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A Bibliometrics Literature Review on Cryptocurrency

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Abstract:

Objective: A bibliometrics literature review on Cryptocurrency and thematic clustering. The study tried to answer the following questions: What are the most active publishers in Cryptocurrency? What are the most active Authors in Cryptocurrency? What is expression count of the main categories in Cryptocurrency? What is expression count of the sub-categories in Cryptocurrency?

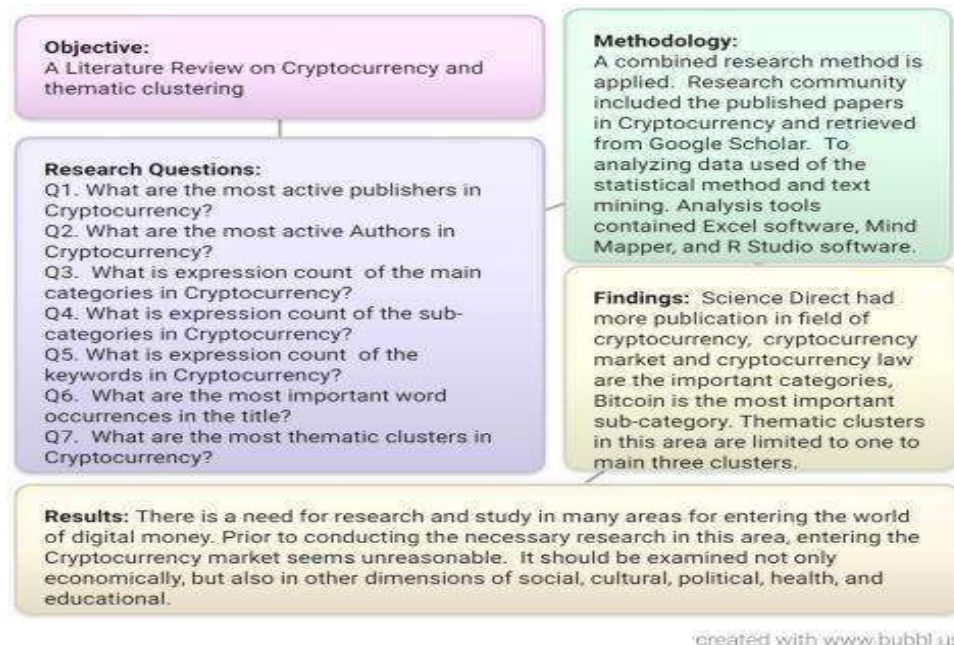
Q5. What is expression count of the keywords in cryptocurrency? What are the most important word occurrences in the title? What are the most thematic clusters in Cryptocurrency?

Methodology: A combined research method is applied. Research community included the published papers in cryptocurrency and retrieved from Google Scholar. To analyzing data used of the statistical method and text mining. Analysis tools contained Excel software, Mind Mapper, and R Studio software.

Findings: ScienceDirect had more publication in field of cryptocurrency, cryptocurrency market and cryptocurrency law are the important categories, Bitcoin is the most important sub-category. Thematic clusters in this area are limited to one to main three clusters.

Result: There is a need for research and study in many areas for entering the world of digital money. Prior to conducting the necessary research in this area, entering the Cryptocurrency market seems unreasonable. Digital Money should be examined not only economically, but also in other dimensions of social, cultural, political, health, and educational.

Viz-Abstract



Keywords: Cryptocurrency, Scientific publications, Thematic clustering, Digital currency, Digital money, Future Money.

Introduction

There are different views on the cryptocurrency. Many people think that cryptocurrency is the main focus of the digital economy and slowly eliminate today's money. Some other experts and economists have a negative attitude towards the cryptocurrency. These people believe that virtual coins do not have a brilliant future and face price bubbles. They do not see a good future for the cryptocurrency market. Their advice is to avoid this market and they believe entry into the cryptocurrency market threatens investing. It seems that investing in the cryptocurrency market has a high risk. Because most of the cipher currencies still do not have the economic backing, they can face a sharp fall in price at any moment.

A review of the literature suggests that the future of the cryptocurrency market will be welcomed by users again. It's likely that they will break their price record during this time. In the past, the price has been dramatically risen. For example, at one time, the price of each BitCoin rose within a few weeks to about \$ 20,000. In the current market for cryptocurrency, the popularity of them is a factor in the rise and fall of prices. Such a market is very risky and not a good place to invest. On the other hand, investors are not willing to enter the market of "National Virtual Coin." Because cryptocurrency, born by banks or governments, basically controls a lot of them, they do not have a sharp price fluctuation.

A "cryptocurrency" is any form of currency that only exists digitally, that usually has no central issuing or regulating authority but instead uses a decentralized system to record transactions and manage the issuance of new units, and that relies on cryptography to prevent counterfeiting and fraudulent transactions (Merriam-Webster, 2019). Frankenfield (2019) stated a cryptocurrency is difficult to counterfeit because of this security feature. He said that a defining feature of a cryptocurrency, and arguably its biggest allure, is its organic nature; it is not issued by any central authority, rendering it theoretically immune to government interference or manipulation. Digital currency (digital money, electronic money or electronic currency) is a type of currency available in digital form (in contrast to physical, such as banknotes and coins). It exhibits properties similar to physical currencies, but can allow for instantaneous transactions and borderless transfer-of-ownership (Wikipedia).

The problem of the research related to the specific sensitivity of cryptocurrency. It is necessary to carry out thorough research on the subject. Future of money is equal to the future of the world economy. Entering the future money market requires detailed research in this area. We did not know exactly in what areas of scientific research cryptocurrency. We did not know what the gaps are in the research done in this area. Scientific clustering in this field was not observed. Therefore, this research was conducted with the aim of discovering the scientific literature in this field. Main objective was literature discovering and thematic clustering on cryptocurrency. In this regard, the following questions were answered:

- Q1. What are the most active publishers in cryptocurrency area?
- Q2. What are the most active authors in cryptocurrency area?
- Q3. What is expression count of the main categories in cryptocurrency area?
- Q4. What is expression count of the sub-categories in cryptocurrency area?
- Q5. What is expression count of the keywords in cryptocurrency area?
- Q6. What are the most important word occurrences in the title of the papers?
- Q7. What are the most thematic clusters in cryptocurrency area?

Methodology

A combined method is used in this research. Research community included the published papers in field of cryptocurrency. The number 1120 results retrieved from Google Scholar on 24 May 2019 (Fig 1). The search formula limited to papers (no citations) any time.

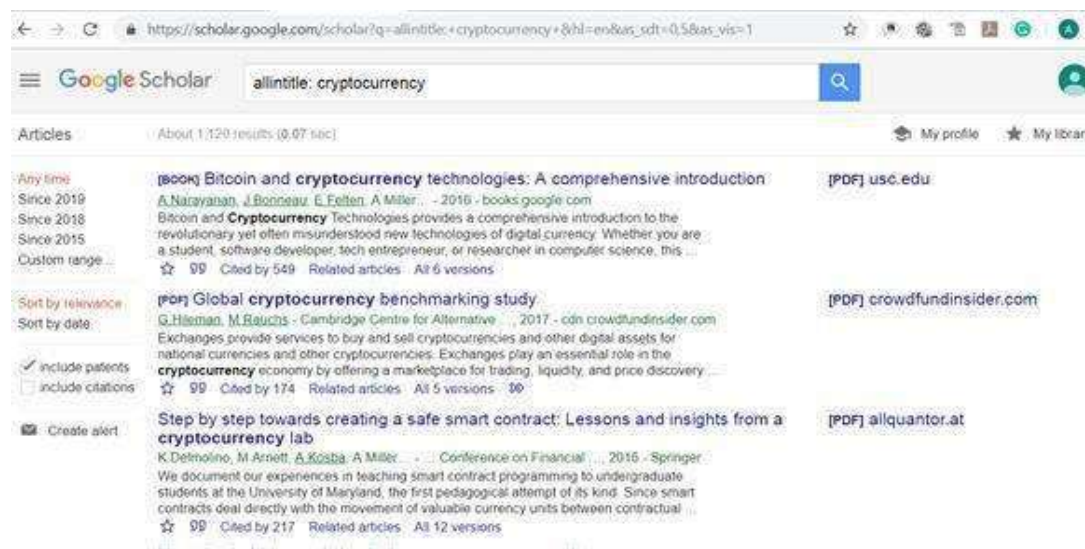


Figure 1. Data retrieval in Google Scholar

In first step after reviewing the problem of research, literature review was carried out. In the next step, specific research questions were identified. In the third stage, the basic concepts and terminology of the research were defined. In the fourth stage, the design and research tools were identified. The Google Scholar was determined as a data collection tool. The data entered to the Excel software manually. Google Scholar was chosen because this scientific search engine provides access to scientific articles in a comprehensive manner than to scientific databases for the user. In the fifth step, the community and sample of research were identified and data were collected. The English conference articles and journal articles were reviewed (Fig. 2). Scientific letters that were published in Science Direct were considered. Online articles were also released. Books have been deleted from the data. Sample papers have been limited to five years (2015-2019). Because the cryptocurrency is a very new topic. In the preparation of data, wherever the articles were not keyword-specific, the researcher entered the appropriate keyword using her expertise. SSRN's eLibrary articles not considered. Also, theses and patent permits were not considered. Handbooks and book chapters were also deleted from the sample. Maximum six key words were considered for each paper. Categories and sub-categories were extracted from the title or abstract. According to the Krejcie and Morgan (1970) Sample Size Table, 280 samples of 1120 items were retrieved. All of the retrieved item reviewed one by one. Finally 123 papers were entered into the dataset based on the entry conditions. The articles were retrieved according to relevance and 28 pages of the latest pages were reviewed. In the sixth step, the collected data was analyzed. To analyze the data, several software were used to answer the research questions. To analyzing data used of the statistical method and text mining. Analysis tools contained Excel software and Mind Mapper "Bubbl.us". R Studio software was used to draw thematic clustering and respond to the final question.

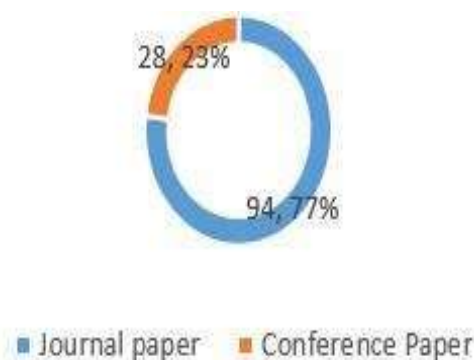


Figure 2. Document types in research sample

Findings

In this section, the research questions are answered as the following:

Q1. What are the most active publishers in cryptocurrency area?

Figure 3 shows that ScienceDirect had more publication in field of cryptocurrency than other publishers. IEEE, Springer, ACM, and MDPI are more active publishers in this area after ScienceDirect respectively. Perhaps one of the reasons for the popularity of science in publishing articles in the field of cryptocurrency is that it is a resource for all subjects, such as basic sciences, pure science, agriculture, engineering, medicine, economics, humanities and social sciences.

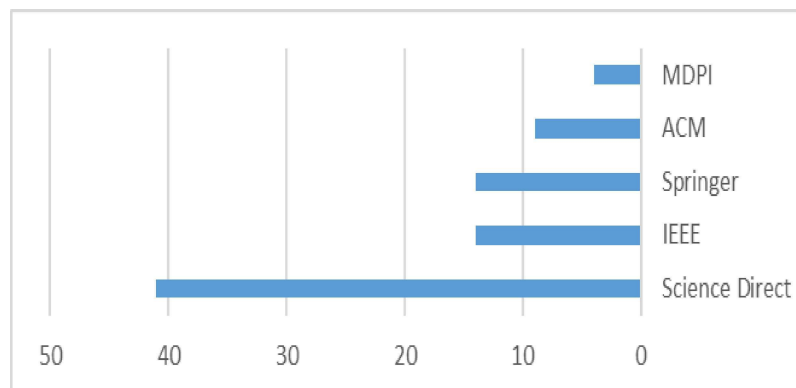


Figure 3. Publisher's Occurrence in the published paper

Q2. What are the most active authors in cryptocurrency area?

Table 1 shows that who researchers were active to publish papers in field of cryptocurrency on the conference and journal papers. The review of the authors of the articles shows that most authors have published one or maximum two articles in this regard. There is no specialist in the field of cryptocurrency, which has multiple articles. There are no high-citation articles and authors in this field too. The future will change with the change of money, so there is a significant need for people specializing in cryptocurrency. Professionals in different fields should be trained in this field. Even university disciplines will be highly effective in this regard. Entering the future money without sufficient knowledge and study will be very dangerous.

No.	Author	Year	No.	Author	Year
1	Kevin Delmolino, Mitchell Arnett, Ahmed Kosba, Andrew Miller, Elaine Shi	2016	37	Sergi Delgado-Segura, Cristina Pérez-Solà, Jordi Herrera-Joancomartí, Guillermo Navarrop-Arribas, and Joan Borrell	2018
2	John Fry, Eng-Tuck Cheah	2018	38	Zac Zimmer	2017
3	Georg Fuchsbauer	2015	39	Peter D. DeVries	2016
4	U. Mukhopadhyay, A. Skjelum, O. Hambolu, J. Oakley, L. Yu, R. Brooks	2016	40	Ross C. Phillips, Denise Gorse	2017
5	Xin Li, Chong Alex Wang	2016	41	Matthew D. Steiman, Adnan P. Lauf, Roman Yampolsky	2016
6	Adam S. Hayes	2017	42	Christian Conrad, Anessa Custovic, Eric Ghyssels	2018
7	Abeer ElBahrawy, Laura Alessandretti, Anne Kandler, Romualdo Pastor-Satorras, Andrea Baronchelli	2017	43	Radhesh Krishnan Konoth, Emanuele Vineti, Veelaisha Moonsamy, Martina Lindorfer, Christopher Kruegel, Herbert Bos, and Giovanni Vigna	2018
8	Cameron Harwick	2016	44	Sally M. Gainsbury, Alex Blaszczynski	2017
9	Neil Gandal, Hanna Halaburda	2016	45	Wei Zhang, Pengfei Wang, Xiao Li, Dehua Shen	2018
10	Young Bin Kim, Jun G. Kim, Wook Kim, Jae Ho Im, Tae Hyeon Kim, Shin Jin Kang, Chang Hun Kim	2016	46	M. Linton, E. G. S. Teo, E. Bommes, C. Y. Chen, Wolfgang Karl Härdle	2017
11	Wen Raymakers	2015	47	Marek Laskowski, Henry M. Kim	2016
12	Sarah Jane Hughes, Stephen T. Middlebrook	2015	48	Ekaterina Hope Alexandrova, Stavrina Olesya Yuryevna	2017
13	ATM Litchfield, J. Herbert	2015	49	John Fry	2018
14	Itay Eyal	2017	50	Saiful Rezaa Latif, Muhammad Azi Mohd, Mohd Nazul Mohd Amin, Arwin Idham Mohamad	2017
15	Guglielmo Maria Caporale, Luis Gil-Alana, Alex Plastun	2018	51	Marie Vasek	2015
16	Luisanna CoccoCiuffo, ConcettaMichele Marchesi	2017	52	Ashtley Patman	2017
17	Steven David Brown	2016	53	Scott D. Hughes	2018
18	Shi-Feng Sun, Man Ho Au, authorJoseph K. Liu, Taz Hon Yuen	2017	54	Yu-Long Gao, Xiu-Bo Chen, Yu-Ling Chen, Ying Sun, Xin-Xin Niu, Yi-Xian Yang	2018
19	Zhengyao Jiang, Jinjun Liang	2017	55	Sarah Azouvi, Mary Maller, Sarah Meiklejohn	2019
20	Eric P. Pacy	2015	56	Nashirah Abu Bakar, Sofian Rosbi	2017
21	Leopoldo Catania, Stefano Grassi, Francesco Ravazzolo	2018	57	Eric Engle	2017
22	Erol Kazan, Chee-Wee Tan, Eric T. K. Lim	2015	58	Alla Ivanovna Ivashchenko	2016
23	Dimitris Chatzopoulos, Mahdeh Ahmadi, Sokol Kosta, Pan Hui	2018	59	Nicola Bonni	2019
24	Christian Brenig, Rafael Accorsi, Gunter Muter	2016	60	Dominik Stroukal, Barbora Nedvzdovala	2016
25	Peter M. Krafft, Nicolas Della Penna, Alex Sandy Pentland	2018	61	Austin Elliott	2017
26	Elie Bouri, Syed Jawad Hussain Shahzad, David Roubaud	2018	62	Elie Bouri, Chi Keung Marco Lau, Brian Lucey, David Roubaud	2018
27	L. Alessandretti, A. ElBahrawy, L.M. Aiello, A. Baronchelli	2018	63	Wei Zhang, Pengfei Wang, Xiao Li, Dehua Shen	2018
28	Diana Mergenova Sat, Grigory Olegovich Krylov, Kirill Evgenyevich, Bozr Erbnay, Alexander Borisovich Kasatkin, Ivan Aleksandrovich Kornev	2016	64	Shuyao Yi, Zishuang Xu, Gang-Jin Wang	2018
29	Jeremiah Blocki, Hong-Sheng Zhou	2016	65	Alexander Braunels, Roland Mestel	2019
30	Guglielmo Maria Caporale, Alex Plastun	2018	66	Evan Howitt	2016
31	J. Alejandro F. Castellanos, Debora Coll-Mayor, José Antonio Notholt	2017	67	Hossein Hassani, Xu Huang, Emmanuel Sikra	2018
32	Ross C. Phillips, Denise Gorse	2018	68	L. Guo, X. J. Li	2017
33	Javed Barkatullah, Tino Hanke	2015	69	Edward Lehner, Dylan Hunzeker, John R. Ziegler	2017
34	Nashirah Abu Bakar, Sofian Rosbi, Koyotaka Utsuki	2017	70	Peter Mell, John Kelsey, James Shook	2017
35	Jian Liu, Wenting Li, Ghassan O. Karame, N. Asokan	2018	71	Tuyet Duong, Alexander Chepurmoy, Lei Fan, and Hong-Sheng Zhou	2018
36	Matthew E. Gladden	2015	72	Nashirah Abu Bakar, Sofian Rosbi	2017
74	Shaen Corbet, Grace McHugh, Andrew Meegan	2017	73	C. Di Piero	2017
75	Timothy Bierer	2016		Bradley Danby, Shruti Bhargava, Andrew Miller, and Pramod Viswanath	
76	Darko Stosic, Dusan Stosic, Teresa B. Luderer, Tatjana Stosic	2018	100	Ross C. Phillips and Denise Gorse	2018
77	Ferry Mulyanto	2015	101	Chang Yeon Kim, Kyungho Lee	2018
78	Alexander Chepurmoy, Vasily Kharm, Dmitry Meshkov	2018	102	Yoonhwan Kim, Ju-Yeon Jo	2018
79	Kefa Rabah	2017	103	Marco BALDI, Franco CHIARALUCE	2017
80	Qiang Ji, Elie Bouri, Chi Keung Marco Lau, David Roubaud	2018	104	Josh Kamps, Bennett Kleinberg	2018
81	Cindy Tekobbe, John Carter McKnight	2016	105	Dennis Chu	2019
82	Yanuar Andrianto, Yoda Diputra	2017	106	Maurice Omane-Adjepong, Paul Nagdiede, Nana Kwame Akosah	2018
8384	David Vidal-Tomas, Ana M. Ibanez, Jose E. Fariños	2018	107	Ryan Clements	2018
85	Jethin Abraham, Daniel Higdon, John Nelson, Juan Ibarra	2018	108	Mykola Inshyn, Leonid Mohilevskiy, Oleksii Drozd	2018
86	Sapumal Ahangama, Danny Chiang	2016	109	Yehuda Lindell and Ariel Nof	2018
87	Choon Poo	2016	110	Walid Mensi, Khamis Hamed Al-Yahyaee, Sang Hoon Kang	2018
88	Ke Wu, Spencer Wheatley and Didier Somette	2018	111	Mike Thelwall	2017
89	Oleksii Drozd, Yaroslav Lazur, Ruslan Serbin	2018	112	Julian Rauchberger, Sebastian Schrittwieser, Tobias Dam, Robert Luh, Damjan Buhov, Gerhard Potzelsberger, and Hyoungshick Kim	2018
90	Fuka Yamada, Tatsuo Nakajima, and Mizuki Sakamoto	2016	113	Peter J. Denning, Ted G. Lewis	2017
91	Pedro Bação, António Portugal Duarte, Helder Sebastião, Srdjan Redzepagic	2018	114	V. G. Soslovskiy, I. O. Kosovskiy	2016
92	Alan Litchfield, Jeff Herbert	2018	115	Sanford I. Millar	2018
93	Tranyang Zhang, Himanshu Pota, Chi-Cheng Chu, Rajit Gadhi	2018	116	Krishma Sunil Kumar Sharma, Er. C. K. Rana Nahida Nisar	2017
94	Monia Milutinović	2018	117	Junichiro Kume, Masayuki Abe, Tatsuoaki Okamoto	2015
95	Sungjoo Ha, Byung-Ro Moon	2018	118	Syed Ahmed Muzakker, Moge Jamal Ahmed, Siddique Mohammed Shandar	2016
96	Laura Alessandretti, Abeer ElBahrawy, Luca Maria Aiello, Andrea Baronchelli	2018	119	Tuyet Duong, Alexander Chepurmoy	2018
97	Arif Sari, Seyfullah Kilic	2017	120	Hong-Sheng Zhou	2018
98	Mohammed Almukayniz, Vvin Paliath, Malay Shah, Malay Shah, Paulo Shakarian	2018	121	Oleksii Drozd, Oleg Basai, Hanna Churpita	2018
99	Shuangyu He, Qianhong Wu, Xuzhao Luo, Zhi Liang, Dawei Li, Hanwen Feng, Haibin Zheng, Yanan Li	2018	122	Darko Stosic, Dusan Stosic, Teresa B. Luderer, Tatjana Stosic	2018
	Gulila Fanti, Shaileshh Bojja Venkatakrishnan, Surya Bakshi,	2018	123	Xuan HanYamin Liu, Haixia Xu	2017
				Martin Laabs, Sinisa Bujanovic	2018

Table 1. Active authors in field of cryptocurrency

Q3. What is expression count of the main categories in cryptocurrency area?

Figure 4 shows that "cryptocurrency market", "cryptocurrency blockchain", and "cryptocurrency law" are the important categories in field of cryptocurrency respectively. Figure 5 shows ten most important main categories in cryptocurrency.

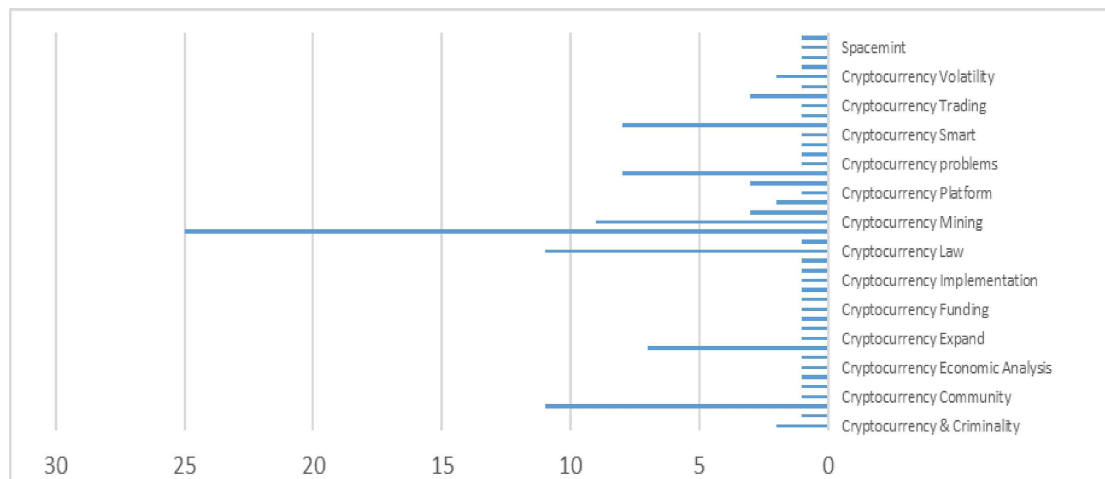


Figure 4. Main categories in the published paper

The main categories are very few that have been worked out in this field. The findings show that most of the paper are on cryptocurrency market. The market is the first subject in the researches. Since the future of the world depends on the future of money, it shows that it has to be researched and developed in various dimensions. This finding revealed an undeniable reality. How to walk in a new world without enough knowledge and knowledge? The first step in this way is to create the necessary structures. One of the most important structures is to create knowledge and awareness about the subject.

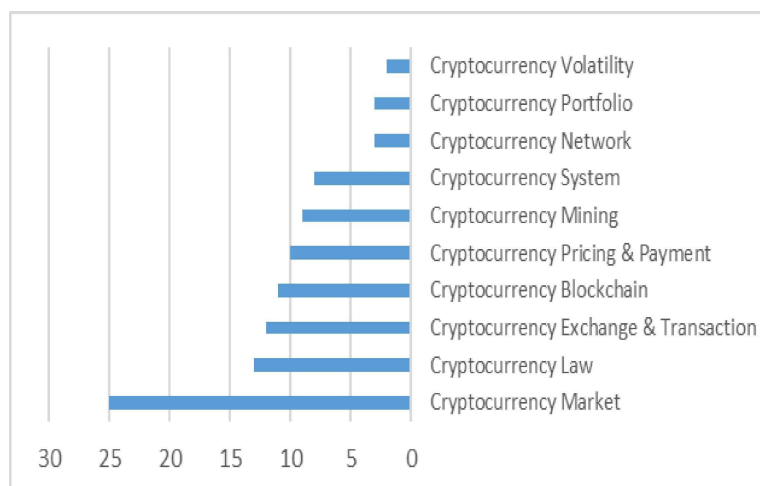


Figure 5. Expression count based on the main categories in the published paper

Q4. What is expression count of the sub-categories in cryptocurrency area?

Figure 6 shows expression count and prominence based on the sub-categories in the published papers in field of cryptocurrency. BitCoin is the most important sub-category than others. Gambling online is the prominence subcategory.

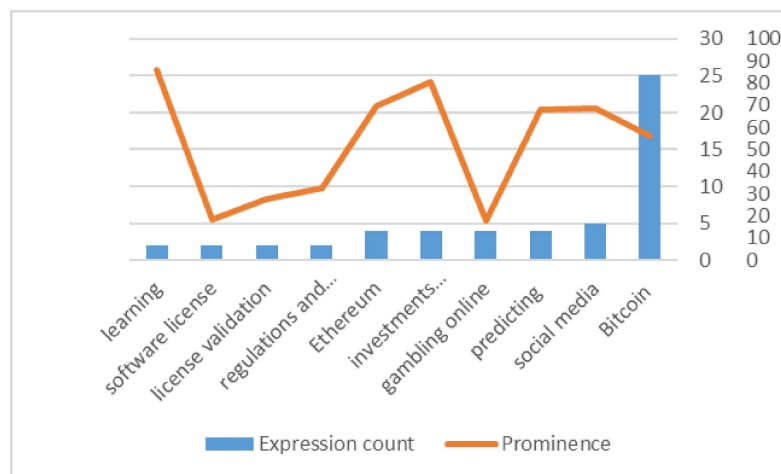


Figure 6. Expression count and prominence based on the sub-categories in the published paper

There are a lot of gaps in the sub-subcategories as well. Many of the cryptocurrency-related topics have not yet been investigated. Moving on to future money - Future money needs a lot of studies. All minor and minority subjects need to be studied in order to be able to go for a systematic planning and strategic planning.

Q5. What is expression count of the keywords in cryptocurrency area?

Figure 7 shows that most Expression count based on the keywords in the published paper are cryptocurrency and BitCoin. A lot of research has been done on Bitcoin. Even surveys show that Bitcoin ranked fifth in Google Search. This is despite the fact that other cryptocurrencies have not been considered. Rarely, talk about one or two other cryptocurrency. The researcher thinks that is a big deal. Other digital moneys should also be considered. Their capabilities and limitations should be studied individually. In this way, we can identify the weaknesses and strengths in order to create new virtual moneys and we can also improve and expand the current cryptocurrencies.

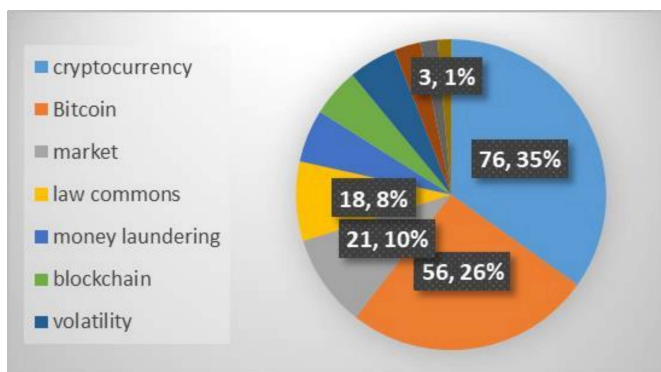


Figure 7. Expression count based on the keywords in the published paper

Q6. What are the most important word occurrences in the title of the papers?

Figure 8 shows that word occurrences in title in the published paper. Cryptocurrency, market, BitCoin, using, blockchain, analysis, volatility, digital, exchange, and system had more occurrences respectively. These findings also confirm other findings. The titles of published articles indicate that experts in this field should pay attention to other aspects. National R & D units should be established.

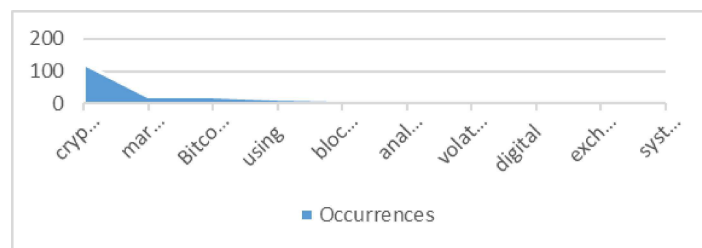


Figure 8. Word occurrences in title in the published paper

There is no way out of the arrival of new technology in the monetary arena. The most important national and global action is to increase the level of public knowledge and awareness.

Q7. What are the most thematic clusters in cryptocurrency area?

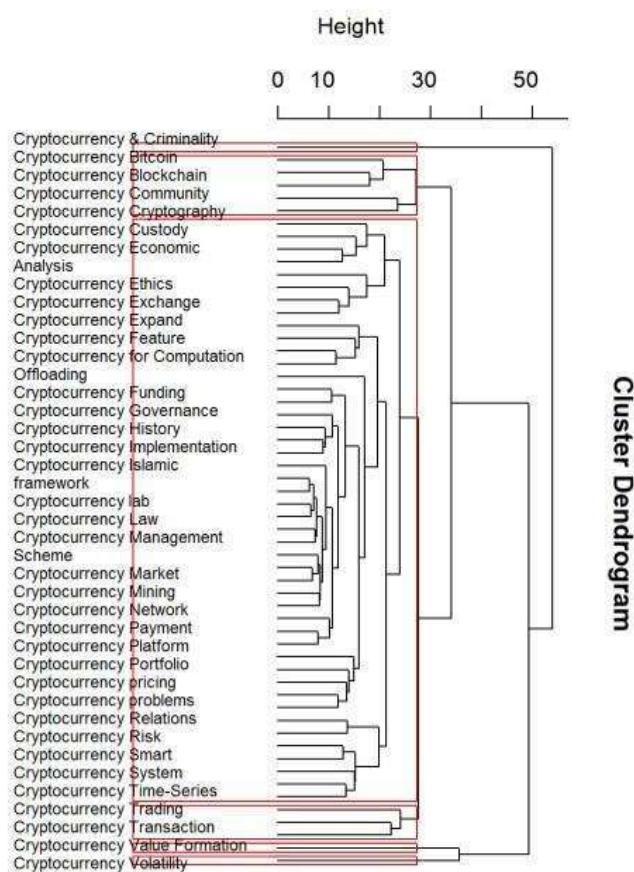


Figure 9. Thematic cluster dendrogram in field of cryptocurrency

Figure 9 shows a thematic cluster dendrogram in field of cryptocurrency. There are two main clusters in this area: cryptocurrency market and cryptocurrency law. This chart shows that the main clusters that are in the currency field are very small. This is while there are significant substantive issues that need to be addressed. Experts in teams of professionals must examine cryptocurrencies in the variety dimensions. The digital moneys should be examined not only economically, but also in other dimensions of social, cultural, political, health, and educational.

Discussion

There is a need for research and study in many areas for entering the world of digital money. Prior to conducting the necessary research in this area, entering the cryptocurrency market seems unreasonable. Research on the opportunities and limitations, threats and strengths of cryptocurrency is essential. The present study showed that no significant research has been done in this regard. With the introduction of new technologies into the daily lives of humans, they are not averse to the use of digital money and cryptocurrency. This is the future of economy and money in the world. Therefore, we must try to enter the world of the future with the necessary knowledge. The best thing to do in this situation is to raise people's awareness and knowledge of the face of the new generation of money. From the study of published articles in the field of cryptocurrency, it has been concluded that much research has not been carried out on many related topics. These recommended topics include: virtual economy, virtual banking, global trade, supporting system, sanctions and cryptocurrency, economic and social pathology, international payments, portfolio management, and monetary and fiscal policy. It is recommended to study virtual money in different dimensions of social, cultural, political, health, and educational too.

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