

DIGITAL PLATFORM AND BUSINESS: A BIBLIOMETRIC ANALYSIS

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Abstract: *This article discusses global research trends in digital platforms and business through bibliometric studies, examining publication output and the co-occurrence of author keywords. Metadata were obtained from Scopus, which consisted of 7639 articles published between 2013 and 2023. The VOSviewer software reviewed nine clusters. The most frequently used keywords were digital platforms, social media, digital transformation and social networking (online). These clusters represented streams of digital platform research in business. This article further discusses research opportunities related to digital platforms in support of sustainable business growth in the future.*

Keywords: *Digital, Platform, Business*

Introduction

Digital platforms allow businesses to quickly and efficiently address customer needs and feedback. As demonstrated by Ruggieri, Roberto; Savastano, Marco; Scalingi, Alessandra; Bala, Dorina; D'Ascenzo, Fabrizio 2018, digital platforms ensure greater efficiency in business management. Businesses can use websites, mobile apps, and social media platforms to reach their customers anytime and anywhere in the world. A digital platform is computer software that allows users to create, share, and access information or data. It typically refers to the hardware and software components that make up a digital ecosystem, including everything from social media networks and mobile apps to cloud-based services and Internet of Things (IoT) devices. However, all digital platforms have one thing in common: they are designed to facilitate user-generated content (UGC) and empower individuals or businesses with the ability to reach out to others via technology (Palmer, G., 2022).

Implementation of digital platforms have changed the traditional ways of doing business in bricks and mortar to digital channels such as online marketing, App store, purchase via internet

or smartphone, e-transaction and e-commerce. Yet, digital transformation is a complex process and it brings along many challenges, especially for small-scale businesses. According to Rajala, A. and Hautala-Kankaanpää, T. 2023, it was revealed that the performance of small and medium enterprises (SMEs) is not directly affected by platform-based digital connectivity. However, this varies depending on the level and type of economic change. The same holds true for larger companies, which face the challenge of how to manage the opportunities and risks of digital transformation. As stated by Haoran Bai, 2021, due to digital technology, it may lead to the emergence of hacking attacks. Additionally, businesses with technological systems are exposed to a variety of threats such as leaking customer information and cybercriminals.

Nevertheless, there are numerous advantages of transforming a business into a digital business. It improves the effectiveness and efficiency of organizations. Apart from that, it also boosts productivity. According to Pfister, P., & Lehmann, C. 2023, five benefits have been identified: increased revenue, improved customer satisfaction, enhanced employee satisfaction, improved efficiency, and productivity. This is further supported by Wu, Y., Li, H., Luo, R. and Yu, Y. 2023, who found that digital transformation can effectively improve the total factor productivity (TFP) of enterprises, either state-owned enterprises (SOEs), large enterprises and high-growth enterprises. They are better equipped to achieve high-quality development by increasing their digital transformation. In line with Haoran Bai's observations in 2021, digital technology has brought many benefits to organizations such as centralization, access to the new markets, and transparency.

Digital platforms and business is an increasingly significant field. A vast amount of bibliometric research has been carried out in this field. This paper discusses bibliometric indicators for studies related to digital platform and business studies and will proceed with a network analysis to define the most important sub-areas within this topic. To define the trends in digital platforms and business, the following questions are proposed:

- Q1: Who and how much has been published in the area, with regard to the authors, their affiliated organizations and countries?
- Q2: What are the research trends in online learning studies according to the year of publication?
- Q3: What are the popular keywords related to these studies and have they evolved/ changed over the last ten years?
- Q4: What is the status of co-authorships?
- Q5: What is the status of co-citations?

Literature Review

Digital Platform

A digital platform economy is emerging. Companies such as Amazon, Etsy, Facebook, Google, Salesforce, and Uber are creating online structures that enable a wide range of human activities. As stated by Xiaolan Fu, Elvis Avenyo & Pervez Ghauri 2021, digital platforms serve as the main drivers of the platform economy and are fundamental to the digital transformation process. This opens the way for radical changes in how we work, socialize, create value in the economy, and compete for the resulting profits. Digital transformation is forcing companies to change their business models and adapt to a new market for sustainability.

The pace of growth in the digital economy is unparalleled. In 2016, the global economy was assessed at \$11.5 trillion, with expectations of reaching \$19 trillion by 2025 (Digital Spillover, 2017). This remarkable expansion can be attributed to various factors, including the

increasing adoption of online retail, the widespread use of mobile devices, and the evolution of the sharing economy. Establishing a robust online presence has become increasingly vital for businesses, especially as various industries shift their operations to the digital realm. In recent years, there has been a notable upsurge in the digital economy, marked by a growing number of companies transitioning to online platforms. This phenomenon is underpinned by multiple variables, including the accessibility of the Internet for businesses, the escalating trend of online shopping among consumers, and the simplified procedures for companies to initiate their digital footprints. Consequently, the digital economy has achieved a valuation in the trillions of dollars, and its continued expansion is anticipated in the foreseeable future. This expansion is fundamentally reshaping business operations and restructuring the dynamics of the overall economy.

A digital platform is a collection of software and hardware tools that companies use as a part of their digital strategy. Digital platforms are places where companies connect with users. Moreover, depending on the company's business model, digital platforms can also connect organizations with business to business (B2B) clients, investors, and providers. Digital platforms have created a new way of operating for companies and organizations in a "business ecosystem" (Presch, G., Dal Mas, F., Piccolo, D., Sinik, M., & Cobianchi, L., 2020). Users can use them to exchange goods, or information, knowledge, and services. Digital platforms are normally used in business include social platforms (X formerly known as Twitter, Facebook), advertising platforms (Google, Youtube), subscription-based platforms (Netflix, Spotify), and e-commerce platforms (eBay, Amazon). As described by Johannes W. Veile, Marie-Christin Schmidt, & Kai-Ingo Voigt in 2022, digital platforms act as intermediaries, interconnecting various internal and/or external actors for purposes such as information sharing, product development, and supply and demand matching. However, according to Marina Gómez García & Laura Hospido, 2022, digital platforms serve as technological infrastructures that function as intermediaries, streamlining interactions among two or more individuals to facilitate the delivery of services through IT applications in exchange for compensation.

Digital Platform and Business: Opportunities and Challenges

Digital platforms can be a game-changer for small-scale businesses, providing them with cost-effective tools to reach a broader audience, streamline operations, and compete in the digital age. According to Klaus E. Meyer, Jiatao Li, Keith D. Brouthers, & Ruey-Jer "Bryan" Jean, 2023, digital technologies not only enable cost reduction in businesses but also enable novel types of products and business models. Digital platforms are an excellent way for small businesses to find new customers. Other than that, small businesses can improve their customer experiences by using technology to better source, compile and analyze customer data. Ruggieri et al, 2018, revealed that start-up businesses displayed great growth prospects and created customer value by offering innovative products and services through digital platforms.

Digital platforms and businesses have revolutionized diverse industries, offering a plethora of benefits, yet they also confront significant issues and obstacles. The ascent of digital platforms is engendering competition among platforms, as they acquire both smaller platforms and conventional businesses. For smaller businesses, there is an urgency to compete effectively against their more financially robust and well-established counterparts. To secure a competitive advantage in the market, these companies must promptly pinpoint growth opportunities and strategize how technology can be harnessed to augment human endeavors. The challenge arises when platform owners face competition from rival platforms as well as traditional non-platform firms (Klaus E. Meyer et al, 2023), leading to high barriers to entry. Regarding privacy and

security concerns, Zixu Liu, Pedro Sampaio, Grigory Pishchulov, Nikolay Mehandjiev, Sonia Cisneros-Cabrera, Arnd Schirrmann, Filip Jiru, & Nisrine Bnouhanna, 2022, emphasize the importance of enforcing digital platform governance rules for knowledge protection and security. Arcesati, R., Holzmann, A., Mao, Y., Nyamdorj, M., Shi-Kupfer, K., von Carnap, K., & Wessling, C., 2020, also agreed that cybersecurity and data regulations are likely to be the main challenges for foreign companies doing business with China in the digital platform economy. Other than that, K. Schwertner, 2017, suggested that the primary risks are data security issues, lack of interoperability with existing IT systems, and lack of control. Therefore, numerous efforts have been made as preventive actions. Deloitte in 2015, reported the need to adjust talent and IT resources by investing in appropriate skills and excellent IT infrastructure.

Methodology

This research is a qualitative descriptive study with a bibliometric approach. Bibliometric analyses enable readers to gain a holistic view of the chosen topic of research throughout a specified time period (Gokhale, A., Mulay, P., Pramod, D., & Kulkarni, R. 2020). The object of the analysis is the published metadata of research results on digital platform and business obtained from the Scopus database.

Data search strategy

This study employed a screening sequence to determine the search terms for article retrieval. Study was initiated by querying Scopus database with, TITLE-ABS-KEY (digital AND platform AND business) thereby assembling 7,639 publications. Afterwards, the query string was revised so that the search only covered the publications period from 2013 to 2023. The final search string TITLE-ABS-KEY (digital AND platform AND business) AND PUBYEAR > 2012 AND PUBYEAR < 2024 AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English")) refinement included 2,579 publications which was used for bibliometric analysis. As of 2023, all articles from Scopus database were incorporated in the study.

Data analysis

Data sets containing the study publication year, publication title, author name, journal, citation and keyword in PlainText format were acquired from Scopus database covering the period from 2010 to 2023 and was analysed in VOSviewer software version 1.6.19. This software was utilized for analysis and formation of maps by employing the VOS clustering and mapping methods. Furthermore, by applying visualisation techniques through VOSviewer to the data set, patterns built on mathematical relationships were uncovered and analyses such as keyword co-occurrence, citation analysis and co-citation analysis were performed.

Findings

1. What are the research trends in online learning studies according to the year of publication?

Documents by year

Figure 1 displays the number of publications on digital platforms published each year from 2013 to 2023. The figures indicate that research on digital platforms has exhibited a significant and positive development pattern over this period. Notably, the rate of publications appears to have increased steadily from 2015 to 2022 but slightly decreased in 2023. This is unexpected, considering that 2023 was anticipated to have a higher number of publications on digital platforms, given that it was seen as one of the solutions to ensure business continuity.

Documents by year

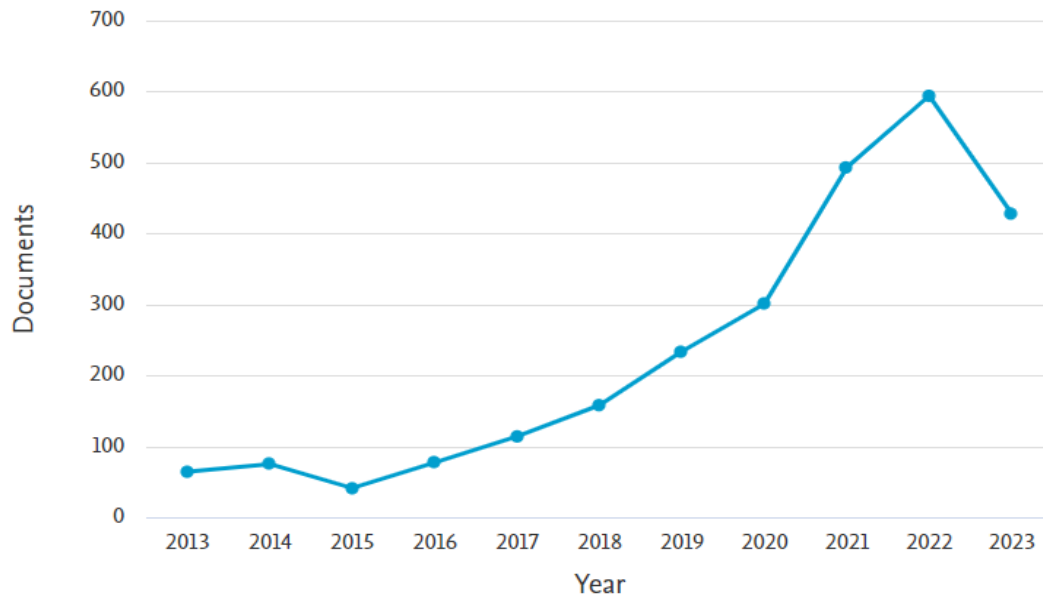


Figure 1: Number of publications per year

- Who and how much has been published in the area with regard to the authors, their affiliated organizations and countries?

Documents by author

The top ten authors are listed in Figure 2 and Table 1 below. Six authors have authored five or more articles: Trabucchi, D. (12), Buganza, T. (9), Parida, V. (7), Yousaf, Z. (6), Anshari, M. and Mancha, R. (5).

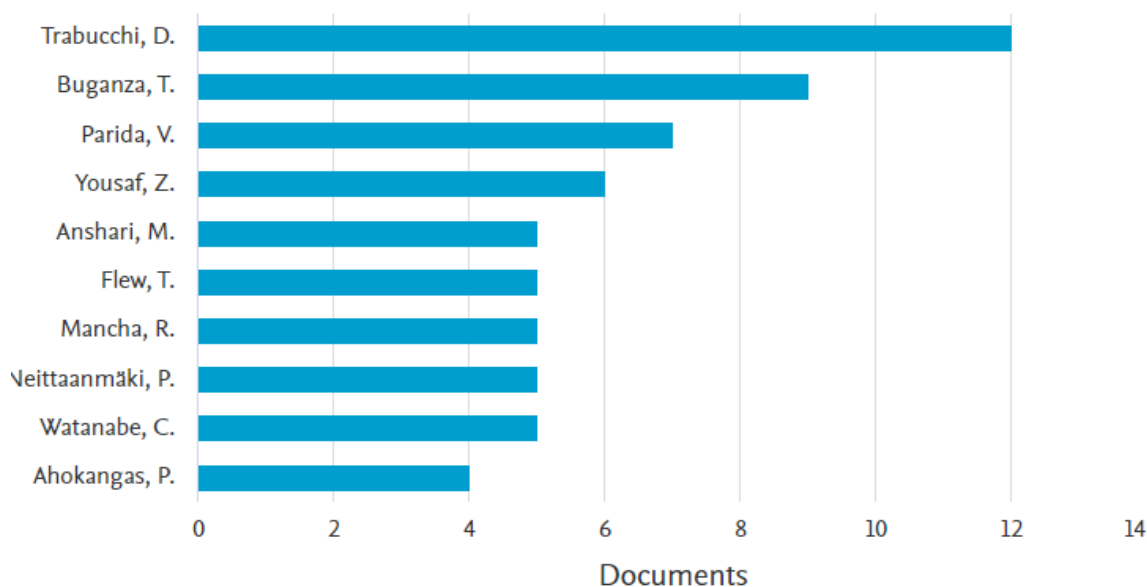


Figure 2: Number of authors with more articles

Authors	Publications
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Table 1:
authors at

Trabucchi, D.	12
Buganza, T.	9
Parida, V.	7
Yousaf, Z.	6
Anshari, M.	5
Mancha, R.	5

Number of
least 5 articles

Documents by affiliation

The total publications of the institutions are charted in Figure 3. When the effects of the institutions are examined, the most effective ones are Politecnico di Milano and Queensland University of Technology. Then, it is Universiteit van Amsterdam, Fujitsu Ltd, and Symbiosis International Deemed University, with 16 publications. University of Cambridge, Financial University under the Government of the Russian Federation and Aalto University are at the end of the top 10 list, with 15 publications.

Documents by affiliation

Compare the document counts for up to 15 affiliations.

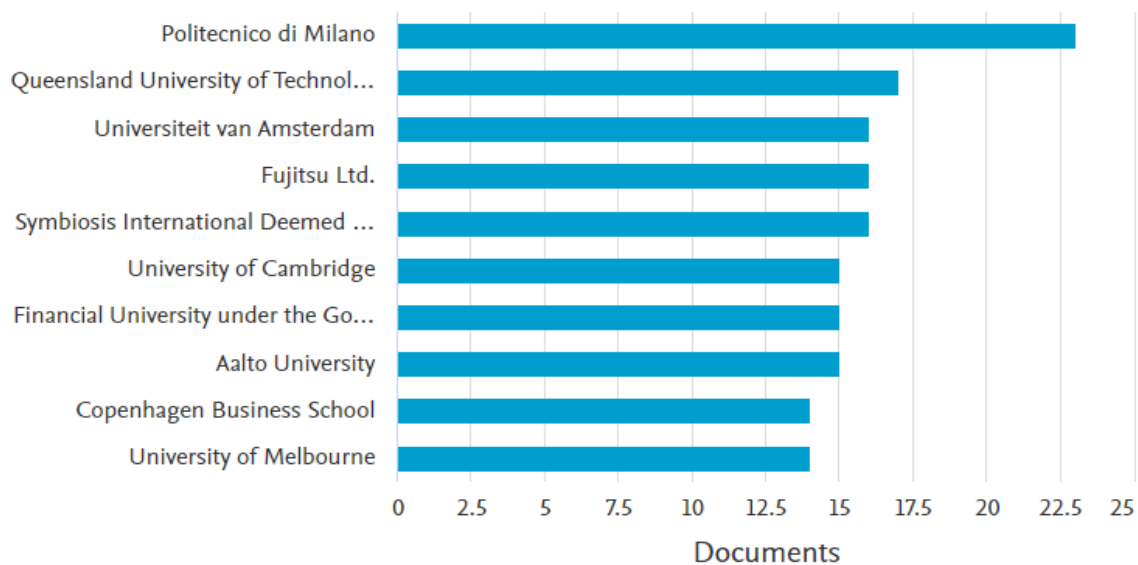


Figure 3: Most relevant affiliations

Documents by country or territory

Figure 4 below shows the authors from 15 countries that are responsible for at least 100 papers and above. The countries with the largest number of articles are United States (392), China (319), United Kingdom (253), India (207), Italy (171), Germany (162), Australia (138), Spain (120), and Russian Federation (102).

Documents by country or territory

Compare the document counts for up to 15 countries/territories.

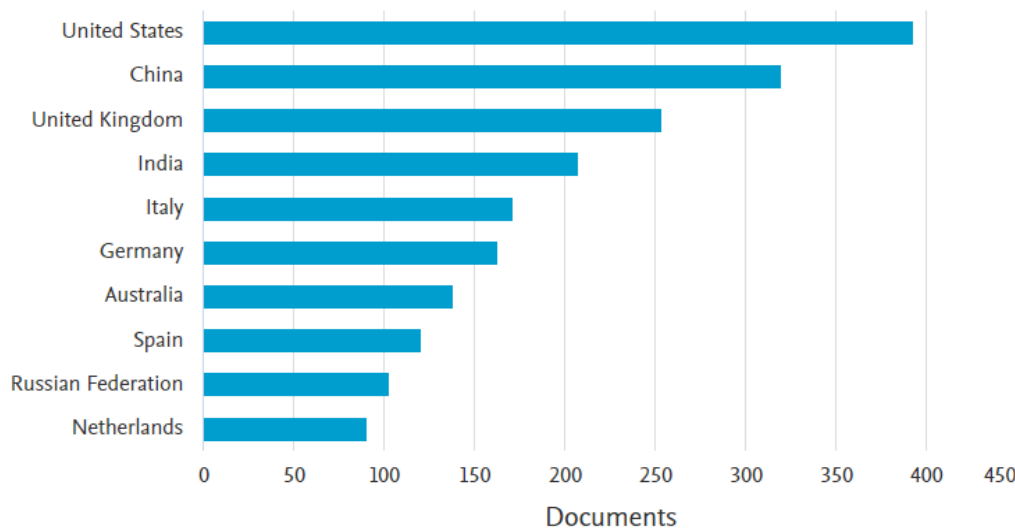


Figure 4: Corresponding author's country

3. What are the popular keywords related to the study and have they evolved/ changed over the last ten years?

Network visualisation of co-occurrence

The co-occurrence analysis revealed that the keywords are grouped into nine clusters or groups, as shown in Figure 5. The keywords within these clusters provide information about related research topics in the area of interest (Goksu, 2021). As depicted in Figure 5, the largest cluster is the red cluster with 197 keywords, followed by the green cluster with 175 keywords. The third cluster is represented by the yellow color with 107 keywords, followed by the blue cluster as the fourth cluster with 92 keywords. The remaining keywords are distributed across clusters 5 to 9, resulting in a total of 754 keywords.

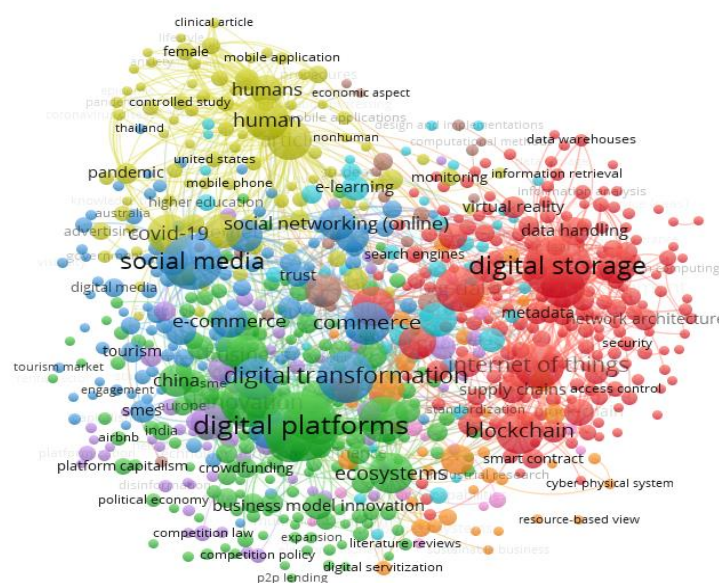


Figure 5: Network visualization-keywords

These findings highlight the importance of digital platforms in business and as a necessity of using technology for the development and sustainability of companies in the market.

The Overlay visualization map

The overlay map that emerges from the keyword co-occurrence analysis reveals trend over the years, specifically from 2013 to 2023, and provides insights into the tendency of research topics (Goksu, 2021). The overlay visualization map related to our analysis is shown in Figure 6. When analyzing Figure 6, it becomes evident that popular topics such as digital platforms, social media, digital transformation and online social networking have been searched between 2019 and 2022, as indicated by a slight color variation.

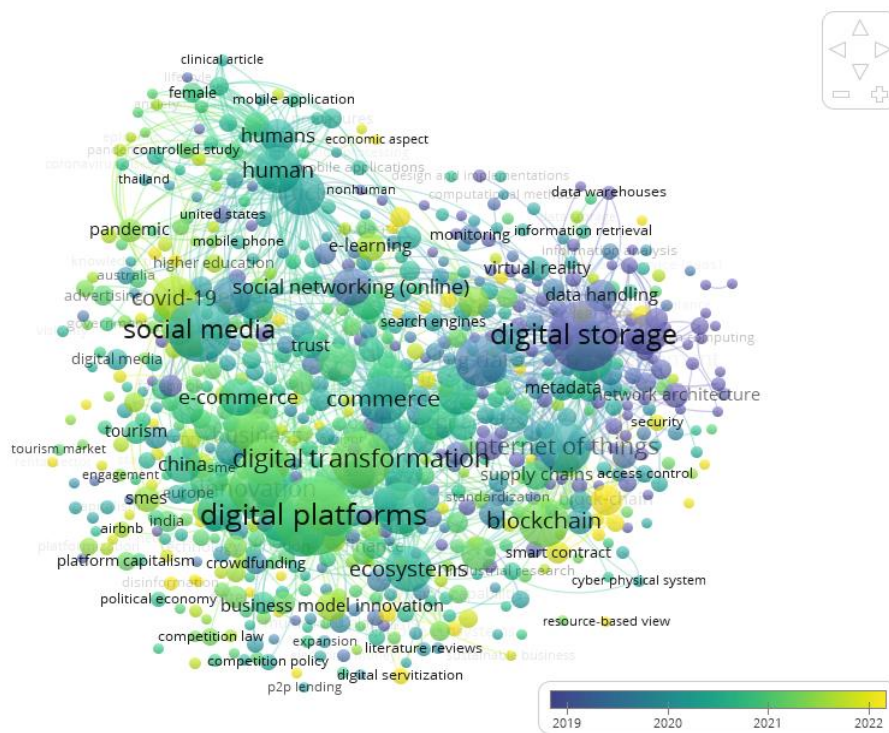


Figure 6: Overlay visualization

4. What is the status of co-authorships?

The co-authorship analysis was conducted to determine the cooperation of researchers in this area of digital platform and business study. For the analysis of collaboration among authors in the field of digital platforms and business, the analysis revealed that only four groups were connected (see Figure 7), and only a few researchers facilitated this connection. Kassen M. from Cluster 1, Puriwat W. and Tripopsakul S. are from Cluster 2, Ramaswamy M. is from Cluster 3 and Yablonsky S. is from Cluster 4. It is evident that cooperation among researchers working specifically in the business area of digital platforms is limited, despite the presence of numerous authors.



Figure 7: The co-authorship map of authors

5. What is the status of co-citations?

In co-citation analysis, article citation signifies the intellectual linkages to specific research areas (Ardito, L., Scuotto, V., Del Giudice, M. and Petruzzelli, A.M., 2019). If documents are present together in a publications' reference list, then they are said to be co-cited, which means they are associated with similar discipline of research (Fahimnia, Behnam & Sarkis, Joseph & Davarzani, Hoda, 2015). Larger nodes represent more cited documents and thicker link means more the co-citation of connected nodes. In Figure 8 and Table 2 below, the map displays 643 links and four clusters.

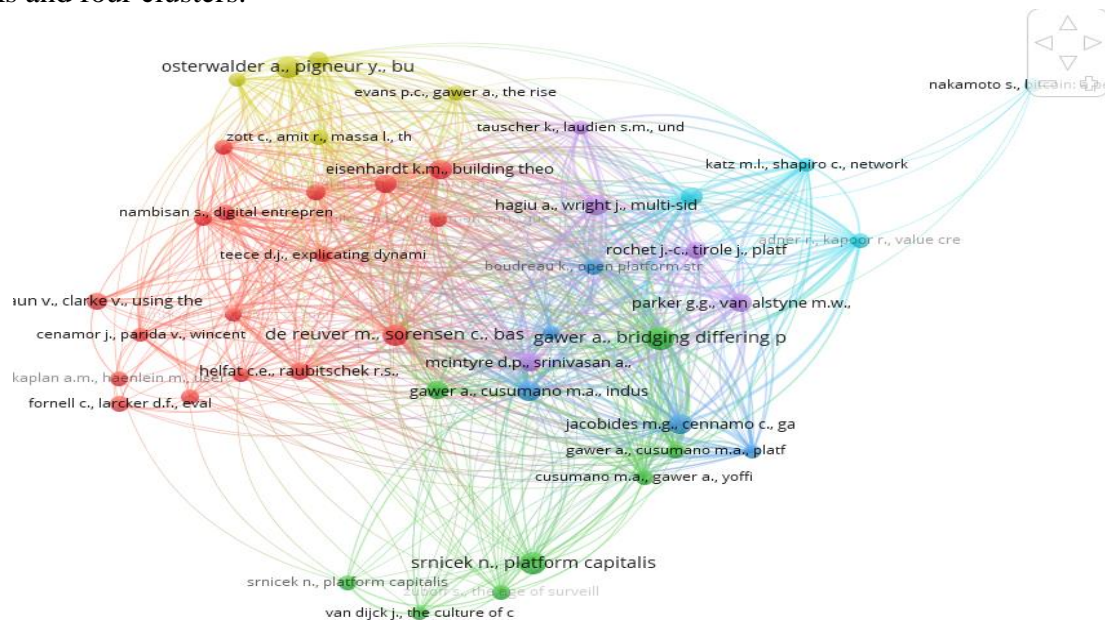


Figure 8: Co-citations network

Table 2: The top 10 most cited articles

Authors	Cited by
De Reuver M.; Sørensen C.; Basole R.C.	789
Kenney M.; Zysman J.	738
Teece D.J.	557
Gupta P.; Seetharaman A.; Raj J.R.	462
Constantinides P.; Henfridsson O.; Parker G.G.	405
Helfat C.E.; Raubitschek R.S.	386
Kohtamäki M.; Parida V.; Oghazi P.; Gebauer H.; Baines T.	378
Batrinca B.; Treleaven P.C.	364
Barbarossa S.; Sardellitti S.; Di Lorenzo P.	363
Richardson L.	321

Discussion

This paper performed a bibliometric analysis of the publications on the topic of digital platform and business that were listed on the Scopus database from 2013 to 2023. Trabucchi, D has contributed the highest to the area studied. His writings contributed to twelve publications. On the other hand, the results showed that the top 10 research organizations in this domain are as follows; the Politecnico di Milano, Queensland University of Technology, Universiteit van Amsterdam, Fujitsu Ltd., Symbiosis International Deemed University, University of Cambridge, Financial University under The Government of Russian Federation, Aalto University, Copenhagen Business School and University of Melbourne. The results also illustrate that the top countries are the United States, China, the United Kingdom, India, Italy, Germany, Australia, Spain, and the Russian Federation. This shows that there is extensive research has been done in these organizations and countries. The United States is known as a developed country and the usage of digital platform in business cannot be denied. Looking at the trend of publications, it shows a positive trend of publication from the year 2013 to 2023. However, a declining trend in the publication is evident in the later year, such a drop is not surprising since the year 2023 is still in progress and most of the publication comes to the end of the year, Therefore, it is considering that the higher number of publications increase over the year.

The results of the bibliometric analysis showed that there are four major clusters under the keywords digital storage, digital platform, human, and social media. These keywords highlight that the area of digital platform and business formed a recent research trend for many scholars. In addition, from 2019 to 2023, the topics of digital platform, social media, digital transformation, and social networking have become popular topics, whereby the yellow node (Figure 6) implies that the keyword is of current research interest. However, the collaboration between researchers in this area is low. It only focuses on these four major clusters and connects a few researchers although there are a lot of researchers on this topic. In terms of co-citations, within four clusters, there are 643 links exist. Therefore these results imply that there are a lot of opportunities for collaboration available which will contribute more to the literature and development to ensure the competitiveness of the industry. On the other hand, looking at the top ten contributors on this digital platform and business topic, none of them comes from Asian countries except China. Thus, Asian countries need to contribute more research in this area. It is essential since technology is rapidly changing over time.

Conclusion

Nowadays, the usage of digital platform for business has been widely used. Most of the business sector has its own digital media and digital shop. This study presents the overview research of digital platform and business based on bibliometrics. The bibliometric analysis has been done on 2579 documents from 2013 to 2023, and these were obtained through the WoS database. The analysis points to up United States, China, and the United Kingdom as the top three countries in this research area. There are four main research themes in this area of research which are; digital storage, digital platforms, human and social media. Despite a lot of publications existing in the area, the collaboration or cooperation between researchers is still minimal. The co-citations analysis only captured 643 links within the four clusters.

This paper also recommends future research revealed directly by exploring the results of this study. Therefore, it is hoped that the findings may assist future researchers or any interested parties in understanding the current state of digital platforms and business areas.

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