Possible ways to overcome the obstacles of commercializing the Digital Currency in India: A Bibliometric Analysis

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Abstract: In this new era of digitalization where the world is moving faster with the growing technology and so are we from paper currency to digital currency. The term Cryptocurrency came into existence in the year 2008. It is one of the rapidly flourishing technology in the world, which is taking industries to the next level. This is no less than revolutions in the world of currency globally. Cryptocurrencies are also termed as digital currency which completely depends upon the distributed networks and shared transaction ledgers-the goal was to combine this with basic idea of cryptography within the monetary system. This process will allow to create secure and anonymous system which could handle the digital money with ease. The purpose of this paper is to understand the current scenario and bring on some possible ways to commercialize digital currency in country like India which will change the perception of people about digital currency which will be becoming as the future currency in the world. However, using Bibliometric Analysis, which were published in Peer Review Journals and indexed in Web of Science collection from the period of (1980-2020). Design/Methodology/Approach: The data are collected from Web of Science and some reference are taken from different news editorials in order to build a proper approach. However, people have shown their interest as per the data (600,000) but many were not ready to accept this form of Virtual Currency.
Keywords: Cryptocurrency, Block chain, Digital Currency, Bibliometric Analysis, Web of Science.
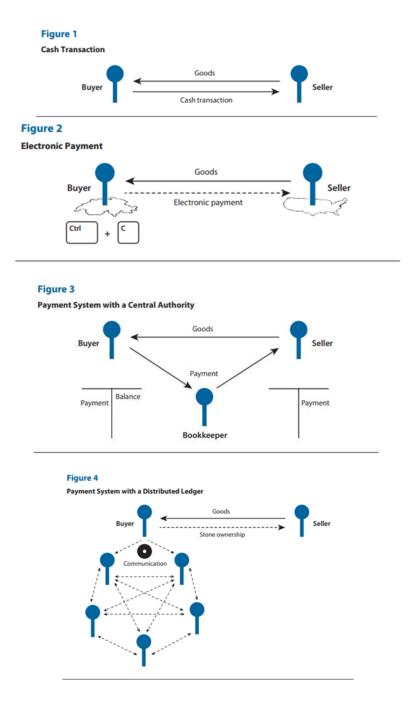
Introduction

Digital currency is a form of virtual currency which is developed with the advancement of technology and it is completely based on embedded de-centralized payment mechanism, which uses distributed ledger for its processing. This digital currency already has been creating an impact globally, due to which there has been an adverse impact in the past- which had led to disruption in the business models, systems& also had created an opportunity for private sector. The main role of this virtual currency will be beneficial for the retail payment services as it has got the potential to facilitate payment transaction. Since this is in decentralized form due to this it is created a sense of insecurity for the government, which has raised to different policy issues for the central banks & the higher authorities.

In the current scenario digital currency is not the form of currency which we use for our daily transactions, as it is not been globally accepted but still there are some countries which has been using some form of digital currency, such as; Bitcoin, Litecoin & many others. Since it is not widely accepted because of series of risk & challenges which could limit its future growth. As of now it has been found that many are looking towards using these form of currency, because they can bypass the third party involvement.(Singh & Singh, 2018)

In the figure given below it shows the traditional way of transaction starting with cash and followed by electronic payment & now using digital currency based on distributed ledger system. (Morabito & Morabito, 2017)

Figure 1
Cash Transaction

Buyer — Goods / Cash transaction — Seller

Figure 2
Electronic Payment

Buyer — Goods / Electronic payment — Seller

Ctrl + C

Figure 3
Payment System with a Central Authority

Buyer — Goods — Seller
Payment
Payment | Balance
Bookkeeper
Payment

Figure 4
Payment System with a Distributed Ledger

Buyer — Goods / Stone ownership — Seller
Communication

Methodology

Study methodology

A comprehensive search was done to collect data from the Web of Science (WoS) directory. Several keywords were identified based on the title pattern of the published articles A total of 4216 records were retrieved using keywords are "Cryptocurrency", "Block chain", "Bitcoin" ,"Digital Currency" and "Digital Money" . The collected data points were further analyzed using certain tools, methods, and metrics to reveal the insights in field of commercialization of Digital Currency.

Data Analysis Method

The collected data were analyzed using Excel, VOS viewer, and Tableau for cleaning, sorting and visualization. Excel was used for all type of calculations related analysis using pivots and mathematical functions.

For different types of visualizations using graphs, VOS viewer and Tableau was used. VOS viewer helped in text analysis. Various clusters and network visualization maps were generated to analyze titles and abstracts.

Analysis and Results

Primary Research Areas

The Keywords used for the research are "Cryptocurrency", "Block chain", "Bitcoin" and "Digital Currency". Top 1000 records for every keyword is dependent on the count of citations, for years 1996-2020, that have these keywords in their title have been considered for the analysis. The key research areas for this study has been depicted in the table below:

Sr.no	RESEARCH AREA	RECORD COUNT	PERCENTAGE(%)
1	COMPUTER SCIENCE	1,677	39.777%
2	ENGINEERING	1,075	25.498%
3	BUSINESS ECONOMICS	1,040	24.668%
4	TELECOMMUNICATIONS	747	17.718%
5	GOVERNMENT LAW	234	5.550%
6	SCIENCE TECHNOLOGY OTHER TOPICS	192	4.554%
7	INFORMATION SCIENCE LIBRARY SCIENCE	158	3.748%
8	CHEMISTRY	123	2.917%
9	PHYSICS	106	2.514%
10	ENVIRONMENTAL SCIENCES ECOLOGY	101	2.40%

Table 1: Key research area for the analysis

From the above table it is depicted that the top 3 research consists of more than 50% out of the total paper i.e 4216 records. Other areas included are Operation Research management, Automation control and more 89 areas.
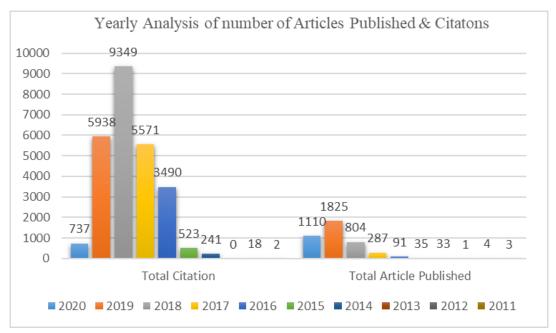
Publication per year

From the table give below and graph which is the representation of the table itself from year 2011-2020, it can be noted that there has been a gradual increment in the number of articles published and citation with years advancing. A maximum of 1825 articles was published in 2019. For citations, the highest number of citations was in the year 2018 which is 9349.
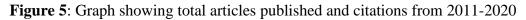
Average citation per paper (ACPP) is calculated as:

$$\text{ACPP} = \frac{\text{Total number of citations}}{\text{Total number of papers published in a particular year}}$$

ACPP is a helpful metric to understand the influence of a journal or an author. It can be seen that from the year 2015-2018 the ACPP is maximum. However, year 2016 has the highest ACPP compared to others from the year 2011-2020.

Sr.no	Year	Total Citation	Total Article Published	ACPP
1	2020	737	1110	0.66
2	2019	5938	1825	3.25
3	2018	9349	804	11.63
4	2017	5571	287	19.41
5	2016	3490	91	38.35
6	2015	523	35	14.94
7	2014	241	33	7.3
8	2013	0	1	0
9	2012	18	4	4.5
10	2011	2	3	0.67

Table 2: Year-wise publication

Figure 5: Graph showing total articles published and citations from 2011-2020

Country-wise analysis of Publications

The analysis of top 20 countries' contribution in terms of publications is shown in table given below. Here, we can clearly see that China has got the maximum number with 973 articles which accounts for 23.079% of the total collected data followed by U.S.A with 874, England with 394, Australia with 284, South Korea 214, Germany 205, India with 196 and so on. But in terms of citations U.S.A has got the maximum number i.e. 8254 and Saudi Arabia has got the least number i.e. 307 in top 20 countries.The publication of countries not mentioned in the table below represents less than 1.589% of the total publications under analysis.

H-Index: The index of 'h' indicates that a value of h records (under analysis) has been cited h number of times within the selected period (1980-2020). It is an important tool to evaluate a researcher's output in terms of its quality and consistency.

PEI i.e. Publication Efficiency Index is one metrics that measures the quality of research (Guan and Ma, 2007). PEI is calculated as:

$$PEI = \frac{TNC_i \, / \, TNC_t}{TNP_i \, / \, TNP_t}$$

Where,

        TNC_i = Total citations by a country

        TNC_t = Total citations by all countries

        TNP_i = Total papers of a country

        TNP_t = Total papers of all countries

The value of PEI more than 1 shows a greater impact of publication than the research efforts devoted to it. Out of 20 countries 9 countries are having their PEI value more than 1 which includes USA, England, South Korea and so on. However, the paper main focus for is for India therefore we have highlighted the column with green colour So, we can see India stand at 7th position in the top 20 countries which is good. But in terms of PEI its value is 0.50545 which satisfying the mark of PEI i.e. 1. However India should be more focusing on improving its PEI number by publishing more relevant articles and deep research.

Sr.no	Countries	Articles	Percentage(%)	Citations	h-index	PEI
1	PEOPLES R CHINA	973	23.079%	6551	37	0.91873
2	USA	874	20.731%	8254	43	1.28868
3	ENGLAND	394	9.345%	3132	28	1.08472
4	AUSTRALIA	284	6.736%	1975	23	0.94895
5	SOUTH KOREA	214	5.076%	1693	20	1.07953
6	GERMANY	205	4.862%	1784	20	1.1875
7	INDIA	196	4.649%	726	14	0.50545
8	RUSSIA	190	4.507%	376	8	0.27004
9	CANADA	178	4.222%	1540	21	1.18058
10	SPAIN	163	3.866%	971	13	0.81288
11	ITALY	151	3.582%	1169	19	1.05641
12	FRANCE	116	2.751%	1270	20	1.49396
13	NETHERLANDS	102	2.419%	465	9	0.62208
14	SWITZERLAND	89	2.111%	515	12	0.78961
15	JAPAN	85	2.016%	389	10	0.62449
16	PAKISTAN	84	1.992%	522	7	0.84798
17	BRAZIL	83	1.969%	447	11	0.73489
18	SAUDI ARABIA	83	1.969%	307	9	0.50472
19	SINGAPORE	79	1.874%	967	17	1.67029
20	U ARAB EMIRATES	77	1.83%	804	12	1.42482

Table 3: Top 20 countries with the highest publications and citation details

Contribution of authors

In the figure given below, each bubble represent there frequency of occurrence and contribution made by the authors. Given the label of size & the circle which helps in understanding the overall frequency in the data set & the color within the circle lead us to know to which cluster it is associated with.The color in the density view ranges from blue (lowest density) to red (highest density). These colour values are determined by the number of nearest terms in the area around a point and the weight, or relative frequency in the case of term co-occurrence maps. The line connecting any two bubbles shows the cooperative relationship between them.
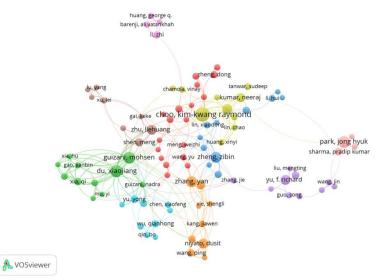

Figure 6: Network visualization map of co-authorship
Authors Keywords analysis

Cluster 1 (301 items)
acceptance
acceptance model
accountability
active galactic nuclei
adoption
advertising
age
agenda
agriculture
anonymity
antecedents
attitudes
australia
banking
banks
barriers
behavior
benefits
bibliometrics
bitcoins
block-chain
blockchain technology
blockchains
business

Cluster 2 (181 items)
5g
5g mobile communicati
5g networks
access control
access-control
accumulator
ad hoc networks
agreement
algorithm
allocation
anomaly detection
architecture
attacks
attribute-based encrypti
auction
authentication
authentication scheme
biometrics
bitcoin mining
block withholding attac
blockchain

Cluster 3 (179 items)
algorithms
altcoin
altcoins
artificial neural network
asset pricing
asset returns
assets
attention
autoregressive condition
bitcoin
bitcoin market
bitcoin price
bitcoin returns
bonds
bubble
bubbles
cash
causality
chaos
co-movement
cointegration

Cluster 4 (89 items)
0
3d printing
accounting
additive manufacturing
artificial intelligence
artificial-intelligence
augmented reality
augmented reality syste
automation
big data
big data analytics
blockchain applications
business process manag
cloud manufacturing
collaboration
competitive advantage
content analysis
coordination
cyber physical systems
cyber-physical system
cybersecurity
data analytics

Figure 7: List of authors keywords

The above figure shows the total keywords which 750 appeared on the Web of Science in our search results. These keywords were made out of 4 clusters having 301, 181, 179 and 89words. The terms 'Bitcoin' and 'Block chain' these two were the most commonly occurring words.

Network visualization map showing the occurrence of author keywords (i.e., keywords listed by the author) is shown below. The size of each bubble shown below describes the frequency of occurrence of that keyword and also they are connected to their cluster containing same color of thread. However their relationship can be determined with the frequency of their occurrence around each other. In map the keyword 'Block chain' and 'Bitcoin' bubble size is the largest ones which depicts that these keywords has occurred maximum number of times. Also, keywords having same color were listed together.
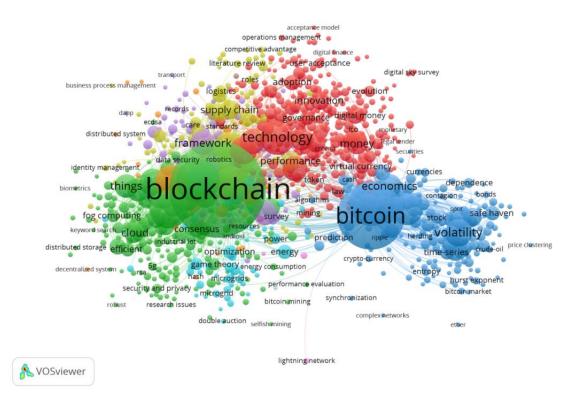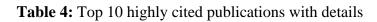
Figure 8: Network visualization map on high-frequency keywords

Most Cited Records

The table given below represents the top 10 highest cited records published within the 4216 data collected. It also includes the information on the authors of the publications, the document title, the publication name and the year they were published in.

S.No	Year	Authors	Document Title	Publication Name	Total Times Cited
1	2016	Christidis, Konstantinos; Devetsikiotis, Michael	Blockchains and Smart Contracts for the Internet of Things	IEEE ACCESS	704
2	2016	Yli-Huumo, Jesse; Ko, Deokyoon; Choi, Sujin; Park, Sooyong; Smolander, Kari	Where Is Current Research on Blockchain Technology?-A Systematic Review	PLOS ONE	286
3	2016	Tschorsch, Florian; Scheuermann, Bjoern	Bitcoin and Beyond: A Technical Survey on Decentralized Digital Currencies	IEEE COMMUNICATIONS SURVEYS AND TUTORIALS	281
4	2018	Xu, Li Da; Xu, Eric L.; Li, Ling	Industry 4.0: state of the art and future trends	INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH	255
5	2018	Khan, Minhaj Ahmad; Salah, Khaled	IoT security: Review, blockchain solutions, and open challenges	FUTURE GENERATION COMPUTER SYSTEMS-THE INTERNATIONAL JOURNAL OF ESCIENCE	247
6	2016	Urquhart, Andrew	The inefficiency of Bitcoin	ECONOMICS LETTERS	232
7	2016	Yue, Xiao; Wang, Huiju; Jin, Dawei; Li, Mingqiang; Jiang, Wei	Healthcare Data Gateways: Found Healthcare Intelligence on Blockchain with Novel Privacy Risk Control	JOURNAL OF MEDICAL SYSTEMS	221
8	2018	Mengelkamp, Esther; Gaerttner, Johannes; Rock, Kerstin; Kessler, Scott; Orsini, Lawrence; Weinhardt, Christof	Designing microgrid energy markets A case study: The Brooklyn Microgrid	APPLIED ENERGY	220
9	2018	Aitzhan, Nurzhan Zhumabekuly; Svetinovic, Davor	Security and Privacy in Decentralized Energy Trading Through Multi-Signatures, Blockchain and Anonymous Messaging Streams	IEEE TRANSACTIONS ON DEPENDABLE AND SECURE COMPUTING	198
10	2017	Lansiti, Marco; Lakhani, Karin R.	THE TRUTH ABOUT BLOCKCHAIN	HARVARD BUSINESS REVIEW	197

Table 4: Top 10 highly cited publications with details

Conclusions

There are various study in areas of Digital currency globally. After going through more than 4000 of records or papers provide by Web of Science, it's been clear that with advancement in technology and with the increase in the pace of digitalization the system is ready for the currency to be in the form of digital. From the research it is prominent that some countries like USA, England, Canada and others are having greater impact of publication and has significantly contributed with score of 1.28, 1.08, 1.18 and so on respectively. However, with the gradual increase in the articles yearly shows the amount of effort put by different countries in this domain. Although, our paper is mainly focused on country India so we had observed that eventually there have been drastic changes too when it comes article publishing and number of times cited but it's not up to the mark. Also, its PEI score is less than 1 which is also not impact full. So, working needs to be done in all these areas in order to see a greater changes in this domain.

This research has been done in the field of digital currency with the use of upcoming technology in order to commercialize it using bibliometric analysis which it taken as a separate field considering other factors like government support, law, and comparison of one nation's progress when compared with others as constant. Considering such factors in mind, the bibliometric analysis has good potential for future research in those areas.

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