
Research Trends in Digital Financial Inclusion: A Bibliometric Analysis Using VoSviewer

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ABSTRACT

Digital financial inclusion (DFI) aims to provide affordable and sustainable financial services to the financially excluded and underserved through cost-effective digital means. This qualitative bibliometric and descriptive research aims to conduct a bibliometric analysis of DFI using VOSviewer software. Data was collected based on the keyword "digital financial inclusion" from Google Scholar. From the results, in 2019 the number of DFI publications increased compared to 2018, indicating an increase in interest. The number remained stable in 2020 and 2021, but there was a significant spike in research interest in 2022. These findings are important for policymakers, researchers, and practitioners to determine the novelty and quantity of the data.

Keywords : *Digital Financial Inclusion; Bibliometric; Digital Inclusion; Data Analysis; VOSviewer*

ABSTRAK

Inklusi keuangan digital (DFI) bertujuan untuk menyediakan layanan keuangan yang terjangkau dan berkelanjutan bagi masyarakat yang tidak terlayani secara finansial dan kurang terlayani melalui sarana digital yang hemat biaya. Penelitian dengan pendekatan bibliometrik dan deskriptif kualitatif ini bertujuan untuk melakukan analisis bibliometrik terhadap DFI dengan menggunakan perangkat lunak VOSviewer. Data dikumpulkan berdasarkan kata kunci "inklusi keuangan digital" dari Google Scholar. Dari hasil penelitian, pada tahun 2019 jumlah publikasi DFI meningkat daripada tahun 2018, yang mengindikasikan adanya peningkatan minat. Jumlah tersebut tetap stabil pada tahun 2020 dan 2021, tetapi terjadi lonjakan minat penelitian yang signifikan pada tahun 2022. Temuan ini penting bagi pembuat kebijakan, peneliti, dan praktisi untuk menentukan kebaruan dan kuantitas data.

Kata Kunci : *Inklusi Keuangan Digital; Bibliometrik; Inklusi Digital; Analisis Data; VOSviewer*

INTRODUCTION

Digital financial inclusion (DFI) has gained significant attention in recent years, signaling a paradigmatic shift in how financial services are accessed and delivered (Yang et al., 2022). DFI has the potential to revolutionize economies and individuals' lives by expanding access to the formal financial system through digital channels, with a particular focus on marginalized groups (Bull & Klapper, 2023). DFI is defined as the use of and access to affordable financial services through digital platforms, such as mobile phones, the Internet, and other digital devices (Demirgüç-Kunt et al., 2020). During the COVID-19 pandemic, DFI was instrumental in facilitating access to essential financial services, such as mobile money transfers, digital payments, and online banking (Ayadi & Shaban, 2020). For example, DFI was used in many countries to support businesses and distribute government aid to vulnerable populations during the pandemic.

Recent research in the field of DFI has revealed several noteworthy trends and novel insights. Studies have demonstrated that DFI has a significant positive impact on economic growth and resilience in various economies. However, there are also concerns about increased CO₂ emissions associated with DFI (Ozturk & Ullah, 2022). Furthermore, DFI has been found to contribute to improvements in manufacturing servitization and entrepreneurial activities in China (Chen & Zhang, 2021). These findings highlight the complex nature of DFI and its potential to generate both positive and negative outcomes depending on the specific context.

The study aims to contribute to the existing body of knowledge by conducting a bibliometric analysis of DFI. Bibliometric analysis is a quantitative approach used to examine the relationships between scientific publications. To achieve this, the study utilized the VOSviewer software, which is renowned for its capabilities in mapping and visualizing research trends. The use of VOSviewer is to enable a comprehensive examination of the field, elucidating significant contributions, critical concepts, and emerging research areas (Oladinrin et al., 2023). VOSviewer, a cutting-edge bibliometric analysis tool, empowers researchers to visualize complex networks of scholarly articles, collaboration between researchers, and journal citations and connections between scientific terminologies (Oladinrin et al., 2023). Utilizing this software to transform vast amounts of academic literature into visually appealing knowledge landscapes is invaluable. Its capabilities in facilitating the organization, aggregation, and presentation of research data render it a vital component of this research (Wang et al., 2023).

An increasing number of scholarly investigations have scrutinized the ramifications of DFI on diverse outcomes, including but not limited to manufacturing servitization, resilience to disruptions, and economic growth. Ozturk and Ullah (2022) discovered that while DFI positively affects economic development in One Belt, One Road (OBOR) economies, it negatively affects environmental sustainability by increasing CO₂ emissions. Chen and Zhang (2021) found that digital finance promotes manufacturing servitization in China by assisting manufacturers in developing new services and entering new markets. Mukalayi and Inglesi-Lotz (2023) established that DFI is positively correlated with both energy consumption and CO₂ emissions in Sub-Saharan African countries. Lu (Y. Lu et al., 2022) discovered that DFI has a positive influence on the ESG disclosure of Chinese companies. Finally, Ayadi and Shaban (2020) found that DFI was instrumental in facilitating access to vital financial services for individuals amid the COVID-19 pandemic.

Despite the growing body of scholarly literature on DFI, bibliometric analysis in this field remains scant. A notable exception is the research by Gallego-Losada et al. (2023), who used the Scopus database to perform a bibliometric analysis of DFI studies.

They found that DFI research spans a wide range of disciplines, including economics, finance, information systems, business, and development studies. This research utilizes VOSviewer software to conduct a bibliometric analysis of the DFI field in an effort to fill the gaps in the literature. Thus, the novelty in this research lies in the findings of the bibliometric analysis that are essential for policymakers, researchers, and practitioners to determine the novelty and quantity of data. In addition to providing a comprehensive overview of the current body of literature, the research aims to make a scholarly contribution to the ongoing discourse on this topic.

RESEARCH METHOD

In this research, we used bibliometric and descriptive quantitative methodologies. We included journals indexed by Google Scholar due to their easy accessibility. We also conducted a comprehensive literature review using Publish or Perish software, chosen for its bibliometric data extraction capabilities (Heumüller et al., 2020).

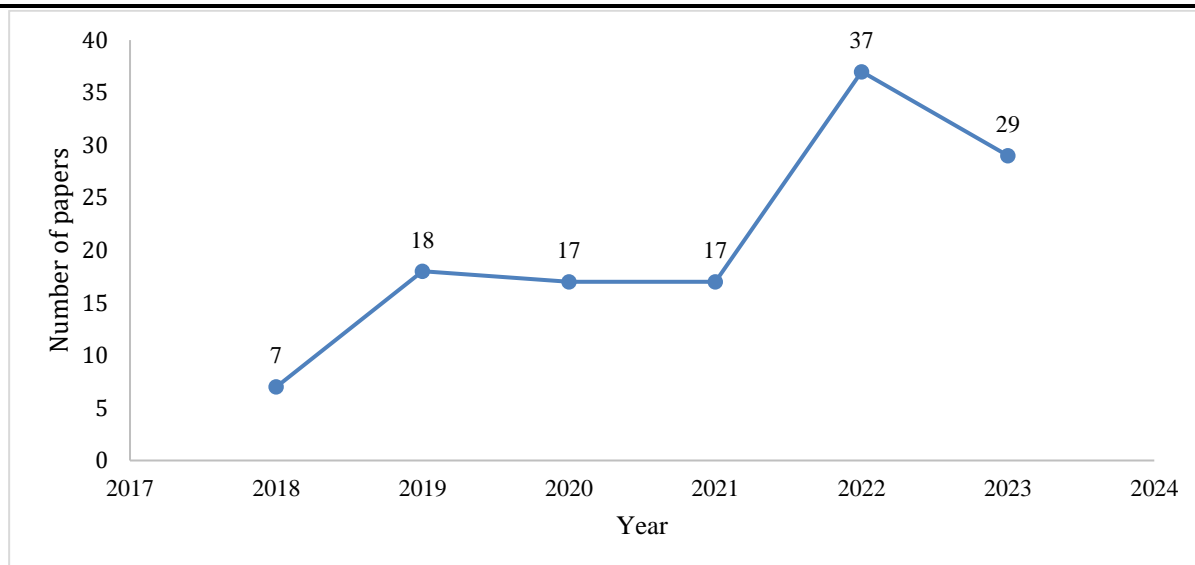
We formatted and stored the data extracted via Publish or Perish for VOSviewer software analysis. We specifically used Publish or Perish 8 and VOSviewer 1.6.17 throughout the research. The initial dataset encompassed articles related to digital financial inclusion. Using the keyword "digital financial inclusion" and considering title, keywords, and abstract criteria within Publish or Perish, we retrieved a total of 980 articles. The data for this study came from journal publication data on consumer behavior acquired through the reference management program.

However, through careful data filtering, we refined the collection to 125 relevant journals. These publications, published between 2018 and 2023, were stored in *.ris format. Subsequently, we used VOSviewer software to generate and analyze bibliometric maps from the extracted dataset. VOSviewer software facilitated the creation of three types of mapping data: network, overlay, and density visualizations. Furthermore, we refined the terms included in the VOSviewer mapping visualization to make our analysis clearer and more relevant. This study utilized a systematic approach to bibliometric analysis, using VOSviewer and Publish or Perish to review and visualize the academic literature on DFI to gain insights into the development, structure, and trends within this research domain.

RESULTS AND DISCUSSION

Research development in the field of digital financial inclusion

DFI has emerged as a prominent area of research in recent years. In 2018, there were only 7 publications on DFI, but this number increased to 18 in 2019, suggesting a growing interest in the topic. The number of publications remained relatively stable in 2020 (17) and 2021 (17), but there was a substantial surge in research interest in 2022 (37 publications). Although there was a slight decrease to 29 publications in 2023, it remained notably high, indicating that DFI continues to be an actively researched field reaching a total of 125 published articles. Levels of development of research on digital financial inclusion are displayed in Figure 1.



Source: Data processed, 2024

Figure 1. Levels of Development of Research on Digital Financial Inclusion

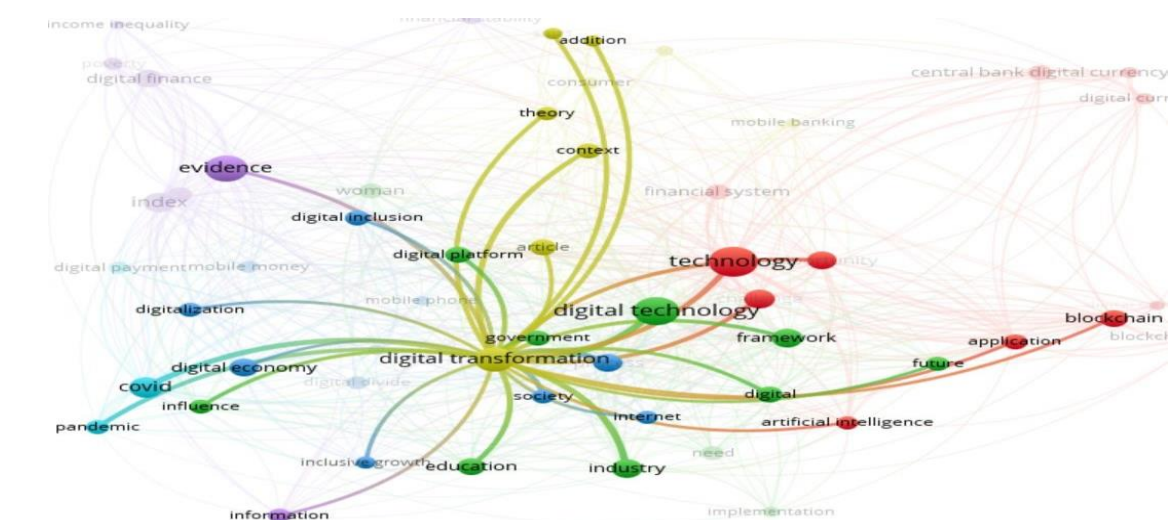
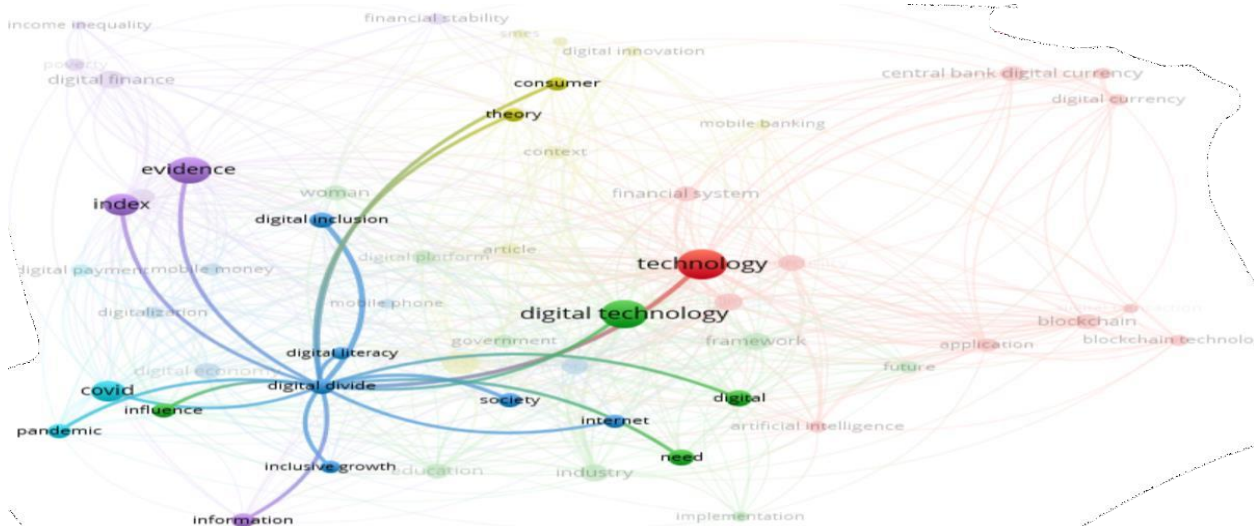
Table 1 presents data from 20 highly cited articles on digital financial inclusion (DFI), providing insights into the citation patterns and impact within this field. The most cited article, by Ozturk & Ullah (2022), has 146 citations, highlighting its significant influence. Chen and Zhang (2021) the study has received 99 citations, further underscoring its significance. Other articles have received varying degrees of citations, ranging from 54 to single-digit citations. This analysis contributes to a deeper understanding of the field's dynamics and influential studies.

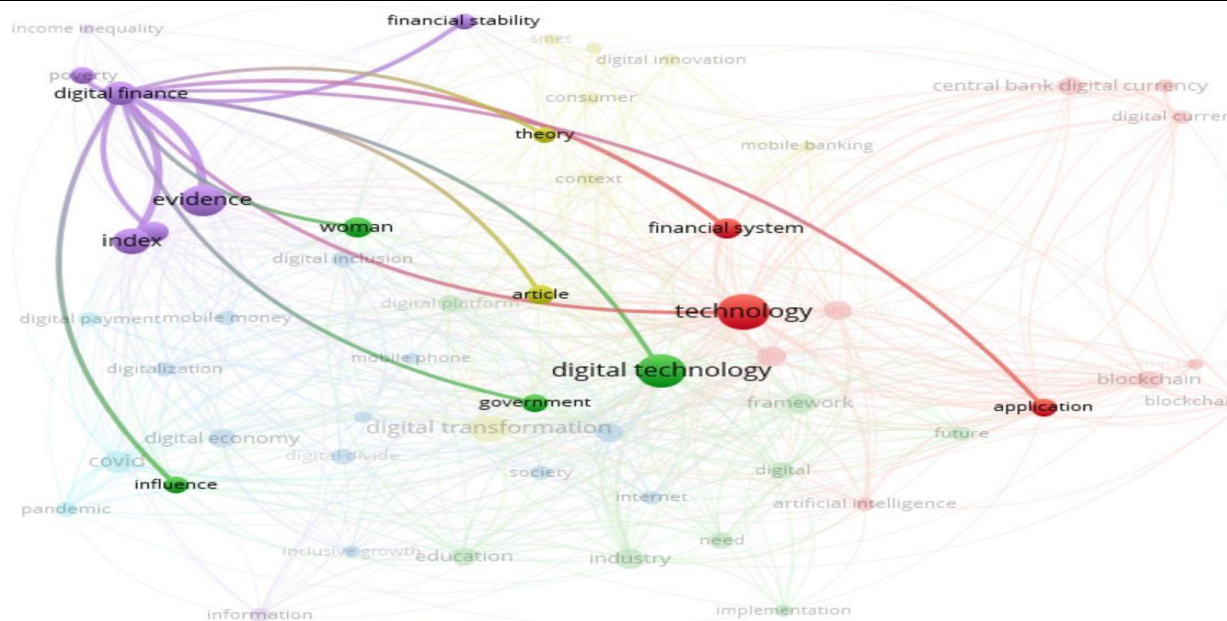
Table 1. Article Data in The Field of Digital Financial Inclusion

No	Authors	Title	Year	Cites	Refs
1	Ozturk & Ullah	Does digital financial inclusion matter for economic growth and environmental sustainability in OBRI economies? An empirical analysis	2022	146	(Ozturk & Ullah, 2022)
2	Chen & Zhang	Does digital finance promote manufacturing servitization: Micro evidence from China	2021	99	(Chen & Zhang, 2021)
3	Yi & Zhou	Does digital financial inclusion significantly influence household consumption? Evidence from household survey data in China	2018	54	(Yi & Zhou, 2018)
4	Liu & Zhang	Digital financial inclusion, multidimensional education, and farmers' entrepreneurial behaviour	2021	22	(Liu et al., 2021)
5	Ayadi & Shaban	Digital financial inclusion: a pillar of resilience amidst Covid-19	2020	17	(Ayadi & Shaban, 2020)
6	Ma & Li	Does digital financial inclusion affect agricultural eco-efficiency? A case study on China	2021	17	(Ma & Li, 2021)
7	Mukalayi et al.	Digital financial inclusion and energy and environment: global positioning of sub-Saharan African countries	2023	12	(Mukalayi & Inglesi-Lotz, 2023)
8	Du et al.	Does digital financial inclusion promote the optimization of industrial structure	2020	10	(Du et al., 2020)
9	Lu et al.	Does digital financial inclusion matter for firms' ESG disclosure? Evidence from China	2022	5	(Yichun Lu et al., 2022)

Visualization of digital financial inclusion topic area using VOSviewer

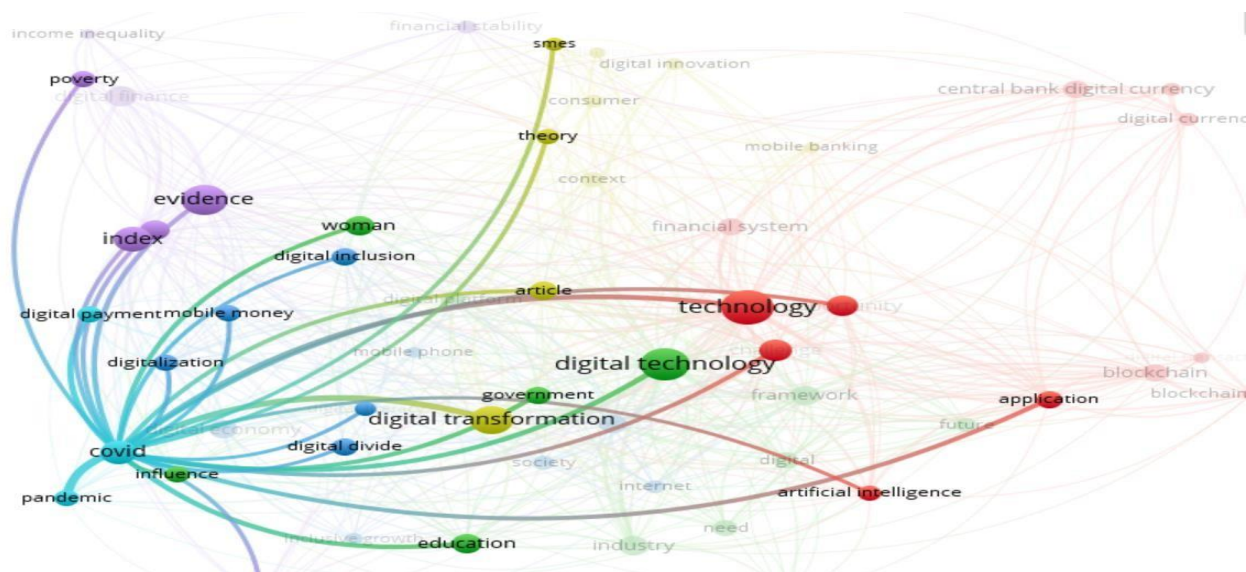
Figure 2. Cluster 1 Network visualization on digital financial inclusion





Source: Data processed, 2024

Figure 6. Cluster 5 Network visualization on digital financial inclusion



Source: Data processed, 2024

Figure 7. Cluster 6 Network visualization on digital financial inclusion

Cluster 1 has 12 items, the items are application, artificial intelligence, blockchain, blockchain technology, central bank, central bank digital currency, challenge, digital currency, digital transaction, financial system, opportunity, and technology (see Figure 2). Cluster 2 has 12 items and these items are digital, digital platform, digital technology, education, framework, future, government, implementation, industry, influence, need, and women (see Figure 3).

Cluster 3 comprises 11 items and the 11 items are digital divide, digital economy, digital inclusion, digital literacy, digitalization, inclusive growth, internet, mobile money, mobile phone, process, and society (see Figure 4). Cluster 4 has 9 items, the 9 items are addition, article, consumer, context, digital innovation, digital transformation, mobile banking, SMEs, and theory (see Figure 5).

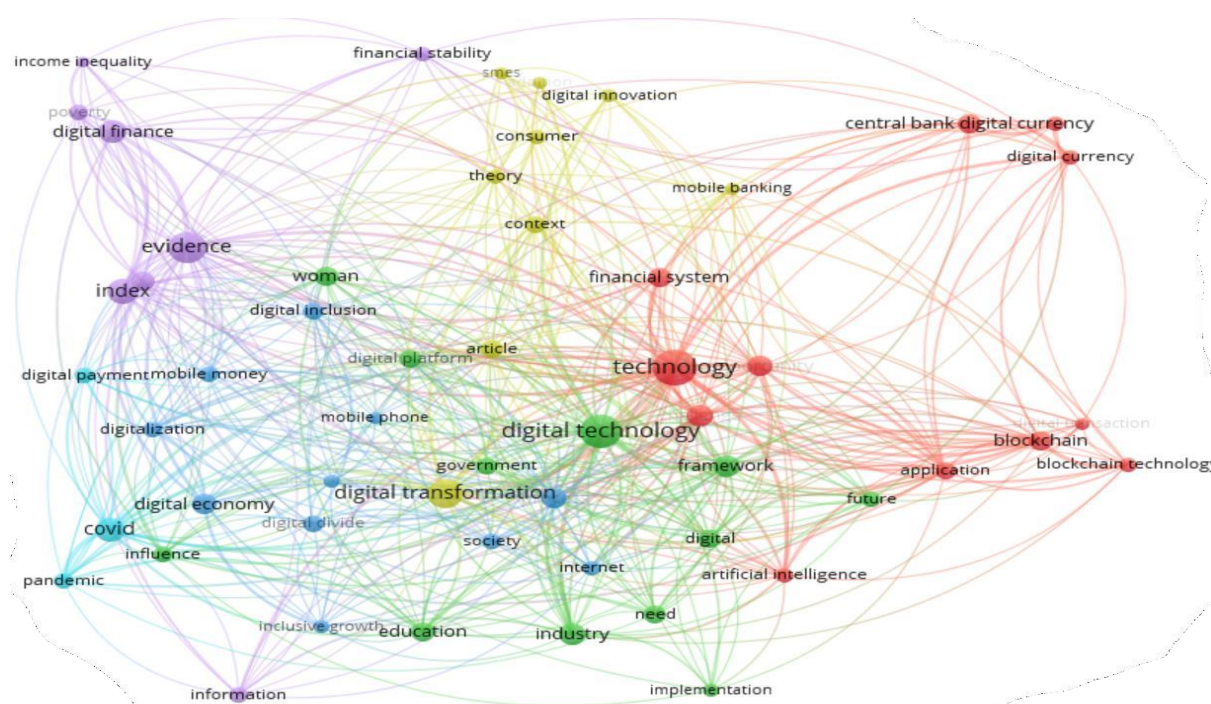
Cluster 5 has 8 items and the 8 items are digital finance, economic growth, evidence,

financial stability, income equality, index, information, and poverty (see Figure 6). Cluster 6 has 3 items and the 3 items are COVID-19, digital payment, and pandemic (see Figure 7).

Regarding the colour of the display, Cluster 1 is displayed in red, Cluster 2 is displayed in green, Cluster 3 is displayed in dark blue, Cluster 4 is displayed in yellow, Cluster 5 is displayed in purple, and Cluster 6 is displayed in light blue.

Network Visualization Digital Financial Inclusion Topic Area Using VOSviewer

VOSviewer provides three types of mappings for each term, including Network Visualization. Network Visualization depicts the relationships between terms on a map, using lines to connect related terms. Figure 8 shows the Network Visualization of the term "Digital Financial Inclusion" (DFI) in VOSviewer. The visualization shows clusters of related terms, with DFI in cluster 3. Cluster 3 has a total strength of 27 and an occurrence of 21. DFI is connected to cluster 2 (Digital Technology), cluster 1 (Digital Transformation), and cluster 6 (COVID-19).

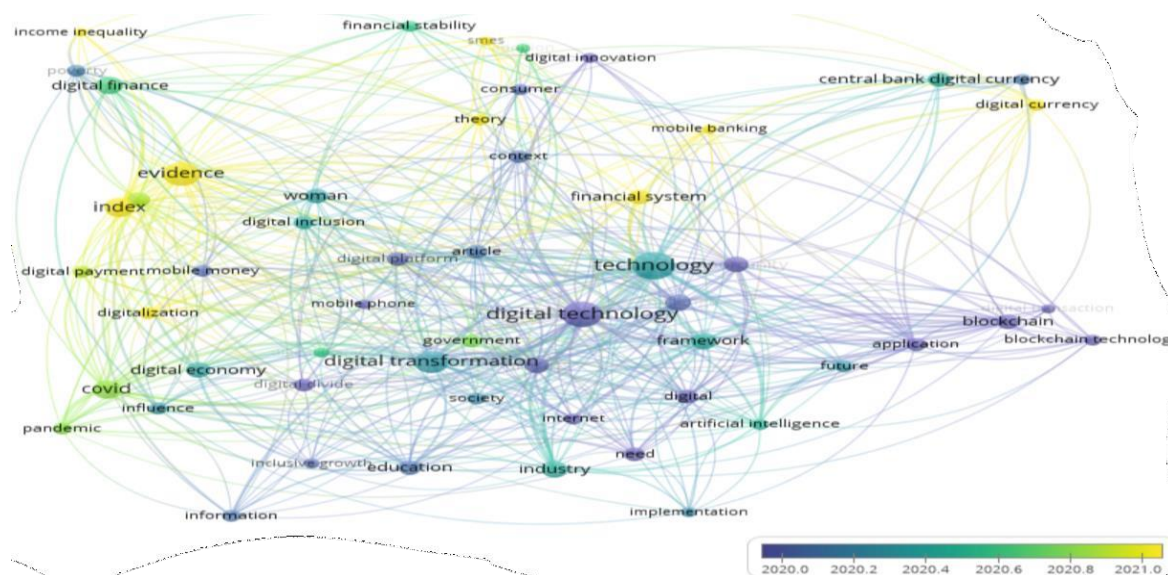


Source: Data processed, 2024

Figure 8. Network Visualization of Digital Financial Inclusion

Overlay Visualization Digital Financial Inclusion Topic Area Using VOSviewer

Digital financial inclusion is a growing research term in the field of digital financial services, with a growing prominence in recent years. The term's color transition to yellow indicates its recent addition to the lexicon of digital financial services, indicating its recent emergence as a discrete field of study. The association of DFI with other terms like digital technology, digital transformation, and COVID-19 highlights its multifaceted nature and strong connection to significant developments and trends in the digital age. DFI is a social and economic phenomenon, not just a technological innovation. Its prominence as a research keyword, closely related to emissions and food, suggests its potential to address urgent global issues, such as poverty reduction and sustainable development. (See Figure 9)



Source: Data processed, 2024

Figure 9. Overlay Visualization Digital Financial Inclusion Topic Area Using VOSviewer

The concept is also linked to other significant developments and trends in the digital age, indicating its social and economic importance. DFI's potential to reduce poverty and inequality while promoting sustainable development is supported by its association with other significant developments in the digital age (Ouyang et al., 2022).

Density Visualization of Digital Financial Inclusion

The density visualization of digital financial inclusion highlights the most frequently discussed topics, such as sustainable development, mobile money, financial technology, and financial inclusion as shown in Figure 10. The yellow color in the density map indicates their high frequency in prior research, and larger diameters indicate their greater significance. Emerging research areas in digital financial inclusion include "financial literacy," "women's empowerment," and "financial inclusion for the poor." The term "financial technology" has gained significant traction in recent years, indicating the potential of fintech to expand the reach of financial services.

The concept of mobile money is also widely used, indicating the potential of mobile money to facilitate greater accessibility to financial services in developing nations (Azergun, 2021; Bawuah, 2023). "Sustainable development" is an emerging field of study within the realm of digital financial inclusion, indicating the potential of digital financial inclusion to advance sustainable development objectives.

The concepts of "financial literacy," "women's empowerment," and "financial inclusion for the poor" are also burgeoning research areas, indicating the role of digital financial inclusion in enhancing the financial well-being of marginalized groups. The density visualization illustrates the progressive development of digital financial inclusion research, with the term "financial technology" gaining significant traction, indicating the increasing focus on the potential of fintech to improve the financial sector and reach of services (Oyewola & Dada, 2022).

Figure 10. Density Visualization of Digital Financial Inclusion

The objective of this research is to examine the bibliometric sources pertaining to digital financial inclusion (DFI). A subject area comprising keywords, abstracts, and titles yielded 125 pertinent articles when the keyword "digital financial inclusion" was applied. We generated mapping data, including network, overlay, and density visualisations, using the VOSviewer software. Digital financial services research about "digital financial inclusion" was the most studied topic between 2018 and 2023, according to our findings. We identified key themes in each of the previous studies using bibliometrics for this study, which is useful for determining the novelty of future research. The analysis reveals that DFI can pose environmental challenges like increased CO2 emissions but also significantly contributes to economic development and resilience in various economies. It also supports entrepreneurial endeavors and outsourcing of manufacturing services in China, highlighting its multifaceted nature and potential positive or negative outcomes.

To improve the investigation on digital financial inclusion, several recommendations are proposed. Firstly, it is important to expand the range of databases used beyond just Google Scholar to ensure a more comprehensive dataset. Additionally, while the focus of the research was on quantitative bibliometric analysis, incorporating qualitative methodologies could provide deeper insights into the contextual factors influencing DFI. Longitudinal studies should also be considered to track the development of DFI and its long-term impacts. Furthermore, further investigation is needed to address environmental concerns related to DFI, such as increased carbon dioxide emissions, and establish sustainable digital financial solutions. Ultimately, strengthening collaboration between researchers, policymakers, and practitioners is crucial to effectively implement research findings and drive tangible progress in the field of DFI.

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