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Kuldeep Kumar Kamboj, Ankit Kesharwani, Rakesh Mohan Joshi, Prateek Maheshwari

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Kuldeep Kumar Kamboj

Indian Institute of Foreign Trade (IIFT), IIFT Bhawan, B-21, Qutab Institutional Area, New Delhi, 110016, India Email: kkamboj1@gmail.com

Ankit Kesharwani*

Indian Institute of Management Rohtak, IIM Rohtak Campus, Southern Bypass, Management City, Sunarian, Rohtak, Haryana, 124010, India Email: Kesharwani.ankit@gmail.com *Corresponding author

Rakesh Mohan Joshi

Indian Institute of Plantation Management Bangalore, IIFT Bhawan, B-21, Qutab Institutional Area, New Delhi, 110016, India Email: director@iipmb.edu.in Email: rakeshmohanjoshi@iift.edu

Prateek Maheshwari

Indian Institute of Foreign Trade, IIFT Bhawan, B-21, Qutab Institutional Area, New Delhi, 110016, India Email: prateek@iift.edu

Abstract: The rise of mobile payment systems has transformed how we conduct financial transactions, making it a topic of increasing interest in the research community. This research uses the 5W-1H framework to assess and understand the research pattern within this domain. The study selected 784 open-access research documents from the Scopus database published in the last 15 years related to business management and allied areas. The selected papers were analysed using bibliometric methods of literature review aided by VOSviewer and Biblioshiny software. The findings provide insights into the current trends and themes within the field, revealing significant contributors and directions for future research. The analysis also emphasises the importance of using appropriate selection tools and keywords to limit study outcomes.

Overall, this research paper contributes to understanding the mobile payment systems domain and offers valuable implications for researchers and practitioners alike, highlighting areas of potential growth and development within the field.

Keywords: mobile payment systems; m-payment systems; digital payments; mobile payment adoption; bibliography; VOSviewer; Biblioshiny.

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Biographical notes: Kuldeep Kumar Kamboj is a research scholar at IIFT, New Delhi, and an alumnus of FMS, Delhi, boasts over 15 years of global expertise. Currently, he is serving as the Chief Manager and National Lead in Bancassurance and Credit at a prominent Government of India financial institution. He has garnered experience from reputable organisations such as STC, Wipro Consulting, UIDAI, and HCL. He excels in institution-building, extending financial services to grassroots levels. In his current role, he played a crucial role in establishing India's largest interoperable banking infrastructure, utilising Aadhaar and India Stack. His diverse background in the industry and academic contributions at IIFT, significantly contribute towards the growth of the insurance and financial sector in India.

Ankit Kesharwani is an Assistant Professor specialising in Marketing and Strategy, brings over eight years of post-PhD teaching experience. He was previously associated with IIFT Delhi Campus (2018–2021) and IBS Hyderabad (2014–2018). His expertise lies in digital marketing, marketing analytics, and business research methods. With a PhD from the University of Memphis, USA, he has conducted training sessions for government and corporate organisations, contributing to projects like LPI-S 2020, LEADS 2021, and KVIC 2021. He has published extensively in esteemed international journals, focusing on technology adoption, mobile health apps, mobile payment apps, and more.

Rakesh Mohan Joshi is the Director of the Indian Institute of Plantation Management, Bangalore and a Professor at the Indian Institute of Foreign Trade, New Delhi. He has held various positions including Professor and Chairperson (Research) at the Indian Institute of Foreign Trade, New Delhi. His books, *International Business* and *International Marketing* published by Oxford University Press are widely prescribed across the world. His Case studies were awarded by London Business School and published internationally.

Prateek Maheshwari is an Assistant Professor in Marketing at IIFT, New Delhi, possesses over ten years of academic and two years of corporate experience. He holds a PhD in Management and is UGC-NET qualified. With degrees in Engineering and Management, he completed a Faculty Development program from Aston University, UK. He advocates for collaborative learning and believes in the true purpose of education. His research interests span marketing, general management, and educational innovation. He has published in reputable journals, participated in conferences, and contributed to workshops and seminars nationally and internationally.

1 Introduction

Mobile payments refer to transactions that are conducted through a mobile device, which serves as the interface for initiating and completing the transaction (van der Heijden, 2002). The advent of e-commerce has opened various avenues for changes and advances in business activities (Bezhovski, 2016), including how payments have been carried out. The ongoing advancements and continual evolution of e-commerce have significantly increased the prevalence of mobile payments within commercial organisations, with mobile payments emerging as a prominent component (Mützel, 2021).

The concept of a mobile payment system has been defined as a payment service that utilises information and communication technologies to facilitate the exchange of money (Kar, 2021). With the advent of wireless technology, mobile payments have become increasingly popular as they offer greater convenience, reduced transaction fees, and improved electronic payment security (Hoofnagle et al., 2012). These benefits have made mobile payment systems attractive to businesses of all sizes and their customers.

Compared to other payment systems, mobile payment systems provide a more secure payment mechanism, which is why they have become a preferred mode of payment (Hoofnagle et al., 2012). Wang et al. (2016) have classified mobile payment systems into five categories:

- 1 mobile payment at the point-of-sale
- 2 mobile payment as the point-of-sale
- 3 mobile payment platform
- 4 independent mobile payment system
- 5 direct carrier billing.

This categorisation reflects the broad applicability of the mobile payment system and has contributed to its increasing popularity in recent years.

Due to the many advantages that mobile payment systems offer, the area has been widely researched. Researchers have investigated various aspects of mobile payment systems, including their adoption, security, and functionality. Mobile payment systems are the technical infrastructure and tools that enable mobile payments, mobile payment adoption assesses how extensively these systems are adopted and utilised by consumers and businesses (De Luna et al., 2019). As a result, the mobile payment system domain has become an area of significant interest for researchers across different disciplines (Wang et al., 2016).

The mobile payment system has become a popular area of research, with over a hundred published papers and articles related to the subject (Lee et al., 2023). Such a massive volume of data can be challenging to analyse, and hence, this research paper has opted to use bibliometric analysis to perform a meaningful literature review. Bibliometrics refers to a quantitative examination of the various aspects related to the creation, development, advancement, and utilisation of scholarly publications (Moral-Muñoz et al., 2020). This method uses information related to citations, publications, keywords, sources, and other essential data to provide insights into the research trends and themes within the field. For example, two recent studies used bibliometric analysis to investigate the research trends in mobile payment systems from 2005 to 2021 (Abdullah and Khan, 2021) and 2001–2021 (Tounekti et al., 2022). These

publications were limited in scope because they mostly discussed the factors and results of mobile payments make-up. Our study provides a comprehensive review of the mobile payments systems composition. This helps in achieving a holistic understanding of the research conducted thus far and identifies opportunities to advance research in this area further.

Model	Paper title	Application	Reference
Information systems success model	An empirical examination of continuance intention of mobile payment services	How system quality and information quality affect the use and user satisfaction	Zhou (2013)
Technology Acceptance Model (TAM)	Mobile payments adoption by US consumers: an extended TAM	How does the intention to use the Information System to influence the individuals' decision of actual usage of the technology?	Bailey et al. (2017)
Integrated model on mobile payment acceptance (IMMPA)	The integrated model on mobile payment acceptance (IMMPA): an empirical application to public transport	It describes the purchasing decision as a response to stimuli from influences.	Di Pietro et al. (2015)
Unified Theory of Acceptance and Use of Technology (UTAUT)	Examining the intervening role of age and gender on mobile payment acceptance in Ghana: UTAUT model	Investigate the effects of constructs on the behavioural intention to use	Acheampong et al. (2018)

 Table 1
 Models used in various studies

The citations to a particular article, author, and source often indicate the impact it has on the specific field of research. While co-citation helps in finding out the group of authors or topics that have similarities in their work (Pilkington and Liston-Heyes, 1999; Ramos-Rodrígue and Ruíz-Navarro, 2004).

In this research paper, the main aim is to explore the current research trends and themes within the mobile payment system domain using bibliometric analysis. This analysis includes two major components: performance analysis and science mapping (Noyons, 1999; Gutiérrez-Salcedo et al., 2018; Donthu et al., 2021).

The process of performance analysis entails the examination of multiple indicators, including publication output, citation counts, and journal impact factors, with the aim of evaluating the performance of authors, institutions, and countries operating within the domain of mobile payment systems. In contrast, science mapping entails the utilisation of visual depictions, such as co-citation maps and keyword co-occurrence networks, to visually illustrate the interconnections of publications, authors, and keywords within a certain academic domain (Gutiérrez-Salcedo et al., 2018).

To achieve this aim, the research paper seeks to answer several key research questions. The 5W1H (who, what, when, where, why, and how) framework is used as it provides an effective way to process complex data (Little et al., 2023). The research questions are as follows:

- Who are the key scholars or institutions conducting bibliometric analyses of mobile payment systems?
- What aspects of mobile payment systems are being analysed through? Is it their evolution, adoption, technology trends, or something else?
- When was the bibliometric analysis conducted, and what is the timeframe of the research being analysed (e.g., publications up to 2020)?
- Where was the bibliometric data collected? Which databases or sources were used to gather the relevant research articles?
- Why is there a need for a bibliometric analysis of mobile payment systems? Is it to understand trends, gaps in research, or to inform future research directions?
- How was the bibliometric analysis conducted? What metrics or methods were used to assess the literature on mobile payment systems?

This research study endeavours to offer significant insights into the current state of research in the domain of mobile payment systems. It tries to identify major areas of concentration and potential for additional exploration.

The remaining sections of the paper are organised as follows: first, the primary research methodology, bibliometric analysis, is explained. Next, the data and performance of the bibliometric study are analysed. Then, the results and outcome of the research paper are summarised to draw conclusions. The second section explains the research methodology in detail, the third section presents the results and analysis, and the fourth section discusses the implications and limitations of the study. Finally, the paper concludes with a summary of the key findings and suggestions for future research.

2 Literature review

The literature on mobile payment systems is both extensive and continuously evolving, reflecting the ever-changing landscape of technology and consumer behaviour in the digital age (Kalinic et al., 2019; Daragmeh et al., 2021). Researchers have dedicated considerable efforts to exploring various dimensions of mobile payment systems, offering valuable insights into their adoption, security, user experiences, and broader societal implications (Daragmeh et al., 2021). One significant area of research delves into the intricate web of factors that influence the adoption of mobile payment systems (Kalinic et al., 2019). Scholars have conducted in-depth investigations into the role of trust, perceived usefulness, ease of use, and security in shaping consumers' willingness to embrace these innovative payment methods (Verkijika, 2020; Daragmeh et al., 2021). Moreover, studies have meticulously examined how demographic variables, such as age, income levels, and cultural factors, impact adoption patterns, providing a nuanced understanding of user behaviour.

Security and privacy have emerged as paramount concerns within the realm of mobile payments (Moghavvemi et al., 2021). Researchers have tirelessly explored a multitude of strategies to fortify the security of mobile transactions, encompassing robust authentication methods, advanced encryption techniques, and innovative biometric authentication systems. Furthermore, the intricate ethical considerations related to user privacy, data protection, and user consent have been dissected in great detail, offering valuable guidance to policymakers and service providers (Patil et al., 2020). User experiences and the art of interface design have taken centre stage in optimising mobile payment systems (Liébana-Cabanillas et al., 2019; Kalinic et al., 2019). Researchers have conducted extensive usability testing and collected user feedback to refine the design elements that contribute to a seamless and user-friendly payment experience (Verkijika, 2020). This iterative process has not only improved the practicality of mobile payment applications but has also enhanced user satisfaction and trust in these systems.

The societal implications of mobile payment systems represent a captivating area of study (Moghavvemi et al., 2021). Researchers have sought to understand their profound impact on financial inclusion, particularly in underserved regions where mobile payments can bridge gaps in financial access (Patil et al., 2020). Additionally, investigations into the environmental sustainability of mobile payments, when compared to conventional payment methods, have shed light on their potential to reduce carbon footprints and promote environmentally conscious financial transactions (Liébana-Cabanillas et al., 2019; Kalinic et al., 2019). The integration of emerging technologies, notably blockchain and artificial intelligence, into mobile payment systems has emerged as a frontier of exploration. These cutting-edge technologies hold the promise of revolutionising security, transparency, and transaction efficiency within the mobile payments landscape, prompting researchers to assess their feasibility and potential disruptions (Daragmeh et al., 2021).

Recent global events, such as the COVID-19 pandemic, have thrust mobile payment systems into the spotlight (Moghavvemi et al., 2021; Al-Qudah et al., 2022). The pandemic expedited the adoption of contactless and remote payment methods as consumers sought safer alternatives (Sunarjo et al., 2021). Researchers need to study the enduring effects of these behavioural shifts, investigate how industries have adapted to the new payment landscape, and provide timely insights into the ongoing transformation of the financial sector.

3 Methodology

Bibliometric analysis is a quantitative research method that is commonly used to explore and analyse large volumes of scientific data (Donthu et al., 2021). The methodology employed in bibliometric analysis encompasses the utilisation of several quantitative techniques, including citation analysis, on bibliometric data, which consists of units of publishing and citation (Broadus, 1987). Bibliometric analysis is widely recognised as a robust research methodology for investigating shifts in intellectual, social, and conceptual trends within a certain field (Zupic and Čater, 2015). This approach provides insights into the research landscape of a particular field, enabling researchers to identify influential authors, institutions, or publications, as well as to assess the impact and performance of individual researchers or academic journals (Mahi et al., 2021).

Furthermore, bibliometric analysis has the potential to reveal patterns and trends in scientific research, in addition to its utility in evaluating the research effect on individuals and institutions. One potential use of this methodology involves monitoring the progression of research subjects over a period, detecting nascent research domains, and scrutinising author and institutional partnerships (Martí-Parreño et al., 2016). Overall, bibliometric analysis offers a valuable tool for researchers to explore and understand

scientific literature, assess the impact and performance of individual researchers, institutions, and academic journals, and track the evolution of research trends and patterns. The use of this methodology underscores its importance in contemporary research and scholarship. Figure 1 shows the process used for the bibliometric analysis.

The detailed process, as suggested by Donthu et al. (2021), is explained below.





Source: Dahiya et al. (2022)

3.1 Stage 1: Selection of database

In the first stage of a bibliometric analysis of mobile payment systems, the selection of an appropriate database is crucial. The choice of the database should be based on the subject area and research objectives of the study. In this case, the 'Scopus' database was selected for conducting the bibliometric analysis. Scopus is a comprehensive scientific database that covers a wide range of subject areas, including computer science, engineering, and finance. It provides access to a vast collection of academic literature, including peer-reviewed journals, conference proceedings, and books. By selecting Scopus, as the database for the bibliometric analysis of mobile payment systems, the researchers can access a wealth of relevant literature and data. This includes information on key publications, authors, and institutions, as well as citation data and trends in the field.

Overall, the selection of an appropriate database is a critical step in the bibliometric analysis of mobile payment systems. Choosing a comprehensive and relevant database such as Scopus can provide researchers with the necessary data and insights to conduct a thorough analysis of the field.

3.2 Stage 2: data collection and filtration

The second stage in conducting a bibliometric analysis of mobile payment systems involves selecting appropriate keywords and applying filters to refine the search results. In this study, the keyword ('mobile payment system' OR 'm-payment systems' OR 'mobile wallet') has been used to identify relevant research documents. This initial search returned 3,445 research documents, which were considered too broad to be useful.

In order to enhance the relevance of the data, the search has been refined to encompass distinct subject domains, including business, management, and accounting; social sciences; economics, econometrics, and finance; arts and humanities; and multi-disciplinary fields. Furthermore, the search has been restricted to the time period between 2007 and the present day. The study of mobile payment systems in 2007 holds paramount importance due to pivotal developments. The introduction of the iPhone revolutionised smartphones and paved the way for mobile payment apps (Markoska et al., 2015). Concurrently, M-Pesa's launch in Kenya initiated mobile money services, reshaping financial access (Lepoutre and Oguntoye, 2018). The emergence of near field communication (NFC) technology enabled secure contactless payments (Ondrus and Pigneur, 2009). Increased mobile internet accessibility further facilitated transactions (Dahlberg et al., 2008). The long-term impact of these developments continues to shape the mobile payment landscape, making 2007 a focal point for comprehensive research.

These filters help to eliminate irrelevant research documents and refine the search results to include only those that are most relevant to the study. After applying these filters, the number of research documents has been reduced from 3,445 to 927, which is a more manageable dataset for conducting the bibliometric analysis.

By selecting relevant keywords and applying appropriate filters, researchers can obtain a more focused dataset that is better suited to their research objectives. This approach can help to ensure that the bibliometric analysis provides insights and data that are relevant to the specific research questions being addressed.

3.3 Stage 3: data analysis

The third stage in conducting a bibliometric analysis of mobile payment systems involves data analysis. After selecting the relevant documents and downloading them in CSV format, software such as VOSviewer and Biblioshiny from R Studios can be used to analyse the data. In this stage, the data analysis includes several types of analyses, such as relevance and impact analysis of manuscripts, authors, and sources under performance analyses, co-occurrence of keywords, co-citation of authors, and co-citation of documents under science mapping.

The utilisation of relevance and impact analysis serves the purpose of discerning the manuscripts, authors, and sources that hold the utmost significance and influence within the domain of mobile payment systems. This analysis has the potential to offer valuable insights into the most notable contributions in the subject, aiding researchers in the identification of possible collaborators and sources of inspiration for future research endeavours.

In contrast, science mapping entails the examination of the simultaneous occurrence of keywords, the citation of authors in conjunction, and the citation of documents in conjunction. This study facilitates the identification of patterns and correlations among many elements within the discipline, including research themes, authors, and institutions. The utilisation of science mapping techniques can yield a graphical depiction of the organisation and composition of a particular academic discipline, thereby aiding researchers in the identification of potential lacunae in existing knowledge or avenues for future exploration.

In the context of a bibliometric examination of mobile payment systems, data analysis assumes a pivotal role. Through the utilisation of suitable tools and methodologies, researchers have the ability to acquire valuable knowledge on the most pertinent and significant articles, authors, and sources within their respective subjects. This process enables them to discern trends and establish connections that can subsequently enlighten and guide future research endeavours.

3.4 Stage 4: analysing results and drawing conclusions

The fourth stage in conducting a bibliometric analysis of mobile payment systems involves analysing the results and drawing conclusions. Following the collection and analysis of the data, a thorough examination and interpretation of the outcomes is conducted. Bibliometric analysis facilitates researchers in comprehending the conducted investigations and the corresponding outcomes. Through the examination of bibliometric analysis findings, scholars are able to discern the foremost and impactful publications, authors, and sources within the realm of mobile payment systems. Additionally, individuals possess the ability to discern patterns and establish correlations among many elements within the discipline, including study subjects, writers, and institutions. These findings have the potential to assist researchers in identifying possible study gaps or topics that warrant additional examination.

In addition, bibliometric analysis enables academics to evaluate the influence and efficacy of particular scholars, institutions, and academic publications within the respective discipline. Through a comprehensive analysis of citations and publications attributed to specific academics and institutions, researchers are able to discern the most prolific and influential contributions within their respective subject. Overall, the results of the bibliometric analysis provide a comprehensive understanding of the existing literature and research landscape in the field of mobile payment systems. By drawing conclusions based on the findings, researchers can identify research gaps and opportunities for future investigation and contribute to the development of the field.

3.5 Stage 5: summarise

The fifth and final stage in conducting a bibliometric analysis of mobile payment systems involves summarising the results and drawing logical conclusions. After analysing the data and drawing conclusions, the outcomes of the research paper are summarised in a logical and coherent manner.

The summary of the results includes a clear presentation of the most significant findings, including the most relevant and influential manuscripts, authors, and sources in the field of mobile payment systems. Additionally, the summary includes an analysis of the impact and performance of individual researchers, institutions, and academic journals in the field. Furthermore, the summary of the results may also include a discussion of the potential implications and future directions for research in the field of mobile payment systems. This discussion may highlight potential research gaps and opportunities for further investigation, as well as the potential impact of the findings on the field.

Overall, the summary of the results serves as a logical and coherent conclusion to the bibliometric analysis of mobile payment systems. It provides a clear and concise presentation of the most significant findings and their potential implications for the field. This summary can be used to inform future research and contribute to the advancement of the field.

4 Results and discussion

In accordance with the two main types of bibliometric analysis, namely performance analysis and science mapping (Gutiérrez-Salcedo et al., 2018), this section is divided into two major sub-sections. The first sub-section focuses on performance analysis, which involves the evaluation of the relevance and impact of manuscripts, authors, and sources in the field of mobile payment systems. The second sub-section focuses on science mapping, which involves the analysis of the co-occurrence of keywords, the co-citation of authors, and the co-citation of documents to identify patterns and connections in the field of the mobile payment system. By dividing the section in this manner, we aim to provide a comprehensive analysis of the bibliometric data and insights into the research landscape of mobile payment systems.

4.1 Performance analysis

Performance analysis is a bibliometric analysis technique that is used to evaluate the performance of a research domain (Donthu et al., 2021; Kumar et al., 2022). This analysis includes a variety of metrics, such as production trends, the most relevant and impactful authors and sources, and the most frequent keywords. By examining these metrics, performance analysis provides insights into the productivity, impact, and

influence of the research domain, as well as the major contributors to the field. Overall, performance analysis is a valuable tool for researchers seeking to understand the research landscape of a particular field, such as the domain of mobile payment systems.

4.2 Annual scientific production

The term 'annual scientific production' refers to the number of documents that are produced each year in a given field of research. This metric provides insight into the volume and pace of research activity in the field and can be used to track changes and trends over time. By analysing annual scientific production, researchers can gain a better understanding of the research landscape and the pace of development in a particular field.

The graph shows that production has increased since 2007. There are a few years, like 2012 and 2020, which show a decrease in production compared to last year. 2022 has the highest production.





4.3 Most relevant authors

The relevance of authors in a particular field of research can be assessed by the number of documents they have produced. Generally, authors with a higher number of publications are considered more relevant in the field. In Table 2, we present the top fifteen authors in the field of mobile payment systems based on the number of documents they have published. This analysis provides insights into the most prolific and influential authors in the field and highlights potential sources of inspiration and collaboration for future research.

According to Table 2, Liébana-Cabanillas has the highest number of publications, with twenty-three documents. This made the author the most relevant author in the entire research area. It is followed by Muñoz-Leiva, who published 11 papers, and Sánchez-Fernández, who published eight papers.

Authors	Number of documents
Liébana-Cabanillas F.	23
Muñoz-Leiva F.	11
Sánchez-fernández J.	8
Gong X.	7
Ondrus J.	7
Halaweh M.	6
Liu Y.	6
Molinillo S.	6
De Luna I.R.	5
Liu J.	5
Shaikh A.A.	5
Singh B.	5
Zhang H.	5
Zhang J.	5
Zhang K.Z.K.	5

 Table 2
 Top 15 most relevant authors with the number of research documents produced

4.4 Most impactful author

The impact of an author's work can be measured by the effect it has on the entire research domain. To assess this impact, researchers often use metrics such as total citation and H-index. The total citation refers to the total number of times an author's work has been cited by other researchers in the field, while the H-index considers both the number of publications and the number of citations for each publication. By using these metrics, researchers can gain insights into the influence and impact of individual authors in the field of research, such as the domain of mobile payment systems.

4.4.1 Total citations

Total citations (TC) refer to the total number of times that an author's work has been cited by other authors in the field of research. This metric is often used to evaluate the impact of an author's work, as a higher number of citations generally indicates greater influence and significance (Aroeira and Castanho, 2020).

In Figure 3, we present the most impactful authors in the field of mobile payment systems based on total citations. The analysis reveals that the most impactful author is Liebana-Cabanillas F., with a total of 1,305 citations for their work. This is followed by Ondrus J, who has received 1,016 citations, and Mallat N, with 1,010 citations. These authors have made significant contributions to the field of mobile payment systems, and their work has had a major impact on the research domain. By analysing total citations, researchers can gain insights into the most influential authors and their contributions to the field of research.

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Author Local Impact by TC index

4.4.2 *H*-index

H index shows the highest number of documents that receive an equal number of citations. It helps in understanding both the productivity and impact in the overall research field (Bornmann and Daniel, 2007). Higher H index shows the high impact of the author in the entire research area.





Figure 4 shows that Liebana-Cabanillas F has the highest H index of 14. This indicates that the author's 14 documents have at least 14 citations. This is followed by Munoz-Leiva F with an H index of 8 and Ondrus J with an H index of 7.

4.5 Most relevant sources

The relevance of sources is decided by the number of documents published in those sources. Thus, the higher the number of papers published under a particular source, the higher its relevance will be. The graph below shows the top 10 sources in terms of the number of documents published.

As shown in Figure 5, the most relevant source is *Electronic Commerce Research and Applications* with 21 publications. It is followed by *Sustainability (Switzerland)* with 18 publications, and *Telecommunication Policy* with 14 publications.





Most Relevant Sources

4.6 Most cited documents

The impact of the documents in the research field is assessed through the number of citations received by the document.

Table 3 shows that 'Understanding consumer acceptance of mobile payment services: an empirical analysis' is the most cited document with 670 citations. It is followed by a paper titled 'An empirical examination of factors influencing the intention to use mobile payment,' with 658 citations.

4.7 Most productive countries

The country's productivity is assessed by the number of documents produced by the authors and institutions of that country. The higher the number of documents, the more the productivity of a country. Table 4 shows the top 10 countries in terms of documents produced by them.

Table 4 shows that *China* is the most productive country in the world, as it publishes over 144 documents in the field of research. It is followed by the *USA* with 125 publications and *India* with 110 publications.

Document	Title	Citations
Kim et al. (2010)	An empirical examination of factors influencing the intention to use mobile payment	1,906
Au and Kauffman (2008)	Understanding consumer acceptance of mobile payment services: An empirical analysis	1,855
Mallat (2007)	Exploring consumer adoption of mobile payments – A qualitative study	1,490
Oliveira et al. (2016)	Mobile payment: Understanding the determinants of customer adoption and intention to recommend the technology	1,446
Zhou (2013)	An empirical examination of continuance intention of mobile payment services	1,185
Shin (2009)	Towards an understanding of the consumer acceptance of mobile wallet	1,006
Lu et al. (2011)	Dynamics between the trust transfer process and intention to use mobile payment services: A cross-environment perspective	951
Yang et al. (2012)	Mobile payment services adoption across time: An empirical study of the effects of behavioral beliefs, social influences, and personal traits	947
Au and Kauffman (2008)	The economics of mobile payments: Understanding stakeholder issues for an emerging financial technology application	837
Dahlberg et al. (2015)	A critical review of mobile payment research	679

Table 3Most impactful documents with total citations

Table 4	Top 10 countries with the highest number of documents pu	ublished
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Countries	Number of documents published
China	144
USA	125
India	110
UK	55
Indonesia	45
Germany	43
Spain	40
Malaysia	39
Taiwan	37
Australia	27

4.8 Most impactful sources

The impact of the sources refers to the effect the sources have on the entire research domain. The impact of the source is assessed in terms of total citations and the H index.

4.8.1 Total citations

Total citations are the total number of times all the documents of an author have been cited by other authors. The higher the number of citations, the higher the impact of that author is.

Figure 6 Top 10 most impactful sources in terms of total citations (see online version for colours)



Figure 6 shows that the most impactful source considering total citations is *Computers in Human Behavior*, which receives 2,621 citations. It is followed by *Electronic Commerce Research and Applications* with 2,581 citations and *Industrial Management and Data Systems* with 739 citations.

4.8.2 H-Index

A scientist has index h if h of his or her research papers have at least h citations each and the other papers have fewer than h citations each (Hirsch, 2010; Bornmann and Daniel, 2007).

Figure 7 shows that *Electronic Commerce Research and Applications* have the highest H index of 20. This shows that the source's 20 documents have at least 20 citations. This is followed by *Computers in Human Behavior* with an H index of 11 and *Sustainability (Switzerland)* with an H index of 9.

4.9 Most frequent keywords

The frequency of the words refers to the number of times the term has occurred in the entire research literature. Figure 8 shows the top 10 most frequently occurring keywords in the research literature.

The graph shows that the *global system for mobile communication* is the most frequent keyword, with 207 occurrences. It is followed by *mobile payment* with 201 occurrences and *electronic money* having 182 occurrences.





Source Local Impact by H index

Figure 8 Top 10 most frequently occurring words (see online version for colours)



Most Relevant Words

4.10 Science mapping

Science mapping refers to the study of the literature by providing a graphical representation of the relationship between the research units in a particular research domain (Kumar et al., 2022; Donthu et al., 2021). This section includes the co-occurrence of keywords, co-authorship of authors, and co-citation of authors.

4.11 Co-occurrence of keywords

Co-occurrence refers to the occurrence of two keywords together in the research documents. This analysis helps in understanding the link between the keywords in the literature. There are a total of 5,114 keywords. This makes the analysis very difficult and

cumbersome. The threshold of 25 occurrences has been set to make the analysis more meaningful set. This reduces the data to 33 words. The network diagram below shows the link between these 33 most occurring words.





The network diagram shows that there are majorly four clusters. The link strength between two words is shown by the width of the line connecting them. The words with the highest co-occurrence are mobile payments and global systems for mobile communications, as they have a link strength of 168. It is followed by electronic money and a global system for mobile communications with a link strength of 159.

4.12 Co-authorship of authors

The co-authorship analysis refers to the study of links between authors. These links are formed when authors come together and produce research documents. This analysis helps in understanding the collaboration trends between the authors.

There are a total of 2,198 authors. To reduce the data and draw meaningful results, the data is limited by applying the threshold limit of a minimum of 100 citations. This reduces the data to 91 authors. But not all 91 authors have links. The group of 11 authors forms the most significant group with ties.

The network diagram shows that the pair of authors with the highest link strength is Liebana-Cabanillas F. and Munoz-Leiva F. with a link strength of 9. It is followed by the pair of Munoz-Leiva F. and Sanchez-Fernandez J. with a link strength of 8.





Figure 11 Co-citation of Authors (see online version for colours)



4.13 Co-citation of authors

Co-citation refers to the citation of two authors together. The study focuses on understanding the links between the citations received by the authors. There are 35,836 cited authors. It is very huge data. To reduce the data and draw meaningful results, a threshold limit of 150 citations has been applied. The data is reduced from 35,836 authors to 19 cited authors.

The network diagram shows that Liebana-Cabanillas F. and Munoz-Leiva are the most co-cited authors, with a link strength of 1,214. It is followed by Liebana-Cabanillas F. and Sanchez-Fernandez J. with a link strength of 1,011.

5 Conclusions

The study focuses on the bibliometric analysis of the literature available in the research area of mobile payment systems. The data is extracted from the Scopus database, and finally, 927 documents have been selected for analysis. As the volume of data is huge, for literature review, bibliometric analysis is used for the literature review.

The performance analysis shows that annual production is continuously rising. The most relevant author is Liébana-Cabanillas F., the most impactful author in terms of total citations and H index. Therefore, Liébana-Cabanillas F. becomes the most productive author in the entire research area. China is the most productive country, publishing the highest number of documents.

The most relevant keywords are mobile payments and global systems for mobile communications in terms of both the number of occurrences and co-occurrence. This shows that these keywords are currently used more in the research domain both separately and together.

6 Future research agenda

The future of mobile payment presents a multifaceted landscape, shaped by evolving trends, challenges, and the lasting impact of the COVID-19 pandemic. Researchers can explore critical areas such as enhancing security and privacy measures, improving user experiences through innovative interface designs, and addressing cross-border payment complexities (Herget and Steinmüller Krey, 2021; Tu et al., 2022). The integration of emerging technologies, including blockchain and AI, holds promise for advancing mobile payment systems. Moreover, ensuring inclusivity and accessibility, especially in emerging markets, remains a priority (Zhao and Bacao, 2021). Researchers can delve into the evolving regulatory frameworks governing mobile payments and assess their implications. Additionally, the post-pandemic world has accelerated mobile payment adoption, making it essential to investigate the enduring effects on consumer behaviour and industry adaptation. Sustainability and environmental considerations in mobile payments, as well as collaborations within the payment ecosystem, are avenues ripe for exploration (UNESCO, 2021). As mobile payments continue to transform financial transactions globally, these research directions offer a comprehensive roadmap for understanding and shaping this dynamic field.

7 Implications

Our bibliometric analysis offers valuable insights for researchers and professionals in the realm of mobile payment systems. Firstly, it charts the publication trends, signalling the growing interest in mobile payment systems. By pinpointing influential articles and prolific authors within this field, it highlights essential references for scholars and professionals alike. Secondly, our study dissects the prevailing themes and topics that define the intellectual landscape of mobile payment systems. This analysis provides a clear picture of the most critical areas of research, aiding in the identification of knowledge gaps and emerging trends. Lastly, it outlines promising avenues for future research in mobile payment systems, offering a roadmap for scholars looking to contribute to this evolving domain. Marketing professionals can also benefit from our study by gaining a comprehensive understanding of the key subjects covered in the existing research literature. They can leverage this knowledge to streamline literature searches and foster collaborations with academics, ultimately enhancing their grasp of mobile payment systems' intricacies and opportunities.

The implications of future research in mobile payment adoption include enhancing security and privacy for increased trust, improving user experiences to boost adoption, addressing cross-border challenges for global trade, integrating emerging technologies for competitive advantage, promoting financial inclusion in emerging markets, and navigating evolving regulations. Research can help businesses adapt to post-pandemic digital payment trends, adopt sustainable practices, and foster collaborations within the industry. These implications collectively contribute to industry growth, customer satisfaction, and innovation in the mobile payment systems.

8 Limitations

While our research on mobile payment systems has its strengths, it also presents certain limitations. For instance, our bibliometric search was conducted using the specific keyword 'mobile payments' Consequently, we may have missed relevant articles that utilise related terms such as 'm-payment transactions' or 'mobile wallet usage' Future bibliometric analyses can mitigate this limitation by incorporating a broader range of search terms to capture a more comprehensive dataset. Another constraint is our reliance on the Scopus database, which may have resulted in the exclusion of some pertinent articles on mobile payment systems. A potential remedy would involve diversifying the database sources by incorporating platforms like Web of Science (WOS) or Google Scholar to ensure a more exhaustive coverage of the literature. Furthermore, our study focused primarily on articles categorised under the business or management domain, potentially overlooking valuable mobile payment research in other fields. To address this limitation, future research can extend bibliometric analyses to encompass mobile payment studies in various other academic domains.

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