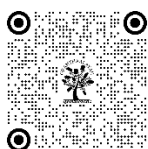# DIGITAL PAYMENT SYSTEMS: GLOBAL RESEARCH TRENDS AND INSIGHTS FROM BIBLIOMETRIC ANALYSIS

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ABSTRACT

This study analyzes a bibliometric analysis of digital payment systems using Scopus database journals from 1987 to 2024, covering four decades of publications and including performance and science mapping analysis of various articles. It uses bibliometrics, performance analysis, and science mapping to analyze 590 articles from the Scopus database. The analysis reveals a notable rise in publications in recent years, with the United States, China, and India being the most productive countries. The top outlets in digital payment system literature are Sustainability, the Journal of Cleaner Production, and Emerald Emerging Market Case Studies. This is the first study to reveal the rapid rise in digital payment system literature, highlighting contributions from the USA, China, and India and identifying key journals. The analysis provides a novel framework for future research, addressing contemporary challenges in the field.

Keywords: Digital Payment Systems, Scopus Database, Bibliometric Analysis, Performance Analysis, Science Mapping, Conceptual Map, Biblioshiny

1. INTRODUCTION

The ascension of digital payment systems marks a paradigm shift in the fabric of global financial transactions, presenting both opportunities and challenges that demand rigorous scholarly attention. With the digital economy burgeoning, fuelled by technological advances and consumer demand for convenience and efficiency, the examination of digital payment systems becomes crucial. This paper sets out to scrutinize the expansive literature on digital payment systems through a comprehensive bibliometric analysis, offering insights into the evolution, current state, and future trajectory of this dynamic field. The significance of digital payments in the modern economy cannot be overstated, as they underpin e-commerce, facilitate international trade, and offer inclusive financial services to unbanked populations (Ozili, 2020). The shift towards digital payments has been accelerated by the Covid 19 outbreak, which underscored the importance of digital finance solutions in maintaining economic activities during lockdowns (World Bank, 2021). Furthermore, the digital payment landscape continues to evolve with the advent of blockchain technology, mobile payment platforms, and peer-to-peer payment systems, expanding the research frontier for academics and practitioners alike (Hayashi & Keeler, 2021). Given the pivotal role of digital payment systems in the global economy and their rapid evolution, there is a pressing need to synthesize the existing literature to discern patterns, identify gaps, and propose directions for future research. Bibliometric analysis refers to the application of quantitative approaches to summarize a

vast array of bibliometric data, such as citations, authors, keywords, and journals. The primary aim is to unveil the underlying intellectual framework and emerging developments within a specific research field. This approach offers an unbiased and time-efficient means of evaluating the effect of research outputs, researchers, and institutions, while also shedding light on the nature and caliber of research collaborations (Havemann & Larsen, 2015). By leveraging bibliometric analysis, researchers can generate impactful studies and establish a solid foundation for constructing discipline in innovating and meaningful ways (Donthu et al. 2021). When using this technique, academics can obtain a thorough understanding, pinpoint areas of incomplete knowledge, produce novel concepts for investigation, and strategically arrange their works within the discipline (Donthu et al 2021).

By applying bibliometric methods to analyze 590 articles from the Scopus record, this research aims to construct a detailed digital payment system research landscape, highlighting influential authors, seminal works, and emerging trends. The vast body of literature on digital payment systems reflects a multidisciplinary interest, encompassing technological innovations, consumer behavior, regulatory frameworks, and economic impacts. Previous bibliometric studies have offered valuable insights into specific aspects of digital payments, such as mobile payment adoption (Zhou, 2014) and the implications for financial inclusion (Demirguc-Kunt et al. 2018). However, to the best of our understanding, comprehensive bibliometric evaluation is still lacking that covers the broad spectrum of digital payment system literature over four decades. This paper represents a novel contribution to the field, setting the stage for future research endeavors and informing policy discussions on digital finance. Additionally, this study not only charts the historical development and current landscape of digital payment system research but also anticipates future trends and challenges in this rapidly evolving domain.

1.1. DIGITAL PAYMENT SYSTEMS

The digital age has revolutionized financial transactions, replacing cash-based exchanges with methods such as mobile payments, e-wallets, and online banking. This shift reflects technological advancements and changing consumer preferences for convenience, speed, and security. The ongoing innovation in digital payment systems presents opportunities for scholarly exploration of their implications for economies, businesses, and consumers.

The relevance of digital payment systems has surged in recent years, an outcome vividly illustrated by their pivotal role amidst the Covid outbreak. With the imposition of social distancing measures and a significant decrease in physical commerce, digital payments became a convenience and necessity for many, accelerating their adoption globally (Olsen et al., 2021). This period underscored the resilience and adaptability of digital payments, further cementing their position in the future of commerce and finance. Research in this area has blossomed, reflecting the complexity and dynamism of digital payment ecosystems. Scholars like Ge et al. (2022) have emphasized the significant link between technological innovation and economic development, highlighting the critical role that consumer-oriented services, accessible via mobile applications, play in this procedure. Karjaluoto et al, 2019 & Vij et al 2020 further explores this relationship, focusing on how mobile banking and payment applications have revolutionized the consumer service sector in developed nations, contributing to enhanced customer satisfaction and corporate growth. The global landscape of digital payments is marked by diversity, with distinct trends emerging in different geographical regions.

Advancement technology has transformed how we conduct transactions, significantly changing the global payment landscape. Digital payments have become the forefront of innovation, offering remarkable efficiency and cost-effectiveness. Their impact extends across various aspects of our lives, from daily routines to social interactions, business operations, and the economy. The Covid 19 pandemic's start has quickened the shift towards online payments, profoundly altering consumer habits. To minimize the risk of virus transmission, individuals and businesses are swiftly embracing digital payment methods, reducing the need for in-person transactions and social interactions. Regulators worldwide endorse digital payments to ensure smooth business operations under mobility restrictions, stimulating economic activities amid significant challenges. Furthermore, the rise of fintech companies has expedited this transformation by providing tailored, fast, secure, and convenient payment solutions. Through cash-back rewards and discounts, these fintech companies have effectively encouraged millions of consumers to adopt digital transactions, thus fuelling ongoing changes in the payment industry.

The COVID-19 outbreak has notably influenced human behavior, particularly with the widespread adoption of remote work, which necessitated rapid and widespread acceptance of digital technology. Purba et al. (2021) underscores the significance of application security in enabling secure transactions for potential consumers. The adoption of mobile

payments signifies a shift towards a society that depends less on physical currency, replacing traditional cash transactions with digital alternatives. Patil et al. (2020) emphasizes the impact of attitudes, societal circumstances, and the COVID-19 pandemic on the inclination to use mobile banking services. Schieman et al. (2021) indicates a substantial change in work patterns during the pandemic, with remote work becoming widespread globally to mitigate viral transmission. Despite encountering challenges, the experience of working remotely has generally been viewed favorably (Békés & Doorn, 2020, Beck & Hensher, 2020; Nundy et al., 2021). Chadee et al, 2021 highlight the lack of specific guidelines for utilizing digital technology in remote employment and increased household energy consumption.

The prevalence of mobile applications in consumer services has become particularly noticeable, a topic explored by Karjaluoto et al, 2019 & Vij et al, 2020. Advanced nations, in particular, have witnessed a substantial surge in mobile banking and payment application use. The perceived value of these services significantly affects customer satisfaction in this realm (Karjaluoto et al., 2019). The strategic investment in Mobile Financial Services Applications (MFSA) enriches client interactions and fosters corporate expansion (O'Brien et al., 2020). Furthermore, electronic wallets offer options to digitize consumer loans and corporate receivables and are rapidly gaining global popularity (Khoa, 2020).

The digital payments industry in India has experienced significant growth, driven by increased smartphone availability, infrastructure improvements, and favourable regulatory policies (Capegemini, 2019). Recent reports show a notable surge in internet usage, with the Unified Payment Interface (UPI) emerging as the preferred payment method (Worldline, 2019). These systems' user-friendly interfaces and simplicity have contributed to the widespread adoption of mobile payment methods (Singh et al., 2017). Initiatives like demonetization and Digital India have played a crucial role in accelerating the acceptance of mobile-based payment systems, positioning India at the forefront of digital payment advancement (FIS, 2018).

The following issues are the focus of this study:

1) Initially, what are the main digital payment system sources?
2) What authors and publications have been mentioned the most?
3) Which themes are frequently employed in digital payment systems?
4) How many publications have been published overall on digital payment systems or customer adoption-related words?
5) Which nations and associations receive the highest citations?
6) What are the prevailing themes for the new scholars in the customer adoption or digital payment system area?

The research aimed to evaluate the evolution of research on consumer behavior towards mobile transactions throughout the COVID-19 outbreak. This involved analyzing bibliometric data and publication patterns in the Scopus record, using VOSViewer as well as Biblioshiny tools for analysis. Bibliometrics is crucial for obtaining datasets that enhance research rigor and help identify trends and cycles in the scholarly literature (Xie et al., 2020).

2. METHODOLOGY

This research makes use of bibliometric analysis approach to systematically look over the global research trends, intellectual structure, and knowledge evolution within the digital payment systems literature. Bibliometric analysis involves the quantitative examination of bibliographic data and citation patterns, offering a powerful methodological toolkit for mapping the evolution of a research field, identifying influential works and authors, uncovering thematic patterns, and delineating emerging research fronts (Abbas et al, 2020). Analysis using bibliometrics is a methodical process utilized to comprehensively understand research patterns and trends in specific academic fields by analyzing data from literature platforms such as Google Scholar, Web of Science, as well as Scopus (De Bellis, 2009; Benckendorff & Zehrer, 2013; Zyoud et al., 2015; Bergman, 2012; Martín-Martín et al., 2018. It involves extracting and analyzing metadata such as citations, authors, keywords, and article counts (Van Raan, 2005; Gholampour et al., 2022). Unlike traditional literature reviews that discuss advancements, challenges, and future directions (Abbas et al., 2020), bibliometric analysis employs advanced techniques like science mapping analysis as well as performance analysis (Persson et al., 2009; Yoon & Lee, 2012; Mooghali et al., 2012; Mingers & Leydesdorff, 2015; Kipper et al, 2020; Gutiérrez-Salcedo et al, 2018; Gaviria-Marin et al, 2019; Rotundo & Sackett, 2002; Donthu et al, 2021b). While studies often examine

these techniques separately, integrating them provides a comprehensive understanding of research landscapes (Hallinger & Kovačević, 2021; Brown et al, 2020; Donthu et al. 2021b).

2.1. DATA EXTRACTION APPROACH

The Scopus record, which is among the most extensive and extensively used abstract & citation indexes in academic research, provided the data required for this bibliometric assessment. The search query employed a combination of relevant keywords and Boolean operators to retrieve publications related to digital payment systems and customer adoption. The specific search string used was: TITLE-ABS-KEY ("digital payment" OR "digital payment system" OR "customer adoption") AND PUBYEAR < 2024. This search query captured relevant documents with the specified keywords present in the title, summary, or author-assigned keywords while restricting the results to publications from 1987 up to 2024 (the year of data extraction). To ensure a comprehensive coverage of the literature, no additional filters or limitations were imposed based on document type, subject area, or language.

2.2. BIBLIOMETRIC EVALUATION TECHNIQUES

Several bibliometric analytic methodologies were used in this work to have a deeper understanding of the intellectual landscape and research patterns within the literature on digital payment systems. These techniques included Co-citation analysis, which identifies frequently co-cited publications, revealing influential authors and seminal works; Co-word evaluation, which examines co-occurrence patterns of author-assigned keywords to identify prevalent themes and research topics; Bibliographic Coupling, which evaluates the similarity between publications by analyzing shared references; and Performance Analysis, which measures research productivity and impact of institutions, nations, authors, and publication sources. These methodologies offer valuable insights into research trends and knowledge structures, but it is essential to acknowledge their potential limitations. The terminology and citation practices across different disciplines or research communities can influence the results of co-citation and co-word evaluation, and the accuracy of these analyses depends on the comprehensiveness and quality of the underlying bibliographic data.

3. EVALUATION OF DATA

Recently, bibliometric evaluation has become increasingly prevalent in management, developing sophisticated data analysis tools explicitly tailored for bibliometric datasets. Notable examples of software tools used for bibliometric analysis include VOS viewer (Van Eck & Waltman, 2010), bibliometric evaluation using R (Aria & Cuccurullo, 2017), CitNet-Explorer, Sci-MAT, Bib excel and Cite Space (Van Eck & Waltman, 2014), (Cobo et al. 2012), (Persson et al, 2009), (Chen, 2006). Among scholars in a social science field, VOS-viewer and bibliometric analysis using R are particularly popular (Nettle & Frankenhuis, 2019). Researchers frequently utilize bibliometric data from the Scopus record and analyze it using the R program and VOS-viewer. Bibliometrics, implemented in the R programming language, is highly favored among bibliometric analysts due to its rapid updates and integration with other statistical R programs (Aria & Cuccurullo, 2017). It simplifies importing and converting data into an R data frame while seamlessly integrating with the Scopus API to retrieve comprehensive metadata on a researcher's entire collection of scientific publications. The biblioshiny platform is utilized in scientific research to conduct science mapping and performance analyses, both crucial components of bibliometric analysis. It serves as an online platform for bibliometrics, enabling users to input data, transform it into a data frame, apply data filters, perform data analysis, and generate visual representations for sources, authors, and documents.

3.1. SCIENTIFIC OUTPUT

Table 1 presents a calculation of the scientific production of papers from 1987 to 2024. The 590 articles from 427 sources were published from 1987 to 2024 in digital payment systems or customer adoption, with a 9.09 average per year publication. Using an average of 6.85 citations per article annually, the average number of referrals per article was 24.38, which is a significant number for a long time. Out of 590 documents, 367 articles, four books, five review pieces, 153 papers from conferences, and 39 book chapters were published in the selected field for the study. A few single-authored articles are among the 2,187 authors and 1,644 author themes shown in the findings. The international

collaboration index of 24.92 evaluates the authors' degree of collaboration; the findings show that, in the case of the digital payment system (DPS) or consumer adoption, there are 2.76 authors per article.

Table 1 Data Extracted from Scopus Database

Description	Results
Timespan	1987:2024
Sources (journals, books, etc)	427
Documents	590
Annual growth rate (in %)	9.09
Document average age	6.85
Average citations per doc	24.38
References	24481
Document contents	
Keywords plus	2187
Author's keywords	1644
Author	
Authors	3
Authors of single-authored docs	1
Authors collaboration	
Single-authored docs	5
Co-authors per doc	2.98
International co-authorships (in %)	24.92
Document types	
Article	367
Book	4
Book chapter	39
Conference paper	153
Conference review	5
Note	2
Review	19
Short survey	1

Source Compiled by author

3.2. PUBLICATION TRENDS

The idea of a digital payment system has been around since 1987, but until 2005, there were significantly fewer articles on this topic in multidisciplinary journals compared to general management journals. However, there has been a developing interest in this concept since the beginning of the twenty-first century, leading to a considerable increase in research articles on the subject. The number of publications on this topic has seen substantial growth since 2013, as illustrated in Figure 1, which displays the total amount of published works each year. The data indicates that there may have been more active development of this concept between 1987 and 2005. Notably, around 2013, there was a notable surge in the number of publications on this topic, and this trend continues today, highlighting the novelty and significance of the subject matter.

Figure 1 Annual Total articles per year
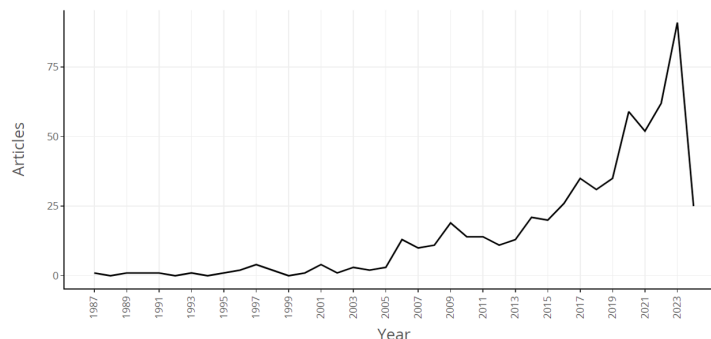
3.3. PERFORMANCE EVALUATION

Total citations issued in a given year

Between 1987 and 1995, only one article was published in the digital payment system magazine, and each piece received more than thirty citations. Additionally, the average number of citations per year was close to one. In this time frame, publications on this subject were absent for a few years. The years 1988, 1992, and 1994 are the ones that warrant special mention. Even though the number has been steadily growing since 1996, it is still only one digit in extent. Beginning in 2006, there was a notable rise in the quantity of publications about the subject. From that year, there was a significant shift in the quantity of publications in this field and a rise in the quantity of citations. Despite this, the number of citations peaked at the time of 2011, surpassing both the previous years and the years to come. The number of papers published yearly will exceed fifty beginning in 2020, which is expected to continue rising from this point forward each year. Additionally, the study considers documents that have been published and papers that are currently being published. Table 2 makes it abundantly evident that 2023 will see a total of 91 publications, which is the most number of papers ever published.

**Table 2** Average total citations every year (1987: 2024)

Years	MeanTCperArt	N	MeanTCperYear	Citableyears
1987	25.00	1	0.66	38
1989	25.00	1	0.69	36
1990	44.00	1	1.26	35
1991	253.00	1	7.44	34
1993	0.00	1	0.00	32
1995	188.00	1	6.27	30
1996	42.00	2	1.45	29
1997	16.75	4	0.60	28
1998	1.50	2	0.06	27
2000	8.00	1	0.32	25
2001	104.00	4	4.33	24
2002	196.00	1	8.52	23
2003	33.67	3	1.53	22
2004	0.50	2	0.02	21
2005	71.00	3	3.55	20
2006	23.85	13	1.26	19
2007	24.90	10	1.38	18
2008	49.00	11	2.88	17
2009	25.37	19	1.59	16
2010	38.57	14	2.57	15
2011	78.00	14	5.57	14
2012	35.36	11	2.72	13
2013	58.31	13	4.86	12
2014	30.19	21	2.74	11
2015	54.15	20	5.42	10
2016	68.58	26	7.62	9
2017	39.69	35	4.96	8
2018	21.48	31	3.07	7
2019	25.57	35	4.26	6
2020	13.59	59	2.72	5
2021	9.42	52	2.36	4
2022	7.27	62	2.42	3
2023	1.99	91	1.00	2
2024	1.16	25	1.16	1

Source Compiled by authors

Most relevant sources, authors country and affiliation

For finding the most relevant sources, authors, and affiliations concerning the digital payment system topic on the Scopus database, we find from Figure (2) three journals, such as AIP Conference Proceedings, Journal of Internet Banking and Commerce, & Journal of Financial Services Marketing, with seven journal articles. International Journal of Banking Marketing, sustainability, and Applied Energy is the second-most authored journal in the field of digital payment systems. As for the country-wise representation concerned with relation to the quantity of citations, the data represent USA, India, and China. Dominant Contributor: University of California is the top contributor with 21 articles. As per Table 4 in the article, "Ernest Orlando Lawrence Berkeley National Laboratory & the University of California are the major contributors, with a combined total of 37 articles if considering all variations of its name. The list includes a mix of universities, national laboratories, and international organizations, reflecting an array of contributions from distinct types of establishments. The presence of multiple entries for Ernest Orlando Lawrence Berkeley National Laboratory suggests that data might need to be consolidated for accurate representation. This table helps identify key contributors and their respective impacts on the publication landscape within the analyzed field.

Figure 2 Most Relevant Sources
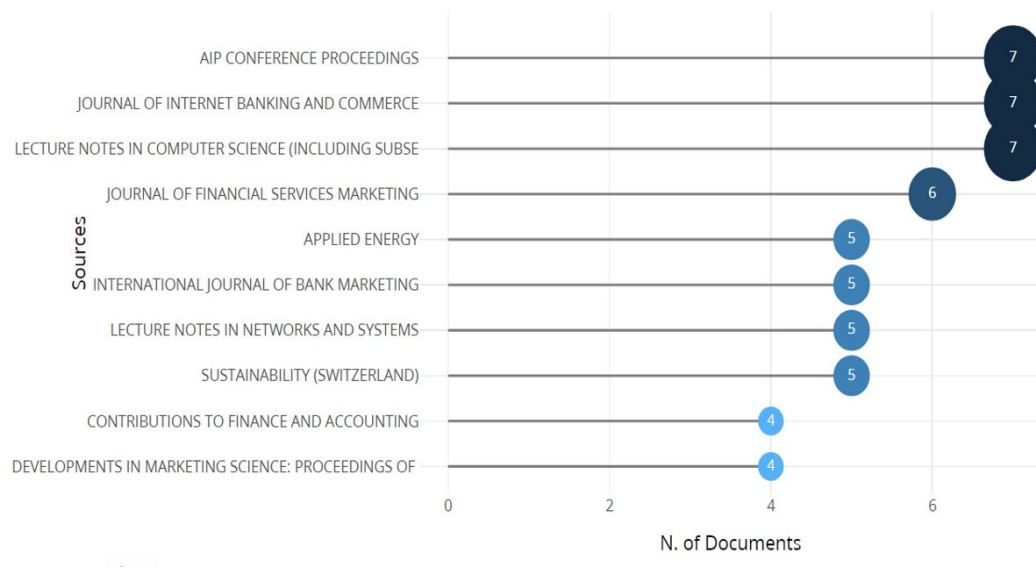
Table 3 Most Relevant Counties in Producing digital payment systems

Region	Frequency
USA	327
India	320
China	157
UK	96
Indonesia	71
Malaysia	65
Germany	51
Australia	46
Bangladesh	43
Saudi Arabia	38

Source Compiled by authors

Table 4 Most Relevant Affiliation

| Affiliation	Articles
University of California	*21*
Ernest Orlando Lawrence Berkeley National Laboratory	*18*
Not reported	*12*
Ernest Orlando Lawrence Berkeley national laboratory (Berkeley lab)	*11*
Lovely professional university	*9*
Beijing university of posts and telecommunications	*8*
Lawrence Berkeley National Laboratory	*8*
Lulea university of technology	*8*
The university of the south pacific	*8*
World health organization	*8*

Source Compiled by authors

Most globally cited publications

Figure 3 presents a bibliometric analysis focusing on the most cited documents within the field, displaying the number of global citations received for each work. The Y-axis lists the documents by author(s), publication year, and the journal or conference where they were published. The X-axis represents the number of global citations each document has received, ranging from 0 to 800. The document by Oliveira T., 2016, published in "Computers in Human Behavior," is the most cited with 805 global citations. This indicates a high impact and significant influence on the research community. The second most cited document is by Lu Y., 2011, in "Information & Management," with 537 citations, also suggesting substantial recognition and importance. Other Notable Documents are Androulaki E., 2013, in "Lecture Notes in Computer Science," with 418 citations, and Sharples M., 2016, also in "Lecture Notes in Computer Science," with 388 citations, reflect notable contributions in the computer science and technology domain. Documents by Aguirre E., 2015, in "Journal of Retailing" and De Ruyter K., 2001, in "International Journal of Service Industry Management" have received 388 and 352 citations, respectively, highlighting their relevance in retail and service industry research. The figure explains about the Consistent Impact Across Years and Fields by Ellen P.S., 1991, in "Journal of the Academy of Marketing Science" (JAMS), despite being older, has accumulated 253 citations, indicating its lasting influence. Xu H., 2009, in "Electronic Markets" and Wang H.Y., 2010, in "International Journal of Hospitality Management," with 238 and 221 citations, respectively, demonstrate impactful research in electronic markets and hospitality management.

The documents span various research areas, including human behavior, information management, computer science, retail, service industry management, power systems, and hospitality management, indicating the broad interdisciplinary nature of the research impact. This diversity suggests that the topics covered by these highly cited documents are influential across different fields, not just confined to a single domain. The figure highlights the most influential documents in terms of global citations within the analyzed field. It showcases the broad impact of research across various disciplines, emphasizing the significance of contributions in human behavior, information management, computer science, retail, service industries, power systems, marketing, and hospitality management. The high citation counts of these documents underscore their importance and the extensive recognition they have received from the research community.

Figure 3 Most global Cited Documents
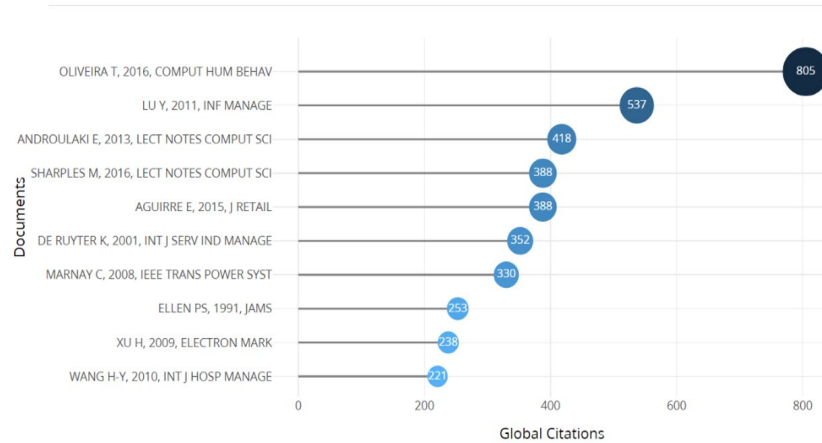
Analysis of Trends diagram

The graphic represents a bibliometric evaluation of research trends and the evolution of different terms associated with the digital payment system throughout time in Figures 4 and 5. The X-axis depicts the time range from 1995 to 2024, during which research and publications on the specified topics have been monitored. The Y-axis displays a compilation of several phrases related to the digital payment system and its accompanying technologies. Some of the terms mentioned are "cryptography," "e-commerce," "mobile payments," "blockchain," and "artificial intelligence." The preliminary research, undertaken before the year 2000, primarily focused on fundamental technologies such as "cryptography" and "security." The word "e-commerce" was introduced in the early 2000s to describe the increasing prevalence of digital transactions and online shopping platforms.

The increase in digital payment methods has led to a noticeable change in the subjects of research undertaken from 2000 to 2010. Within the digital economy, the increasing importance of sectors such as "mobile commerce," "information systems," and "electronic commerce" is demonstrated by the introduction of new terminology. Since 2010, there has been a significant expansion in the number and diversity of concepts, with prominent additions such as "blockchain," "artificial intelligence," "behavioural finance," and "consumer behavior." This era exemplifies a transition towards integrating advanced technologies like blockchain and artificial intelligence, as well as analyzing user behavior. This indicates that the industry is progressing and placing greater emphasis on technological improvements and user-centered approaches. Over the past few years, terms like "distributed energy resources," "solar power generation," and "economic and social effects" have become more common. This indicates the utilization of an interdisciplinary approach, where digital payment systems are integrated with broader economic, social, and environmental considerations. The magnitude of the blue dots in a given year represents the quantity of research undertaken or the number of publications related to each term. The prominence of larger dots surrounding terms like "blockchain," "artificial intelligence," "mobile commerce," and "information systems" signifies that these fields have garnered significant research focus, especially in recent years.

The image depicts a bibliometric study that visually represents the rapid evolution that has occurred in the realm of digital payment systems. The initial focus on encryption and security is highlighted, along with the subsequent growth of mobile payments and e-commerce, as well as the recent integration of advanced technologies and transdisciplinary subjects. The increasing complexity and expanding scope of digital payment systems are evident in this trend, driven by technological breakthroughs and changes in economic and social surroundings.
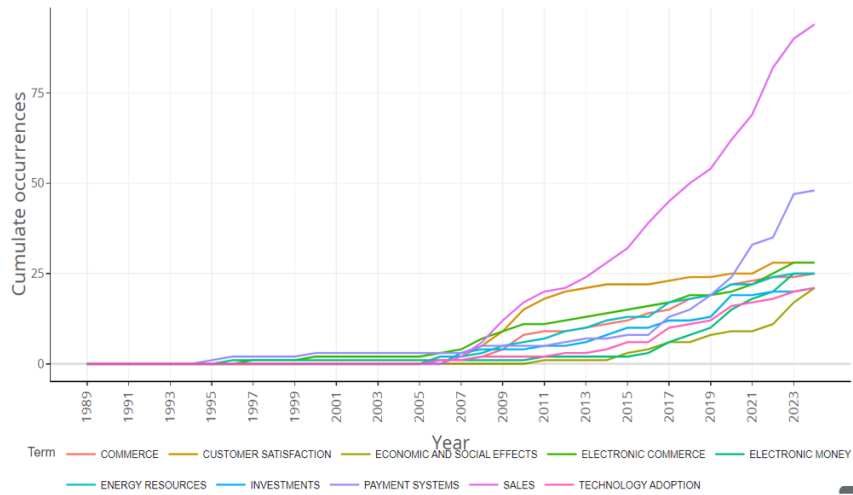
Figure 4. Evolution of different terms
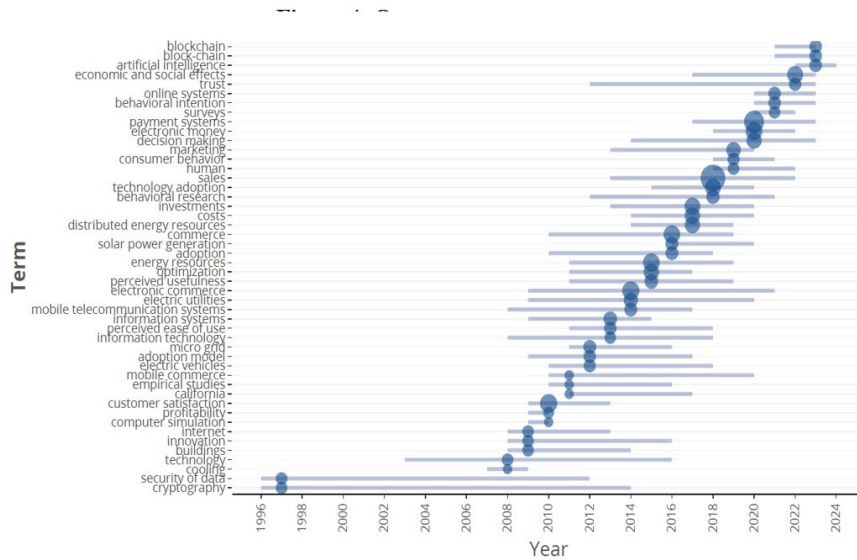
Figure 5 Trending Topics

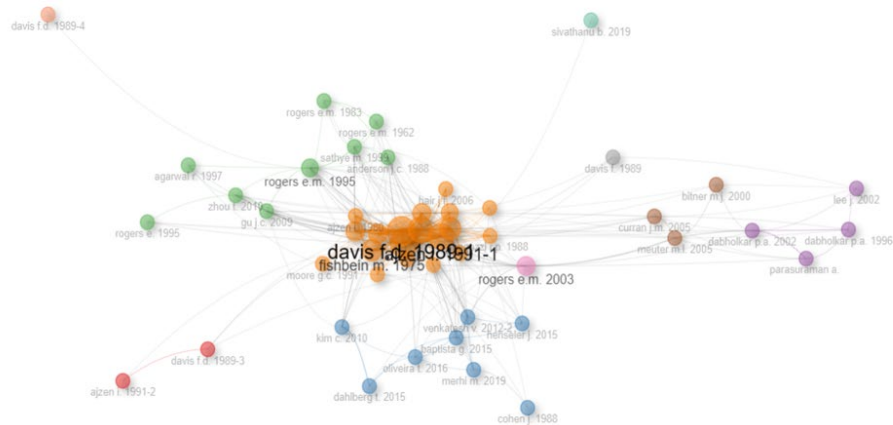Figure 3.4: Occurrence as per year

Figure 6 Co-citation Evaluation

Figure 6 is a network visualization showing the citation relationships between various academic articles. Each node represents a scholarly article. The lines connecting the nodes indicate citation relationships, where one paper cites another. The size of each node typically reflects how many citations the article received; larger nodes have more citations. Nodes are color-coded, often representing different clusters or thematic groups based on citation patterns and topics. The largest and most central node is "Davis fd 1989", indicating it is a highly influential paper with many citations. This central position suggests it serves as a foundational or seminal work in its field. The figure has many clusters of different colors.

1) **Orange Cluster:** This cluster, centered around "davis fd 1989," likely represents a core theme or foundational topic with many interrelated papers citing each other.

2) **Green Cluster:** Nodes such as "rogers e m 1995" and "rogers e m 1962" are prominent, indicating their influence in a related but distinct subfield or theme.

3) **Blue Cluster:** Includes nodes like "kim 2015" and "vankatesh v 2015," suggesting a more recent focus or emerging subfield that builds on earlier works.

4) **Other Clusters:** Red, purple, and gray clusters represent additional thematic groups or subfields with less central but still notable influence.

This network visualization reveals the structure of citations among academic articles, highlighting influential works and the thematic clusters they form. Key observations include that "Davis fd 1989" is the most central and influential paper, serving as a cornerstone for subsequent research. Distinct color-coded clusters show different research themes or subfields. Repeated citations of works by authors like "Rogers e m" indicate their significant impact on the field. Overall, this visualization helps to understand the citation landscape, identifying key papers, thematic groupings, and the evolution of research topics over time.

**Figure 7** Co-occurrence of keywords
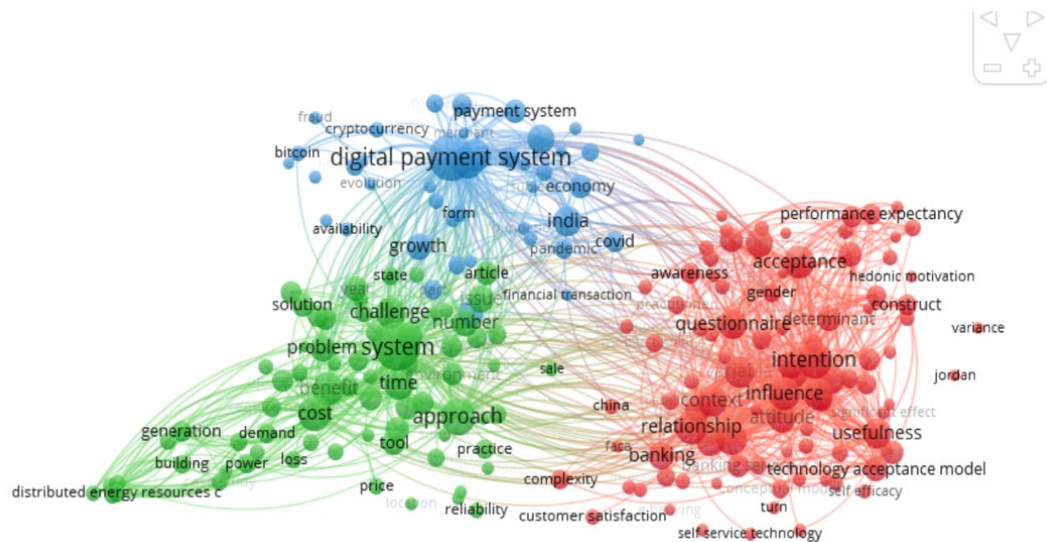
Thematic Map

This part of the bibliometric evaluation is helpful for the new research scholar to find the emerging topics in the field and their relationship with other similar terms (Akter et al., 2021; Mahi et al., 2021). An examination of word occurrence networks is used to elucidate what science says in a field, as well as major themes and patterns (Vaismoradi et al., 2013; Jain et al., 2021). Thematic maps help to summarize previous studies into four different quarters based on the themes (Caust & Vecco, 2017) & (Jain et al, 2021). The great centralization and density of elements in the quadrant on the upper right make them crucial to the field. These elements denote the areas of research which have been constructed and are essential in a given field of study. The motifs in the quadrant on the upper left side are often called niche themes due to their high centrality & low density. The concepts in the leftmost quad. of the image, which are

thought to be developing or declining, are characterized by a lack of density and low centralization. Because of their low density and strong centrality, the concepts in the quadrant on the bottom right are regarded as basic concepts.

The themes (Figure 8) indicate that "sales", "Customer satisfaction," and "electronic- commerce" represent an essential field of research in the discipline of digital payment systems, as demonstrated through the node's size. Besides, these terms have a few additional elements located in the lowermost right region, encompassing "Commerce," "electric utility," and "electric vehicles." The central emerging areas in this field are Blockchain and blockchain payment systems. The niche areas are the human adoption system of digitalization and the discriminant analysis of digital payment systems.

Figure 8 Thematic Map
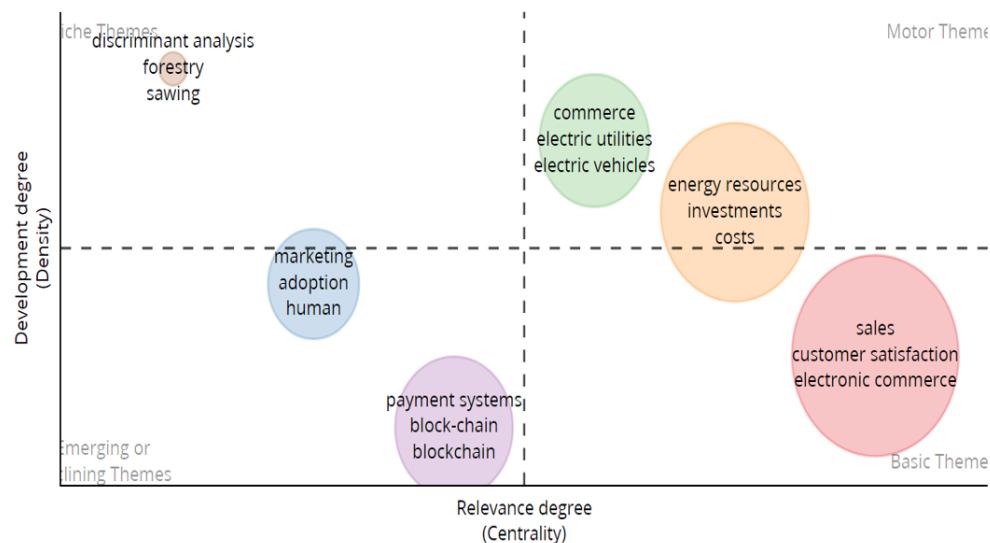
4. DISCUSSION

This study's bibliometric analysis provides an overview of digital payment systems literature, charting its evolution, influential works, and emerging trends over four decades. The analysis reveals unexplored areas that require further investigation to advance our understanding of this dynamic field.

Firstly, the socioeconomic implications of digital payment systems, particularly on financial inclusion and economic development, require more attention. Existing studies have focused on improving access to financial services, but a more detailed examination of their effects on marginalized communities, rural populations, and the unbanked is essential. Long-term studies using mixed-methods approaches can help identify barriers and enablers of digital payment adoption, informing targeted policies to promote inclusive economic growth. Additionally, research could explore the role of digital payment systems in alleviating poverty, empowering women, and fostering entrepreneurship in underserved communities. Secondly, the convergence of digital payments with emerging technologies like blockchain, AI, and IoT creates opportunities for interdisciplinary research collaborations. It is imperative to look at the effects of these technologies on the security, scalability, and efficiency of digital payment systems to develop more robust solutions. Collaborative efforts between computer scientists, cryptographers, and financial experts could yield ground-breaking advancements in secure digital payment infrastructures. Furthermore, the analysis emphasizes the significance of taking a holistic and interdisciplinary approach to studying digital payment systems. Collaboration across disciplines such as behavioural economics, cybersecurity, regulatory frameworks, and environmental sustainability could lead to a more thorough understanding of hindrances and opportunities in this area. Interdisciplinary research teams and collaborative networks could help generate novel approaches to address the complexities of digital payment systems. For example, collaborations between economists, psychologists, and user experience designers could provide insightful information about the variables driving digital payment adoption and usage, guiding user-centric design and policy decisions.

Moreover, methodological advancements and data-driven approaches offer opportunities to utilize large-scale transactional data and computational tools. Machine learning, predictive modeling, and data mining techniques can

uncover patterns, identify risk factors, and develop predictive models for digital payment adoption and behavior. Integrating qualitative and quantitative methods, such as ethnographic studies and sentiment analysis, can provide insights into users' experiences, perceptions, and attitudes toward digital payment systems. These approaches can inform user-centric design and policy decisions to tailor digital payment solutions to diverse user needs and preferences.

In future research, it is essential to revisit existing theories and consider new frameworks that better capture the complexities of digital payment ecosystems. Incorporating insights from psychology, sociology, and anthropology could enrich our understanding of the cognitive, social, and cultural factors influencing digital payment adoption and usage. Cross-cultural and cross-national studies could provide valuable insights into varying adoption patterns and consumer behaviors across different regions and demographics. Understanding the factors influencing digital payment adoption and usage could inform more tailored strategies for stakeholders operating in diverse markets. Research could also contribute to the development of global standards and best practices for digital payment systems while accounting for local cultural norms and regulatory environments. Additionally, the analysis emphasizes the role of leading journals like the "Journal of Financial Services Research, Electronic Commerce Research and Applications, & the Journal of Payment Systems and Strategies in disseminating necessary research on digital payment systems. It also highlights influential authors and works, key themes, and the impact of advanced technologies like AI and blockchain. Additionally, it showcases the geographic distribution and institutional drivers of influential research in digital payment systems. Future research should prioritize the environmental implications of digital payment systems, including their potential impact on energy consumption, electronic waste, and carbon footprint. Life cycle assessments, energy efficiency analyses, and sustainable design approaches could contribute to the development of environmentally friendly digital payment solutions. Collaboration between financial experts, engineers, and environmental scientists could yield innovative solutions that balance the convenience and efficiency of digital payments with environmental sustainability goals. Embracing interdisciplinary collaborations, leveraging methodological advancements, refining theoretical frameworks, and considering cross-cultural and environmental perspectives will help researchers contribute to a more holistic understanding of digital payment systems and ensure their effectiveness, inclusivity, and sustainability worldwide.

5. CONCLUSION

This comprehensive bibliometric evaluation has provided a thorough examination of the rapidly growing field of digital payment systems research over the past four decades. Through a rigorous exploration of publication data, key findings have emerged that shed light on the evolution, influential contributors, prominent themes, and geographical trends within this domain.

Firstly, the analysis has identified core academic journals, such as the Journal of Financial Services Research, Electronic Commerce Research and Applications, and the Journal of Payment Systems and Strategies, as significant platforms for disseminating high-impact research on digital payment systems. Additionally, pioneering authors like Fred D. Davis, Viswanath Venkatesh, and Paul A. Pavlou have made invaluable contributions by establishing foundational concepts related to technology adoption models, user acceptance, and trust in online transactions, laying the groundwork for subsequent research endeavors. Furthermore, the study has highlighted frequently explored themes, such as security and privacy issues, consumer trust and risk perception, mobile payment systems, and blockchain technology, underscoring the multidisciplinary nature of this field and its continuous adaptation to emerging technologies and consumer behaviors. Notably, the analysis has revealed the supremacy of China, the United States, and India in citation counts and research collaborations, reflecting the substantial contributions of researchers and institutions from these countries to the advancement of digital payment systems. Significantly, the study has identified emerging themes that hold immense potential for future exploration, including cryptocurrency and blockchain integration, AI and machine learning applications, fintech innovations in developing economies, the effect of COVID-19 on digital payment adoption, and the growth of sustainable and environmentally-friendly payment solutions.

6. LIMITATIONS

1) The study's focus on a single database (Scopus) and the exclusion of conference publications, editorials, and book chapters may have resulted in an inaccurate portrayal of the research landscape, potentially overlooking valuable contributions from these sources.

2) The use of alternative bibliometric tools and methodological approaches, such as different science mapping techniques and page rank analysis, could enhance the depth and accuracy of the analysis, providing additional perspectives and insights.

3) The analysis does not explicitly quantify the total number of papers published, which could provide valuable contextual information about the volume and growth rate of research in digital payment systems and customer adoption.

4) The research acknowledges the constraints inherent in bibliometric analyses, such as the probable influence of terminology and citation practices across different disciplines or research communities, which may impact the accuracy of co-citation and co-word analyses.

5) The accuracy of the evaluation is dependent on the comprehensiveness and quality of the underlying bibliographic information from the Scopus repository, which may be subject to potential errors or inconsistencies.

Despite these limitations, the bibliometric analysis contributes significantly to a better understanding of the digital payment systems domain by identifying key contributors, influential works, thematic trends, and emerging fields of research. The outcome operates as a useful resource for scholars, professionals, and decision-makers, providing a solid foundation for further exploration, collaboration, and the development of innovative solutions in this rapidly evolving field.

CONFLICT OF INTERESTS

None.

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REFERENCES

Abbas, A. F., Jusoh, A. B., Mas'od, A., & Ali, J. (2020). Bibliometric analysis of global research trends on electronic word of mouth using Scopus database. J. Crit. Rev, 7, 405-412.

Akter, S., Uddin, M.H. and Tajuddin, A.H. (2021), "Knowledge mapping of microfinance performance research: a bibliometric analysis", International Journal of Social Economics, Vol. 48 No. 3, pp. 399-418

Alvarez-Risco, A., Mlodzianowska, S., García-Ibarra, V., Rosen, M. A., & Del-Aguila-Arcentales, S. (2021). Factors affecting green entrepreneurship intentions in Business University Students in COVID-19 pandemic times: case of Ecuador. Sustainability, 13(11), 6447.

Aria, M. & Cuccurullo, C. (2017) bibliometrix: An R-tool for comprehensive science mapping analysis, Journal of Informetrics, 11(4), pp 959-975.

Bastos, R. T. D. R. M., Blagitz, M. N., Aragón, M. L. S. D. C., Maia, L. C., & Normando, D. (2019). Periodontal side effects of rapid and slow maxillary expansion: a systematic review. The Angle Orthodontist, 89(4), 651-660.

Beiwei, L., Zhengliang, Y., & Hongtao, L. (2022). Factors influencing green entrepreneurship of returning migrant workers under the dual-carbon background. Security and Communication Networks, 2022

Benckendorff, P., & Zehrer, A. (2013). A NETWORK ANALYSIS OF TOURISM RESEARCH. Annals

Bergman, E. M. L. (2012). Finding citations to social work literature: The relative benefits of using Web of Science, Scopus, or Google Scholar. The journal of academic librarianship, 38(6), 370-379.

Blowers, A. (1997). Environmental policy: ecological modernisation or the risk society?. Urban studies, 34(5-6), 845-871.

Brown, T., Park, A. and Pitt, L. (2020), "A 60-year bibliographic review of the journal of advertising research: perspectives on trends in authorship, influences, and research impact", Journal of Advertising Research, Vol. 60 No. 4, pp. 353-360.

Caust, J., & Vecco, M. (2017). Is UNESCO World Heritage recognition a blessing or burden? Evidence from developing Asian countries. Journal of Cultural Heritage, 27, 1-9.

Chen, C. (2006), "Is CiteSpace II: detecting and visualizing emerging trends and transient patterns in scientific literature", Journal of the American Society for Information Science and Technology, Vol. 57 No. 3, pp. 359-377.

Cobo, M.J., Lopez-Herrera, A.G., Herrera-Viedma, E. and Herrera, F. (2012), "SciMAT: a new science mapping analysis software tool", Journal of the American Society for Information Science and Technology, Vol. 63 No. 8, pp. 1609-1630

Costantini, V., & Mazzanti, M. (2012). On the green and innovative side of trade competitiveness? The impact of environmental policies and innovation on EU exports. Journal of Research Policy, 41(1), 132–153

Cox, S. (2020). The Green New Deal and Beyond: Ending the Climate Emergency While We Still Can. City Lights Books.

Criscuolo, C., & Menon, C. (2015). Environmental policies and risk finance in the green sector: cross-country evidence. Energy Policy, 83(1), 38 –56.

Culnan, M.J. (1986), "The intellectual development of management information systems, 1972–1982: a co-citation analysis", Management Science, Vol. 32 No. 2, pp. 156-172.

Culnan, M.J. (1987), "Mapping the intellectual structure of MIS, 1980-1985: a co-citation analysis", MIS Quarterly, Vol. 11 No. 3, pp. 341-353.

Culnan, M.J., O'Reilly, C.A., III and Chatman, J.A. (1990), "Intellectual structure of research in organizational behavior, 1972–1984: a co-citation analysis", Journal of the American Society for Information Science, Vol. 41 No. 6, pp. 453-458.

Cybermetrics. Scarecrow Press, Lanham, MD. https://lib.ugent.be/catalog/rug01:001668507

De Bellis, N., (2009). Bibliometrics and Citation Analysis: From the Science Citation Index to

Demirel, P., Li, Q. C., Rentocchini, F., & Tamvada, J. P. (2019). Born to be green: new insights into the economics and management of green entrepreneurship. Small Business Economics, 52(4), 759-771.

Demirel, P., Li, Q. C., Rentocchini, F., & Tamvada, J. P. (2019). Born to be green: new insights into the economics and management of green entrepreneurship. Small Business Economics, 52(4), 759-771.

Demirguc-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2018). The Global Findex Database 2017: Measuring financial inclusion and the fintech revolution. The World Bank.

Dervis, H. (2019), "Bibliometric analysis using bibliometrix an R package", Journal of Scientometric Research, Vol. 8 No. 3, pp. 156-160.

Domańska, A. (2021). Green Entrepreneurship. In The Palgrave Handbook of Global Sustainability (pp. 1-16). Cham: Springer International Publishing.

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. Journal of Business Research, 133, 285-296.

Ellegaard, O., & Wallin, J. A. (2015). The bibliometric analysis of scholarly production: How great is the impact? Scientometrics, 105(3), 1809-1831. doi: 10.1007/s11192-015-1645-z

Ertz, M., & Leblanc-Proulx, S. (2018). Sustainability in the collaborative economy: A bibliometric analysis reveals emerging interest. Journal of Cleaner Production, 196, 1073-1085.

Esty, D. C., & Winston, A. S. (2009). Green to gold: how smart companies use environmental strategy to innovate, create value, and build competitive advantage. Journal of building and Engineering, 2(5), 1-13.

Falagas, M.E., Pitsouni, E.I., Malietzis, G.A. and Pappas, G. (2008), "Comparison of PubMed, Scopus, Web of Science, and Google Scholar: strengths and weaknesses", The FASEB Journal, Vol. 22 No. 2, pp. 338-342.

Farinelli, F., Bottini, M., Akkoyunlu, S. & Aerni, P. (2013). Green entrepreneurship: the missing link towards a greener economy. ATDF Journal, 8(3), 42-48.

Farooq, R. (2022). A review of knowledge management research in the past three decades: a bibliometric analysis. VINE Journal of Information and Knowledge Management Systems.

Filser, M., Kraus, S., Roig-Tierno, N., Kailer, N., & Fischer, U. (2019). Entrepreneurship as catalyst for sustainable development: Opening the black box. Sustainability, 11(16), 4503.

Galvão, A., Ferreira, J. J., & Marques, C. (2017). Entrepreneurship education and training as facilitators of regional development: A systematic literature review. Journal of Small Business and Enterprise Development.

Gaviria-Marin, M., Merigó, J. M., & Baier-Fuentes, H. (2019). Knowledge management: A global examination based on bibliometric analysis. Technological Forecasting and Social Change, 140, 194-220.

Gaviria-Marin, M., Merigo, J.M. and Baier-Fuentes, H. (2019), "Knowledge management: a global examination based on bibliometric analysis", Technological Forecasting and Social Change, Vol. 140, pp. 194-220.

Gholampour, S., Gholampour, B., & Noruzi, A. (2022). Highly Cited Papers in Sport Sciences: Identification and Conceptual Analysis. International Journal of Information Science and Management (IJISM), 20(2).

Gobena, A. E., & Kant, S. (2022). Assessing the Effect of Endogenous Culture, Local Resources, Eco-Friendly Environment and Modern Strategy Development on Entrepreneurial Development. Journal of Entrepreneurship, Management, and Innovation, 4(1), 118-135.

Gutiérrez-Salcedo, M., Martínez, M. Á., Moral-Munoz, J. A., Herrera-Viedma, E., & Cobo, M. J. (2018). Some bibliometric procedures for analyzing and evaluating research fields. Applied intelligence, 48(5), 1275-1287.

Haldar, S. (2018). Green entrepreneurship in the renewable energy sector–a case study of Gujarat. Journal of Science and Technology Policy Management.

Haldar, S. (2019). Green entrepreneurship in theory and practice: insights from India. International Journal of Green Economics, 13(2), 99-119.

Haldar, S. (2019). Opportunities and Challenges for Green Entrepreneurship: Case Studies in India. Sustainable Development in India: Emerging Scenarios and Concerns, 81.

Haldar, S. (2019). Towards a conceptual understanding of sustainability-driven entrepreneurship. Corporate Social Responsibility and Environmental Management, 26(6), 1157-1170.

Hallinger, P., & Kovačević, J. (2021). Science mapping the knowledge base in educational leadership and management: A longitudinal bibliometric analysis, 1960 to 2018. Educational Management Administration & Leadership, 49(1), 5-30.

Hayashi, F., & Keeler, E. (2021). Emerging payment methods and the private sector's role in payment system innovation. Federal Reserve Bank of Kansas City, Economic Review, 106(1), 35-58.

He, Q., (1999). Knowledge discovery through co-word analysis. Lib. Trends 48 (1),133–159.

Hirt, J., Bergmann, J., & Karrer, M. (2021). Overlaps of multiple database retrieval and citation tracking in dementia care research: a methodological study. Journal of the Medical Library Association: JMLA, 109(2), 275.

Hörisch, J., Kollat, J., & Brieger, S. A. (2017). What influences environmental entrepreneurship? A multilevel analysis of the determinants of entrepreneurs' environmental orientation. Small Business Economics, 48(1), 47–69.

Huang, C., Yang, C., Wang, S., Wu, W., Su, J. and Liang, C. (2020), "Evolution of topics in education research: a systematic review using bibliometric analysis", Educational Review, Vol. 72 No. 3, pp. 281-297.

Hueso, J. A., Jaén, I., & Liñán, F. (2020). From personal values to entrepreneurial intention: a systematic literature review. International Journal of Entrepreneurial Behavior & Research. Interdisciplinary Research & Perspective, 3(1), 50–62. DOI:10.1207/s15366359mea0301_7

Jain, J., Walia, N., Singh, S., & Jain, E. (2021). Mapping the field of behavioural biases: a literature review using bibliometric analysis. Management Review Quarterly, 1-33.

Khudzari, J. M., Kurian, J., Tartakovsky, B., & Raghavan, G. V. (2018). Bibliometric analysis of global research trends on microbial fuel cells using Scopus database. Biochemical engineering journal, 136, 51-60.

Kiraka, R. N. (2021). Green Entrepreneurship: The Case Study of the Kenyan Climate Innovation Centre. In Responsible Management in Emerging Markets (pp. 83-106). Palgrave Macmillan, Cham.

Koester, E. (2017). Green entrepreneur handbook: the guide to building and growing a green and clean business (p. 461). Taylor & Francis.

Kumar, S., Sureka, R., & Colombage, S. (2020). Capital structure of SMEs: a systematic literature review and bibliometric analysis. Management Review Quarterly, 70(4), 535-565.

Le Loarne Lemaire, S., Razgallah, M., Maalaoui, A., & Kraus, S. (2022). Becoming a green entrepreneur: An advanced entrepreneurial cognition model based on a practiced-based approach. International Entrepreneurship and Management Journal, 1-28.

Leichenko, R., & O'Brien, K. (2019). Climate and society: Transforming the future. John Wiley & Sons.

Lotfi, M., Yousefi, A., & Jafari, S. (2018). The effect of emerging green market on green entrepreneurship and sustainable development in knowledge-based companies. Sustainability, 10(7), 2308.

Lotfi, M., Yousefi, A., & Jafari, S. (2018). The effect of emerging green market on green entrepreneurship and sustainable development in knowledge-based companies. Sustainability, 10(7), 2308.

Mahi, M., Ismail, I., Phoong, S. W., & Isa, C. R. (2021). Mapping trends and knowledge structure of energy efficiency research: what we know and where we are going. Environmental Science and Pollution Research, 28(27), 35327-35345.

Mann, G. (2018). Climate leviathan: A political theory of our planetary future. Verso Books.

Martín-Martín, A., Orduna-Malea, E., & Delgado López-Cózar, E. (2018). Coverage of highly-cited documents in Google Scholar, Web of Science, and Scopus: a multidisciplinary comparison. Scientometrics, 116(3), 2175-2188.

Massy, C. (2020). Call of the reed warbler: A new agriculture–a new earth. Univ. of Queensland Press.

Mingers, J. and Leydesdorff, L. (2015), "A review of theory and practice in scientometrics", European Journal of Operational Research, Vol. 246 No. 1, pp. 1-19.

Mooghali, A., Alijani, R., Karami, N., & Khasseh, A. A. (2012). Scientometric analysis of the scientometric literature. International Journal of Information Science and Management (IJISM), 9(1), 19-31.

Muo, I., & Azeez, A. A. (2019). GREEN ENTREPRENEURSHIP: LITERATURE REVIEW AND AGENDA FOR FUTURE RESEARCH:

Muo, I., Azeez, A..(2019). Green Entrepreneurship: Literature Review and Agenda for Future Research. International Journal of Entrepreneurial Knowledge, 7 (2), 17-29. doi: 10.12345-0007. International Journal of Entrepreneurial Knowledge, 7(2).

Nettle, D., & Frankenhuis, W. E. (2019). The evolution of life-history theory: a bibliometric analysis of an interdisciplinary research area. Proceedings of the Royal Society B, 286(1899), 20190040.

Orr, D. W. (2016). Dangerous years: Climate change, the long emergency, and the way forward. Yale University Press.

Ozili, P. K. (2020). Financial inclusion and fintech during COVID-19 crisis: Policy solutions. SSRN Electronic Journal.

Persson, O., Danell, R. and Schneider, J.W. (2009), "How to use Bibexcel for various types of bibliometric analysis", Celebrating Scholarly Communication Studies: A Festschrift for Olle Persson at his 60th Birthday, Vol. 5, pp. 9-24.

Persson, O., Danell, R., & Schneider, J. W. (2009). How to use Bibexcel for various types of bibliometric analysis. Celebrating scholarly communication studies: A Festschrift for Olle Persson at his 60th Birthday, 5, 9-24.

Post, C., Sarala, R., Gatrell, C., & Prescott, J. E. (2020). Advancing theory with review articles. Journal of Management Studies, 57(2), 351-376.

Priya, P., Venkatesh, A., & Shukla, A. (2021). Two decades of theorising and measuring women's empowerment: Literature review and future research agenda. In Women's Studies International Forum (Vol. 87, p. 102495). Pergamon.

Puaschunder, J. M. (2019, October). The legal and international situation of AI, robotics and big data with attention to healthcare. In Report on behalf of the European Parliament European Liberal Forum.

Rotundo, M., & Sackett, P. R. (2002). The relative importance of task, citizenship, and counterproductive performance to global ratings of job performance: a policy-capturing approach. Journal of applied psychology, 87(1), 66.

Russo, L. L., Caradonna, G., Biancardino, M., De Lillo, A., Troiano, G., & Guida, L. (2019). Digital versus conventional workflow for the fabrication of multiunit fixed prostheses: A systematic review and meta-analysis of vertical marginal fit in controlled in vitro studies. The Journal of prosthetic dentistry, 122(5), 435-440.

Santini, C. (2017). Ecopreneurship and ecopreneurs: Limits, trends and characteristics. Sustainability, 9(4), 492.

Secundo, G., Del Vecchio, P., & Mele, G. (2020). Social media for entrepreneurship: myth or reality? A structured literature review and a future research agenda. International Journal of Entrepreneurial Behavior & Research.

Sharma, N. K., & Kushwaha, G. S. (2015). Emerging green market as an opportunity for green entrepreneurs and sustainable development in India. J. Entrep. Organ. Manag, 4.

Soomro, B. A., Ghumro, I. A., & Shah, N. (2020). Green entrepreneurship inclination among the younger generation: An avenue towards a green economy. Sustainable Development, 28(4), 585-594.

Staniškis, J. K. (2022). Socio-Environmental-Economic Transformations Towards Sustainable Development. In Transformation of Business Organization Towards Sustainability (pp. 81-165). Springer, Cham.

Sunny, S. A., & Shu, C. (2019). Investments, incentives, and innovation: geographical clustering dynamics as drivers of sustainable entrepreneurship. Small Business Economics, 52(4), 905-927.

Tien, N. H., Hiep, P. M., Dai, N. Q., Duc, N. M., & Hong, T. T. K. (2020). Green entrepreneurship understanding in Vietnam. International Journal of Entrepreneurship, 24(2), 1-14.

Trapp, C. T., & Kanbach, D. K. (2021). Green entrepreneurship and business models: Deriving green technology business model archetypes. Journal of Cleaner Production, 297, 126694.

Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. Nursing & health sciences, 15(3), 398-405.

Van Eck, N.J. and Waltman, L. (2010), "Software survey: VOSviewer, a computer program for bibliometric mapping", Scientometrics, Vol. 84 No. 2, pp. 523-538.

Van Eck, N.J. and Waltman, L. (2014), "CitNetExplorer: a new software tool for analyzing and visualizing citation networks", Journal of Informetrics, Vol. 8 No. 4, pp. 802-823.

Van Raan, A. F. J. (2005). For Your Citations Only? Hot Topics in Bibliometric Analysis. Measurement:

World Bank. (2021). The World Bank Annual Report 2021: Supporting countries in unprecedented times. The World Bank.

Yoon, B. and Lee, S. (2012), "Managing technological knowledge for supporting R&D activities: scientometrics-based approach", Knowledge Management Research and Practice, Vol. 10 No. 3, pp. 237-251

Yu, D., Xu, Z. and Wang, X. (2020), "Bibliometric analysis of support vector machines research trend: a case study in China", International Journal of Machine Learning and Cybernetics, Vol. 11 No. 3, pp. 715-728.

Zhou, T. (2014). Understanding mobile payment user adoption: An empirical study. Mobile Information Systems, 10(1), 69-84.

Zyoud, S.H., Al-Jabi, S.W., Sweileh, W.M. and Waring, W.S. (2015), "Scientific research related to calcium channel blockers poisoning: bibliometric analysis in Scopus, 1968–2012", Human and Experimental Toxicology, Vol. 34 No. 11, pp. 1162-1170.