A Bibliometric Analysis of the Literature on Utility and Security Tokens

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Abstract

With the advancement of technology and the advent of the internet, a great digital revolution began. Faced with this scenario of technological innovation, the economic sector is increasingly looking for the use of efficient tools, which provide improvements from a financial perspective. Currently, digital assets and the token economy are already part of the reality of this new digital age, the choice of the present work stems from the interest in analyzing and understanding the diversity of scientific productions that are consolidated in the journals, indexed in databases, for such analysis uses the bibliometric method, which makes it possible to analyze the intellectual production on the topic of interest in a more robust and temporal way, allowing the quantification of the impact and relevance of scientific productions. This study aims to implement bibliometric resources using the R Project software, searching for data in the Scopus and Web of Science databases, having as keywords Security Token and Utility Token. The bibliometric application showed significant results, making it possible to quantify important data, as the year of beginning of publications containing the theme, main authors, documents and most cited authors, words most frequently used in titles, collaboration by country, among other information that add scientific research in a positive and considerable way.

Keywords: Bibliometry; Security Token; Token; Token Economics; Utility Token.

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1. Introduction

Technological innovation has impacted the world in radical ways. Digital transformation is redefining industries, making new business models possible, and providing opportunities that were previously unfeasible. Its impact is dramatically changing how we think, live, work, and relate to each other in an agile and seamless way. The advent of the Internet, blockchain technology, digital currencies, and the token economy is disrupting the mainstream of the traditional financial market worldwide. Investment in this new market is faster, less costly, and allows international investors to be attracted more quickly and efficiently. One way to measure the efforts of the academy to understand, verse, and question this disruption of the financial market, caused by the technology innovation, is the bibliometric research. According to [5], bibliographic indicators that are based on statistical analysis of quantitative data found in technical and scientific production have been used to measure the activity of scientific production. Reference [7] says that communication is the essence of science, and, increasingly, studies capable of measuring scientific production are needed. Analyzing the production of scientific knowledge is something extremely efficient and widely used in the last decades; methods such as bibliometric make it possible to quantify information about a given theme. Reference [11] states that the increased interest of the scientific community in bibliometric studies is related to the facilities provided by technological advances, which enable the control and dissemination of information. With the advance of the internet, the expansion of bibliometric research is notorious. Such technological resources help in the development of computer programs aimed at bibliometric methods, making it possible to analyze databases quickly and efficiently. According to [13], the improvement of new technologies has significantly leveraged the creation of specific databases for bibliographic searches. The main purpose of these databases is to map, analyze and quantify the productivity of authors, institutions, areas of knowledge and the impact factor of journals. In this sense, seeking greater visibility for scientific production, several databases have been created and gained worldwide prominence, among them, we can mention: Web of Science; Scopus; Google Scholar Metrics; SCIELO, Scopus, among others. Today academic studies, market reports, technical papers, and case studies are gradually addressing related issues. The interest of academia in meeting the needs of the market is becoming more apparent. The present study aimed to realize an investigation on Security Token and Utility Token. To this end, the R-project software and the bibliometric method were used to analyze and quantify, in a temporal manner, all the information obtained on the theme. The databases chosen for the research were Scopus and Web of Science. This article is divided into 5 sections. The first deals with digital assets, briefly and objectively addressing their definition and how they have been inserted in the financial market. The second section presents the importance of bibliometry as a tool for measuring the academic publication on a given topic of interest. The fourth section presents the statistical and descriptive results of the bibliometry proposed in this article and, finally, the conclusions are presented.

2. Digital Assets

Tokens can be understood as digital coupons that can be sold for common currencies or cryptocurrencies. They can have many functions, enabling various types of investor advantages, such as providing access to the services of startups without granting ownership rights. Thus, it is possible, for example, that companies can finance themselves but remain autonomous. For [12], tokens can be chips, tickets, coins, counterfeit money, marbles,

stickers, or stamps. The token can be seen as a hybrid asset of traditional and new financing methods, allowing new and existing companies to raise capital and transfer property in a more integrated way. Intended particularly for the SME sector, it allows small companies to "tokenize" their equity, increase their capital, and at the same time, be in a position of freedom with respect to their investments in a manner previously only available to publicly traded companies. Token economics, according to [18] can be understood as a subset of economics that studies the economic institutions, policies, and ethics of the production, distribution, and consumption of goods and services that have been "tokenized". Cryptocurrencies are assets that rely primarily on cryptography and distributed ledger technology (DLT). They are neither issued or guaranteed by a central bank or public authority and are usable as a medium of exchange and/or for investment purposes and/or to access a good or service by agents who believe in, trust, and wish to make use of these assets. The cryptocurrency, more necessarily Bitcoin, emerged as an innovative model, totally alternative, of financial exchanges between parties, with the proposal of being a reliable payment system, prioritizing security. Since 2008, the year that cryptocurrencies emerged, the entire technological network for payment and financial transactions has been evolving rapidly. Cryptocurrencies include utility tokens and security tokens. Utility tokens provide their owner with a right to use either a product or a service, linking this right to the actual launch of the product or service to which it is attached. Thus, a utility token has its value linked to the environment of the platform that launched it. According to Statista, one of the world's largest statistics portals, in 2018, the global utility token market was valued at about 12.8 million US dollars. This market is estimated to grow to about $2.6 billion by 2029. Security Tokens, in this model we have the right of ownership, be it of a company, a project or even a venture. In these cases, the tokens are regulated, approaching very closely to the shares of a company that had its launch by an IPO. Security Tokens are a union of the innovation of blockchain technology with the reduction of bureaucracy in the form of IPO acquisitions, but guaranteeing the legal security of the business. We emphasize that STOs (Security Token Offering) are not the substitution of physical shares themselves, they are in fact a fusion of blockchain and smart contracts, already explained above. With their adjectives, STOs ended up being a safer option to ICOs. According to a report issued by Chain Partners and published in February 2019, the security token market will reach $2 trillion by 2030 with a CAGR (compound annual growth rate) of 59% during 2019-2030. Market studies published by Statistia, and Chain Partners present the financial potential of utility and security tokens. In this paper we will evaluate, through literature study, the interest of academia in the topic.

3. Bibliometric

Bibliometrics is a quantitative and statistical technique that can measure scientific production and knowledge indexes "[...] just like demography does when it censuses the population" (FONSECA, 1986, p. 10) *apud* [13]. According to a search in CAPES journals involving "Strategic Planning" and "Competitive Strategy", the evolution of this theme during the years 1980 to 2019 was verified. To perform this research, the keywords "Strategy Planning" and "Competitive strategy" were used to cover the search space, since the quantity of documents is greater in the English language. (PRITCHARD, 1969) *apud* [14] defines the term bibliometrics, proposed by Pritchard in the late 1960s, as the application of statistical and mathematical methods to the analysis of literary works. For [13] the main activity on which bibliometrics is based is the analysis of citations, performed between the citing text and the quoted excerpt. Foresti (1990) reports that this method, provides the development of scientific knowledge and recognition of the writer, contributing to the construction of new

information sources. Besides exposing the existing and relevant literature to scientific works. The bibliometric study is a statistical methodology, whose objective is to measure and quantify the scientific production on a given theme. This tool allows the dissemination of information, becoming increasingly necessary and efficient in the field of science and technology. According to [8] this method is based on the elaboration and application of three important empirical laws, namely: Law of Author Productivity (LOTKA,1926); Law of Word Frequency (ZIPF, 1949) and the Law of Journal Dispersion (Bradford,1934). That said, Lotka's Law, also known as the Law of Inverse Squares, was created in 1926, after a study on the operosity of scientists [16]. This is responsible for studying the productivity of each author, by identifying the frequency of their publications. Lotka states that an extensive part of scientific literature is produced by a small number of researchers, in other words, those who produce a lot, but many researchers who publish little, equals in terms of production to the most productive researchers. Then Lotka formulated the inverse squares law, represented by $\frac{1}{n^2}$, where n is the number of articles. Thus, the above-mentioned law refers to the calculation of the productivity of authors, being an efficient tool to quantify the production. Bradford's Law, also known as the Law of Dispersion, was created in 1934 and focuses on a particular set of journals, with the main objective of relating the dispersion of production, enabling the researcher to establish a core to assist in developing policies for acquisition and disposal of journals on specific topics [17]. Bradford was interested in determining the core of journals that focus on a specific theme, conducting numerous studies that culminated in the formulation of the law of dispersion. Finally, we have Zipf's Law or Minimum Effort which objective is to relate the number of times the words of interest appear in a text, that is, it measures and generates a list of high and low frequency terms in journals [17]. This law was created in 1949 and is of utmost importance to describe the relationship and order of words in publications of interest [14]. According to [13] the rigor of these studies is characterized by meeting the premises that govern the bibliometric method. The authors are expected to attend to the Laws, following five steps of the integrative literature review, being: Elaborate the research protocol; Identify the most relevant studies in the field; Evaluate the quality of the studies surveyed; Synthesize the data collected; Integrate the results obtained. The use of bibliometrics, according to [1], is gradually extending to all disciplines. It is particularly well suited for scientific mapping currently when the emphasis on empirical contributions is producing voluminous, fragmented, and controversial research streams. According to [2] interest in bibliometric data and the emergence of analytical methods began in the 1980s. Initially, mathematicians, information scientists and sociologists were concerned with mathematical models in bibliometrics. After that, by the end of the decade, interest in bibliometrics waned. In the 1990s, the large volumes of digital, easily processable bibliometric data, as well as the need to provide reliable data and quantifiable information about scientific production and the frequent introduction of resource allocation in science and research made the question of the possible application of bibliometric an attractive topic again. According to the authors, bibliometrics is experiencing a renaissance, not primarily regarding mathematical modeling and theoretical principles, but as an instrument of science management. For this article, a search was conducted on the Scopus platform and the web of science. Scopus is the largest database of abstracts and citations of peer-reviewed literature, with bibliometric tools to track, analyze and visualize research. Scopus contains more than 22,000 titles from over 5,000 publishers worldwide, covering the fields of Science, Technology, Medicine, Social Sciences and Arts & Humanities. In addition, it contains more than 55 million records dating back to 1823, two of which 84% have references dating back to 1996. Clarivate Analytics' Web of Science (WoS), according to [10], is the world's

leading platform for searching scientific citations and analytical information. Web Of Science is an Institute for Scientific Information (ISI) database that indexes the Science Citation Index Expanded (SCI-EXPANDED) from 1945 to the present day. It is used both as a research tool that supports a wide range of scientific tasks in diverse knowledge domains, and as a dataset for large-scale data-intensive studies. The WoS has been used in thousands of academic studies published over the past 20 years. The base is multidisciplinary, covering the fields of science, technology, medicine, social sciences and Arts and Humanities. According to Torres-Salinas, Lopez-Cózar and Jiménez-Contreras (2009) apud [4], the two databases have different historical roots and, therefore, reflect divergent philosophies. According to the authors Web of Science began as a practical implication of one of the three basic laws of bibliometrics, the Bradford law. This is related to productivity dispersion, according to [5], and aims to measure the dispersion of scientific knowledge in periodical publications. Scopus, on the other hand, developed within the context of Elsevier's role as a marketer of a large collection of journals and, for this reason, includes more journal titles than Web of Science.

4. Analysis and Results

This section will present the bibliometric analyses resulting from searches for the keywords Security Token and Utility Token in the Scopus and Web of Science databases.
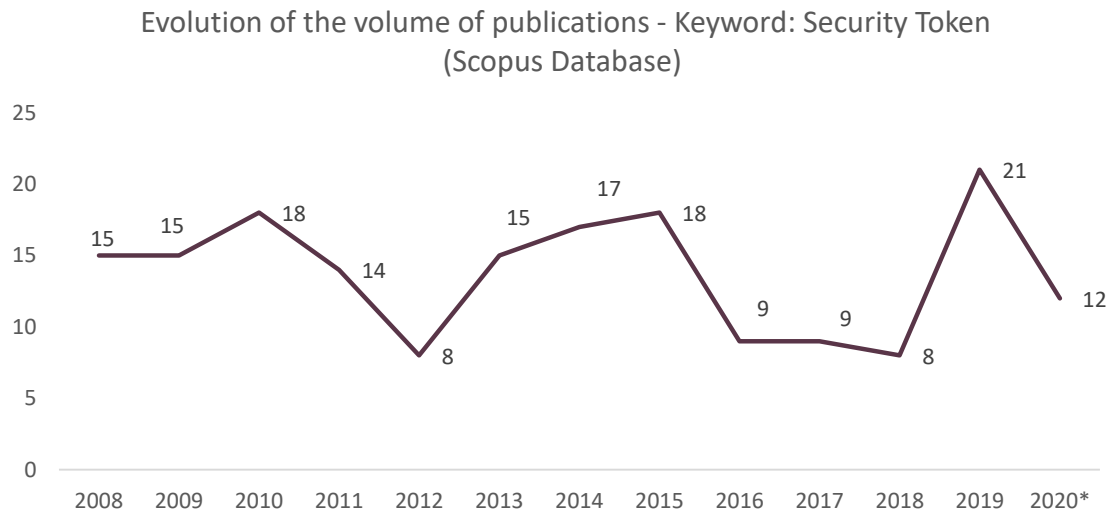
4.1. Security Token

According to the search on the Scopus platform, the term "security token" was first described in an academic paper in 2008, and until December 2020, 179 academic papers have addressed the topic. Of these, 47 are articles, 10 book chapters, 115 conference papers, and 7 conference reviews or reviews. In table 1 we can see that the papers addressing the topic in question have an average citation per year of 7.21 and each paper has an average of 8.43 citations. In the Web of Science platform 56 documents were found with the term, of these, 18 are articles and the rest are conference papers. As can be seen in table 1, on the Web of Science platform 56 documents were found with the topic, about 31% of the volume on Scopus. The average number of citations per year, per document and per year and document is similar in both bases. According to the research 171 authors are involved in research related to the topic in the Web of Science base. It is worth noting that no intersection study was done between the two bases. The joint analysis of the bases is not within the scope of this study.

The search on the Scopus and Web of Science platforms (table 1) also revealed that in the researched period each published paper has an average of 3 authors and the collaboration indexes were 2.97 and 3.35, respectively. Figure 1 shows the evolution of the volume of publications over the analyzed period, according to the Scopus database. 2019 was the year with the highest number of publications having Security Token as a theme and 2012 the year with the lowest number of publications, in this year only eight papers were published.

Table 1: Keyword: Security Token (Scopus and Web of Science). Search period: From 2008 to 2020.

| Description	Scopus	Web of Science
Documents	179	56
Average number of citations per year	7.21	7.23
Average of citations per document	8.43	8.08
Average of citations per year and per document	0.87	0.89
Authors	486	175
Author appearances	552	189
Authors of single-author documents	17	4
Authors of documents with multiple authorship	469	171
Documents with single authorship	21	5
Documents by Author	0.37	0.32
Authors by document	2.72	3.12
Co-authors per document	3.08	3.38
Collaboration index	2.97	3.35

Source: Own preparation based on the Scopus and Web of Science search.

Evolution of the volume of publications - Keyword: Security Token (Scopus Database)

Figure 1: Keyword: Security Token (Scopus Database) evolution of the volume of publications.

Source: Own preparation based on the Scopus database search.

Figure 2 shows the evolution of the volume of publications over the analyzed period, according to data from Web of Science. It can be noted that the years 2008 and 2015 present the largest number of publications with the theme Security Token, with 8 publications each. In 2012 there was the lowest number of publications among the analyzed period, in this year only 2 papers were published. We can observe that the publications do not follow a growth pattern in the analyzed period, varying considerably between 2008 and 2020.

Evolution of the volume of publications - Keyword: Security Token
(Web of Science Database)
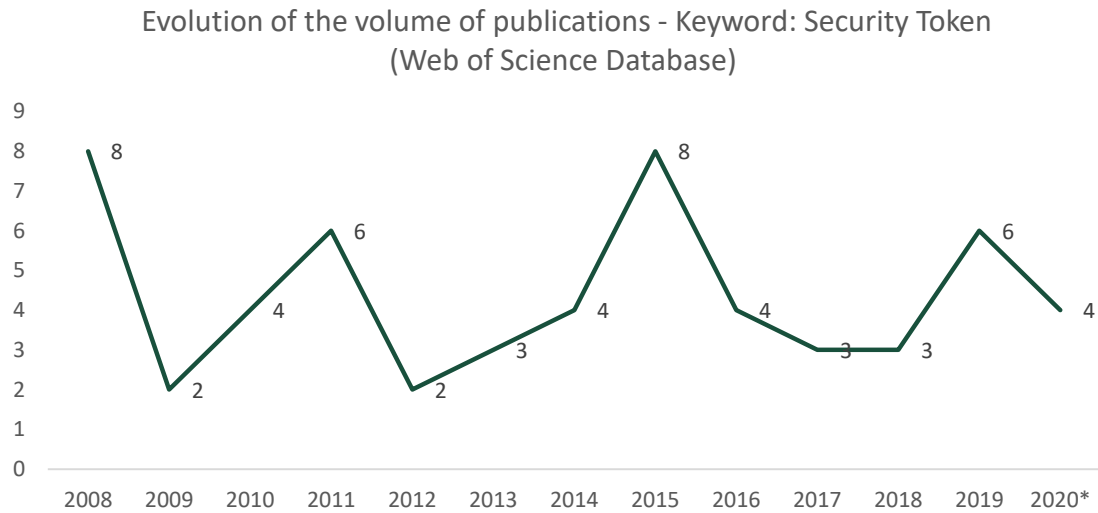
Figure 2: Keyword Security Token (Web of Science Base) evolution of the volume of publications.

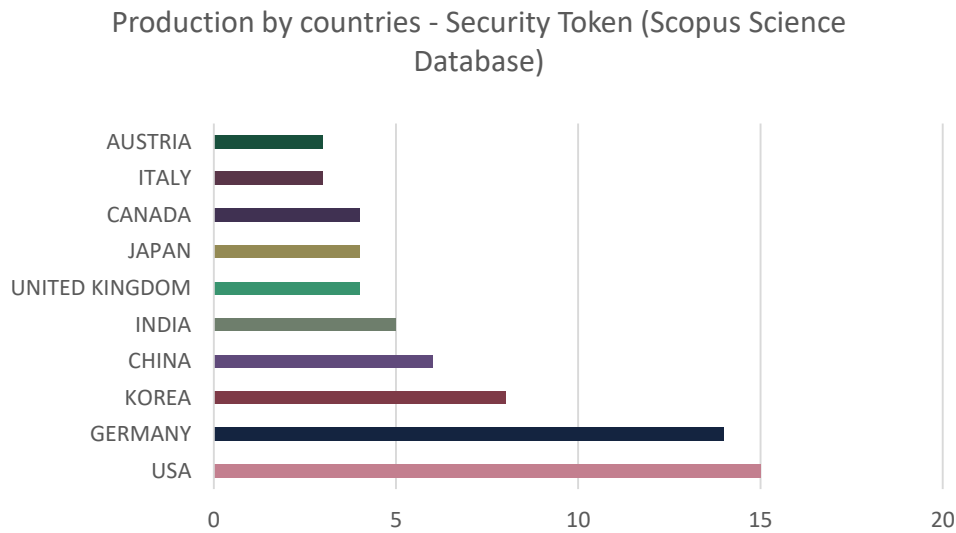**Source:** Own preparation based on the Web of Science search.

Table 2 shows the authors who most participated in the research that addressed the Security Token theme. The author Frank Stajano - Professor of Security and Privacy at Cambridge University - was the author who published the most during the period, with 5 publications in the Scopus database. In the Web of Science, the author who published the most was Xiaochuan Wu.

Table 2: Keyword Security Token (Scopus and Web of Science) - Top authors by theme.

| Base: Scopus	
Authors	**Documents**
Frank Stajano	5
Graeme Jenkinson	3
Graham Steel	3
Jun Wu	3
Junxing Zhang	3
Base: Web of Science	
Authors	**Documents**
Jun Wu	3
Nadarajah Asokan	2
Kakali Chatterjee	2
Xiang Gao	2
Hien Thi Thu Truong	2

Source: Own preparation based on the Scopus and Web of Science search.

Figure 3 shows the volume of publications by country according to the Scopus database. As can be seen, the 3 countries that published the most were USA (15), Germany (14) and Korea (8). Figure 4 shows the volume of publications by countries according to the Web of Science database. Among the 10 countries that published the most, in the period analyzed (2008 to 2020), the 3 countries with the highest volume of publications were China (11), USA (5) and India (5).

Production by countries - Security Token (Scopus Science Database)

Figure 3: Keyword: Security Token (Scopus database) main countries

Source: Own preparation based on the Scopus database search.

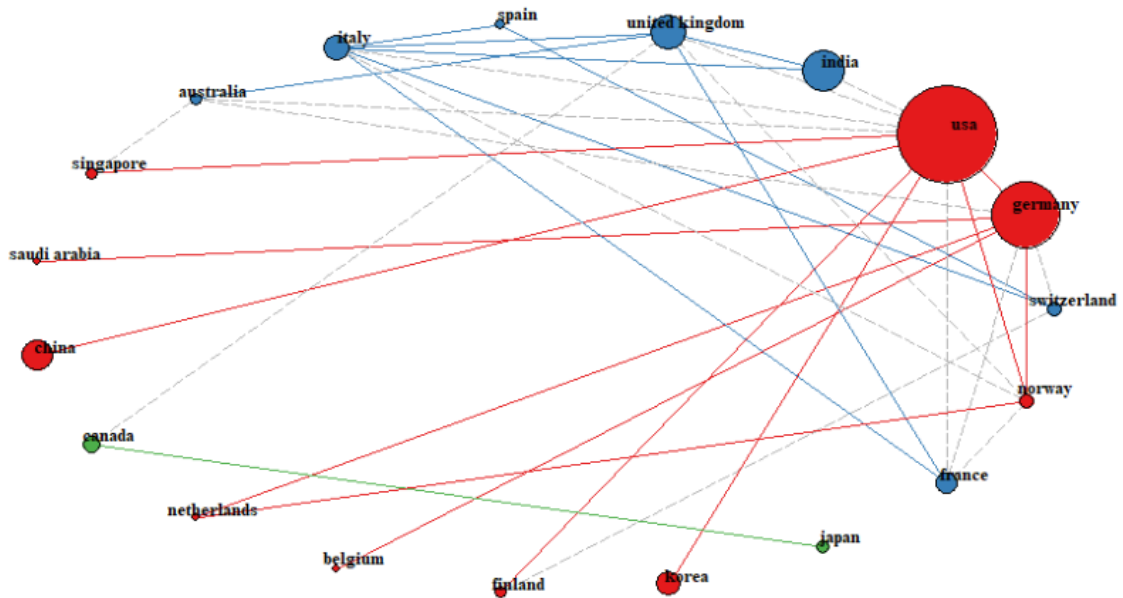**Production by countries - Security Token.(Scopus Science Database)**
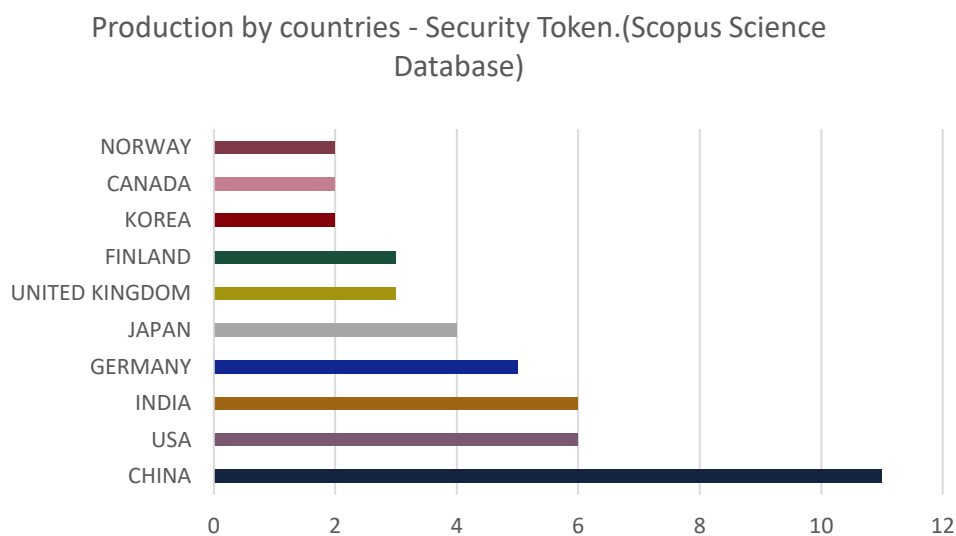
Figure 4: Keyword: Security Token (Web of Sience base) main countries

**Source:** Elaborated from the Web of Sience database search

Figure 5 shows a bibliographic collaboration network (more information in [3]) with a minimum frequency of a vertex equal to 5. After analyzing the results of the search for the term Security Token in the Scopus database, one can observe the scientific collaboration of countries in publications on the topic. The United States is the country with the largest number of publications and direct collaborations (6), and has collaborative relationships with Germany, China and Korea, among others. Italy is the second country with the most direct collaborations (5), having in its network Spain, the United Kingdom, India and others.

Figure 5: Keyword: Security Token (Scopus database) main countries

Source: Own preparation based on the Scopus database search.
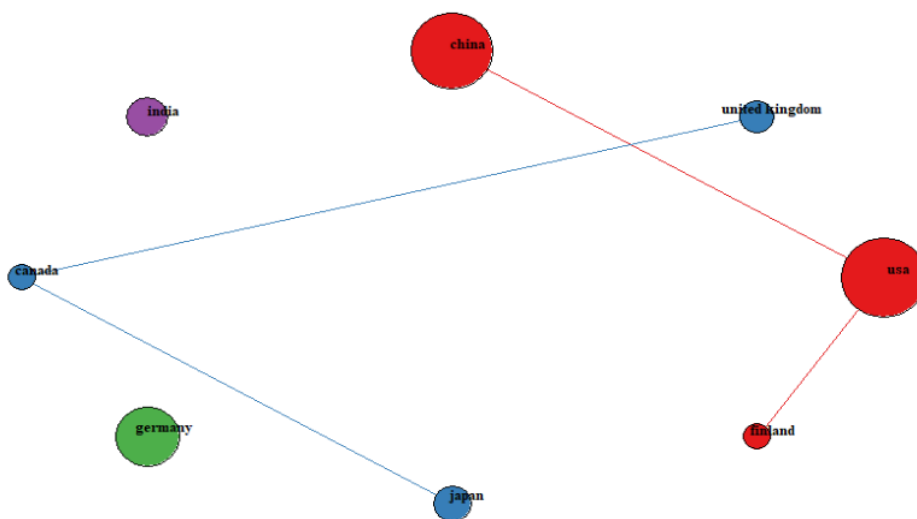
Figure 6: Keyword: Security Token (Web of Science Base) main countries

Source: Own elaboration based on the search in the web of sience base.

In Figure 6, after analyzing the results of the search for the term Security Token in the Web of Science database, one can observe the scientific collaboration of the countries. China and the United States have the largest volume of publications. A second collaboration network covers Canada, Japan and the UK. India and Germany have a significant publication volume, but do not participate in the collaboration network with the other countries.

Table 3 shows the most cited documents, according to the Scopus and Web of Science databases. It is noted (Scopus base) that the first title - published in 2011 - was cited 80 times in the analyzed period, the second (2011) and the third (2010) had 58 citations. In the Web of Science database, the most cited article was published in 2011 and, to date, has had 46 citations.

Table 3: Keyword Security Token (Scopus and Web of Science) - Most cited documents

Base	Title	Number of quotes
Scopus	User perceptions of security and usability of single-factor and two-factor authentication in automated telephone banking	80
	TCP fast open	58
	Attacking and fixing PKCS#11 Security Tokens	58
	QR-TAN: Secure mobile transaction authentication	44
	Comparing and fusing different sensor modalities for relay attack resistance in Zero-Interaction Authentication	40
Web of Science	User perceptions of security and usability of single-factor and two-factor authentication in automated telephone banking	46
	Proposed Security Mechanism for XMPP-Based Communications of ISO/IEC/IEEE 21451 Sensor Networks	26
	Comparing and Fusing Different Sensor Modalities for Relay Attack Resistance in Zero-Interaction Authentication Authentication: Design, integration and usability	23
	Prescribers' expectations and barriers to electronic prescribing of controlled substances	12
	Automated analysis of security protocols with global state	9

Source: Own preparation based on the Scopus and Web of Sience search.

Figure 7 presents the conceptual structure map of a scientific field performing Correspondence Analysis (CA) with the documents obtained in the search for the words Security Token in the Scopus base. The figure shows,

through bibliographic coupling, by means of approximation measures, the allocation of keywords informed by the authors, the analysis consists of grouping in the same nucleus the terms that present a similarity connection with each other. That said, it can be noted in the conceptual structure map five clusters composed by the terms: electronic, systems, analysis, making, blockchain, among others. It is important to emphasize that the term Blockchain appears in a solitary cluster and more distant from the others, indicating that it stands out as a significantly frequent term in scientific works addressing the topic of Security Token, but it does not have a strong similarity connection with the other keywords, since Blockchain is an innovative technology that consists of having access to a distributed and decentralized database for recording information that cannot be modified, which indicates a variable focused on operations security, whereas the other terms present direct link with the operating system, technological application, among other themes, pointing out that the latent variables of the clusters are distinct. Thus, we have the temporal structure of the most frequent keywords in journals from 2008 to 2020.
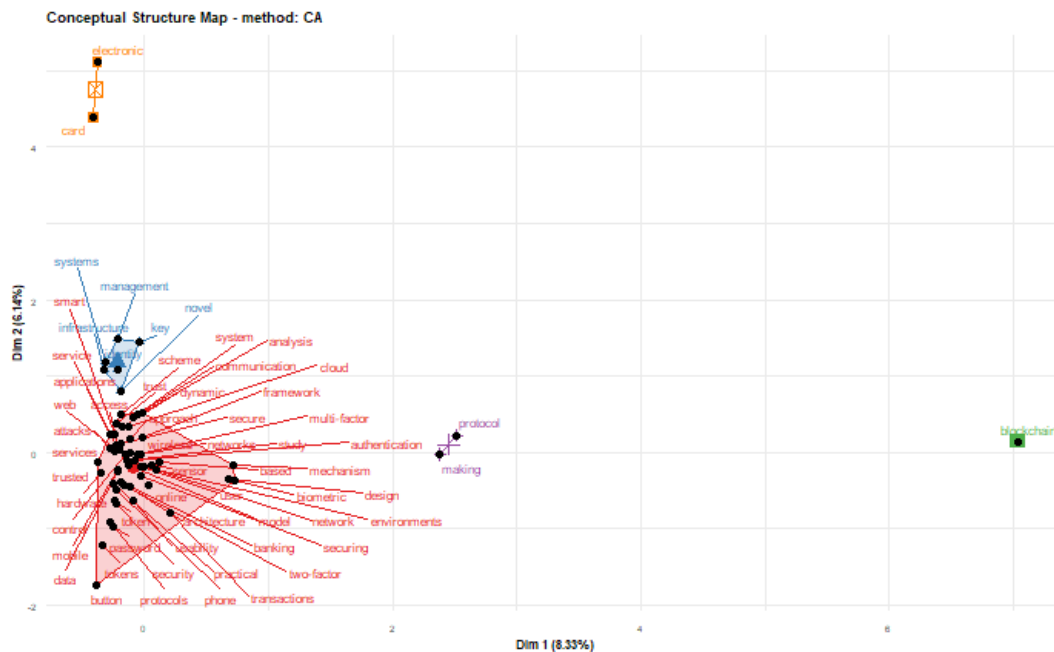

Figure 7: Conceptual structure map Keyword: Security Token (Scopus)

Source: Own preparation based on the Scopus database search.

Figure 8 presents the conceptual structure map performing Correspondence Analysis with the documents obtained in the search for the words Security Token in the Web of Science base. One can notice five clusters composed of the terms: mobile, token, cloud, security, web, among others. Each cluster is composed of a set of keywords that have similarities among them. These form a temporal structure of the most frequently used terms in scientific documents, portraying the development of scientific research in digital assets and token economy.

Figure 8: Conceptual structure map Keyword: Security Token (Web of Science)

Source: Own preparation based on the search in the web of science database

Figure 9 shows, after searching for the term Security Token in the Scopus database, the word cloud containing the 50 most frequent words in journal titles between 2008 and 2020. Note that the most evident words are security, secure, mobile, token and web, these being the most used when it comes to the theme.

Figure 9: Cloud of most frequent words in journal titles with Security Token keyword, base: Scopus

Source: Own preparation based on the Scopus database search.

Figure 10 shows, after a search for the term security token in the web of science database, the 50 most frequently used words in titles of scientific productions in the analyzed period (2008 - 2020). The words security and authentication are the most evident among those presented. Therefore, these are used more frequently in titles whose theme involves the term security token.

Figure 10: Cloud of most frequent words in journal titles with Security Token keyword, base: Web of Science

Source: Own preparation based on the Web of Science search.

4.2. Utility Token

Table 4 shows the data regarding the search for the term Utility Token in the Scopus and Web of Science databases from 2008 to 2020, but the term only appears in the literature after 2018. According to the search on the Scopus platform, the term "utility token" was used in a scientific paper for the first time in 2018 and by December 2020 there were 26 documents addressing the topic. Among these, 11 articles, 1 book, 4 book chapters, 9 conference papers and 1 review. In table 2, the papers addressing the topic have an average citation per year of 1.65 and each paper has an average citation of 2.25. On the Web of Science platform the term "Utility Token" was addressed, for the first time in 2019 and until December 2020 only 6 documents containing the cited term were found, among these 3 articles and 3 conference papers. The average number of citations per year is 1.67, citation per document 2.33 and per year and document 0.917. It is noteworthy that no intersection study was done between the two databases, because their joint analysis is beyond the scope of this study.
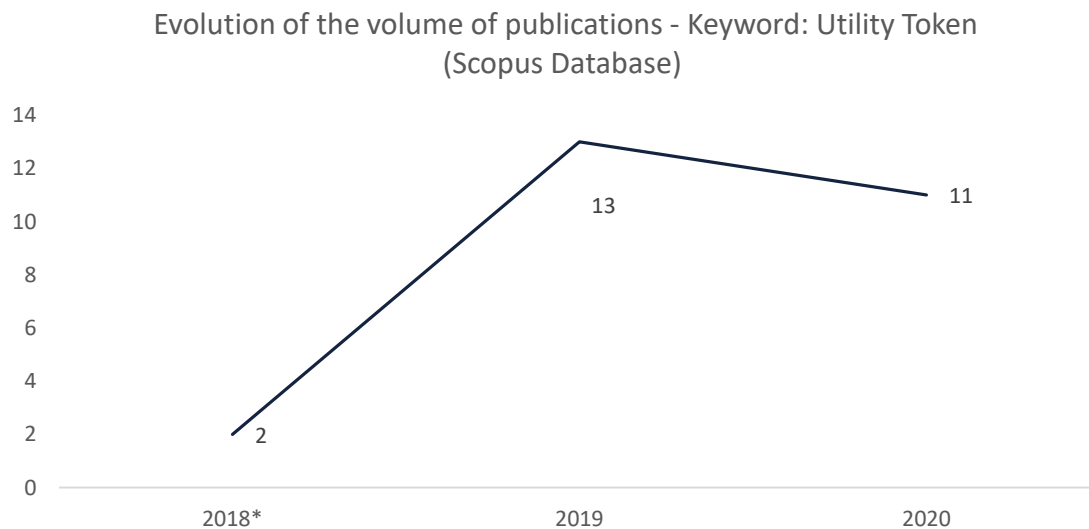
Table 4: Keyword: Utility Token (Scopus and Web of Science). Research period: 2018 to 2020.

Description	Scopus	web of science
Documents	26	6
Average number of citations per year	1.65	1.67
Average of citations per document	2.5	2.3
Average of citations per year and per document	0.8269	0.92
Authors	69	21
Author appearances	76	22
Authors of single-author documents	4	0
Authors of documents with multiple authorship	65	21
Documents with single authorship	4	0
Documents by Author	0.377	0.29
Authors by document	2.65	3.5
Co-authors per document	2.92	3.67
Collaboration index	2.95	3.5

Fonte: Source: Own preparation based on the Web of Science search

Figure 11 exposes the evolution of the volume of publications over the analyzed period, according to the Scopus database. The publications related to the Utility Token theme occurred between 2018, 2019 and 2020. In the Web of Science database (figure 13) we can observe publications only in the most recent years, 2019 and 2020.

Figure 11: Keyword: Utility Token (Scopus database) evolution of the volume of publications

Source: Own preparation based on the Scopus database search.

Evolution of the volume of publications - Keyword: Utility Token
(Web of Science Database)
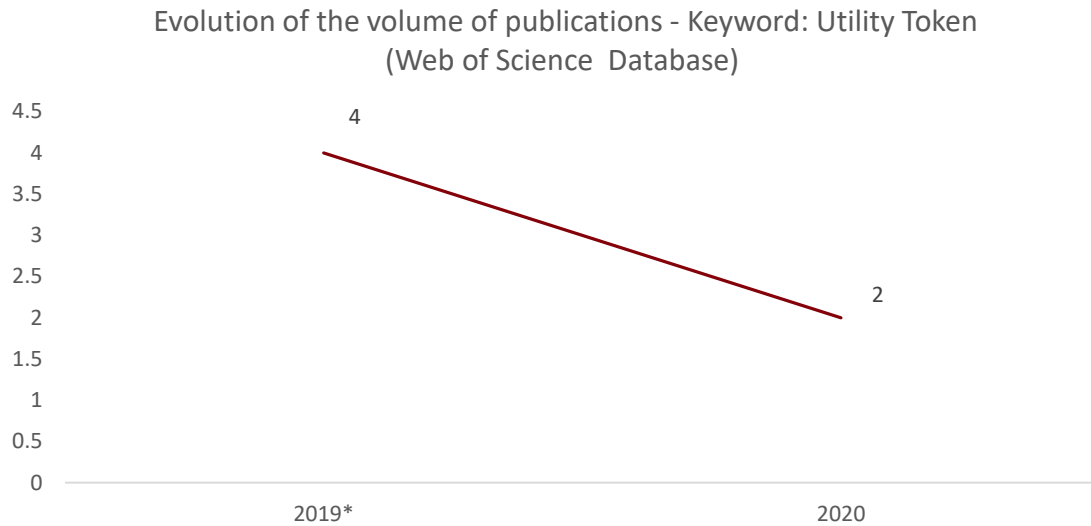
Figure 12: Keyword: Utility Token (Web of Science Base) evolution of the volume of publications.

Source: Own preparation based on the search in the Web of Science database.

In Table 5, one can observe the authors with the largest participation in research related to the Utility Token theme. According to the Web of Science database, the researcher Jun Wu was the author who published the most in the analyzed period with 2 publications. In the research conducted in the Web of Science database, the researchers who most disseminated the subject published 2 articles each.

Table 5: Keyword: Utility Token (Scopus and Web of Science) - Main authors by theme.

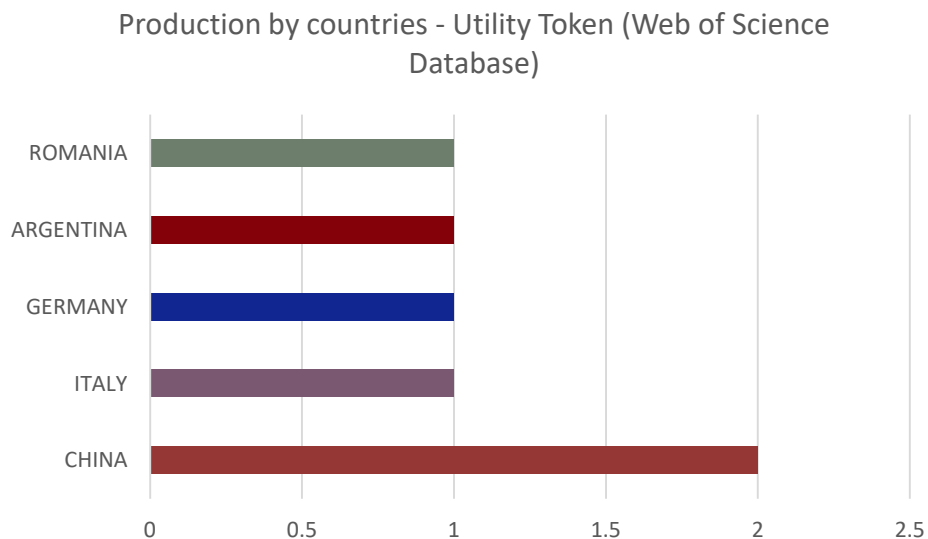| Base: Scopus	
Authors	**Documents**
Simone Kriglstein	2
Marvin Loh	2
Alexander Pfeiffer	2
Sarah Swammy	2
Richard Thompson	2
Base: Web of Science	
Authors	**Documents**
Jun Wu	**2**
Nicu Bizon	1
Dmitri Boreiko	1
Yixin Cao	1
Benedict Drasch	1

Source: Own preparation based on the Scopus and Web of Science search.

Figure 13 shows the volume of publications by country according to the Scopus database, the 3 countries that published on the Utility Token theme were USA (4), Austria (4) and Germany (3). Figure 14 shows the volume of publications by country according to the Web of Science database, it is noted that in the analyzed period from 2018* to 2020, China (2) is the country that published the most on the theme, followed by Romania, Italy, Germany and Argentina.
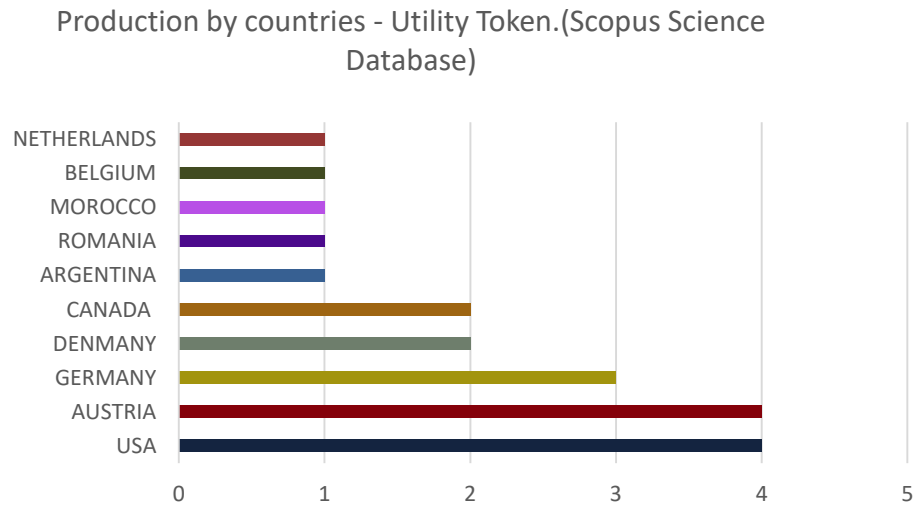
Figure 13: Keyword: Utility Token (Scopus database) main countries

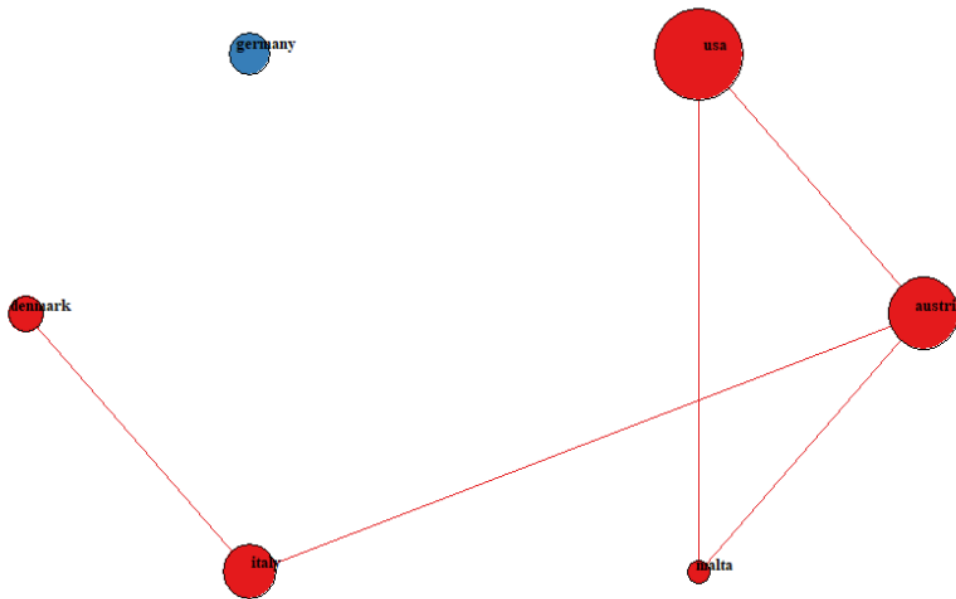**Source:** Own preparation based on the Scopus database search.

Figure 14: Keyword: Utility Token (Web of Science Base) main countries

Source: Own preparation based on the search in the Web of Science database.

Figure 15 shows the analysis of the results of the search for the term Utility Token in the Scopus database, and it

is possible to observe the scientific collaboration of the countries. Austria is the country that presents the greatest collaborative volume, having a direct relationship with the United States, Austria and Italy. Germany, despite having publications related to the theme, is not part of the collaborative network mentioned above.

Figure 15: conceptual Keyword: Utility Token (Scopus) - main countries

Source: Own preparation based on the Scopus database search.

In Figure 16 it is possible to observe the scientific collaboration of the countries, according to a search in the Web of Scince database. China has the largest collaborative volume in publications but has no direct collaboration with the other countries. These countries present equal proportions in scientific collaborations when it comes to the Utility Token theme.
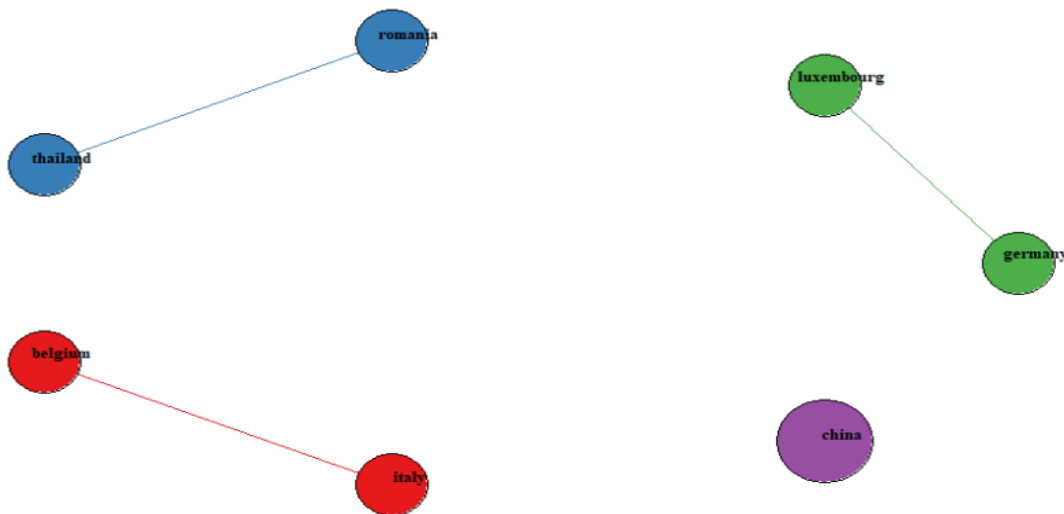
Figure 16: conceptual Keyword: Utility Token (Web of Science Base) - main countries

Source: Own preparation based on the Web of Sience search.

Table 6 presents the most cited documents, according to the Scopus and Web of Science databases. It is noted (Scopus base) that the first title - published in 2018 - has been cited, to date, 20, the second (2019) had 12 citations. In the Web of Science base, the most cited article was published in 2019 and, to date, had 5 citations.

Table 6: Keyword: Utility Token (Scopus and web of science) - Most cited documents

Data	Title	Number of citations
Scopus	Crypto-securities regulation: icos,token sales and cryptocurrencies under eu financial law	20
	The impact of governance signals on ICO fundraising success	12
	Regulation of Crypto Tokens and Initial Coin Offerings in the EU: De lege lata and de lege ferenda	4
	Blockchain and Smart Contracts: Complementing Climate Finance, Legislative Frameworks, and Renewable Energy Projects. Complementing Climate Finance, Legislative Frameworks, and Renewable Energy Projects	4
	Implementing blockchain technology in irrigation systems that integrate photovoltaic energy generation systems	3
Web of Science	Tokenization: Open Asset Protocol on Blockchain	5
	Implementing Blockchain Technology in Irrigation Systems That Integrate Photovoltaic Energy Generation Systems	4
	Blockchain Startups and Prospectus Regulation	4
	The token's secret: the two-faced financial incentive of the token economy	1

Source: Own preparation based on the Scopus and Web of Sience search.

Figure 17 shows the conceptual structure map with the documents obtained in the search for the words Utility Token in the Scopus base. By the bibliographic coupling methodology, following similarity measures, the existence of three clusters containing the terms token, crypto and blockchain is noted. The clusters are composed of keywords that have similarities among themselves and with the theme, forming a temporal structure of the most frequent terms in documents, whose subject is related to Utility Token in the period from 2018 to 2020. Regarding the base of documents published in the Web of Science, it was not possible to generate clusters due to the lower number of articles, because they are not grouped by the coupling methodology.
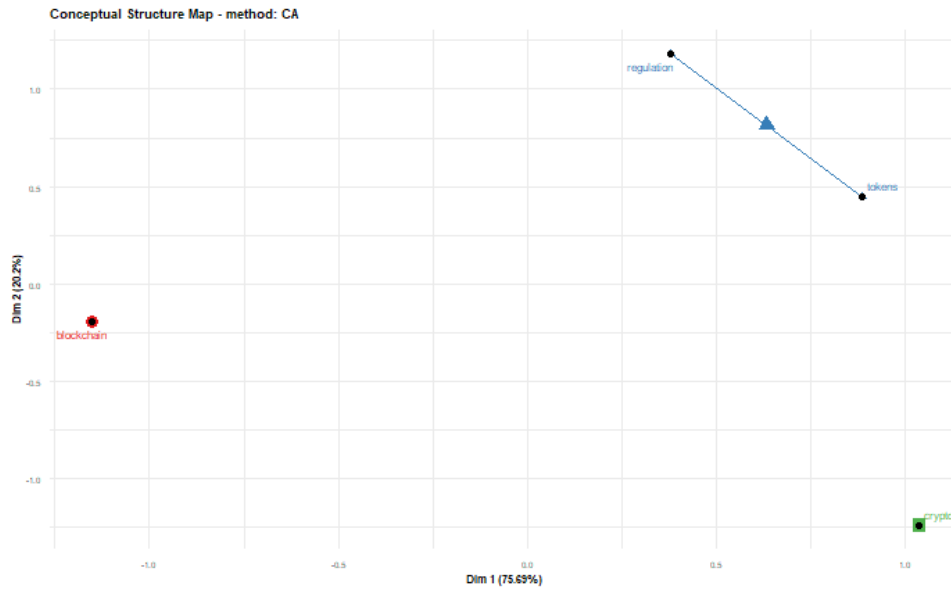
Figure 17: Conceptual structure map Keyword: Utility Tokens (Scopus)

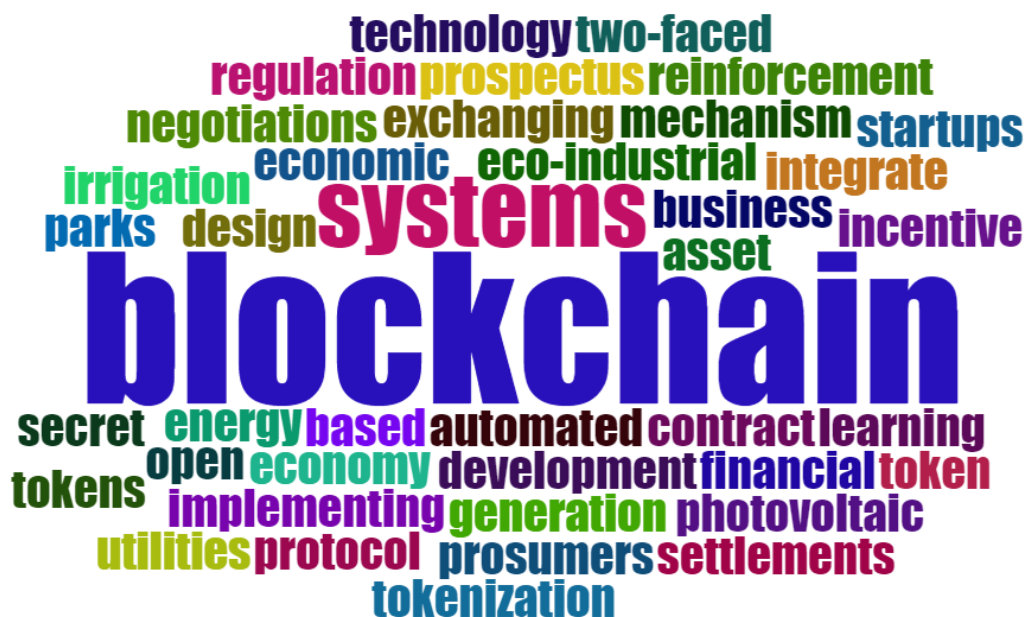**Source:** Own preparation based on the Scopus database search.

Figure 18 shows, after a search for the term Utility Token in the Scopus database, a word cloud containing the 50 most used terms in the titles of journals referring to the theme addressed. The word with the most evidence is blockchain, followed by crypto, regulation and tokens, which are the most frequent when it comes to the topic.

Figure 18: Cloud of most frequent words in journal titles with keyword Utility Token, base: Scopus

Source: Own preparation based on the Scopus database search.

In Figure 19 a word cloud can be seen containing the 50 most frequent terms in titles of scientific productions in the period 2018 to 2020. The words blockchain and systems are the most evident among those presented. These terms are the most used by authors when the main subject involves digital assets.

Figure 19: Cloud of most frequent words in journal titles with keyword Utility Token, base: Web of Science

Source: Own preparation based on research at Web of Science.

The token economy (Utility Token and Security Token) is still a booming topic. With the advent of Bitcoin, the first cryptocurrency, the financial market has expanded and reached new heights. The application of econometric and mathematical models can be an important step towards consolidating the themes on academic agendas. In our study we did not find much research that applied models to predict and study the new market. Furthermore, in-depth studies on how this new economy may affect government policies, financial market integrators, financial asset valuation metrics, record companies, currency control, and the movement of assets across borders are opportunities for further research.

5. Conclusion

The advent of the internet, blockchain technology, digital currencies and the token economy promote the disruption of the traditional financial market mainstream worldwide. In this article, we use bibliometric research to measure the efforts of academia to understand, discuss and question this disruption in the financial market caused by technological innovation. The use of the bibliometric method has become a frequent practice in scientific research. This is a quantitative and statistical technique capable of measuring production rates and scientific knowledge, helping in temporal analysis and identifying trends in journals indexed in databases. The present work aimed to investigate and analyze the terms Security Token and Utility Token according to journals in the Scopus and Web of Science databases. Publications between 2008 and 2020 were analyzed. The implementation of the bibliometric methodology, using the R-project software, made it possible to obtain a

historical overview of the terms. The Security Token keyword was observed first, according to the Scopus database. The first time the term appeared in a journal was in 2008, and by 2020 there were 179 published documents, with an average citation per year of 7.21, the year with the highest number of publications was 2019. The main author of the topic in question is Professor Frank Stajano and the country showing the highest volume of publications was the United States, followed by Germany. The search for the keyword by the Web of Science database presented similar results, but only 56 documents containing the theme were found, with an average citation per year of 7.23. The years 2008 and 2015 presented the highest volume of publications in the analyzed period and the country with the most publications was China, followed by the United States. The second keyword observed was Utility token. According to the Scopus database, the term appeared in scientific papers after 2018, and until 2020 26 documents were found addressing the theme, with an average citation per year of 1.65. 2019 was the year to present more productions, 13 in total. It is observed that the authors present similar number of publications, on average 2 publications per author in the period in question, China and Austria are the countries with the highest volume of published scientific papers. As for the Web of Science database, only 6 documents were found addressing the term Utility Token, with 2019 being the year when the productions on the topic began, with an average of 1.67 citations per year. The analysis points to China as the country with the highest volume of scientific productions published between 2019 and 2020. In the maps of conceptual structures in which Correspondence analysis was performed, the objective of which is to group, through similarity, the keywords most used by the authors in scientific works, addressing the themes Security Token and Utility Token, it was noted that for the two databases used, it was possible to highlight 5 clusters involving terms such as: electronic, systems, analysis, making, blockchain. With this analysis, it was possible to highlight some latent variables linked to clusters, such as data security, technological innovation and operating system. It was found, through bibliometric analysis, that the theme has been gaining space in academic agendas, not just in the financial market. Over the past 12 years, numerous researchers from different countries have come together to discuss the topic and contribute to academic literature. This fact can help the new financial ecosystem to effectively consolidate based on theory previously explored by academic researchers. After the mapping carried out, Brazil's contribution in publications on the subject was low; it was not mentioned in any list highlighting the countries that publish the most. That said, the bibliometric analysis is understood as an opportune and efficient tool when it comes to bibliographic review, this method significantly assists studies on specific themes, providing the temporal measurement and dissemination of important data relating to scientific productions.

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