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A Bibliometric Analysis of Digital Currency Research

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ABSTRACT

Purpose – This study aims to provide a general framework for scientific research on digital currency.

Design/methodology/approach – In the research, bibliometric analysis was carried out using performance analysis and science mapping techniques. Web of Science (WoS) database was used to compile scientific studies and evaluations based on bibliometric analysis were made using VOSviewer software.

Findings – In the research, the change in the number of studies on the concept of digital currencies over the years was determined. The authors who carried out the most studies on the subject and the most frequently used keywords in the studies were determined. It is also emphasized that the novelty of the subject and its recognition by the public may attract the attention of researchers.

Discussion – It has been determined that the number of studies on digital currencies tends to increase. The keywords "blockchain" and "cryptocurrency" were the most common keywords in keyword searches. This demonstrates that the use of blockchain technology used in cryptocurrency has become widespread. However, it can be stated that it may be beneficial for Türkiye, which has a low level of contribution to the international literature on the subject, to produce more studies.

1. INTRODUCTION

In the ever-evolving world of finance, digital currencies are at the forefront of this development. However, as in-depth research on digital currencies is conducted, questions about its impact on legal frameworks and economic systems are increasing (Georgios, 2024). Studies on digital currencies and developments in the field are increasing rapidly. Every innovation in this context increases the potential of the digital currency area. Therefore, as we move forward in this complex environment regarding the concept of digital currencies, especially in the financial field, developments show that finance is moving towards a future that is more inclusive, transparent and secure.

Digitalization is reshaping economic activities, narrowing the role of cash and promoting new forms of digital money (Mancini-Griffoli et al., 2018: 4). New cryptocurrencies are emerging almost every day (Bech & Garratt, 2017). Technological innovation is changing both monetary transfer mechanisms and the ways in which money is held (Kavuri, Milne & Wood, 2021: 2).

According to Henley & Partners' "*World's First Crypto Asset Report*" (2023), there are 88,200 crypto millionaires worldwide and 40,500 of them hold their wealth in Bitcoin. The total market capitalization of cryptocurrency has now reached USD 1.2 trillion and there are 425 million cryptocurrency holders worldwide (Henley & Partners, 2023). The Bitcoin ecosystem and other cryptocurrencies are emerging as a disruptive innovation in the financial world. In general, it is considered that cryptocurrencies are a welcome development in the financial field (Vora, 2015: 829-830).

2. CONCEPTUAL FRAMEWORK

2.1. Digital Currency

Digital currencies have created confusion as much as they have been the center of attention since they first came to the agenda. Digital currencies, which entered our lives with the concepts of "Blockchain" "Bitcoin" and finally "Cryptocurrency", have been the subject of many discussions. Digital currencies can be classified as

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digital money and other assets. Assets are actually all kinds of information stored in the blockchain system. This information is specially hashed with crypto (encryption) algorithms (a complex code generated by crypto algorithms). Digital money is the monetary equivalent of this information. Digital currencies can refer to the currencies produced by central banks (fiat money) that we use in our lives, as well as private currencies within the blockchain system (TBB, 2022: 3-4).

A digital currency is any currency that can only be used in electronic form (Rodeck, 2023). Digital currencies have no physical properties and exist only in digital form. Transactions involving digital currencies are conducted using computers or electronic wallets connected to the Internet or designated networks (Investopedia, 2024). Digital currencies are transforming the global payment environment, reshaping monetary policy and accelerating changes in global economic power.

Cryptocurrencies are virtual currencies that do not have physical assets, are traded without being linked to an authority and do not have specific centers; they are subject to processing in electronic environments known as less costly, fast and secure money transfer. A fundamentally new type of cryptography was first proposed by David Chaum in 1983, allowing for an automated payment system with various features. In 1998, the "*b-money*" system, created by computer scientist Wei Dai, introduced many of the features seen in today's cryptocurrencies, and in 2008, Satoshi Nakamoto wrote "*Bitcoin: A Peer-to-Peer Electronic Cash System*" in 2008, the birth of cryptocurrencies was realized (Karyağdı & Yolci, 2023: 6). There are subtle differences between digital currencies and cryptocurrencies, although the two terms are often used interchangeably. Cryptocurrency is a subset of digital currency but uses cryptography to ensure security, thus making it extremely difficult to counterfeit (Zhong, 2022: 585).

2.2. Bibliometric Analysis

Bibliographic review is a research method that provides useful statistical analysis and a comprehensive representation for researchers trying to examine scientific knowledge on a particular topic. The approach, also known as science mapping, can be used to examine both broad areas of interest and more specific fields. In addition, the method is a useful tool for researchers to reconstruct and transform qualitative data into quantitative data (Dima, 2022: 3-4).

Bibliometric analysis is a common and accurate method for examining and analyzing large volumes of scientific data. This technique aims to grasp the interconnectedness between journal citations and summarize the current situation in terms of an existing or emerging research topic (Kuzior & Sira, 2022: 4). In general, there is a widespread desire among decision makers to characterize and quantify the research carried out. In this context, bibliometric analysis naturally presents itself as a tool (Ellegaard & Wallin, 2015: 1811).

Basic research in science measurement (quantitative measurement and analysis of science) has increased significantly. This has led to the emergence of numerous new measures and techniques (Braun, 2010: 870). The introduction of different platforms for tracking publications and analyzing citation or relationship networks between publications has enabled effective access to information and the analysis of documents according to various criteria. Bibliometric analysis method, first defined by Pritchard (1969), is one of the methods that can be used for this purpose. Bibliometric studies reveal the current status, orientation and development of studies in the literature in a particular discipline; it provides the opportunity to analyze academic journals and articles by mathematical or statistical analysis according to citations, subjects or country distribution (Sezgin et al., 2022: 2).

Bibliometric techniques allow the identification and comprehensive analysis of the most influential research articles and key trends, increase the depth and breadth of literature reviews, and contribute significantly to the systematic and rigorous investigation of academic fields (Sánchez-García, et al. 2024: 191). Bibliometric methods or analysis are now firmly established as scientific specializations and are an integral part of research evaluation methodology, especially in scientific and applied fields. The methods are increasingly used when studying various aspects of science and also in the worldwide ranking of institutions and universities (Ellegaard & Wallin, 2015: 1809).

The controversial use of bibliometrics in scientific decision-making has necessitated the need for researchers to be knowledgeable and interested in bibliometrics. The issue of bibliometric standards in bibliometric research was first raised by Glänzel & Schoepflin (1994) (Jonkers & Derrick, 2012: 829). Despite the rapid

growth of the field of bibliometrics and the ever-increasing interest in indicators for the assessment and measurement of scientific production, the field is in crisis: subfields are fragmenting, the field lacks consensus on fundamental questions and internal communication, and the quality of scholarship is being questioned by other disciplines (Glänzel & Schoepflin, 1994: 375).

Bibliometrics is also an important tool for analyzing and evaluating the progress of academic research in countries, universities, research centers, research groups and journals. Web-based online bibliographic databases ISI, Web of Science, Scopus, CiteSeer, Google Scholar or NLM and MEDLINE or others are common bibliometric data sources for research (Yıldız, 2019: 502). Web of Science (WoS) database was used in this study for the compilation of academic articles. WoS is the world's oldest, most widely used and authoritative database of research publications and citations (Birkle et al., 2020: 363). Today, articles published in journals examined in the citation indexes in the WoS database are widely accepted in the academic community and as a result, this database is frequently used in bibliometric analysis.

3. LITERATURE REVIEW

When the literature on the research topic is examined, it is noteworthy that there are bibliometric analysis and comprehensive studies on concepts such as digital assets, digital currencies, cryptocurrencies, virtual currencies and blockchain technology. In addition, it has been observed that bibliometric analysis is frequently used in many different research areas from tourism to education, from economy to health. In this context, general information about some studies conducted abroad and at home is given below.

It is seen that the studies on digital currencies in the literature are mostly in the fields of central bank digital currency and cryptocurrency and blockchain. Pana (2021), Bhaskar et al. (2022), Sah et al. (2023), Alrawashdeh, N. (2023), Kvedaraviciute & Sapkauskiene (2023-2024), Ceylan & Ceylan (2024) aimed to examine the trends in the development of central bank digital currency literature and to identify important characteristics of the research area. They used a bibliometric analysis to analyze academic publications on central bank digital currencies in different databases and periods. Kuzior & Sira (2022), García-Corral et al. (2022), Yiğenoğlu et al. (2022), Alqudah et al. (2023), Jain et al. (2023), Lazea et al. (2024) conducted a comprehensive crypto and blockchain analysis with bibliometric research. In the analyses made using different databases, it is understood that concepts such as digital currency, blockchain and cryptocurrency are the most recurring keywords. Overall, the analysis revealed bibliometric characteristics of the central bank digital currencies literature, including publication trend, influential countries, influential articles, prolific authors, levels of collaboration, and co-occurring keywords.

4. METHOD

4.1. Purpose and Importance of the Research

In recent years, advances in financial technologies have accelerated the transition to a digital economy. Digital currencies have come to life as products of this progress and have been the center of attention since the first day they came to the agenda. Many studies have been carried out on the subject of digital currencies and the purpose of this study is to present a general framework of these studies.

It is considered that this research is important in terms of revealing the current situation regarding the studies on the concept of digital currency numerically in terms of various indicators such as year, research areas, etc. It also aims to identify the authors who have carried out studies on the subject and the collaborations between these authors, and revealing the research trends by determining the prominent topics or the topics that are addressed together in the studies carried out. In addition, it is thought that the novelty and public recognition of the subject of this research may attract the attention of researchers.

4.2. Data and Analysis

In this study, Web of Science (WoS) database was utilized to collect the data within the scope of the research. WoS was chosen because it is an advanced database for performing detailed temporal searches and is reliable as a scientific source (Dima et al., 2022; Popescu et al., 2022). On 01.04.2024, 1,416 studies were reached in the search with the keyword "digital currency". The aim of the field selection was to reach the most publications. Evaluations based on bibliometric analysis were made using VOSviewer software. Details about the process of obtaining data on the studies on digital currencies are presented in Table 1.

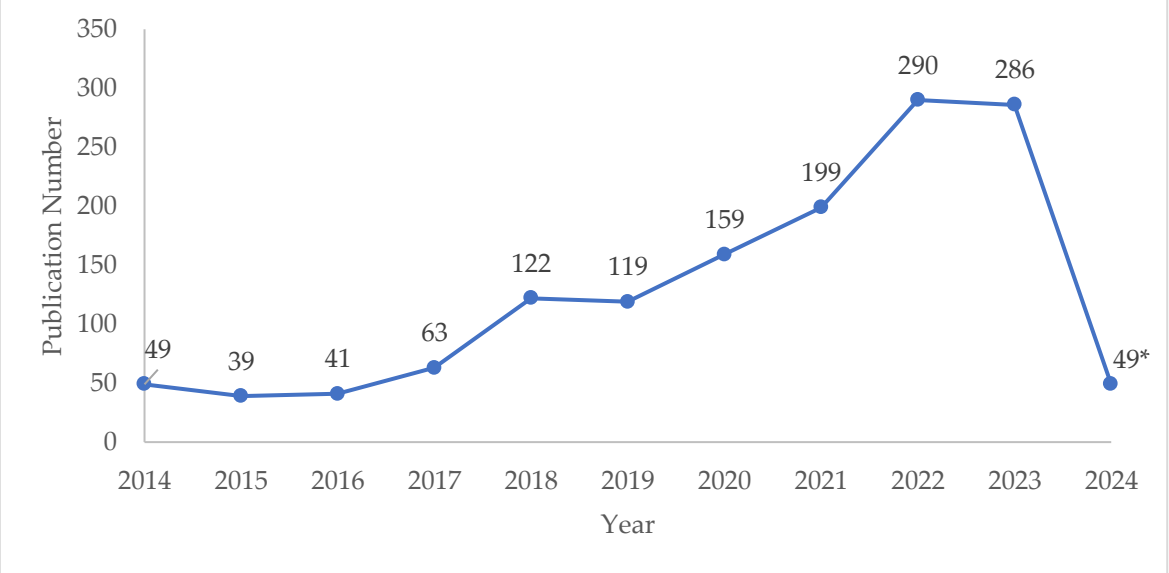
Table 1. The Acquisition Process of Data

Database	Web of Science Core Collection Editions: All	
Search Field and Terms	Search Field: Topic: Search Terms: Digital Currency, Digital Currencies, Central Bank Digital Currency, Digital Money	
Criteria	Document type: Article, review article, Proceeding Paper, Book Chapters, Book, Others (Editorial Material, conference review etc.) Document language: English	N = 1416

In order to determine the current status of the studies on digital currencies, a search was made in the subject search field *("digital currency" or "digital currencies" or "central bank digital currency" or "digital money"*) within all versions of WoSCC on 01.04.2024 and 1,416 results were found as a result of the search.

5. FINDINGS

According to the results of the query made according to the titles of scientific publications and keywords in the WoS database, a total of 1,416 publications related to the concept were made in the relevant literature in the world between 01.01.2014-01.04.2024. In the digital asset theme, firstly, when the distribution of publications in the WoS database according to years is analyzed; it is seen that scientific publications on digital asset have an increasing trend. The distribution of these publications by years is presented in Figure 1.



* As of the 1st of April.

Figure 1. Distribution of Publications by Year

Source: VOSviewer

When Figure 1 is analyzed, it is seen that the most publications were made in 2018 (290 publications) and the least publications were made in 2015 (39 publications). Since 2024 is included in the research from the beginning of April, the number of publications seems to be low. However, although it is April, it can be said that the total number of publications is the same as the total number of publications in 2014, so it can be said that the number of publications will continue to increase at the end of 2024. The distribution by countries is presented in Figure 2.

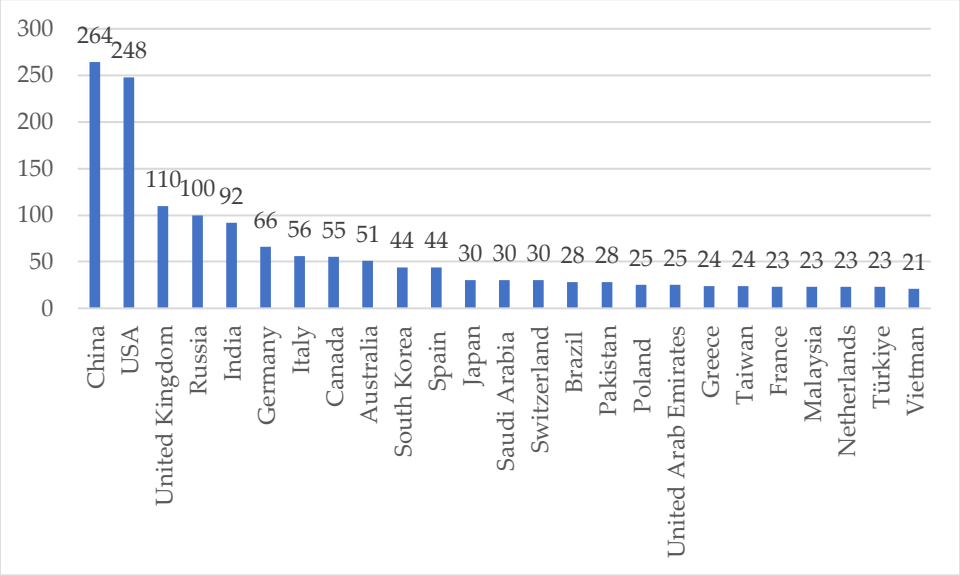


Figure 2. Distribution of Publications by Country

Source: VOSviewer

According to Figure 2, it is inferred that China has the highest number of publications with 18.64% (264 publications). It is followed by the USA with 17.51% (248 publications) and the UK with 7.76% (110 publications). Türkiye ranks 24th with 23 publications in total and constitutes 1.62% of the publications in this field.

In the next step on digital currency, the distribution of publications in the WoS database by type is shown in Table 2 below.

Table 2. Distribution of Digital Asset Related Studies According to Publication Types

Publication Type	Number of Publications
Article	1.019
Conference Proceedings	263
Book Chapter	48
Review	37
Book	3
Others (editorial, conference review, etc.)	46
Total	**1.416**

Source: VOSviewer

According to Table 2, it can be said that articles (71.93%), conference proceedings (18.57%) and book chapters (3.38%) lead the studies on digital currencies, respectively.

The distribution of publications on the theme of digital presence according to the university/research institution is presented in Figure 3 below.

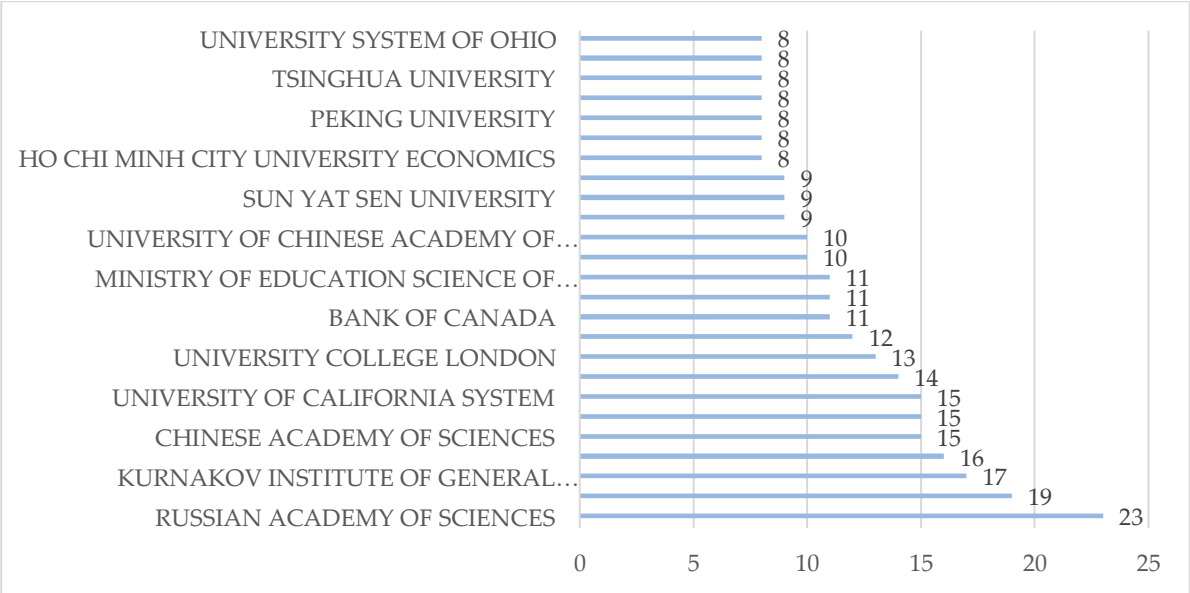


Figure 3. Distribution of Publications by Institutions

Source: VOSviewer

As can be seen in Figure 3, the Russian Academy of Science has the highest number of publications on the topic of digital currencies (23 publications). In second place is University of Londan (19 publications) and in third place is Kurnakov Institute of General and Inorganic Chemistry of the Russian Academy of Sciences (17 publications).

The key common word analysis related to the digital asset theme using the VOSviewer program is presented in Figure 4.

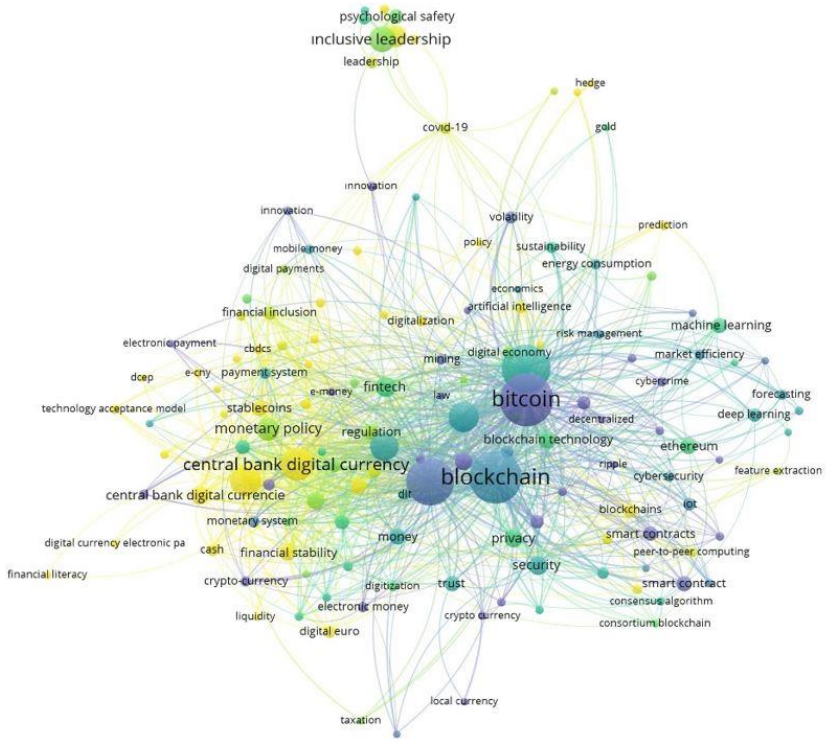


Figure 4. Co-occurrence Analysis of the Digital Currency Keywords

Source: VOSviewer

When the co-occurrence analysis of the digital currency keywords in Figure 4 is examined, it is seen that the top three popular keywords are "blockchain", "bitcoin" and "central bank digital currency", respectively. The density visualization of the most frequently used keywords is presented in Figure 5 below.

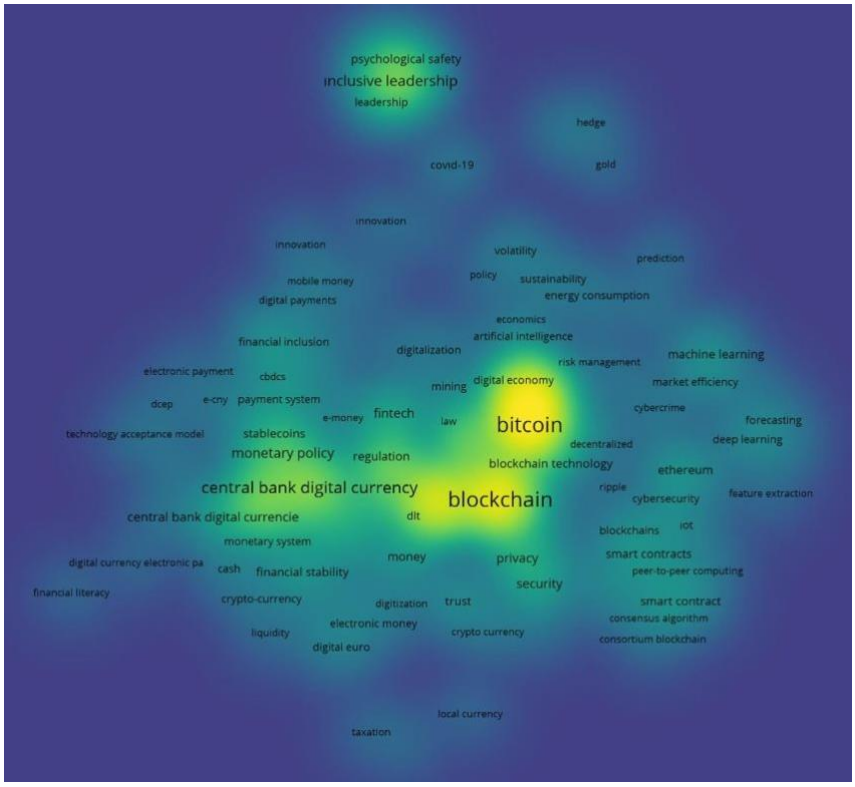


Figure 5. Density Visualization for Keywords

Source: VOSviewer

When the density visualization of the most frequently used keywords in Figure 5 is examined, it is seen that yellow colors represent the most frequently used words and blue colors represent the less frequently used keywords. When the co-occurrence keywords are examined, it is seen that yellow colors form the main center of the concepts of "blockchain, bitcoin and central bank digital currency" as the most intensely used words. When the density visualization is examined, it is seen that the themes close to the main center such as "blockchain technology, digital economy, Fintech, distributed ledger technology (dlt), monetary policy, stablecoin, digital currency, leadership" are at the forefront.

The findings regarding the number of publications and citations of the most cited authors are presented in Table 3.

Table 3. Top 10 Authors with the Highest Number of Publications and Citations

	Author	**Publication**	**Citations**
1	Bekiros, Stelios	5	590
2	Biryukov, Alex	4	393
3	Lahmiri, Salim	4	329
4	Hong, Kihoon	3	638
5	Hofmann, Heath	3	496
6	Li, Jianqiu	3	496
7	Dziembowski, Stefan	3	391
8	Ouyang, Minggao	3	496
9	Song, Ziyou	3	496
10	Baur, Dirk G.	2	648

Source: VOSviewer

Another analysis method related to the VOSviewer program is to determine the researchers with the highest number of publications. Figure 6 below shows the researchers with the highest number of publications. In addition, the clusters formed by the researchers and the links between the researchers are also shown.

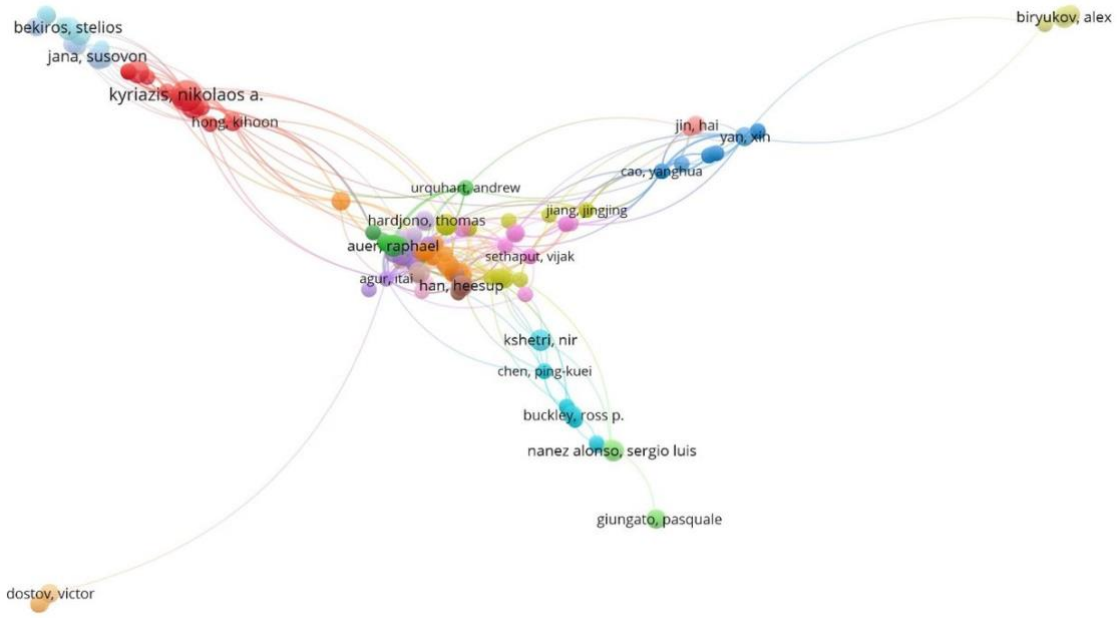


Figure 6. Co-authorship Network for Research on the Digital Currency

Source: VOSviewer

According to Figure 6, there are 12 clusters and 144 links in total. Accordingly, the size of the circles indicates the number of publications of the authors, the same circle colors indicate that the authors work together, and the lines between the circles indicate the authors who are related to each other. When Figure 6 is analyzed, it is seen that the researchers with the highest number of publications are Nikolaos A. Kyriazis, Raphael Auer and Stelios Bekiros.

6. CONCLUSION AND DISCUSSION

In this study, bibliometric analysis methods were used to capture the conceptual structure and development of the publications in the journals in the WoS database on the concept of digital asset. In the analysis, keywords of scientific publications, keywords in abstracts and citation networks revealing the collaboration between authors were used and visualizations were made through the VOSviewer program. 1,416 publications were included in the analysis. Important publication indicators in the digital asset theme are summarized and international research performance is evaluated. The strength of this study is that it summarizes and reports the findings of key papers on the topic of digital currencies.

According to the analyses; when the distribution of publications according to types is examined, it is seen that the highest number of publications (1,019) are articles and the lowest number (3) are books. It is seen that most of the studies consist of articles. The country with the highest number of publications is China (264 publications) with a rate of 18.644%, China is followed by the USA (248 publications) and the UK (110 publications) respectively, the country with the lowest number of publications is Vietnam (21), Türkiye ranks 24th with 23 publications in total and constitutes 1.624% of the publications in this field. The institution with the highest number of publications on digital currencies is the Russian Academy of Science (23 publications). The University of Londan (19 publications) ranked second, followed by the Kurnakov Institute of General and Inorganic Chemistry of the Russian Academy of Sciences (17 publications). The findings obtained as a result of these analyses show that the countries with the most publications and the institutions hosting the most

publications differ. In addition, in the most recurring keyword analysis, it is seen that concepts such as digital currency, blockchain and cryptocurrency overlap with the studies of Kuzior & Sira (2022), García-Corral et al. (2022), Yiğenoğlu et al. (2022), Alqudah et al. (2023), Jain et al. (2023), Lazea et al. (2024) in the literature, although different databases are used. When the distribution of the studies conducted in this field is analyzed according to the authors, "Bekiros, Stelios" ranks first with 5 studies and "Biryukov, Alex & Lahmiri, Salim" ranks second with 4 studies each.

Based on the bibliometric analysis, it is seen that the concept of digital assets will expand in the coming years, especially in the financial field, and therefore research in this field may gain weight. Financial services are experiencing a significant transformation with the rapid rise of digital assets. In this context, it is strategically important for businesses to successfully manage financial transformation.

This study aims to provide a situation analysis for researchers who want to study the concept of digital currencies. It is expected to provide a road map for researchers who want to work on this subject. Thanks to these analyses, it is expected to inspire future studies based on which themes the researchers and institutions working on this subject in the world focus on. As a result, these studies can be revealed which topics and themes finance science is concentrated around in the context of digital currencies, as well as which financial terms digital currencies are mostly studied with.

As in any study, the present study also has some limitations. One of the shortcomings of the study is that the articles included in the research focus on bibliometric analysis in the WoS database. It does not include studies published in languages other than English. The dataset is limited between 1 January 2014 and 1 April 2024. Considering that the development environment in the field of study is constantly changing, new studies can be conducted as different research topics by making periodic updates in future studies and obtaining data from other databases. It is also recommended that bibliometrics should be included in the curricula of universities due to its importance.

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