

Fintech advancements in the digital economy: Leveraging social media and personal computing for sustainable entrepreneurship



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ABSTRACT

Sustainable entrepreneurship refers to the practice of creating and managing a business venture in a manner that is environmentally and socially responsible while still maintaining financial profitability. Social media has become essential for entrepreneurs to build and promote their businesses. It allows them to connect with potential customers, build brand awareness, and reach a wider audience. In recent years, there has been increasing interest in exploring the relationship between sustainable entrepreneurship and social media and how social media can impact sustainable entrepreneurship development. This paper aims to analyze social media's impact on sustainable entrepreneurship development. The study uses data collected from Scopus to identify keywords related to social media, entrepreneurship, and sustainability. Coupling analysis identifies the most frequent keyword groups and clusters and measures their centrality, impact, and color. The results show that social media and entrepreneurship are strongly linked and that social media can positively impact sustainable entrepreneurship development. The study also highlights the importance of ecosystem thinking in promoting sustainable entrepreneurship and the potential of machine learning and sentiment analysis in studying the impact of social media on entrepreneurship. The findings of this study can be useful for policymakers, entrepreneurs, and researchers interested in promoting sustainable entrepreneurship through social media.

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Introduction

Sustainability is an essential concept for modern society and a key driver for innovation in Fintech (C. Weidinger, Fischler, & Schmidpeter, 2013; Tripathi et al., 2022; Mrad & Cui, 2019). Sustainable entrepreneurship is a distinct subdomain within Fintech research (Muñoz & Cohen, 2017; Hu et al., 2022; Bouarara, 2022; Thomas et al., 2019). Sustainable entrepreneurship is focused on preserving nature, life support, and community in the pursuit of perceived opportunities to bring future products, processes, and services for

gain into existence (Shepherd & Patzelt, 2008; Kar, 2022; Usha Rani et al., 2022). Sustainable entrepreneurship is essential for transitioning towards a more sustainable future. Collaboration between all stakeholders is necessary for achieving desired levels of sustainability in Fintech. Therefore, there is a need for service-oriented business models that have contributed to the growth of sustainable entrepreneurship in the Fintech environment (Rosário et al., 2022; Brdesee et al., 2022; Kumar et al., 2021; Zhang, 2023). Sustainable entrepreneurship is a key driver for social innovation (Avila-Garzon et al., 2022; Gu et al., 2022; Sahoo & Gupta, 2021). Sustainable entrepreneurship is a management approach that can lead to business success and is a key part of the solution to the challenges of our society. Integrated business models are necessary to ensure sustainable business success and corporate social responsibility (Weidinger et al., 2013; Narayan et al., 2022; Awad et al., 2022; Karmaker et al., 2023).

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Sustainable entrepreneurship provides new opportunities for developing corporate responsibility, considering ecological and social issues (Urbaniec, 2018). Sustainable entrepreneurship can enhance education, productivity, socioeconomic status, physical health, and self-reliance of individuals and societies. Sustainable entrepreneurship can create economic gains for investors, entrepreneurs, and economies (Shepherd & Patzelt, 2008; Tembhurne et al., 2022; Zhang et al., 2023; Jallad & Iglesias, 2020).

Sustainable entrepreneurship is a need in today's world. Sustainable entrepreneurship can have several benefits. Dean et al. (Dean & McMullen, 2007) argue that entrepreneurship can help resolve environmental problems by identifying opportunities for profitability while reducing environmentally degrading economic behaviors. Terán-Yépez et al. (Terán-Yépez et al., 2020) provide a bibliometric analysis of the field and identify the most significant research tendencies, enabling the proposal of several future research directions. Crals et al. (Crals & Vereeck, 2005) argue that SMEs can afford to do business sustainably and should select a simple, pragmatic, and effective format tailored to their needs. Rodgers et al. (Rodgers, 2010) uses a case study approach to explore the modus operandi of ecopreneurship and finds that ecopreneurs SMEs are looking to other goals alongside financial ones and are prepared to go to significant lengths to achieve such goals. Overall, the papers suggest that sustainable entrepreneurship can have economic, environmental, and social benefits.

Recently, with the increase in digital communication, social media use has increased, affecting sustainability in diverse ways (Pearson et al., 2016; Bouarara, 2021; Sahoo et al., 2022). Social media impacts entrepreneurship and can be used to increase the ability of entrepreneurs to find new opportunities (Park et al., 2017a). Social media moderated the relationship between the research participants' attitudes concerning sustainable entrepreneurship and their desire to practice sustainable entrepreneurship (El-Gohary et al., 2023; Pareek et al., 2022). Also, social media provides a virtual communication platform to a resource layer in creating and maintaining activity structures in B2B relationships and networks (Drummond et al., 2018a; Joshi et al., 2022; Zhang et al., 2021). Therefore, social media can become a platform for sustainable entrepreneurship and support for the development of goods and services that can become sustainable (Onete, Dina, & Vlad, 2013; Yen et al., 2021). Hence, researchers are proposing that social media is the source of sustainable entrepreneurial opportunities (Secundo et al., 2020). In this context, in this

research, we analyze social media's impact on sustainable entrepreneurship development. We used the Scopus database to collect the relevant articles and analyze them to find social media's impact on sustainable entrepreneurship.

Research methodology

Scopus, the largest database of academic literature, is the source for the data used in this technique. The major purpose of this research is to investigate how sustainable business models may benefit from using Fintech development. We gathered information on authors, keywords, and references to do this. To analyse the data and spot trends, we employed metrics like frequency of occurrence, degree of centrality, and significance. We also utilised network analysis to see how the keywords are connected and to find groups of terms with similar meanings. Overall, this study helps identify major topics and research areas in the field of Fintech-based sustainable entrepreneurship and comprehend the effect that social media has on this phenomenon.

Results and discussion

We used the Scopus database to analyze social media's impact on Fintech advancement in digital economy. Fig. 1 presents the detail of our dataset. From Fig. 1, it is clear that our dataset consists of 559 documents from 363 different sources (journals, books, etc.) published between 2009 and 2023. The average age of the publications is 3.82 years, and the average number of citations per document is 8.063. Furthermore, Fig. 1 indicates that the average number of citations per year per document is 1.696, which suggests that the documents still receive citations at a steady rate even after several years of publication.

In terms of document types, articles are the most common, followed by conference papers and book chapters. The analysis also includes information about the document contents, with the most frequently occurring keywords being the "Keywords Plus (ID)" and "Author's Keywords (DE)".

Regarding the authors, there are 1350 authors identified in the documents, with an average of 2.42 authors per document. The collaboration index of 2.88 suggests that there is a moderate level of collaboration among authors in these publications.

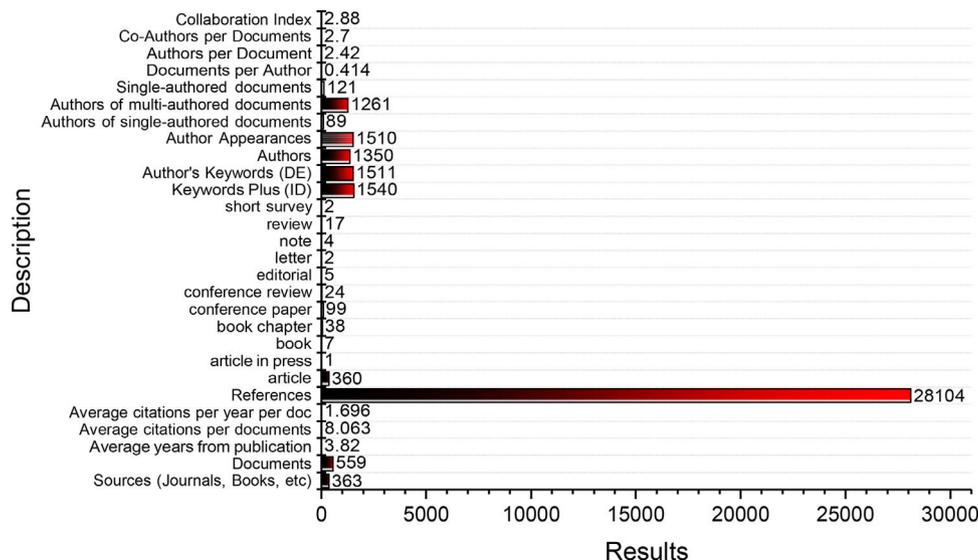


Fig. 1. Main information.

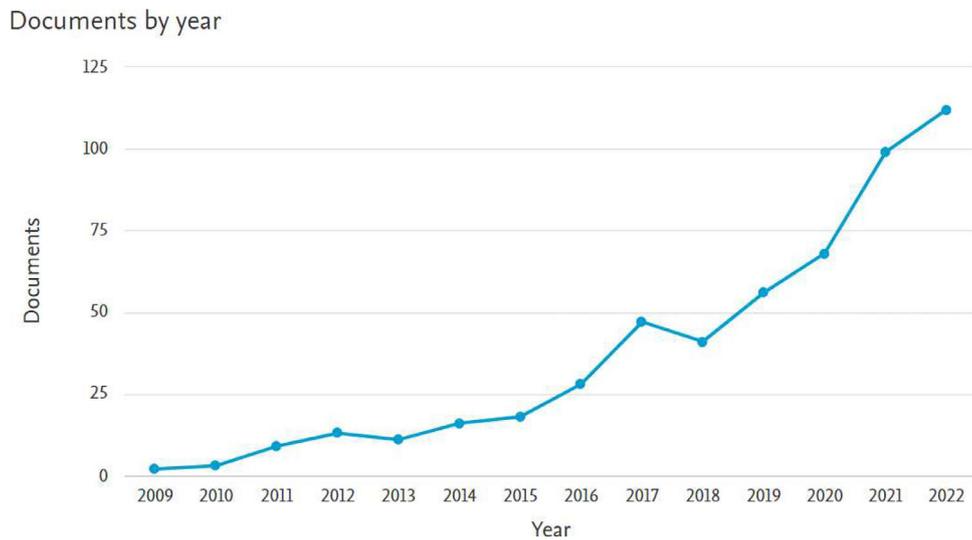


Fig. 2. Annual scientific production.

Overall, Fig. 1 suggests that the publications analyzed in this bibliometric analysis are fairly recent and continue receiving a steady number of citations annually. Collaboration among authors is moderate, with articles being the most commonly published document type.

Fig. 2 presents the annual scientific production. Based on Fig. 2, it appears that annual growth rate is 23.41 %. Fig. 2 shows that the number of articles published per year has been increasing steadily since 2009, with a notable increase in 2016. In 2021, the number of articles published jumped to 99; in 2022, it increased even further to 110. However, in 2023, the number of articles published dropped to 38, which could be attributed to the fact that the year had not yet ended and the data had been collected before the end of the year.

Overall, Fig. 2 suggests a steady increase in the production of articles over the years, with a significant increase in recent years. The drop in the number of articles published in 2023 could be an anomaly or a result of incomplete data.

Analysis of authors

Lotka's Law (Pao, 1985; Potter, 1981) asserts that the productivity of writers in a particular topic follows an inverse square distribution. In other words, a few writers will be responsible for the vast bulk of scholarly output on a given topic.

Mathematician and statistician Alfred Lotka is credited with developing the law in the 1920s. Numerous forms of publishing patterns have been tested against Lotka's Law, and it has been proven to hold true across multiple disciplines. Lotka's Law is significant because it elucidates how writers on a particular topic contribute relative to one another. Researchers may learn more about the most prolific writers' research interests, partnerships, and funding sources by identifying them. Lotka's Law may also be used to spot new developments and gaps in the literature that need to be investigated.

Lotka's law states that the relative output of different writers follows an inverse-square law. Because of this, there will be far more writers who have only authored one document than authors who have produced numerous documents. That is to say, the vast bulk of the literature in an area will be written by a very small number of writers.

Fig. 3 shows that, according to Lotka's Law, the great majority of writers (91.6 %, to be exact) have only created a single document. Only 7 % of all writers have authored both documents, making up a substantially lower proportion of the total. Fewer writers (0.8 percent, 0.4 percent, and 0.1 percent, respectively) have authored three, four, or twenty-six documents.

Lotka's Law, which predicts that a small fraction of writers will account for the bulk of publications on the subject, supported by the

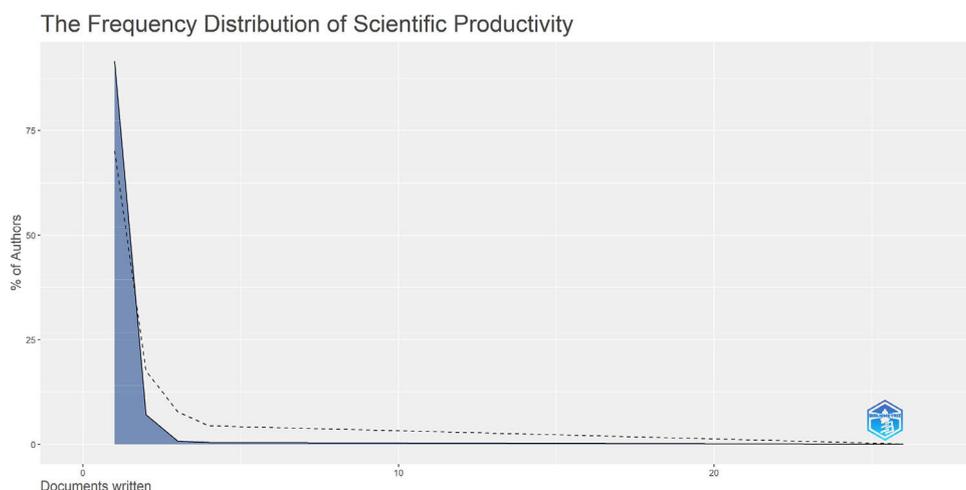


Fig. 3. Author distribution by lotka's law.

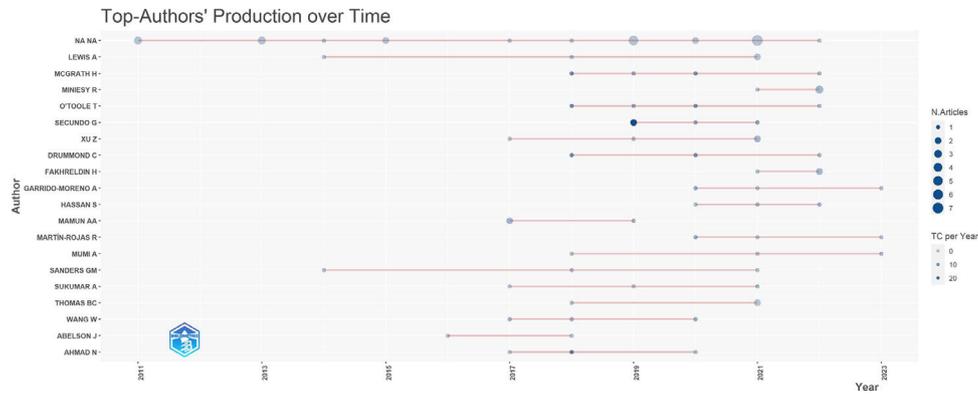


Fig. 4. Author production.

distribution of productivity among authors in this discipline. You may use this data to find the most prolific writers in your profession and learn more about what makes them successful. It may also be used to identify places where there is room for improvement in terms of cooperation or research.

Fig. 4 was utilized to learn more about the writers by gauging their output in terms of time. The command `autoref fig:my_author` returns data on a group of authors' previous publications. The data includes the total number of citations (TC) for all of the author's papers, the average number of citations per year (TCpY) for all of the author's papers, the number of times each author wrote a paper in a given year (frequency), and so on for each author.

Fig. 4 shows that some writers have many years of publication, while others have just one year of publication. instance, in 2016, Abelson J. produced a paper that was cited four times, but in the years that followed, he only published two more. Similarly, Fakhreldin H had a paper published in 2021 that was not cited at all, but he had two articles published in 2022 that were cited five times in total. varying writers' works have varying citation impacts, as seen by the statistics. While Mamun AA's two 2017 publications earned 24 citations, just one of Lewis A's three published in various years has yet to be cited.

Analysis of country

Publication rates in a certain area of study are shown geographically in Fig. 5. Researchers' output in terms of publications from various areas is shown.

For instance, in this data set, the United States (USA) has 188 times as many publications as the United Kingdom (UK) (90), and India

(77). There are also a lot of books published in Indonesia (59), China (54), Spain (48), and Australia (44).

Fig. 5 is helpful for determining which nations or areas are doing the most cutting-edge research in a certain subject and for monitoring long-term changes in that output. It may also be used to find people in other countries who might be interested in working together on a research project.

Analysis of publication source

Bradford's Law (Patra et al., 2006), proposed by Samuel C. Bradford in 1934, is a principle that characterizes the dispersion of scientific and scholarly literature in a given field of study or subject area. According to this law, a minority of journals or sources encompass a substantial portion of the articles related to a particular subject. Bradford's Law operates on the basis of "zones," which classify journals into groups based on their frequency and significance within the subject area. The first zone comprises a small number of highly influential journals, the second zone includes a greater number of moderately influential journals, and the third zone contains numerous less influential journals. This principle can be advantageous for researchers and librarians in determining the most vital sources of information within a subject area, enabling them to prioritize their research endeavors accordingly. Additionally, Bradford's Law can be used to approximate the number of articles available in a particular field by estimating the number of identified sources or journals.

We can apply Bradford's Law to identify the core journals, as represented in Fig. 6. Fig. 6 shows the ranking of 46 journals based on their frequency of appearance in the dataset, along with their

Country Scientific Production

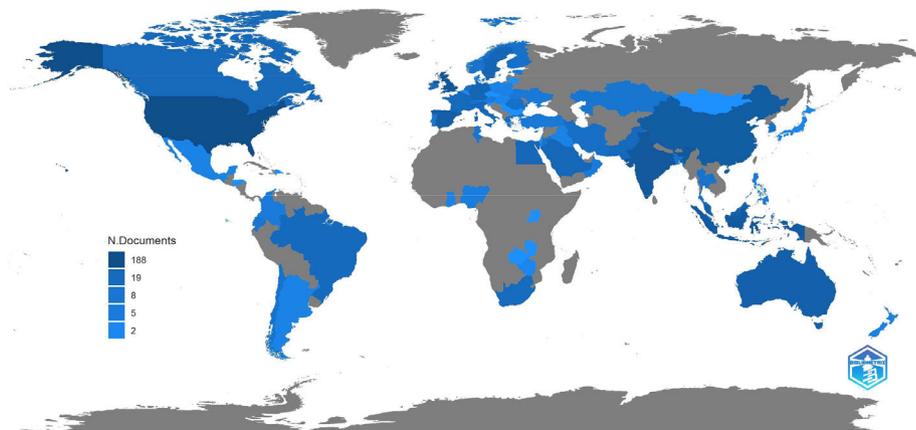


Fig. 5. Country scientific production.

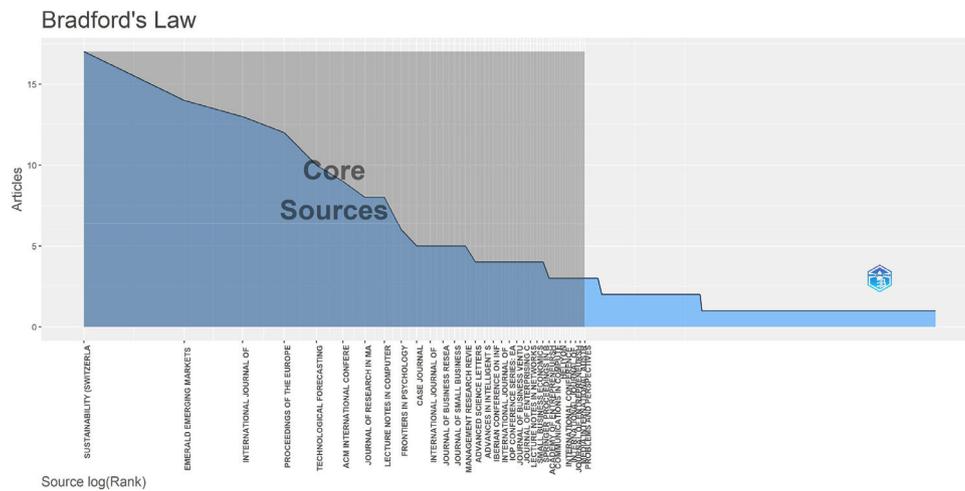


Fig. 6. Source impact according to Bradford Law.

cumulative frequency and zone classification. The zone classification is determined by grouping journals into three zones based on their cumulative frequency.

According to Bradford's Law, the first few journals in the list should be the most highly cited and represent the nucleus of the field. In this case, the top three journals, ACM International Conference Proceeding Series, Finance Research Letters, and IEEE Transactions on Computational Social Systems, fall within Zone 1 and account for only 9 articles, or 25 % of the total dataset. The next eight journals fall within Zone 1 as well, and account for an additional 8 articles, bringing the cumulative frequency to 17, or 47.2 % of the total.

The remaining 38 journals are distributed across Zones 2 and 3 and account for 39 articles, or 52.8 % of the total. According to Bradford's Law, these journals would have relatively lower citation rates and could be considered as the periphery of the field.

Overall, this analysis suggests that the core journals in the field of exported data are relatively few, while the majority of the literature is spread across a larger number of journals with lower citation rates. Understanding the distribution of journals in this way can help researchers and practitioners to identify the most influential and authoritative sources in a particular field of study.

Analysis of trending topics

Fig. 7 depicts the occurrences of various terms. The terms are all associated with business, marketing, and entrepreneurship in some way.

Fig. 7 shows that out of all the keywords, "social media" occurs 130 times. This suggests that social media is a crucial and timely issue in relation to the data set under consideration. "Social networking (online)" occurs 87 times, making it the second most common term. This relates to the discussion of social media and highlights the significance of online social networking in this context. With a frequency of 72, "entrepreneurship" ranks as the third most common term. This suggests that entrepreneurialism is a prevalent theme among the data being examined. The terms "marketing" and "commerce" also come up often, with 22 and 19 occurrences, respectively.

Keyeord trend analysis

Based on the Fig. 8, we can identify some trending research areas:

- From 2017 through 2021, there will be a steady increase in the use of social media and online networking. This indicates that people are still curious about the societal effects of social media and internet networking.
- From 2017 to 2022, there has been a rise in both traditional and social forms of entrepreneurship. This trend is indicative of rising enthusiasm for the role of entrepreneurship in driving economic growth and social transformation.
- From 2016 to 2021, AI and data mining will be hot topics. The popularity of both big data and machine learning has increased the need for studies in both fields.
- From 2016 to 2021, we also see an increase in the popularity of education and online education. There is a growing interest in

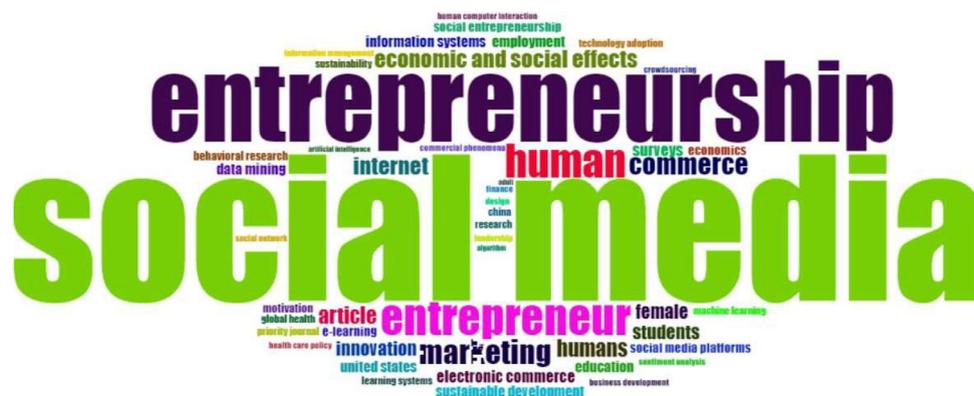


Fig. 7. Important keywords.

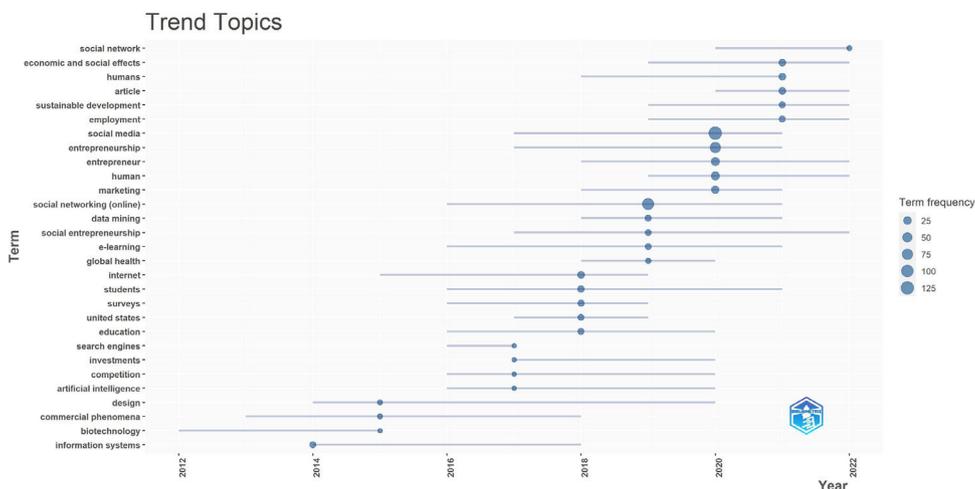


Fig. 8. Keywords trends.

how the rise of online education and other technological innovations in the classroom are influencing traditional methods of instruction.

- From 2019 to 2022, sustainable development has been on the rise. Research in this field is gaining in significance as people become more aware of environmental issues and the need to adopt more sustainable lifestyles.

- They may provide light on international cooperation trends, leading to the discovery of new possible research partners.
- They may be used to evaluate the efficacy of research strategies by providing a visual representation of the impact of research findings in various geographical areas.
- To better understand research gaps and possibilities, they may be used to examine regional research patterns and new subjects.

Overall, thematic maps can provide valuable insights into research patterns and collaborations, helping to inform research policy and investment decisions.

Thematic maps

Thematic maps in bibliometrics are visual representations that display geographic distribution and density of research output or citation impact for a given research field or topic. They provide a way to explore research patterns, collaboration networks, and research clusters in a particular region or country. Thematic maps are important in bibliometrics for several reasons:

Word clusters and their associated labels are shown in Fig. 9 below. There are two main categories to which this formation pertains: the business world and social media. The theme map idea has been applied to the provided data, resulting in the identification of two primary clusters: social media and entrepreneurship. In the first group, we find social media-related disciplines, including networking, marketing, commerce, education, and sentiment analysis. The second group consists of entrepreneurship-related human, gender, leadership, and research-related subjects.

- They are valuable for politicians and funders wanting to invest in certain research topics since they help identify research clusters in a given location.

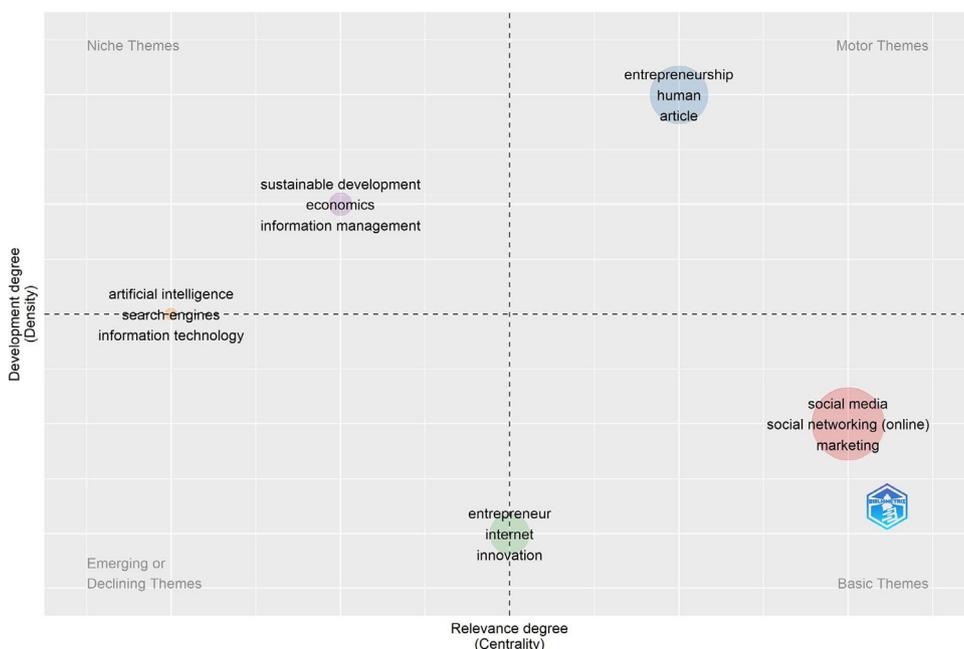


Fig. 9. Thematic map.

Table 1
Highly cited papers.

Papers	DOI	Total Citations
Cotter (2019)	10.1177/1.461.444.818.815.684	199
Olanrewaju et al. (2020a)	10.1016/j.jinfomgt.2019.05.011	165
Li et al. (2017)	10.1037/apl0000217	139
Rippa and Secundo (2019)	10.1016/j.techfore.2018.07.013	139
Smith et al. (2017)	10.1016/j.jbusvent.2016.10.003	133
Estrin et al. (2018)	10.1007/s11187-018-0009-5	110
Wu and Song (2019)	10.3389/fpsyg.2019.01270	103
Ahmad et al. (2018)	10.1016/j.tele.2017.09.006	91
Duffy and Pruchniewska (2017)	10.1080/1369118X.2017.1291703	80
Drummond et al. (2018b)	10.1016/j.indmarman.2017.05.009	74
Pratono (2018)	10.1108/MRR-03-2017-0080	55
Park et al. (2017b)	10.3390/su9091593	53
Bowen and Morris (2019)	10.1016/j.jrurstud.2019.10.031	52
Nakara et al. (2012)	10.1504/IJESB.2012.047608	51
Mack et al. (2017)	10.1016/j.telpol.2016.12.001	49
Saura et al. (2023)	10.1016/j.technovation.2021.102447	49
Craig and Cunningham (2017)	10.1177/1.329.878 × 17,693,700	48
Drummond et al. (2020)	10.1108/EJM-02-2019-0183	41
Morris and James (2017)	10.1108/JSBED-01-2017-0018	40
Sahaym et al. (2021)	10.1016/j.jbusres.2019.09.026	39

Each cluster's contents may be described by its label. Impact on students, motivation, e-learning, entrepreneurship, sentiment analysis, and marketing are just a few of the many areas that fall under the "social media" umbrella. Leadership, study of entrepreneurship, women in business, and business phenomenon are all examples of what the term "entrepreneurship" refers to.

Through simplification and pattern recognition, thematic mapping aids in comprehending large data sets. It's useful finding patterns in massive datasets and classifying related information into coherent categories. For research and decision-making purposes, this technique may help us identify recurring patterns in the data.

This thematic map illustrates how words and ideas are connected, making it easier to see the big picture. They y be useful for discovering and analysing hidden connections and relationships in massive datasets. Researchers may learn more about the connections between various ideas and how they relate to their own research objectives by analysing the incidence of terms in distinct clusters. More specific research questions and hypotheses may be formulated using this data.

Analysis of published documents

In this subsection, we analyze the most globally cited documents. Table 1 presents this analysis. Table 1 helps the w researchers select the most popular papers in the respective domain.

Theoretical and practical implications

In this subsection, we present the key observations of the researchers on the respective research topic.

- Observation 1: Social media can positively and negatively affect sustainable entrepreneurship. Barrera Verdugo and Villarroel (2021); Nhi et al. (2022); Rasmusen et al. (2022) found that a higher frequency of reading social media content is related to a higher perceived relevance of environmental sustainability, social welfare, and fair trade but also linked with less perceived importance of sustainability as a driver of entrepreneurship. Park et al. (2017a) suggest that social media can impact the discovery and creation of entrepreneurial opportunities. El-Gohary et al. (2023) found that social media adoption moderates the relationship between attitudes towards sustainable entrepreneurship and sustainable entrepreneurial intentions among business graduates in Pakistan. Finally, Drummond et al. (2018a) found that social

media can impact the development of entrepreneurial firms' B2B relationships and networks through resource mobilization. Overall, it is evident that social media can play a role in shaping attitudes toward sustainable entrepreneurship and in facilitating resource mobilization, but its impact on the importance of sustainability as a driver of entrepreneurship is less clear.

- Observation 2: Social media use by entrepreneurs has transcended marketing and is now used in business networking, information search and crowdfunding for their business. The use of social media by entrepreneurs has had a significant impact on firm performance and innovation enhancement. An integrative framework was developed to identify relationships amongst elucidated constructs (Olanrewaju et al., 2020b).
- Observation 3: Social media is contributing to sustainability in diverse ways, including behavioral interventions, social and political activism, sustainable business practices, environmental education, and citizen science projects. There is an urgent need for further and more methodologically rigorous research to evaluate the specific impacts of social media on sustainability. Social media has the potential to be a powerful tool for creating a more sustainable society, but it must be used strategically and responsibly (Pearson et al., 2016).
- Observation 4: From Fig. 7, we can find some trending topics.
 1. Online communities and social media: These two fields of study are clearly on the rise as seen by the 130 and 87 instances, respectively. This is probably because of the rising interest in the effects of social media and online networking on both people and society as a whole, as well as the widespread usage of these tools in modern culture.
 2. business owners: These subfields of study are likewise on the rise, with 72 and 32 instances, respectively. This is probably attributable to the rising popularity of entrepreneurship as a method of generating new employment opportunities and stimulating economic expansion.
 3. The study of human behavior is likewise a growing field of study, with 30 occurrences. This attributable to the increasing focus on studying consumer, organizational, and internet behavior.
 4. The study of marketing and business is also on the rise, with 22 and 19 occurrences, respectively probably because of the rising interest in how companies may successfully promote and sell their goods and services online, as well as the increasing significance of marketing and commerce in today's digital economy.

Conclusion

The purpose of this article was to examine the role of social media in the evolution of Fintech in the digital economy. Scopus data analysis revealed that social media significantly influences the growth of Fintech advancements in the digital economy, as shown by the prevalence of social media and entrepreneurship-related keywords in the reviewed literature. The research also discovered that social media may help Fintech advancements in the digital economy in a number of ways, such as via networking, information exchange, and promotion. The vast user bases of various social media sites make it possible for business owners to reach a wide demographic with their product or service pitches. In addition, new sustainable goods and business models may be created thanks to the sharing of information and ideas made possible by social media.

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