phase. For instance, some articles connected to SMEs but were not specifically about e-commerce, and others generally had nothing to do with SME adoption of e-commerce. We only looked at reliable sources and rejected articles without ISSNs. We exported each database to R studio during inclusion. Two composite libraries were created in R studio. The first database, labelled WOS, had 251 publications, while the second, Scopus, had 947 publications. We use R studio to combine these two datasets and eliminate duplicate data. Finally, a new merge database with 1187 publications was extracted, and all the duplicate files were removed. The merge file has been extracted and loaded into R studio for bibliometric analysis.

Process of combining the WOS and Scopus databases Findings

This section reports the study's findings according to the indicators specified in the methodology. The information is separated into four categories: quantity indicators, quality indicators, structure indicators, and e-commerce adoption trends.



Graph 1 . Total publications by year.

Graph 1 shows a growth in attention to the topic since 2001, with 2010 being one of the most productive years, with 51 papers published. The number of publications slowly dropped from 2011 to 2017 before increasing again in 2018 and reaching its maximum level in 2022, with 122 papers published. A gradual reduction in publications from 2011 to 2017 may indicate that the

Table 3. Main information about the data.

Description	Results
Timespan	1999:2024
Sources	702
Documents	1187
Average publication per year	8.74
Average citations per document	16.42
Average citations per year per doc	1.879
References	26935
Keywords Plus (ID)	2737
Author's Keywords (DE)	2380
Authors	2450
Author Appearances	3198
Authors of single-authored documents	177
Authors of multi-authored documents	2273
Single-authored documents	241
Documents per Author	0.484
Authors per Document	2.06
Co-Authors per Documents	2.69
Collaboration Index	2.40

Quantity Indicators

This part of the research results discusses the bibliometric quantity indicators computed for e-commerce.

identification of the adoption of e-commerce determinants experienced a surge in the theoretical sphere between 2001 and 2006, reshaping established technology acceptance models.

Publications showed a definite interest in determining how adoption models may be adapted to match specific socio-cultural, economic, and demographic contexts. As a final observation, we see that there has been a shift in the direction of studying more narrowly defined choices, opting instead to evaluate factors in particular business dynamics in SMEs. To conduct this assessment based on quantitative models in line with the Diffusion of Innovation Theory, it was required to investigate the characteristics of the model's validity and relevance to efficient e-commerce adoption.

the Journal of Small Business and Enterprise Development. Examining the productiveness of publishers gives treasured insights into the most prolific contributors and influential within the subject. This evaluation can help become aware of the leading researchers, institutions, and journals shaping the scholarly discourse on e-commerce adoption amongst SMEs.

The top authors are fractionalised by the number of publications and articles. Macgregor R is leading with 1st position and the highest number of publications, 13. Lim

Table 4. Country scientific production.

Sl. No	Country	Number of publications
1	China	286
2	UK	158
3	Malaysia	133
4	USA	112
5	Indonesia	110
6	Australia	94
7	Italy	47
8	India	40
9	South Korea	34
10	Canada	33

Table 4 indicates that China has the highest research contribution, with 286 publications; the UK, with 158 publications, is in second place, and Malaysia, with 133 publications, is in third place. Examining the geographic distribution of studies' output can monitor the relative studies' strengths and collaborations amongst specific countries. This analysis will highlight the global landscape of e-trade adoption studies, identifying the maximum lively areas and ability for worldwide collaboration.

S is leading with 2nd position and 11 publications, and Chong W published 9 articles and is leading with 3rd position. These insights show the authors who contributed the most in this area.

Quality Indicators

Table 7 represents the ten authors with the most significant citations on the e-commerce adoption topic, identified using quality metrics. Among those 10 is Grandon EE, who has the most citations (761). Their study, published in 2004, presents a factor involved in e-

Table 5. Total publications by different journals.

Sl. No	Sources	Articles
1	Sustainability	28
2	Journal of Electronic Commerce in Organizations	16
3	Journal of Small Business and Enterprise Development	12
4	Journal of Theoretical and Applied Electronic Commerce Research	12
5	Journal of Enterprise Information Management	11
6	Journal of Global Information Technology Management	11
7	Lecture Notes in Networks and Systems	11
8	Electronic Commerce Research	10
9	Ifip Advances in Information and Communication Technology	10
10	International Journal of Business Information Systems	10

There are twenty-eight articles in the leading Journal, Sustainability. Sixteen papers appeared in the Journal of Electronic Commerce in Organization and 12 articles in

commerce adoption with an SME framework for describing and developing e-commerce variables, such as managerial productivity, operational support, and

strategic decision aids. Citation counts the impact of the particular author's publication in the research area.

Table 9 represents the journal with the highest number of citations. The journal with the most significant number

Table 6. Number of articles published by a different author (most relevant author).

Sl No	Authors	Articles	Articles Fractionalized
1	Macgregor R	13	6.67
2	Lim S	11	2.9
3	Chong W	9	2.75
4	Vrazalic L	9	4.5
5	Li Y	8	2.37
6	Wu M	8	3.12
7	Chen H	7	2.81
8	Gide E	7	2.92
9	Packham G	7	1.67
10	Thomas B	7	2

Table 7. Top author with the highest citations

Sl. no	Author	h_index	g_index	m_index	Total citations	NP	PY_start
1	Grandon EE	2	3	0.095	761	3	2004
2	Pearson Jm	2	3	0.095	761	3	2004
3	Li L	2	3	0.25	678	3	2017
4	Mao J-Y	1	1	0.143	670	1	2018
5	Su F	1	1	0.143	670	1	2018
6	Zhang W	1	1	0.143	670	1	2018
7	Ghobakhloo M	4	4	0.286	464	4	2011
8	Scupola A	4	5	0.182	461	5	2003
9	Daniel E	4	4	0.174	415	4	2002
10	Arias-Aranda D	1	1	0.071	402	1	2011

Table 8. Top citations article.

SL no	Paper	Total citations	TC per Year	Normalised TC
1	(Grandon annd Pearson, 2004)	732	34.85	10.4832
2	(Li et al., 2018)	670	95.71	27.5262
3	(Ghobakhloo et al., 2011)	402	28.71	12.2995
4	(Myovella et al., 2020)	264	52.80	16.2424
5	(Hugger, 2003)	253	11.50	5.1189
6	(Rao et al., 2003)	252	11.45	5.0987
7	(Daniel and Wilson, 2002)	250	10.86	6.7659
8	(Awa et al., 2015)	230	23.00	6.1883
9	(Ainin et al., 2015)	213	21.30	3.4237
10	(Kurnia et al., 2015)	206	20.60	5.5426

Table 8 represents the top 10 most cited documents. Among these top 10, Grandon EE published an article in 2004 (Grandon and Pearson, 2004), which got a maximum of 643 citations. External pressure, organisational readiness, perceived utility, and perceived ease of use were identified as the four elements that impact electronic commerce adoption.

Industrial management and data systems are second, with 894 citations. Industrial Management and Data Systems Journal is an interdisciplinary publication that combines operations management and information systems research. New technologies are a significant part of this, particularly emphasising the impact of green IT, sustainable supply chains, big data, and social media on businesses.

Table 9. Top cited articles.

Sl. No	Element	h index	g index	m index	TC	NP	PY start
1	Journal Of Small Business and Enterprise Development	12	12	0.522	966	12	2002
2	Industrial Management & Data Systems	7	8	0.412	894	8	2008
3	Information And Management	1	1	0.048	732	1	2004
4	Information Systems Journal	1	1	0.143	670	1	2018
5	Journal of Global Information Technology Management	8	8	0.364	640	8	2003
6	Journal of Business Research	4	4	0.235	575	4	2008
7	Journal of Enterprise Information Management	6	6	0.286	557	6	2004
8	International Journal of Information Management	5	5	0.333	433	5	2010
9	Technovation	3	3	0.150	377	3	2005
10	Journal of Electronic Commerce in Organizations	9	14	0.474	352	14	2006
11	International Small Business Journal	3	3	0.130	340	3	2002
12	International Journal of Production Economics	3	3	0.188	283	3	2009
13	Journal Of Science and Technology Policy Management	4	4	0.400	282	4	2015
14	Telecommunications Policy	1	1	0.200	264	1	2020
15	Business Process Management Journal	1	1	0.045	252	1	2003
16	Computers in Human Behavior	2	2	0.250	240	2	2017
17	Sustainability	9	13	0.900	236	25	2015
18	Internet Research	4	4	0.250	231	4	2009
19	Procedia Computer Science	4	4	0.667	230	4	2019
20	Industrial Marketing Management	3	3	0.158	221	3	2006

Structure Indicators

Structure indicators are often used to develop and analyse social networks and interactions and to assess the interconnection of publications, authors, and research fields. In bibliometric analysis, nodes stand in for authors and linkages for co-authorships. As a result, leading researchers may be identified, and the collaborative dynamics of leading researchers can be described by analysing these networks.

The examination of structural indicators revealed 2450 authors in the field, 177 documents with a single author, and an average of 16.42 citations per document. On average, there are 2.69 co-authors per document. The annual growth rate is 12.58%. Networks are more than just abstract depictions of social relationships. According to network theory research, the structure of relationships determines the opportunities, limitations, and results of individual activity. The building elements of social networks are collective actors and the relationships they uphold, which impact actionable possibilities.

There is no primary author for the whole field and no prominent authors for the subnetworks, meaning the network is becoming more decentralised and diverse. These subnetworks could be signs of knowledge

fragmentation since they may be connected to the decomposition of the knowledge field.

Trend topic and Research direction

Analysis of high-frequency keywords by cluster and multiple correspondence analysis

The study used multiple correspondence analysis (MCA) to determine the terms in the combined dataset. Figure 3 depicts the conceptual structure of the keywords related to the published articles included in this study. To create a simple two-dimensional (or three-dimensional) graph that reflects the similarity between the keywords, it condenses large amounts of data with many variables into a low-dimensional space. Nearing the centre are keywords that have recently drawn much attention.

We interpret the results based on the clustering of the dots and their distribution along the axes. As seen on the map, word distributions that are closer together have more in common with one another (Aria & Cuccurullo, 2017). Papers on e-commerce adoption, Small and Medium Enterprises, Information Technology, and information systems in Cluster 1 (in red) comprise different terms related to small businesses. The most important cluster, Cluster 2 (blue), has different keywords concentrating on publications about e-commerce restrictions and developing nations.



Figure 1. Collaboration network between the authors.



Figure 2. Collaboration network between the authors.

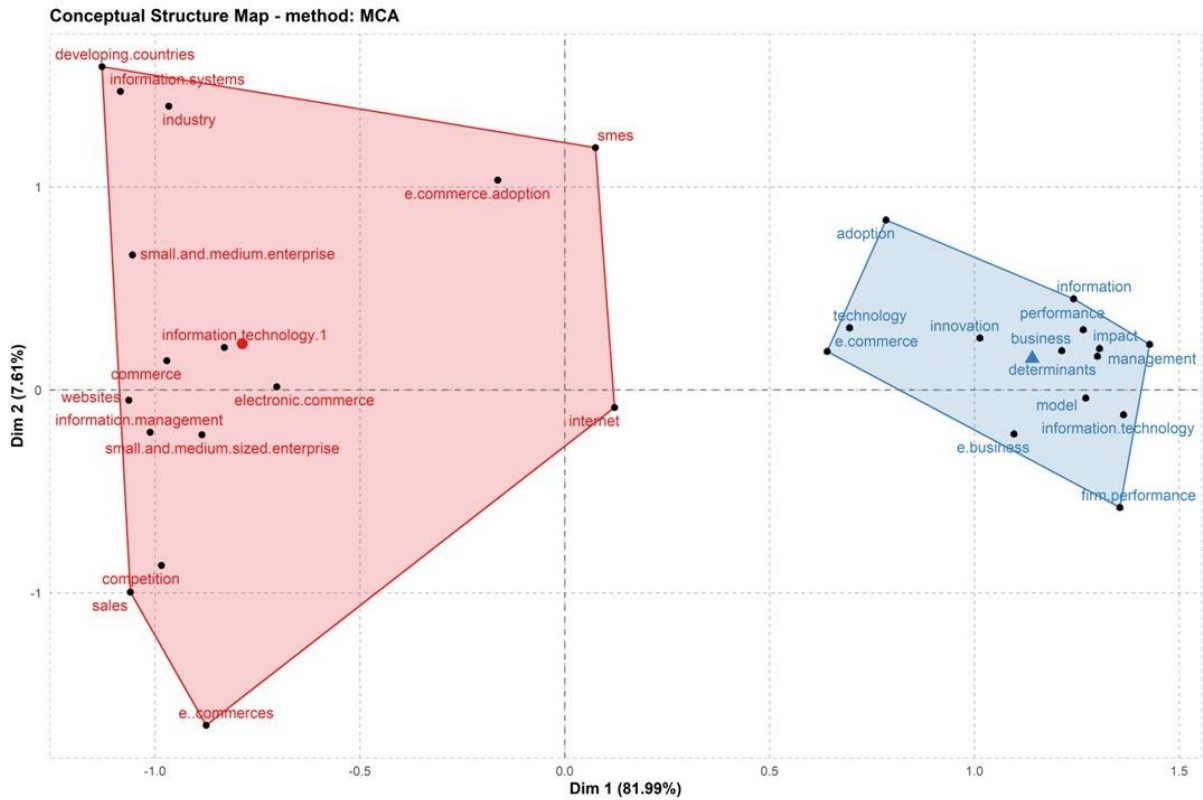


Figure 3. Figure shows the MCA of the Keywords with high frequency mapped conceptually using a factorial analysis of the structural map.

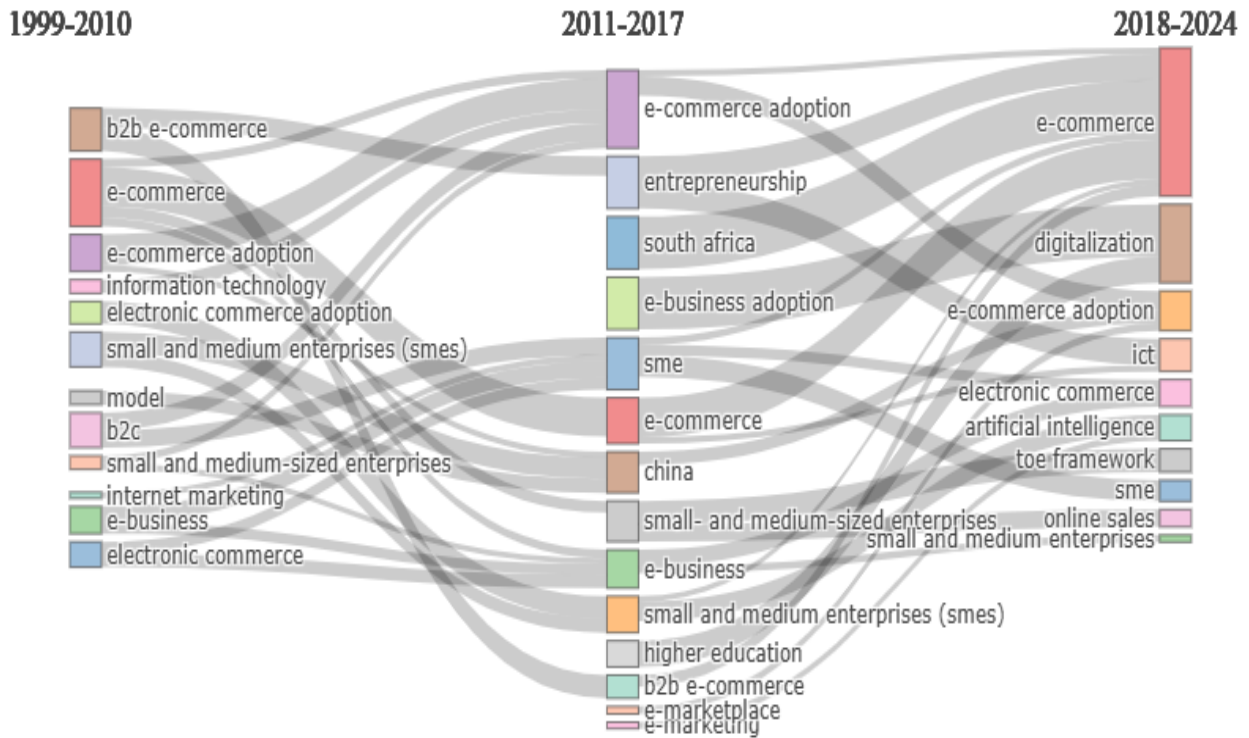


Figure 4. Thematic evaluation of research topics.

Analysis of research topics by thematic evaluation

To create thematic evolution maps, we cluster the domain's term network into its numerous topics. Figure 3 shows the evolution of study participants in e-commerce adoption studies from 1999 to 2024. By analysing the development of themes, we can see how the field's most important topics and findings are shifting over time. Two endpoints, 2010 and 2017, were selected based on the number of publications published.

Table 10. Thematic evaluation in the timeline.

2016	2017	2018	2019	2020	2021	2022	2023	2024
<ul style="list-style-type: none"> • Small and Medium size enterprises • SMES • E-commerce • Internet • Information System 	<ul style="list-style-type: none"> • Information management • E-business • Electronic-commerce • Internet • Marketing 	<ul style="list-style-type: none"> • Adoption • Impact • Sales • Marketing • E-commerce 	<ul style="list-style-type: none"> • Employment • Customer satisfaction • Decision making • Information technology 	<ul style="list-style-type: none"> • Cost • Business modelling • User acceptance • International trade • Decision making 	<ul style="list-style-type: none"> • Cost • Electronic commerce • Big data • SME's 	<ul style="list-style-type: none"> • Innovation • Impact • Performance • Management 	<ul style="list-style-type: none"> • Cross border e-commerce • Electronic commerce • Competitive advantage • Cloud computing • Social media 	<ul style="list-style-type: none"> • Innovation • Artificial intelligence • Digital transformation • Digitilization • Risk assesment

E-business, e-commerce, SMEs, and electronic commerce keywords begin as a distinct subject from 1999 to 2010. "E-commerce" is subdivided into "e-marketplace", "e-marketing", "entrepreneurship", and "SMEs" in the following time slice (2011-2017). This incidence can be explained by an e-commerce adoption study in SMEs, concentrating on entrepreneurship and the e-marketplace. "SMEs" is divided into "e-commerce," "entrepreneurship," "e-marketing" and "e-marketplace". The division is because SMEs have also focused more on e-marketplaces, adopting e-commerce, and adopting e-business.

Next time slice (2018-2024), "e-commerce" is subdivided into "artificial intelligence," "digitalization," "ICT," and "online sales," indicating a move in the study of e-commerce to more complex concepts and how to tackle them. "SMEs are divided into three branches: "e-commerce," "e-business," and artificial intelligence, demonstrating the focus of SMEs' new business marketplace and sustainability in that.

Analysis of keywords

Using keyword analysis, scientists may better identify and record the most pressing research questions, emerging trends, and areas of study (Huang et al., 2021). Graph 2 depicts a study of keyword co-occurrence using a knowledge map, a study of e-commerce adoption in SMEs, and a study in R studio.

In the keyword occurrences graph, the most prominent pick representative term is "electronic commerce (372)," after the keywords, the total number of articles in which they appeared is shown in parentheses. The fact that the keyword "electronic commerce" was found in 372 of all the databases shows that it is the most important thing to

know about this study topic. This cluster also contains keywords like SMES (143), Information Technology (63), and Performance (60).

Trending Topics

Researchers can identify the hottest subjects in a specific study field using bibliometric analysis of the most frequently used keywords (Pesta et al., 2018). Figure 5 shows the study trend and hot subjects in SME research on e-commerce services from 2020 to 2024. It shows that concepts like artificial intelligence, data

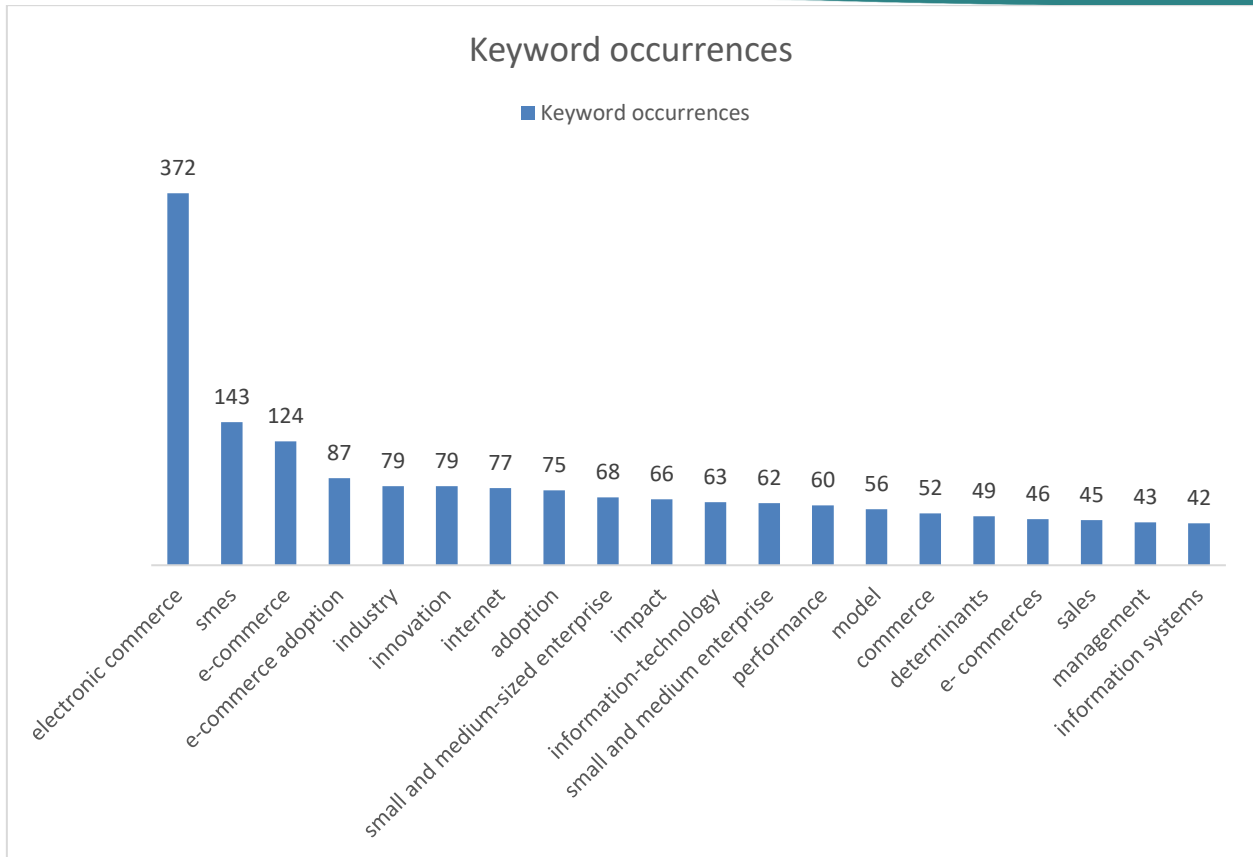
analytics, firm performance, international trade, cloud computing adoption, innovation, competitive advantage, etc., have been the trending topics. Future researchers can use this list of trending keywords to analyse the direction of adoption of e-commerce in SME context research from time to time.

Research Agenda

Based on Figure 4 and Figure 5, we present a research agenda with recommendations for components to consider when adopting e-commerce. This agenda is intended as a research roadmap for the future. The bibliometric analysis revealed that the analysis of the adoption processes of e-commerce in SMEs in emerging countries, utilising dependable models such as the TAM, the theory of planned behaviour (TPB), and, more recently, the technological, organisational, and environmental (TOE) framework, is of great importance to the field of e-commerce research at present.

The findings of the bibliometric analysis indicate an increase in interest in the topic since 2011, with 2022 ranking as one of the most prolific years, with 122 papers produced. Due to COVID-19, the demand for e-commerce has increased. We need to focus on the sustainability of SMEs in the e-commerce platform and avail ourselves of the opportunity. The results of the bibliometric analysis provide an overview of prior themes that have been published and show the publishing trend in small and medium enterprises adopting e-commerce. We also examined the concept's thematic development and status to suggest future research options.

The role of management in an organisation and its organisational structure and culture have been recognised as the main factors in e-commerce adoption. Businesses



Graph 2 . Most frequent keyword occurrences.

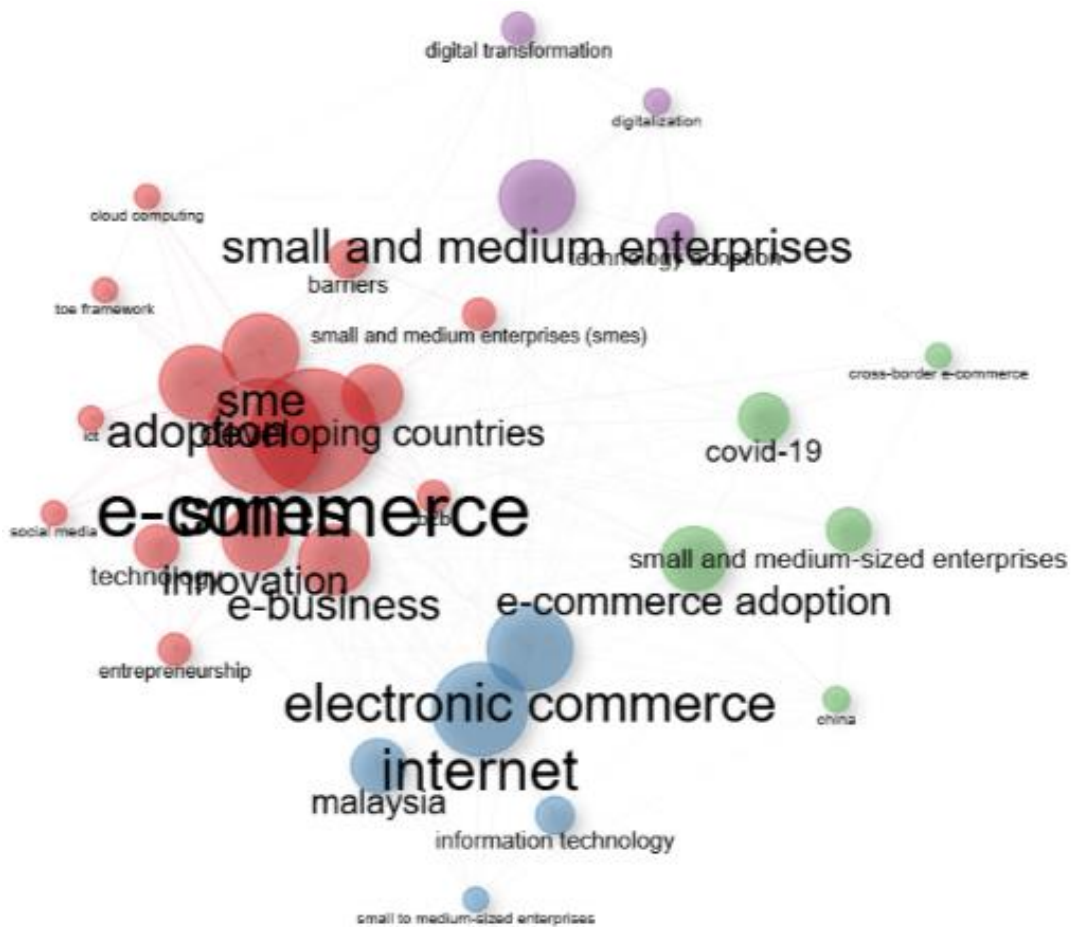


Figure 5. Most frequently used keywords.

that rely on technological and financial resources and have flexible organisational structures are likelier to adopt an e-commerce strategy with some risk.

Findings indicate the necessity of evaluating readiness and technical opportunity, as well as company heads' familiarity with computer systems, support within the organisation, relative value, and suitability when determining the elements that encourage e-commerce adoption in SMEs. Also, many factors are involved in the implementation process, like the registration process in the e-commerce platform, the requirement for relevant documents, brand approval, the listing process, etc., which also affect the adoption of e-commerce.

authors, research networks, current research trends, emerging topics in collaboration, and knowledge sharing among SMEs. This paper offers valuable insights into the current state of research in this field, unravelling the intricate knowledge structure and highlighting the growing significance of this study area.

Limitation

The first limitation of this research is the period covered by the WOS database (2001–May 2024) and the Scopus database (1999 - May 2024).

The second limitation is that we restricted ourselves to the Web of Science and Scopus databases in our

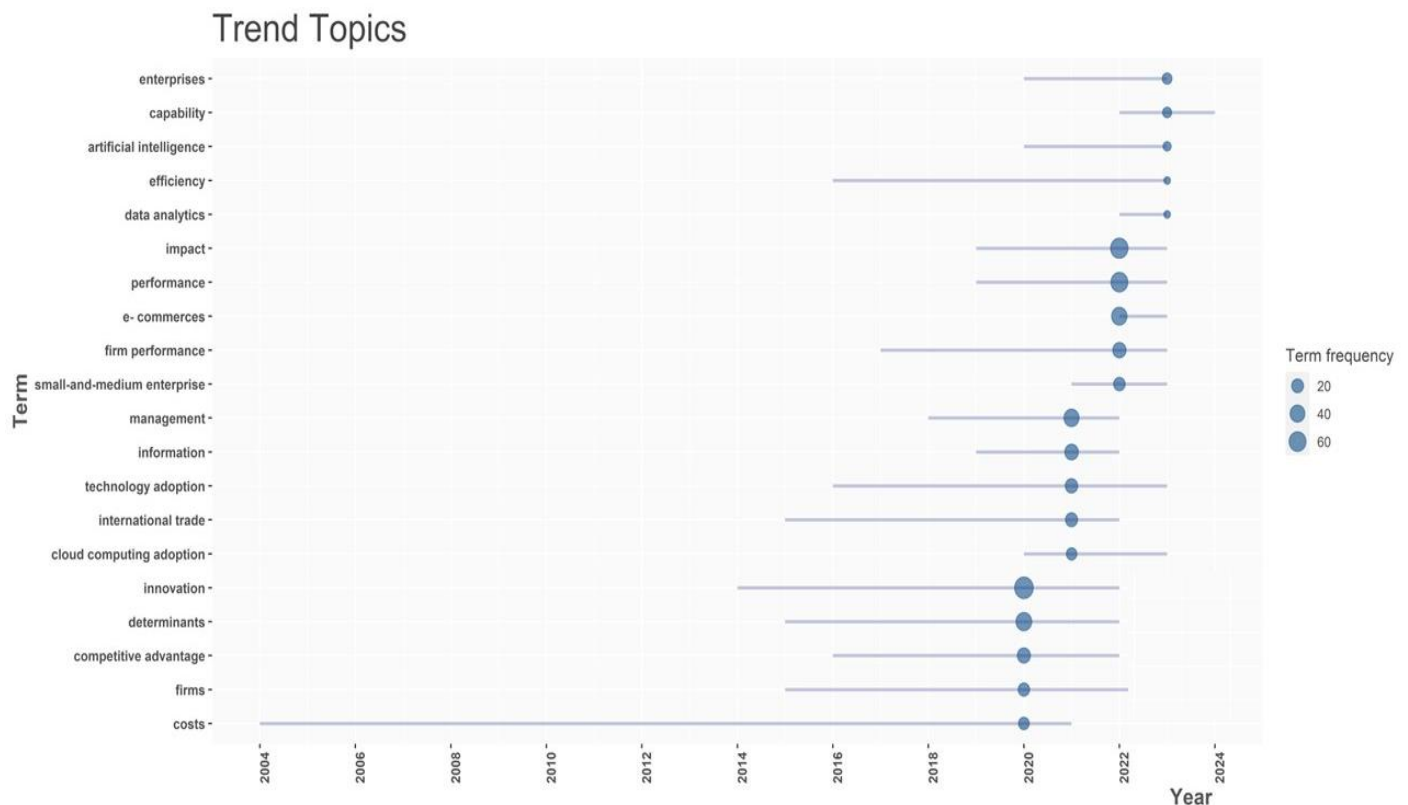


Figure 6. Most trending topics.

Implications

Bibliometric analysis on e-commerce adoption by SMEs can provide valuable insights that contribute to the current knowledge base. Analysis of the authors, publications, citations, keywords and current research trends provides a structure for current studies regarding e-commerce adoption in SMEs. This research identified the highly cited documents and influenced authors, acknowledged their contribution, and highlighted future research directions. Mapping the research communities and identifying the key authors can further collaborate among the researchers and share interest and expertise in adopting e-commerce in SMEs. The analysis can reveal the strategies and factors that most influence the adoption of e-commerce. The study highlighted the essential

bibliometric analysis of the literature on SMEs' adoption of electronic commerce. Future studies should evaluate others, such as Google Scholar and other databases. We also assess a subset of papers, conference proceedings, and publications. Future research should incorporate research notes, books, research notes, and theses as document categories.

Thirdly, the Journal's publications lack keyword indexes for much of its history, especially for older periods. Research should compare the three databases reviewed in this study on topics other than those reported in e-commerce adoption in SME literature to test the validity of current results.

Conclusion

For academics in all fields, bibliometric analysis is becoming critical. As articles appear and evolve in fragments, amassing information becomes increasingly tricky. The identification of intellectual structure and the research front of E-commerce domains is significant not only for research but also for organisations, industries, and policymakers.

Bibliometric is an open-source tool for a thorough E-commerce adoption in SME literature study. When it was written in R, its flexibility and ease of interface with other statistical and graphical tools were priorities. Because bibliometrics is a field of study that is continually evolving, it is flexible enough to allow for rapid integration and upgrading. Its development can address a sizable and engaged developer community created by eminent researchers.

As SMEs comprise a significant portion of the business sector in developing economies, these countries are the primary focus of current research. The slow adoption of e-commerce among small businesses may be traced back to several challenges, such as the perception of adoption and the financial constraints to investing in technology.

Smartphones can help people accept new technologies and allow SMEs to participate in global trade. However, the focus on macro factors in adopting e-commerce has diminished across study domains (electronic marketplaces, consumer behaviour, social theory, and economic analysis).

Researchers may be less interested in these parts of the study of how e-commerce is used because they have been focusing on and specialising in specific factors that affect their use. They have also been paying attention to how the business world and consumers see and feel about the variables involved in its adoption.

Conflict of Interest

The authors declare no conflict of interest.

References

- Abdulkarem, A., Hou, W., Elia, S., Giuffrida, M., Mariani, M. M., Bresciani, S., Sila, I., Dobni, D., Kabanda, S., Brown, I., Minatogawa, V., Franco, M., Durán, O., Quadros, R., Holgado, M., Batocchio, A., Awiagah, R., Kang, J., Lim, J. I., ... De Saulles, M. (2021). Decision factors for the adoption and continued use of online direct sales channels among SMEs. *Sustainability (Switzerland)*, *14*(1), 24–53. <https://doi.org/10.4018/jgim.2005070102>
- Ainin, S., Parveen, F., Moghavvemi, S., Jaafar, N. I., & Shuib, N. L. M. (2015). Factors influencing the use of social media by SMEs and its performance outcomes. *Industrial Management & Data Systems*, *115*(3), 570–588. <https://doi.org/10.1108/IMDS-07-2014-0205>
- Al-Alawi, A. I., & Al-Ali, F. M. (2015). Factors affecting e-commerce adoption in SMEs in the GCC: An empirical study of Kuwait. *Research Journal of Information Technology*, *7*(1), 1–21. <https://doi.org/10.3923/rjit.2015.1.21>
- Al-Bakri, A. A., & Katsioloudes, M. I. (2015). The factors affecting e-commerce adoption by Jordanian SMEs. *Management Research Review*, *38*(7), 726–749. <https://doi.org/10.1108/MRR-12-2013-0291>
- Almtiri, Z., Miah, S. J., & Noman, N. (2023). Application of E-commerce Technologies in Accelerating the Success of SME Operation. *Lecture Notes in Networks and Systems*, *448*, 463–470. https://doi.org/10.1007/978-981-19-1610-6_40
- 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>
- Awa, H. O., Baridam, D. M., & Nwibere, B. M. (2015). Demographic determinants of electronic commerce (EC) adoption by SMEs: A twist by location factors. *Journal of Enterprise Information Management*, *28*(3), 326–345. <https://doi.org/10.1108/JEIM-10-2013-0073>
- Bening, S. A., Dachyar, M., Pratama, N. R., Park, J., & Chang, Y. (2023). E-Commerce Technologies Adoption Strategy Selection in Indonesian SMEs Using the Decision-Makers, Technological, Organizational and Environmental (DTOE) Framework. *Sustainability (Switzerland)*, *15*(12). <https://doi.org/10.3390/su15129361>
- Chan, F. T. S., Chong, A. Y.-L., & Zhou, L. (2012). An empirical investigation of factors affecting e-collaboration diffusion in SMEs. *International Journal of Production Economics*, *138*(2), 329–344. <https://doi.org/10.1016/j.ijpe.2012.04.004>

- Costa, J., & Castro, R. (2021). Smes must go online—e-commerce as an escape hatch for resilience and survivability. *Journal of Theoretical and Applied Electronic Commerce Research*, 16(7), 3043–3062. <https://doi.org/10.3390/jtaer16070166>
- Daniel, E., & Wilson, H. (2002). Adoption intentions and benefits realised: A study of e-commerce in UK SMEs. *Journal of Small Business and Enterprise Development*, 9(4), 331–348. <https://doi.org/10.1108/14626000210450522>
- Gao, J., Siddik, A. B., Khawar Abbas, S., Hamayun, M., Masukujjaman, M., & Alam, S. S. (2023). Impact of E-Commerce and Digital Marketing Adoption on the Financial and Sustainability Performance of MSMEs during the COVID-19 Pandemic: An Empirical Study. *Sustainability (Switzerland)*, 15(2). <https://doi.org/10.3390/su15021594>
- Ghobakhloo, M., Arias-Aranda, D., & Benitez-Amado, J. (2011). Adoption of e-commerce applications in SMEs. *Industrial Management and Data Systems*, 111(8), 1238–1269. <https://doi.org/10.1108/02635571111170785>
- Grandon, E. E., & Pearson, J. M. (2004). Electronic commerce adoption: An empirical study of small and medium US businesses. *Information and Management*, 42(1), 197–216. <https://doi.org/10.1016/j.im.2003.12.010>
- Hossain, M. B., Dewan, N., Senin, A. A., & Illes, C. B. (2023). Evaluating the utilization of technological factors to promote e-commerce adoption in small and medium enterprises. *Electronic Commerce Research*, 0123456789. <https://doi.org/10.1007/s10660-023-09692-7>
- Hugger, A. S. (2003). The adoption of internet commerce by SMEs in the south of Italy: an environmental, technological and organizational perspective. *Journal of Global Information Technology Management*, 1(6), 52–71. <https://doi.org/10.1080/1097198X.2003.10856343>
- Kurnia, S., Choudrie, J., Mahbubur, R. M., Alzougool, B., Kumia, S., Choudrie, J., Mahbubur, R. M., & Alzougool, B. (2015). E-commerce technology adoption: A Malaysian grocery SME retail sector study. *Journal of Business Research*, 68(9), 1906–1918. <https://doi.org/10.1016/j.jbusres.2014.12.010>
- Kuruwitaarachchi, N., & Ali Khatibi, S. F. A. (2020). Information Technology Factors Influence the Adoption to Ecommerce in Small and Medium Scale Organizations in Sri Lanka: A Research Agenda. *International Journal of E-Education, e-Business, e-Management and e-Learning*, 10(1), 95–103. <https://doi.org/10.17706/ijeeee.2020.10.1.95-103>
- Li, L., Su, F., Zhang, W., & Mao, J.-Y. (2018). Digital transformation by SME entrepreneurs: A capability perspective. *Information Systems Journal*, 28(6), 1129–1157. <https://doi.org/10.1111/isj.12153>
- MacGregor, R., & Vrazalic, L. (2007). Small business clusters and their role in prioritising barriers to e-commerce adoption: A study of two approaches to cluster development. *International Journal of Electronic Marketing and Retailing*, 1(3), 236–259. <https://doi.org/10.1504/IJEMR.2007.013055>
- Maryeni, Y. Y., Govindaraju, R., Prihartono, B., & Sudirman, I. (2012). Technological and organizational factors influencing the e-commerce adoption by Indonesian SMEs. *2012 IEEE 6th International Conference on Management of Innovation and Technology, ICMIT 2012*, 436–441. <https://doi.org/10.1109/ICMIT.2012.6225845>
- Mittal, P., & Jora, R. (2023). Exploring student community engagement in higher education: A bibliometric analysis on the path to sustainable development. *Int. J. Exp. Res. Rev.*, 32, 166-177. <https://doi.org/10.52756/ijerr.2023.v32.014>
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). *Academia and Clinic Annals of Internal Medicine Preferred Reporting Items for Systematic Reviews and Meta-Analyses*: 151(4), 264–269. <https://doi.org/10.7326/0003-4819-151-4-200908180-00135>
- Myovella, G., Karacuka, M., & Haucap, J. (2020). Digitalization and economic growth: A comparative analysis of Sub-Saharan Africa and OECD economies. *Telecommunications Policy*, 44(2). <https://doi.org/10.1016/j.telpol.2019.101856>
- Narayanmoorthi, R., Vimala Juliet, A., Mohapatra, O., & Dominic Savio, A. (2016). The effect of

- technology, organization factors on e-commerce adoption among Palestinian SMEs. *Indian Journal of Science and Technology*, 9(38). <https://doi.org/10.17485/ijst/2016/v9i38/101279>
- Nazir, M. A., & Roomi, M. A. (2021). Barriers to Adopting Electronic Commerce for Small and Medium-sized Enterprises in Emerging Economies. *EMAJ: Emerging Markets Journal*, 10(2), 43–55. <https://doi.org/10.5195/emaj.2020.203>
- Ngai, E. W. T., & Wat, F. K. T. (2002). A literature review and classification of electronic Commerce Research, 39, 415–429. [https://doi.org/https://doi.org/10.1016/S0378-7206\(01\)00107-0](https://doi.org/https://doi.org/10.1016/S0378-7206(01)00107-0)
- Ocloo, C. E., Xuhua, H., Akaba, S., Shi, J., & Worwui-Brown, D. K. (2020). The Determinant Factors of Business to Business (B2B) E-Commerce Adoption in Small- and Medium-Sized Manufacturing Enterprises. *Journal of Global Information Technology Management*, pp. 191–216. <https://doi.org/10.1080/1097198X.2020.1792229>
- Olatokun, W., & Kebonye, M. (2010). e-Commerce technology adoption by SMEs in Botswana. *Australian Journal of Emerging Technologies and Society*, 8(1), 42–56. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-78049513526&partnerID=40&md5=b7813350d768748c00c7bdcd45397bff>
- Pesta, B., Fuerst, J., & Kirkegaard, E. O. W. (2018). *Bibliometric Keyword Analysis across Seventeen Years (2000–2016) of Intelligence Articles*. <https://doi.org/10.3390/jintelligence6040046>
- Quaddus, M., Hofmeyer, G., Quaddus, M., & Hofmeyer, G. (2017). An investigation into the factors influencing the adoption of B2B trading exchanges in small businesses An investigation into the factors influencing the adoption of B2B trading exchanges in small businesses. 9344. <https://doi.org/10.1057/palgrave.ejis.3000671>
- Rao Glenn A.; Monge, Carlo A. Mora, S. S. M. (2003). Electronic commerce development in small and medium sized enterprises: A stage model and its implications. *Business Process Management Journal*, 9(1), 11–32. <https://doi.org/10.1108/14637150310461378>
- Shafi, S., Reshi, A., Shah, A., Al-Mutairi, R. H., Al-Mutairi, G., & Ahmad, A. (2024). Artificial Intelligence Driven Bibliometric Insights: Pioneering Down Syndrome Research. *International Journal of Experimental Research and Review*, 37(Special Vo), 68-84. <https://doi.org/10.52756/ijerr.2024.v37spl.006>
- Salah, O. H., & Ayyash, M. M. (2024). E-commerce adoption by SMEs and its effect on marketing performance: An extended of TOE framework with AI integration, innovation culture, and customer tech-savviness. *Journal of Open Innovation: Technology, Market, and Complexity*, 10(1), 100183. <https://doi.org/10.1016/j.joitmc.2023.100183>
- Satar, M. S. (2022). Factors of E-Business Adoption in Small and Medium Enterprises: Evidence from Saudi Arabia. 2022. <https://doi.org/https://doi.org/10.1155/2022/2445624>
- Sujatha, R., & Karthikeyan, M. S. (2021). Determinants of e-commerce adoption: Evidence from small and medium-sized enterprises in India. *International Journal of Business and Society*, 22(2), 574–590. <https://doi.org/10.33736/ijbs.3740.2021>
- Tan, K. S., Chong, S. C., Lin, B., & Eze, U. C. (2009). Internet-based ICT adoption: evidence from Malaysian SMEs. *INDUSTRIAL MANAGEMENT & DATA SYSTEMS*, 109(1–2), 224–244. <https://doi.org/10.1108/02635570910930118>
- Walker, J. H., Saffu, K., & Mazurek, M. (2016). An Empirical Study of Factors Influencing E-Commerce Adoption/Non-Adoption in Slovakian SMEs. *Journal of Internet Commerce*, 15(3), 189–213. <https://doi.org/10.1080/15332861.2016.1191049>
- Yadav, H., Soni, U., Gupta, S., & Kumar, G. (2022). Evaluation of barriers in the adoption of E-commerce technology in SMEs: A fuzzy DEMATEL approach. *Journal of Electronic Commerce in Organizations*, 20(1), 1–18. <https://doi.org/10.4018/JECO.292472>

Yu, J., Zhao, J., Zhou, C., & Ren, Y. (2022). Strategic Business Mode Choices for E-Commerce Platforms under Brand Competition. *Journal of Theoretical and Applied Electronic Commerce Research*, 17(4), 1769–1790.

<https://doi.org/10.3390/jtaer17040089>

How to cite this Article:

Suraj Kumar and K Francis Sudhakar (2024). E-commerce adoption and sustainability with SMEs – An advanced bibliometric analysis. *International Journal of Experimental Research and Review*, 40(spl.), 24-40.

DOI: <https://doi.org/10.52756/ijerr.2024.v40spl.003>



This work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License.