

**Project Dissertation Report on
EMERGENCE OF CRYPTO CURRENCY
AND
ITS IMPLICATIONS FOR INDIA:
A CONCEPTUAL STUDY**

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Certificate

This is to certify that Lt Col Naveen Suri, bona fide student of **Delhi School of Management, Delhi Technological University**, has successfully completed the project work titled **Emergence of Crypto Currency and Its Implications for India: A Conceptual Study**, in partial fulfillment of the requirements of **Master of Business Administration (MBA) program for the academic year 2019-20**.

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Declaration

I hereby declare that the project report titled **Emergence of Crypto Currency and Its Implications for India: A Conceptual Study**, submitted at **Delhi School of Management, Delhi Technological University**, towards partial fulfillment of the requirements for the award of the degree of **Master of Business Administration**, is a record of original research work done by me, under the guidance and supervision of **Dr. Vikas Gupta**.

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Acknowledgement

I would like to express my profound gratitude and special thanks to my **Dr Vikas Gupta**, my faculty advisor and mentor for his valuable guidance and feedback which enabled me to probe the concept deeper and understand the issues better. His critical remarks and comments were very constructive to my work. I owe him much.

I am thankful to all respondents, particularly participants, who were willing to respond to my questionnaires and interviews; they facilitated much of the data collection process. I would also like to express my sincere gratitude and appreciation to all my fellow class members and thank them for their encouragement, moral and academic support.

My particular thanks go to all the instructors at the Delhi School of Management, who provided me with a conducive academic environment and gave me the tools to climb up the intellectual ladder. Since it is difficult to acknowledge everybody individually, I extend my special appreciation to whoever contributed to the accomplishment of this study.

The research work has indeed been a great learning experience.

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Executive Summary

In spite of being the latest buzzword- Crypto Currency, even after over a decade of its existence, the concept is still in its infancy. The complexities of economy hardwired into the central banking system, threatened authorities including political as well as economic, are already trying to either destroy the same or to control it in the manner they do with fiat money. There is lot of talk involving the concepts of crypto currencies and the underlying block chain technology, however there seems little understanding of the concept as such, and even less as to the applicability of the concept. It truly has the potential to completely replace the existing financial system but there are dangers of adoption of the new technology and genuine concerns of the skeptics.

Crypto currency is a completely virtual currency derived using cryptographic methods which cannot, under any circumstances, manifest itself in physical form. More important than the currency, it is the underlying block chain technology, based on the system of absolute, mutual and decentralized trust, which is being talked about in a more accepting manner. However, both are like Siamese twins, conjoined together at a fundamental level, and as of now it seem impossible to accept one without the other.

The block chain technology was the hidden underdog in this entwined concept when it was floated for the first time in 2008 by Satoshi Nakamoto. While the white paper by Satoshi aimed at the first crypto currency i.e. Bitcoin and its conceptual promotion, it's the block chain which has helped in the wider acceptance of the concept, at least theoretically.

Central banks across the world showed initial reluctance towards the acceptance of crypto currencies. As block chain technology emerged into the scene, with applicability across a multitude of industries, slowly but gradually lots of central banks and governments have opened up to it. While most such governments are still trying to understand the disruptive technology, they are also trying to regulate the same in ways they know. However given underlying technology, all such efforts may not achieve worthwhile results. Such a

technology aims to change the very nature of economic equilibrium all around for all stakeholders. Hence the run-of-the-mill regulations would create more friction than smoothen out the issues in wide acceptance of the same.

Though the crypto currencies like Bitcoin had gained temporary association with fraudulent activities, these are few and far in between. The advantage this new tech offers far outweighs the problems with it. Definitely there would be a need to regulate the same, it would need a whole new approach and understanding to think and implement regulations for the same.

Reserve Bank of India (RBI) had declared the transactions involving crypto currencies in India as illegal. However there has been no study, by any government office, which has been carried out in the field, which could support the ban thus imposed by the central bank in India. This ban has over the years, while rest of the world moves ahead to embrace the tech, may have had a detrimental effect on the Indian economy. However there is no denying the fact that this new technology needs to be studied in greater detail and understood much better at the conceptual level first before moving onto the implementation and regulation stage.

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CHAPTER 1

RESEARCH OVERVIEW

1.1 Introduction

The study focuses on the applicability of the crypto currency in Indian economic scenario. In spite of the fact that the emerging technologies of the crypto currency and the block chain are indeed the innovative yet disruptive, the world was initially slow in waking up to the emergence of such a potent technology over the horizon. In the aftermath of global financial crisis, post the housing bubble burst in the US economy, a paper was released online by a person or a group of persons called Satoshi Nakamoto laying down the workings of a decentralized monetary based on a completely virtual currency system using cryptographic methods - the Bitcoin. The network began functioning in January 2009 and the age of crypto currencies began, though for how long is an intriguing query.

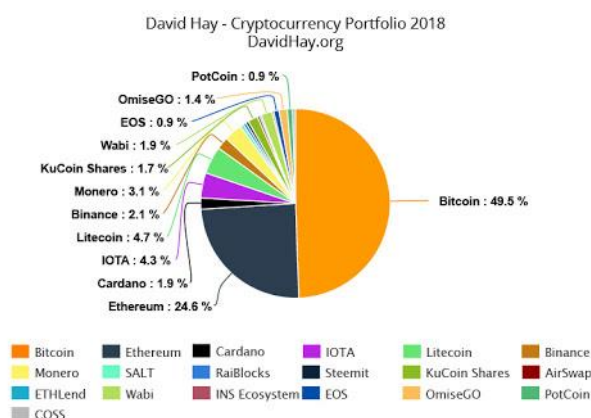


Figure 1 Crypto Currencies of the World

Source: DavidHay¹

There have been over 6000 such digital peer-to-peer (P2P) currencies which had at some point in the last decade emerged on the scene and while most faded away, a few kept going even till today. There are more than 1600 crypto currencies in existence

¹ <http://www.davidhay.org/cryptocurrency-portfolio-2018/>

today with a total market capitalization of over US\$ 191 billion and a daily transaction volume of around US\$ 140 billion, according to coinmarketcap.com. No wonder that the countries all over are talking about them – ban them or accept them, but cannot ignore them. However looking closely, there are only around 10 digital currencies with more than a US\$ 1 Billion in market capitalization. In fact the top 20 crypto currencies together account for more than 93% of the market, while Bitcoin itself accounting for over 66% of the total market cap of all crypto coins in circulation today.

1.2 Background

Virtual Currency and Indian Economic Space. In India the first P2P digital coin start up – Unocoin, was founded 2013 during the time when the Indian state was not yet aware of the innovative tech and the banks would transact in Bitcoin or other crypto currencies. Sathvik Vishwanath and Harish B.V, cofounders of Unocoin, were enthusiastic about using e-wallet and ATM machines to facilitate transactions in cryptos. A year later saw emergence of Zebpay, another Indian startup crypto currency exchange and wallet, soon became quite popular in the technocrat circles capturing over 70% of the growing Indian crypto market over the next couple of years. In 2018 Reserve Bank of India issued a circular to all banking and other financial entities regulated by it that effectively banned dealing in crypto currencies in India. With no financial infrastructure supporting, that effectively struck a death knell for the entire industry in India dealing in virtual currencies.

Government Stand. This was not the first time Government of India (GoI) had made its stand against crypto currencies. In December 2013, RBI vide its first press release in the matter had cautioned users, holders and traders of virtual currencies about the dangers of dealing in crypto currencies which included the following issues as raised in the advisory:

- (a) Virtual currencies being electronic in nature were exposed to risks of hacking or online frauds.
- (b) The payments through virtual currencies weren't regulated by any central agency and had no established remedial mechanism available to customers in case of a transaction gone wrong.

(c) The crypto currencies were not backed by any asset class and their value was highly volatile exposing customers to potential losses due to high volatility.

(d) As per media reports at the time the transactions in crypto currencies could be used in illicit and illegal activities. By virtue of anonymity of counterparties the chances of breaches of law were high for unsuspecting users.

In 2017 RBI and the Finance Ministry again issued multiple statements and notices to emphasize caution against use of crypto currencies. In 2018 Mr. Arun Jaitley, Indian Finance Minister, in a parliamentary statement during budget presentation categorically stated the govt endeavor to ban all kinds of crypto currencies like the Bitcoin. He reiterated that the nation doesn't recognize virtual currencies as a legal tender even though the government was keen on the underlying block chain technology.

Court Battle. The users and traders however didn't give up and there were many petitions filed in the courts including the Supreme Court of India (SC), on various aspects pertaining to the stand taken by the government. In May 2018 RBI issued a notice to all financial entities under it to stop providing any kind of infrastructure support to the users or traders. Another petition was filed in the SC against the circular and the case came to a logical conclusion in 2020 with SC ruling against the RBI stand in the matter.

During the course of the hearings in the matter, it was a response to query on any study by RBI was quoted and acknowledged by the central bank in the court. That response clarified that despite the strict stance taken by the govt and the RBI against crypto currencies, this was not backed by any study or research carried out to support the view. In fact there had been no committee or empowered group who had formally discussed the issue at hand, before issuing the 2018 notice by the RBI. Why, it begs to question than, did the govt take such a harsh stand? It seems after the court room interactions that the RBI fell way short of understanding the concept of crypto currency at a very basic level.

RBI acknowledged in the court that the ban on crypto currency was imposed to maintain the integrity of the banking system in the country. Without any relevant study in the field as to how the banking system would be impacted, blanket ban on crypto

currencies after the budget speech of the Finance Minister, it seemed that the RBI was taking decisions of such magnitude based on narratives set in the political arena.

While setting aside the concept of virtual currencies in the way it was done, RBI seemed confused about the classification of cryptos as such, i.e. as an asset, commodity or a currency system. This confusion has till date not been addressed by the central bank even though promises to carry out a formal study by RBI stands since 2013.

1.3 Statement of Research Problem

The significance of crypto currency has been talked about much across the world. With increasing research undertaken in the field in recent years, the concept attained wider acceptance globally. However there has been little research carried out to understand the concept and its role specifically in developing country like India. There is little literature to prove research on the applicability of crypto currencies in Indian economy. With even govt accepting that there has been no research carried out by the central regulatory authority, it would be fair to believe that academic work on crypto currencies in India is quite limited. It is clear that crypto currency in India has yet to come into the economic system fully. Its merits, demerits, adoption possibilities and the impact on the economy are currently unknown at the fundamental level itself. The aim of this study is to bridge this knowledge gap. From the literature on the subject it was noted that the meaning attached to the crypto currency needs to be understood in respect of the existing economy in general and payment system in particular, more so in Indian context.

1.4 Research Objectives

Main Objective

To analyze crypto currency adoption in Indian economic space.

Sub Objectives

- (a) To gain an understanding of crypto currency concept.
- (b) To understand the existing monetary payment system.

- (c) To ascertain adoptability of crypto currency in Indian economic system.

1.5 Significance of Study

Adoption of crypto currencies in the economic space may be crucial to the multitude of challenges being faced by the banking system in India. The impact on govt administrative mechanisms across all departments or ministries may be benevolent, more so in the current economic slowdown. This study may be relevant for policy formulation for effective regulation of crypto currencies in future, should the govt so decide. Academic benefits of the study can contribute effectively to better understand the virtual currency system, an aspect which is shallowly studied and published on. The study may be beneficial at a practical level to better understand the implications of such an accepted concept for not only public entities but also private entities and academics.

1.6 Assumptions of Study

The study would be guided by the following assumptions:

- (a) General banking and payment systems across the world are by and large similar.
- (b) There are some advantages and some disadvantages of the crypto currency concept which are not yet fully understood.
- (c) The economic conditions in emerging less developed economies are similar.

1.7 Limitations of Study

The study was limited by following constraints:

- (a) The research is limited to the New Delhi and its suburbs.
- (b) Time has been a major limiting factor.
- (c) It was difficult to meet respondents for a one on one interview, as also the lack of motivation from respondents in answering the questionnaires.

(d) The knowledge of the respondents in areas of emerging technology is limited to the exposure levels and individual motivation.

1.8 Research Methodology

A body of creative, logical and systematic work undertaken to increase knowledge and to apply this knowledge to find solutions to real world problems constitutes research involving collection, collation, organisation and analysis of information to better understand any given issue by posing questions and looking for answers. The technological issues of economics results of crypto currencies are better understood using quantitative methods but when the technology is looking for acceptance at a fundamental level involving understanding of the concept itself, qualitative approach yields better results. This study however aims to gain familiarity with the concept of crypto currency in order to formulate a more precise problem specific to its adoption in Indian context and hence follows exploratory qualitative research based on Social Constructionism.

Social Constructionism. As a theory of knowledge and communication, the theory examines the development of a jointly constructed understanding of the world that forms the basis for shared assumptions about reality. The theory is based on the notion that the meanings are emerging in consonance with others rather than acquired individual meanings. It questions what is defined and that reality may change based on the environment and time frame in which it exists. An important social construct for this study is money or the currency and the importance society attaches to it. Thus the concept of money itself changes overtime. We'll see during the study if that concept of monetary or payment system holds true to the theory or not.

Exploratory Research. The research problem identified seeks to clarify the concept further so as to enable further additional research may be undertaken later to honing in on the subject matter with more clarity. It is reiterated that while literature is available on the subject being researched, the acceptance of the same in Indian context still seems a distant dream. This research seeks to add quality information into the existing pool of knowledge with specific references to Indian economic space. The study is thus

exploratory in nature with following assumptions:

- (a) Subjective reality is a valid reality.
- (b) A contextual truth is a valid truth

Qualitative Research. A research which is not subject to quantification or quantitative analysis through statistical tools is a qualitative research. It is a natural inquiry into any phenomena in its natural setting with an aim to understand the underlying reasons for the same.

The tools for qualitative research include case studies, in depth interviews, open ended questionnaire etc. which are then subjected to content review. This kind of research involves understanding behaviour and the reason behind such behaviour and cannot be carried out in a time or cost constraint. However the benefits include:

- (a) There is a clear insider view available.
- (b) Focuses on how and why of the events throwing light on the basic issues involved.
- (c) Generates hypothesis rather than test hypothesis.
- (d) Since it observes natural setting of event in uncontrolled or unconstrained environment it provides true insight of the same.

Looking at the broader picture one is able to see the whole rather than looking for solutions to some specific problem. The research problem in this study involves a topic on which information is already available. However the issues at hand are more of understanding the behaviour of entities and stakeholders in accepting and applying an emerging concept as such into an environment. Since adequacy of relevant data isn't available, this research aims at investigating the issue without attempting to quantitatively identify or measure variables in an environment where even understanding of the underlying is suspect.

Descriptive Research Design. This kind of study aims to describe the concept of crypto currency in a theory based descriptive design by analysing and presenting information. Primary focus of this kind of research is on “Why” and “How” of things

rather than the “What” whereby helping evaluate the complexity of the real world or natural environment for better understanding of events. The essential rejection of crypto currency in Indian economy by the govt needs to be evaluated for the reasons, if any, laying out advantages, disadvantages of the concept and drawing parallels.

Sources of Data. The study primarily focussed on understanding crypto currency concept and thus majorly used available information available.

- (a) **Primary Data Sources.** Primary sources were initially used to reliably establish the awareness level at large in India. Questionnaires and informal unstructured interviews were employed to collect such information wherein the questionnaire was the main instrument of data collection. The sample size was 45. The questionnaires were distributed to respondents and all were provided adequate time to respond unaided and truthfully. The respondents were allayed of their fears about privacy by the researcher so as to avoid any biased responses.
- (b) **Secondary Data Sources.** Secondary source were used extensively to research the problem in great detail. These included available literature and research work already carried out in the field. Emphasis was laid on understanding the relevance of such studies. Further more freely available online literature and video sources were also studied in depth to enable the researcher understand the recent changes in the concept in simpler terms.

CHAPTER 2

LITERATURE REVIEW

Negative Bubble and Shocks in Crypto Currency Markets (John Fry and Tuck Cheah, 2016). The study, through Econophysics- an interdisciplinary application of tools from physics and mathematics, aimed to establish relationship between statistical physics and financial mathematics and also develop a model for understanding financial uncertainty in crypt currency markets. The study was carried out Bitcoin and Ripple and it found a negative bubble in crypto currency market for the two, which had been there since 2014. Given the newness of the technological incorporation into the financial world, the given two currencies faced enormous challenges including legal, regulatory and ethical. Furthermore due to scant literature available at the time on this new concept, the study aimed to contribute towards clarification of the concept itself. As one of the pioneer studies involving application of statistical tools on crypto currency markets, it was found that Ripple was far more overpriced relative to Bitcoin. Financial model so developed, studied different events affecting crypto currency markets. The results were however mixed to the extent that the effects of certain events were pronounced while other events were simply inconsequential.

Analysis of Crypto Currency, Bitcoin and the Future (Peter D. Dvires, 2016). Being a nascent disruptive technology introduced in financial world, and in spite of uncertainty and the prospect it offers, the author aimed to study the crypto currency concept in its simplest terms. The paper studied various aspects of the concept through the largest crypto currency in the world- Bitcoin. The paper systematically carried out SWOT analysis of crypto currencies, through Bitcoin, and looked at the advantages it offered in economic and financial application. While acknowledging movement of the same past the early adoption phase, the author concluded that the concept itself is not adequately clear on the ways it would affect the future. The author also acknowledged the power of the underlying block chain technology but emphasized that much research is needed in the areas of both block chain as well as crypto currency, before graduating to its application in real world.

Bitcoin as Emerging Virtual Currency and Its Related Impact on India (Dr. Pramod Kumar Pandey, 2017). The study focused on the viability of Bitcoin and its underlying block chain technology in the long run. Dr. Pandey concluded that while Bitcoin had given exceptional returns historically, when compared to stock market or gold, the risk involved, as with all crypto currencies, was enormous. There were far too many unknowns in the ecosystem in which these currency play. Thus the long-term viability of Bitcoin and other crypto currencies was suspect. He also noted that its underlying block chain technology was much more stable in the long run due to its adaptable application over a variety of situations. There were a plethora of unknowns across the world pertaining to Bitcoin dealing with the legal status and regulations. The greatest challenge, as and when such currencies come up for adoption would be whether to classify Bitcoin as a currency or commodity. In a complex economic ecosystem like India Bitcoin or for that matter any of the crypto currencies in general, and the block chain technology needs to be weighed very seriously before accepting it as part of Indian market system.

Growth of Crypto Currency in India- Its Challenges and Potential Impact on Legislation (Shailak Jain, 2018). The author of the paper charts the rise of crypto currencies in the world and how they have impacted the financial world. In so far as future expectations from the assets of this nature, the author explores various avenues of application of either the currency itself or the underlying block chain technology. The paper lays down existent and emerging challenges like financial security, stability of ecosystem, impact on existing system, legal status etc. The author also studied regulations of such countries where crypto currencies have been legalized or as yet not declared illegal. The paper thus concludes that the asset and underlying technology holds a great future, as yet are known and unregulated. However the promise of concept to positively impact Indian market system, both monetary and otherwise, is too huge to be disregarded and additional study was recommended.

Crypto Currency- Impact and Future in India (Dr. Anita Sharma, 2018). The study explores various advantages of crypto currency in the economic ecosystem. The author studied the ban on crypto currency in different countries and experiences of such

actions in those countries. The author concluded that while crypto currency may not be accepted as a full-fledged alternative to monetary system as such, value proposition of crypto currencies as a financial asset is quite strong and cannot be ignored.

Crypto Currency in India- Its Effect and Future on Economy with Special Reference to Bitcoin (Dr. Arvind Kumar Singh and Karan Veer Singh, 2018). The author argued that India, despite being on the verge of digital economic revolution, is yet to make up its mind on Bitcoin and other crypto currencies. In view of events like demonetization, the stability of fiat currency has taken a big hit. Notwithstanding the above, RBI is still looking at legalities of the issue. However, it seems that RBI is wary of giving up its control over fiat currency. Even while crypto currencies have been misused in certain cases, the benefits of crypto currencies in Indian economic scenario cannot be emphasized enough. While Indian economy has positive overtones towards crypto currencies, it is now up to the government of India to take a stand on legalizing these. The reluctance on the part of government to legalize crypto currencies is in contravention to its declared policy on cashless economy. It was argued by the author that crypto currencies are here to stay and should be amalgamated with the Indian economy.

A Statistical Analysis of Crypto Currencies (Stephen Chan, Jeffrey Chu, Saralees Nadarajah, Joerg Osterrieder, 2017). The authors analyzed statistical properties of the largest crypto currencies in the market based on their market capitalization. While there were over 700 crypto currencies in existence at the time, the researchers found that 97% of the market comprised of top 15 currencies, while 90% of the market comprised of top 7, with Bitcoin being the largest currency with a market share of 81%. The research studied exchange rates of top 7 crypto currencies and the Euro against the US Dollar spanning almost 3 years of historical data. The research was able to find the best fitting distribution for each crypto currency being studied, however, in spite of conceptual similarities between these currencies; no single distribution could be generally applied to these currencies.

A Conceptual Study on the Impact of Bitcoin on the Indian Economy (Mrs. Geetha RS and Mr. Girisha MC, 2018). The authors analyzed the concept of crypto

currency at a basic level as an emerging technology. They were able to list out the benefits of crypto currencies and the underlying block chain technology especially in Indian context. The paper also listed out broad impact on the economy especially the banking and finance sectors. The one thing which came out clearly in the paper was reluctance on part of Indian government to study the concept in totality with a view of likely future implementation of the same in Indian economy.

CHAPTER 3

CONCEPT REVIEW: CRYPTO CURRENCY

3.1 Historical Perspective: Existing Monetary System

Before looking at the emerging innovative system of financial management with wide scope of application given the versatile underlying block chain concept, it would be prudent to have an overview of current financial system as it evolved today.

3.1.1 Evolution of Financial System

2008 saw global economy come crashing down, taking cue from the housing bubble burst in the US economy. Post the economic crisis, which incidentally was in making due to the nature of centrally managed financial system across the world, a paper was published on internet by an individual or a group of individuals called Satoshi Nakamoto. The paper was the blueprint of the first crypto currency of the world- Bitcoin. Bitcoin network was functional in January 2009 and the first crypto currency of the world was thus born. The world has never looked back since. The term “Crypto Currency” has been visible to public eyes across the world and Bitcoin has been majorly responsible for the interest and acceptance of the concept in the global arena. Indian Consumer was, and has been, as interested in the concept as rest of the world.

As showcased by the market leader- Bitcoin along with its underlying Block Chain Technology is indeed an extremely young yet disruptive innovation which has the potential to change the way established economic system is constructed. With internet now being a way of life, it is inevitable that impact of digital technology would be felt on all aspects of human life. Incidentally, it is the social impact of internet which is the strongest. All social interactions are by and large transactions and the most formal of these belong to the economic space i.e. the financial system.

With advances in technology, an alternate financial system is already trying to manifest itself, a system based on crypto currencies, a system powerful enough change the established world economic system completely. However, the volatility or the stability

of this emerging Fintech is largely unknown. Moreover the underlying Block Chain Technology offers a whole new world of use case scenarios which were yet not even thought about. It would be prudent to understand how the existing financial system, as it stands today, evolved.

3.1.2 Barter and Rise of Commodity Currency

Man is a social animal and had always been so. The social interactions are transactions involving exchange of ideas, trust and resources. It was over a period of time that the workings of this exchange which got suitably modified on-the-go as civilizations progressed. It was actually a risk-reward system which only modified the medium of exchange and the regulatory authorities involved.

Consider the earliest system which was a simple exchange of goods established in the general market system as Barter system. People exchanged goods desired, as held with them and priced at an exchange rate of goods held with oneself. Those were simple times and society was fragmented, far placed, by and large local transactions involving locals. There was little regulation exercised in such matters even by the highest autocratic authorities except in cases of disputes. Here too it was only the exchange rate in the particular case which was presided over and decided. There were little guidelines laid down.

As civilizations expanded and the borders grew, there was an increased interaction amongst people. These increased transactions led to a need of some sort of central regulation. This was the when some semblance of currency started taking place. The earliest known currency system was seen in the Egypt where, in spite of the likings to gold, the Egyptian used Barley as a common state decreed base item for market system. This might be the first currency in the history of mankind. While Barley had the royal decree, the barter system with other goods was also practiced alongside and continued even till today.

As the trade grew over a period of time between different regions of the world, and also colonization by imperial powers, a need was felt of having some standard medium of exchange for trading purposes acceptable in all regions.

3.1.3 Bimetallism

Gold, silver or any other metal deemed valuable in the eyes of beholder has been used for thousands of years as a medium of exchange. In fact the deemed value of these metals were because of their rarity, stability and other metallic properties. Though these metals have been accumulated by powers around the world, the first known use of metal currency has been found in Lydia (modern day Turkey) in around 694 BCE. Thereafter it was spread around the globe as a preferred medium of exchange wherein coins were minted carrying the image of the ruler. These coins were used as a commodity currency based on the precious metals they were made of.

Europe was flush with silver and was the preferred medium of exchange for quite some time. However as global trade grew, both gold and silver were used especially when trading with the Middle East, India, Egyptian empires. The rarity of Gold made it more precious and was thus less wide in circulation. Thus silver coins continued as the currency of choice till around 15th century. Thus there was an established system of exchange incorporating two precious metals- gold and silver, later called Bimetallism.

It was only around beginning of 17th century when England and other colonial powers faced a massive debt due to years of fighting wars when precious metal supply, primarily the silver of the colonial power had depleted massively, that gold started to appeal more to colonial powers. The gold was also limited with the kingdom with some quantity held by the citizens also. In fact, in 1640, privately held gold was also forcibly taken from citizens by King Charles I to service state's debt. Though, the king eventually paid back the gold to people, damage was already done. Later we would discuss how this resulted in the birth of the banking system.

Given the expansion of colonial powers across the world there were advantages of having two precious metals in the monetary system:

- (a) Combination of two metals provided greater monetary reserves.
- (b) Larger monetary base would result in greater price stability.
- (c) Ease of determination and stabilization of exchange rates of two metals using bimetallic standards.

3.1.4 Gold Standard

Europe, as the global power center, introduced paper currency in 17th century, yet continued with gold coins too. The ensuing tension between the paper currency and gold led to introduction of Gold Standard in early 19th century with England taking the lead. This established a clear relation between the paper currency of the nation and its ability to be converted into gold as and when required.

By 20th century most countries subscribed to Gold Standard. Exchange rates were fixed for easy convertibility based on the reserves of gold held by a nation.

However the system collapsed post WWI, with deep economic distress and great depression forcing the war torn nations to inflate their paper currency without such gold backing. Post WWII, similar problems were faced. To obviate problems the nations agreed to benchmark their currencies against US Dollar (USD). This seemed logical as 75% of world gold was then held with the US. As the circulation of USD increased beyond convertible gold reserves of US, the standard finally died in 1970s.

3.1.5 Evolution of Banking

During the late 17th century, king of England had forced its citizens to give up their gold to state. Later, even when the gold was returned to the people, they were wary of such dangers of state taking over their assets again. As a precaution they started keeping their gold with private gold keepers for safety. As this private gold keeping grew, such gold was being lent out also by these keepers. The safety was based on a simple convertible paper contract which permitted a client to redeem his gold from the private keeper at his convenience. This was thus the beginning of a simple banking system. Over a period of time people became more comfortable holding those paper contracts rather than gold commodity.

However there were so many different paper instruments floating around that it was getting beyond control in open market system. State moved in to take over this responsibility and thus was born paper currency, backed by gold and managed through a system of private banks. These banks grew powerful over a period of time and in an era of industrialization and increased trade activity, they even dictated terms to the

state. In US there was a need felt to control these banks and regulate their activities. Thus started actions to achieve the same in 1910 which culminated in the Federal Reserve Act of 1913. This act established the first central bank in the world which was to deal with monetary system, reserves, currency and most importantly regulate the banks. Soon this was followed up across the globe with almost all countries today having a central bank barring Iran and North Korea.

3.1.6 Financial System with Fiat Currency

The existing financial system has been developed over an extended period of time emerging from barter system to other mediums of exchange like metals and money as explained above. Even while these systems evolved there was a gradual and a definite shift in the system towards a standardised currency acceptable to all. While, initially there was no state control over the currencies in circulation, the need of having one, which facilitated large transactions and overcame the limitations of barter system, forced governments to exercise control over currencies. We moved away from barter, though not totally, and used currencies which were valued using different standards like silver or gold held with the authority issuing the currencies. The system worked well for a while but soon was modified to do away with this valuation system.

In the newer system as applicable today, the currency is called “Fiat” currency which is wholly controlled by the government and valued as per normal supply demand relationship. Governments are able to print this currency at their will without any backing what so ever of any kind. The government is able to control the supply of money in the market, inflate or deflate the exchange value etc. In other words there is no intrinsic value of the paper money yet it is in circulation as it is backed by state promise to honor it. “Fiat” is a Latin word meaning “let it be done”. Thus the fiat currency is worth as long as the government backing it says so. However the system suffers following basic flaws:

- (a) **Centrally Controlled.** The fiat system is based on coercive rather than voluntary market relationships and thus is anti-democratic antithesis of a free market economy.

(b) **Price Instability.** Valuation of currency is arbitrary, done by central planners, with no direct relationship to the economic reality. The quantity of currency in fiat currency is invariably and inevitably incorrect which leads to price instability.

(c) **Economic Volatility.** Economy is aggregate of individuals and inaccurate quantity guesses eventually results in volatility. With arbitrary currency valuations it is very difficult to identify correct value and thus the exchange rate of fiat money.

(d) **Currency Debasement.** Paper money eventually returns to its intrinsic value i.e. zero, even though the value of the paper money in fiat system is as fixed by a central authority. This is due to inflation where in the fiat currency loses its value over time, thus more of it is needed to buy same amount of stuff called debasement.

(e) **Redistribution of Wealth.** Increasing the supply of currency leads to redistribution of wealth and no new wealth is generated as fiat money is not backed by anything but a word of the government.

(f) **A Concentration of Wealth.** Wealth and property accumulates to those who have privilege of creating the currency which is economically destabilizing. Currency isn't created in physical form but is virtual state by way of debt. It is this debt which is taken in as an asset by the banks and creates additional wealth.

(g) **Moral Hazard.** Power corrupts and absolute power corrupts absolutely, and this is the basis of the corrupt system in financial world wherein the central banks and the govt are exercising power over the money.

3.2 Crypto Currency

With technology initiating newer ways of social interactions, there are newer processes manifesting themselves pertaining to human societal living. The major impact of the full force of technology is being felt in the area of financial system currently based on fiat currency or paper money as explained above. However, the need to break away from the centrally controlled system, aided by newer technologically assisted interactions in communities gave birth to a more modern form of currency in the virtual

space which overcomes the limitations of physical money. Post Housing Bubble burst in the US and consequent global economic meltdown, world saw the first of such currencies in 2009, with Satoshi Nakamoto gifting the world, Bitcoin. Bitcoin is the first crypto currency, the most widely accepted, most powerful and the most dominating of approximately 2000 plus crypto currencies in existence today.

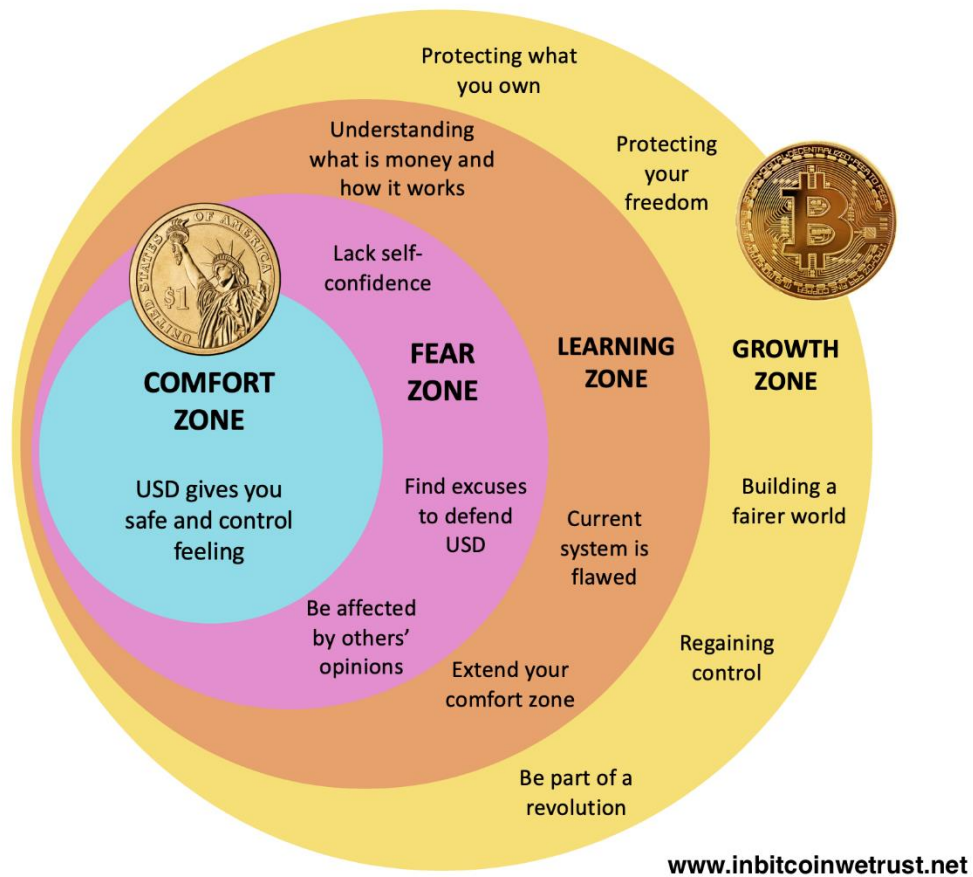


Figure 2 Monetary System and Personal Zones

Source: Sylvain Saurel²

²

<https://medium.com/in-bitcoin-we-trust/flat-money-is-your-comfort-zone-bitcoin-is-your-growth-zone-8994ea554d5f>

What exactly is crypto currency? Crypto currency is an exclusive virtual currency with no physical form like commodity or paper currency. This form of currency is exclusively in the realm of digital world. These exist in the form of digital tokens and are stored in electronic wallets - a specified digital address in the digital space. To understand the concept of crypto currency one needs to understand notion of centralized and decentralized currencies.

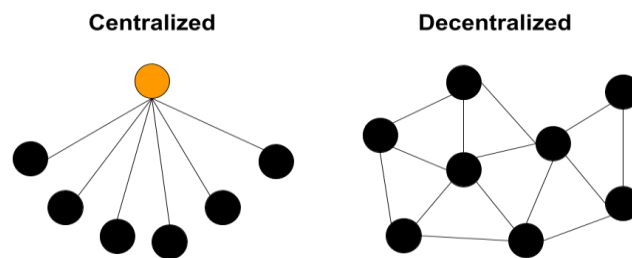


Figure 3: Centralized vs Decentralized System

Source: Richellis³

3.2.1 Centralized Currencies

Centralized currencies are those over which some authority exercises some kind of centralized control in three primary areas:

- (a) **Manufacturing Authority.** This is explained better by talking about central banks around the world. It is these banks that have the authority of government to print or mint paper or coin currency at will or against reserves of any standard commodity held with the government.
- (b) **Monetary Regulation.** The supply of centralized currency is regulated by a central authority which in most nations is the nation's central bank. This regulation pertains to monetary control over the interest rates i.e. the cost of borrowing or cost

³ <https://steemit.com/bitcoin/@richellis/true-decentralization-in-cryptocurrency>

of credit as also setting the value of its currency in a commodity backed or fiat system.

(c) **Financial Institutions.** The central government of a nation is the sole authority to permit persons or institutions to deal in financial markets like accepting deposits or give loans. All such entities are given licenses to operate in the financial ecosystem.

3.2.2 Decentralized Currencies

As above, it can be seen as to how fiat money is controlled centrally and is thus rightly called the centralized currency. If there were a currency which is not controlled by the government in any form that would be than free of the manipulations of the govt. Crypto currencies fit that role perfectly.

- (a) They are not manufactured by any central authority but by a system algorithm.
- (b) These are not controlled or regulated by any government but the system algorithm itself.
- (c) These don't need approval of any authority for operation.

The first and the largest crypto currency is also most widely accepted one - Bitcoin. Even though we are considering the general concept of crypto currency in the study, for the purpose of this study, we would consider Bitcoin for data or specific example as and when the need arises.

3.2.3 Fiat Currency Payment System (Existing Payment System)

Currency is essentially a medium of exchange or a payment system and in today's age it incorporates an elaborate the current payment system works as under:

- (a) Person has a bank account.
- (b) Way of proving control of that account number—PIN code.
- (c) The bank has a data record thereby keeping a private internal database.
- (d) The person can use electronic communications system to identify to their bank

as authentic account holder, and can request for the money in their account be transferred to someone else's account.

(e) The banks edit their ledger of accounts, changing the person's score, and also tell the recipient's bank to do the same for tallying the records.

(f) Money moves via a series of private databases being edited.

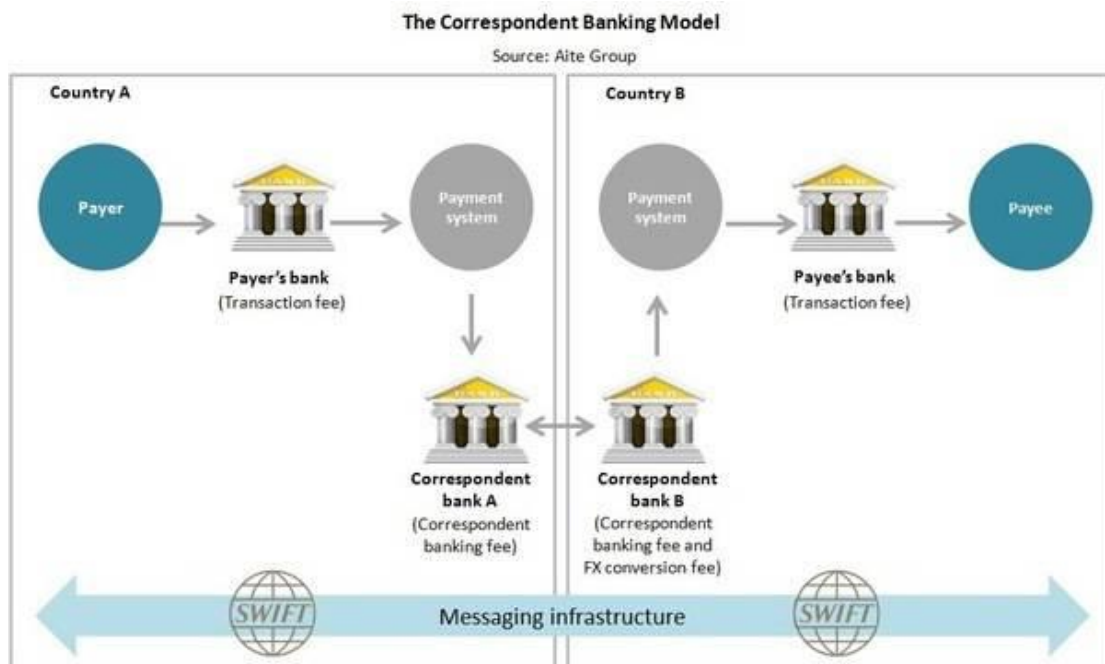


Figure 4: Payment System and Trusted 3rd Party

Source: CB Insights⁴

The above system is essentially incorporating three entities- payer, payee and the bank. The first two are really simple to understand but the requirement of the bank is not. Why can't the two individuals carry out their transactions individually? Yes, they could, but when talking about large sums of money, it is not feasible to carry around that kind of paper currency. So the banks are essentially independent and impartial trust agents who manage the accounts of individuals. Bank's job is to maintain ledger of accounts in respect of individuals and certify that a transaction has taken place between two individuals which is valid and complete. These two banks are trust agents trusted by

⁴ <https://www.cbinsights.com/research/blockchain-disrupting-banking/>

individuals involved and they may be same for individuals or different. It's a fairly simple and trusted system with little faults. However, as the number of individuals and transactions increase, there are multiple trust agents entering the limited space with their own records for certifying the transactions. If in a transaction, any of the trust agent fails to update his records the transaction stays incomplete. And here this system of maintaining records ledger, fails. There is a need of certifying a transaction by multiple banks and updating their ledgers in the same way with regards to that transaction. There is, thus a delay, due to multiple ledgers and banks involved.

3.2.4 Bitcoin Payment (Payment System with Crypto Currency)

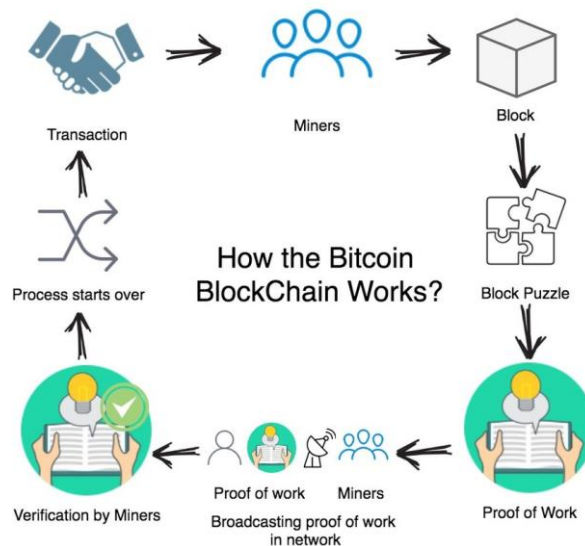


Figure 5: How Bitcoin System Works

Source: Suman Ghimire and Henry Selvaraj⁵

The current system relies on the existence of a third party which is solely responsible for the management of the payments through a central closed ledger. This system introduces additional links in the system which grows more complex, arbitrary,

discretionary and secretive progressively. The Bitcoin system using computer network is way simpler. It uses the existing network of computers for managing the payment without introducing any additional links. In a simplified form it is as under:

- (a) A person wishing to make a payment has a public address (akin to an account number) on a computer network which is a unique system generated identity with electronic records with almost negligible scope for manipulation. It is this public address which stores crypto currency like Bitcoin in form of digital tokens.
- (b) Controlling and operating that unique public address through use of a unique private key (roughly akin to a PIN number) and known only to the owner of that public address.
- (d) Electronic communications system (connected network of electronic devices) to identify to the Bitcoin network, and request that digital tokens, associated with their public address, be moved to someone else's public address.
- (e) This proposed change in moving tokens is put out over the network for validation by the participants in the network.
- (f) The process involves the miners i.e. stakeholders or participants in the network who use their computational power to validate these transactions.
- (g) The two parties who desired to transact as above between their public accounts are able to see that the transaction is validated by miners and payment is completed, proving that the tokens have moved from one address to the other.
- (h) While this transaction is completed, the miner who successfully solved the computational process regarding validating transaction is rewarded for using his resources. This reward is new crypto currency token which is generated by the system. This way new currency tokens are generated till a predetermined level.

3.2.5 Double Spend Problem

As above, the bitcoin system indicates that the payments are completed as in the fiat currency system. However in current currency system is based on physical asset i.e.

paper money which is needed to be exchanged or a trusted third party like a bank needs to certify that one holds the money before making the payment. Everyone involved in an exchange has immediate visual access to the paper money involved or there is the trusted third party verification. Though compromising third party would make this system fall flat for third party is the single critical point of failure which is still followed only because of the system of trust.

The digital currency system is complicated. This complication is a peculiar problem related to digital currency - Double Spending. Double spending is a problem wherein same currency can be spent more than once. This was addressed in the paper money system by employing a third party but digital currency was different.

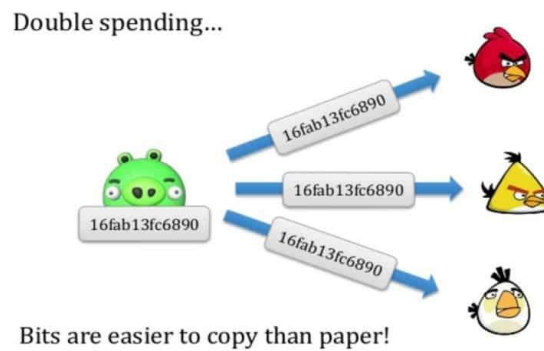


Figure 6: Double Spend Problem

Source: Harsh Agarwal⁶

Any digital file stored in electronic format can be cloned. Once cloned, multiple copies are available to the owner who can now share the same file with multiple individuals. The same principle can be applied to any digital currency as it is nothing but an electronic file. An owner of digital currency may copy the digital token and use

⁶ <https://coinsutra.com/bitcoin-double-spending/>

multiple copies of the same token to make multiple payments. That would be disastrous because it shall cause multitude of problems like inflation and a loss of trust in the digital currency. This would essentially make that currency worthless.

This problem of double spend was conclusively solved by Bitcoin using decentralized cryptographic methods of verification. Bitcoin uses consensus mechanism, known as proof-of-work, to do this task. Instead of the third party, miners perform this function. All transactions are included in a shared public ledger known as block chain. A transaction is valid once it has been verified, grouped into a block and added to a block chain. As more blocks are added to the chain, it becomes difficult to go back, use the same currency token and double spend a transaction. Typically in a Bitcoin block chain the transaction is a fully trusted after additional six blocks being added to the chain.

3.3 Block Chain Technology

It can be appreciated from above that the Bitcoin system is more similar to the fiat payment system on the surface than it may seem, however essential differences lie beneath the surface. Bitcoin system's underlying Block Chain Technology is that difference.

Simply put the block chain technology is a community of networked participants who are solving a difficult computational process and upon finding the solution, the finder is rewarded. This computational process is the transaction which is deemed completed when the correct solution is found. This transaction is verified by the member participants of the network only; there is no third party involvement. Once verified, the transaction is recorded in the network as a block of successful transaction. A reward for the same is sent to the solution finder's public address. This reward can be utilized by the individual using a private key in the way described as above.

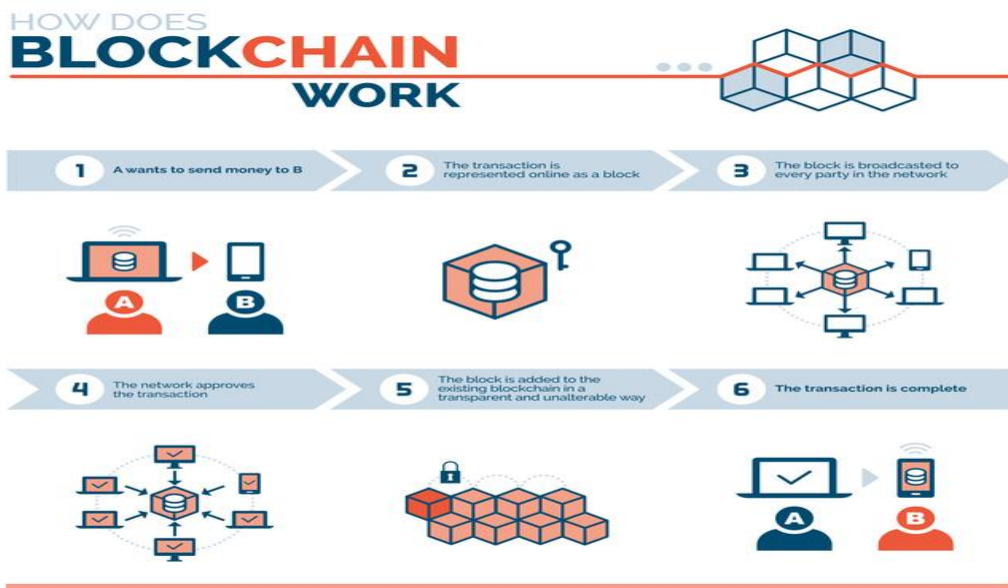


Figure7: Block Chain Working

Source: www.coinmama.com⁷

So where is the currency system here? The reward to the solution finder is a digital token which is generated by the system through a predetermined algorithm. This digital token is the crypto currency in the system which can be used as above. The benefits derived by this technology are as under.

- Decentralization of power to control the system. There is no single entity powerful enough to have control the currency or the transactions.
- Distributed ledger of the transactions which does away with the need of the trusted third party. Since all stakeholders in the system are taken to be trusted parties, simultaneous and real time verification of transactions is carried out.
- Privacy and anonymity of payer and payee. The Bitcoin system offers pseudo anonymity to the stakeholders. A Bitcoin distributed ledger is open to all viewers

⁷ <https://www.coinmama.com/guide/what-is-the-blockchain>

yet offers only the public addresses to be viewed. Identity of the person owning that address isn't revealed. Similarly all transactions are available for verifications but the parties undertaking transactions are hidden.

(d) Usage of cryptography to oust trusted third parties from the system. Since the verification of transactions is done by network participants themselves, there are cryptographic methods used to correctly and uniquely validate such transaction without the need for any third party.

(e) Ease of holding crypto currency is a major advantage of this technology. With no physical form, crypto currency is easy to store, carry and access over digital space.

(f) It is extremely difficult to change a transaction due to Block Chain technology. Verified transactions are recorded as blocks which are sequentially linked with the previous block in the chain.

(g) The issue of double spend is addressed by the effectiveness of this block chain.

So is the system totally secure? No, theoretically there may be a possibility of changing a block chain and alter the blocks. Any change to a block would need the change in appended blocks and, by extrapolation, would need the complete chain to be amended. Further copy of this block chain is spread across the network with all participants holding a copy each. Every transaction is public and any attempt to corrupt it would be flagged to the public while preventing consensus among all ledger copies. Thus to effect a change in a block would not only need changing the complete block chain but also all the copies in the network which would essentially mean the entire network itself which is impossible given the current technology at least.

Essentially the Block Chain is a ledger of records which is maintained exclusively electronically and is updated constantly. The most important feature of the Block Chain tech is that it is public and can be seen by all as a public ledger of records and is updated after every transaction. The copy of this ledger is owned by all participants on the same

network. Though being public may imply lack of privacy, but the system handles this privacy aspect very well. The transactions and accounts in the block chain are anonymized by cryptographic methods needing massive technical and technological power to break it. Incidentally it is this underlying technology which has a much better and wider acceptability in the economy as a technology which is not a threat to the financial system as such, and yet has varied use case scenarios.

3.4 Volatility and Safety

Thus far we know that there is some value attributed to Bitcoin or other such crypto currencies however there is caution required to provide legitimacy to crypto currencies. There are still safety and volatility issues with the concept as such needing attention:

(a) Bitcoin started as a private experiment rather than as a commercial instrument. The workings of the same was put out over internet as to how Bitcoin would be generated and used however same probably did not have any focus of a dedicated financial system powerful enough to replace the existing one. The perceived value within a small networked group attracted speculators to consider it for short term investments. The media played an important role in improving its ratings during initial years. Today also Bitcoin is a specific token of value for a specialised group only. This limited usage lends a very high degree of economic volatility to Bitcoin. Other crypto currencies are even more affected due to even smaller user base.

(b) Crypto currencies are safer but in relative terms only. The technology is still evolving, but the cryptographic nature and distributed ledger of the underlying block chain makes it hard nut to crack; for now. But certain instances of mega frauds have already put a question mark on the safety of crypto money.

(c) Further the taxation, accounting and regulatory needs of the current system is still clueless about how to interface with block chain technology to integrate it into the mainstream financial system. Various countries are looking at the same through various studies to resolve these issues.

(d) The concern for money laundering and financing terror activities is a major

issue in the adoption of crypto currencies. The concern emanates from the degree of anonymity and privacy rendered by the system on the whole. Moreover the dark web with closed websites like the Silk Road doesn't present a very positive usage scenario either.

(e) Easy transfer of the crypto currencies across geographical boundaries makes one look at remittances as a potential use case. But remittances would depend upon the liquid market for crypto in local currencies. Strong liquid markets are a hallmark of a strong economy and where the economy of a state is strong fundamentally; there would be channels for exchanging the currencies. However in the countries needing remittances it is seen that the market fundamentals are not strong thus has limited market liquidity.

(f) The countries with strong mobile payment system may seem to benefit from crypto currencies, for remittances, thus carving out a support and usage structure for itself. However in such cases like Kenya's M-Pesa, the mobile payment has leveraged the existing system, all with its vendors and agents.

(g) Crypto currencies are technological wonder systems in a connected world. There is a need to provide the system minimum stability across the world for them to succeed. Unfortunately, lack of infrastructure and stable enough internet across a majority of countries is a major let down in this regards.

(h) The Bitcoin ecosystem cannot, in its present form, address the fundamental issue of financial exclusion, as in not having access to credit facilities.

3.5 Advantages and Disadvantages: Crypto Currency

Crypto Currency offers multiple benefits as a standalone system and as a bundled product with alternative uses of Block Chain Technology. Though the exact nature of issues would be clear at a much later stage, if, and only if, the crypto currency system is universally adopted, some of the observed benefits and flaws can be enumerated. For the purpose of understanding we consider the same in respect of the largest crypto currency i.e. Bitcoin, as an example.

Advantage Bitcoin. The very nature of the underlying tech provide following advantages to the Bitcoin eco system:

(a) **Decentralization.** The system does away with the need of a middle man or a third party for record keeping. Bitcoin replaces trusted third party with inbuilt cryptographic methods of proving transactions. This also implies that the cost of transacting in Bitcoin eco system is also lowered considerably compared to traditional banking. Furthermore the costs are charged as a reward that needs to be given to miners to keep the network secure. Furthermore since no central agency controls the same, it is inherently unaffected by such actions like demonetization of paper currency.

(b) **No Double Spending.** The proof of work system and the block chain don't allow for double spending and reversing a transaction. Once confirmed publically, the transaction becomes part of the block chain where by the address of the transaction is changed from owner to the new address as recorded in the block. It is now extremely difficult to take the transferred coins back.

(c) **Incentivizing Fairness.** Users of the system are humans with known weakness to dishonesty. In order to commit a fraud in the system by tinkering with approved transaction as part of the block chain, the individual or group of individuals would need to out-power the computing prowess of the complete network. That's a mighty difficult task as of now. Even if an attacker is able to muster that kind of power, the system provides him with an honest alternative to use this computing power at his disposal to generate more coins than all the rest of the network combined. Thus he won't risk the legitimacy of his wealth or the network and therefore the currency.

(d) **Secured Privacy.** Bitcoin users need only internet infrastructure to make Bitcoin transactions. The same is handled from comfort zone of the user and the transactions are much faster yet they are secured as far as privacy is concerned. The transactions are related to change in addresses. This generation of new addresses post a successfully verified transaction preserves the anonymity of users. These transactions are not relatable to individual users and thus cannot be tracked to identify a specific user similar to cash only transactions less the face recognition.

(e) **Predictable Money Supply and No Inflation.** Bitcoin supply is controlled by the system algorithm with a total quantity of 21 million of the currency set to be released progressively in a systematic way till year 2140. Since difficulty of mining increases every 4 years to keep the release rate of Bitcoin constant, it makes sense for miners to adopt the technology early.

Moreover supply of Bitcoin is fixed and its value depends upon demand for the same, which is deflationary in nature. Unlike traditional money Bitcoin supply can't be increased by printing more money. Printing more money by govt creates inflation as the value of currency goes down in value.

(f) **Fast and Cheap Transactions.** Bitcoin transactions take about 10 minutes for verification on the block chain. If these transactions are "zero confirmation" transactions i.e. merchant taking the risk and accepting transaction yet to be verified, bitcoins transactions would be in real time. The icing on the cake is that the transaction fees are miniscule at superfast speeds compared to traditional payment system.

(g) **Stabilizing Tool for Portfolio Volatility.** As per Forbes (2016), Bitcoins correlation to other capital assets is very negligible and this independence makes Bitcoin an ideal asset to be included in portfolio for hedging overall market risk.

Disadvantage Bitcoin.

(a) **Still an Emerging Technological Experiment.** Bitcoin started as a private experiment wherein even Satoshi Nakamoto would not have seen this kind of disruption over such a short period of time. The actual impact of this tech may not be understood as yet. In fact it might be that the exact way in which Bitcoin impacts economy may not have yet been observed in totality. It poses a huge risk to be used as a major investment class for retail investors.

(b) **Technical Vulnerabilities.** Entire Bitcoin concept hinges on one essentially critical aspect of its existence i.e. IT infrastructure and internet. If this critical

component of the system is affected in any way, say, due to electricity issues, the whole system would fall flat on the ground.

Furthermore the systems open source nature means individual ideologies would be conflicting in providing a single direction to the future. Given that computational power is needed to mine the Bitcoin, anyone individual or group, or organization that can assemble such prowess can control the hash rate and the coin as such. In fact govt like PRC have been said to be secretly playing a big role in determining the future in this regard.

While the system benefits from decentralization, it is still an open source computer program, and thus can be manipulated. This can and had in the past led to technical issues and frauds.

(c) **Financial Risk.** Bitcoin is still in infancy and thus needs lot of support to evolve as a stable system. Value of Bitcoin is susceptible to sharp changes due to the public opinion to a system trying to establish on its own. Till Bitcoin is widely accepted, its value would remain volatile. Thus the financial risk associated with Bitcoin is quite high as of now. This is a precarious situation that Bitcoin needs public acceptance to become stable while public sentiment is against it citing the risks involved.

(d) **Unpredictable costs.** Mining Bitcoin has a cost associated with it vis-a-vis its market value. Mining costs are primarily associated with electricity and cost of upgrading hardware to rationalize mining difficulty every four years. However it is seen as a threat to existing monetary system even by govt who allows its usage. They however impose high taxation regime on Bitcoin possession and dealings. This means that costs associated with Bitcoin ecosystem are quite unpredictable and thus dissuade wider, faster adoption.

(e) **Illegal activities.** The benefits of anonymity can also be negated by using Bitcoin in illegal activities. The fact that a website like “Silk Road” was able to transact over 9.5 million Bitcoin, over a period of little over two years, while engaging in drugs and other illegal activities and services, shows the dark side of

crypto currency network. Money laundering, terror financing, crime payments are indeed shady and unwanted use case scenarios of Bitcoin.

3.6 Factors Affecting Crypto Currency Adoption

As above the benefits of crypto currency like decentralization, lower fees and real time transactions make one enthusiastic about embracing this new technology. Yet the fate of cryptos is still skeptical. There are risks in adoption of technology, but that's not exclusive to crypto currencies. As the system is mass adopted these creases would be ironed out, mostly. The fate of crypto currency hinges on mass adoption and the factors affecting adoption by masses can be enumerated as under:

(a) **Volatility.** There are massive price fluctuations in the crypto currency markets. Bitcoin was at a time well over USD 20000, but in 2017 alone it saw drops on five different occasions. The fact that there is little observed correlation between Bitcoin price and the stock market makes it extremely difficult to predict these fluctuations. Even while one may be looking at a global recession in a Covid19 virus hit world economy and stock markets down, Bitcoin showed initial downturn from a price of over USD 10000 in December 2019 to under USD 5000 in a matter of three months, yet bounced back to over USD 6500 in the first half of April 2020.

The crypto markets are known for such fluctuations wherein the price can shoot massively overnight and just as quickly wipe out you investments. This kind of volatility is not attractive to a common investor or a user who would want stability of his currency or investment.

(b) **Awareness.** News and aware user base has a great role when it comes to managing crypto perceptions. At one point of time when China seemed to be investing heavily in Bitcoin mining farms, the price surged. But in 2017 when Chinese authorities banned trading in crypto currency and ICOs (Initial Coin Offers) led to Bitcoin crash to USD 3000. There is a need for sustained positive media coverage and educating people of the benefits of using cryptos which may attract people to start using them.

(c) **Scalability of Technology.** Crypto currency transactions still lack the ability to handle transaction volumes similar to payment systems like PayPal and Visa. By current standards banking systems handle more than 25000 transactions per second while Bitcoin transactions are still in few hundred only. There is definitely an aspect of infrastructure issue wherein an open infrastructure based technology of Bitcoin is competing with privately owned and operated network. However there are projects undertaken to increase scalability to 5000 transactions per second.

(d) **Regulatory Issues.** There are some countries who are trying to support cryptos through regulation while some nations are looking at launching their own crypto currencies. There are some nations who have banned certain aspects of cryptos while some have banned them outright, and in most cases without much study of the technology. This kind of approach is creating doubts in the minds of potential users or investors and thus is a major factor in encouraging adoption or otherwise.

(e) **Usability.** Even when crypto currency can be a global payment system transcending geographical borders, there are a small yet increasing numbers of vendors who have shown inclination in accepting this money. The usability of cryptos would signify universality in usage and is a major factor influencing adoptability.

(f) **Security Issues.** System issues leading to major frauds which, though less in numbers, have come to light. Due to inherent anonymity and open source nature of the system, it is difficult to track the culprits or hackers. These security concerns are legitimate concerns of a potential user and affect adoption of digital money.

(g) **Competition.** Bitcoin was the first crypto but as on date there are over 1600 active crypto currencies in circulation. These are all competing for the value currency proposition and the potential user base is actually confused regarding usage and investment potential of these currencies.

(h) **Cryptos as Asset or Currency.** A major issue is the designation of cryptos as asset or a currency. While some nations are trying to regulate the same,

there is still confusion as to how to regulate them. Even those who banned, like India, are more confused about its standing. RBI tried to classify cryptos as an asset in the court, yet tried to control it as a currency system.

(j) **Block Chain Technology.** It is said that life is a chain of contracts. Being a decentralized system, it is difficult to ensure validation of transactions without suitable rewards, and thus it is difficult to separate crypto currency from block chain tech, at least for now. One of the major influencer to mass adoption of the digital currency seems to be the underlying block chain technology. The truly disruptive and innovative applications of this tech are limited by creativity of the user.

3.7 Global Perspective

The reasons for Bitcoin, or any other crypto currencies, popularity are the same which have resulted in calls for bans or regulatory attention. Govt and the central banks are skeptical about cryptos as they feel threatened about their power to control and also genuinely concerned about the safety of peoples wealth. And yet they are also drawn towards the underlying block chain technology. Thus the legal status of Bitcoin, and other crypto currencies at large, is still undefined or changing among different nations. While usage of crypto currencies itself is not illegal in many countries there are questions on its status as money or commodity and the regulatory issues.

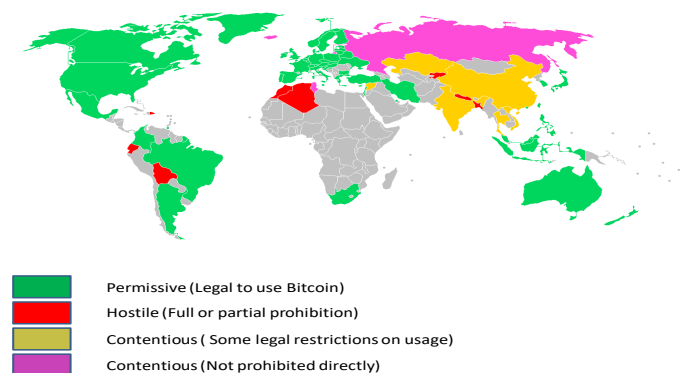


Figure 8: Global Crypto Currency Adoption

Source: www.wikipedia.org⁸

⁸ https://en.wikipedia.org/wiki/Legality_of_bitcoin_by_country_or_territory

Europe. The status of cryptos in EU and G7 is legal. Though EU has not passed any specific regulation, it has stated that taxes are not applicable to conversion between traditional money and digital currency. Though on transactions done with crypto currency do attract relevant GST/VAT. The stand of European Central Bank is that crypto currency doesn't involve traditional financial actors while other states have extended existing financial provisions to virtual coins. In October 2015, Court of Justice of EU had ruled that exchange of virtual currency with paper money be exempt from taxes, effectively consolidating the position of crypto currency such as Bitcoin as a currency system rather than a commodity. Similarly for rest of the Europe, the status of crypto coins has been legalized.

African Continent. North African nations including Egypt, Morocco and Algeria have declared crypto currency as criminally illegal. Nigeria in West Africa has banned cryptos but has formally constituted a committee to look at possibility adoption of underlying Block Chain Technology. South African nations including South Africa, Angola, Namibia and Zimbabwe have accepted crypto coins as commodity rather than a payment system as such.

North America. The US Treasury has classified crypto coins as a convertible decentralized virtual currency while Commodity Futures Trading Commission (CFTC) classifies it as commodity and IRS taxes crypto currency as property. Canada has declared a banking ban on crypto currency but has not made possession or dealings in them as illegal. Mexico has legalized crypto coins as virtual assets and regulates them as such.

Central America and Caribbean. Nations have declared crypto currencies as legal in their states but have few merchants accepting crypto coins.

South America. Most South American nations have legalized crypto currency either by regulating these or by accepting them in an unregulated environment by warnings only. However, Ecuador and Bolivia have banned cryptos criminally while Colombia has banned banking transaction only.

Asia. Most of Central Asian Republics, West Asian nations, Eurasian countries including Russia and the Middle East have adopted crypto coins as legal with suitable

warnings, certain amount of regulations and also banking ban in a few nations. South Asian nations have declared these illegal except Bangladesh which has accepted them with banking ban only. East Asian and South East Asian nations have also adopted cryptos with banking ban.

Oceania. Australia and New Zealand have adopted legal status of crypto coins as a virtual currency system.

CHAPTER 5

DATA PRESENTATION AND ANALYSIS

The researcher had obtained primary data by way of questionnaire based online survey. The questionnaire was systematically and logically divided into four sections. First section gathers demographic and personal data about respondents. The next two sections were for assessing the general awareness levels of the respondents regarding crypto currency and block chain technology respectively. The last section was to gauge the adoptability of crypto currency in Indian economic space in the eyes of respondents.

4.1 Response Analysis

A total of 45 respondents were considered for participation in this study. The researcher had approached over 150 potential respondents with online questionnaires with 45 valid responses being returned. The response rate which was recorded for the study was 30%. The researcher had accommodated for low response rate. Thus even with a low response rate sample was adequate to carry out this study.

4.1.1 Demographic Data

The responses so received had approximately 78% male respondents.

(a) **Age of Respondents.** The age of the respondents showed that a bulk of the respondents were between the age-bracket of 45-54 years. The age profile implied that the respondents understood the importance of an emerging technology.

What is your age
45 responses

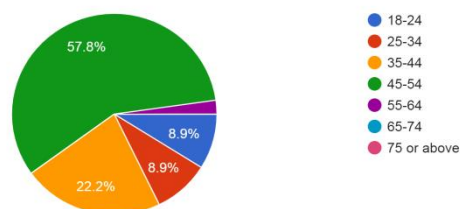


Chart 1: Survey Demography (Age of Respondents)

(c) **Educational Qualifications.** The educational qualifications of the respondents showed that barring one respondent, all held a graduate degree with 20% pursuing a PG course and majority i.e. 47% already holding a PG degree. Also there were 18% respondents who held professional degrees. The mix of academic qualification implied that the sample was theoretically generally aware of the world event around them.

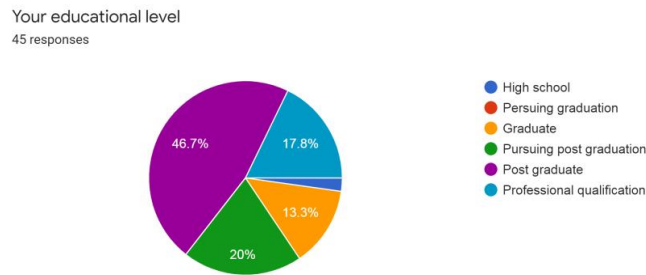


Chart 2: Survey Demography (Educational Qualification of Respondents)

(d) **Employment Status and Annual Income.** Around 40% of the respondents were govt employees, along with 22.5% holding corporate positions and another 18% employed in professional services. One respondent was also a business owner. Annual income of the respondents revealed that about 70% of the respondents were earning above Rs 10 Lakh p.a. More than 50% respondents were in income bracket beyond Rs 20 Lakh. These two data points implied that exposure levels of the respondents to technical and management aspects of technology were adequate for this study.

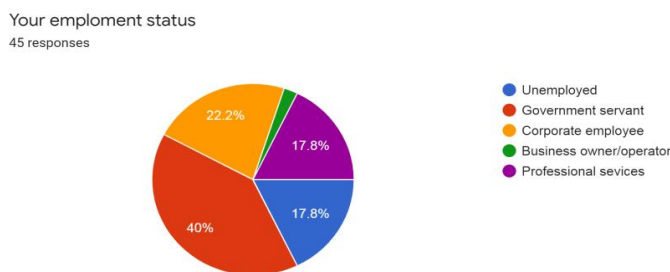


Chart 3: Survey Demography (Employment Status of Respondents)

Whats your average annual income
45 responses

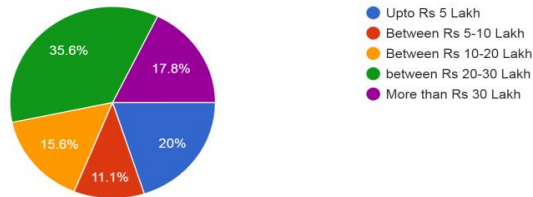


Chart 4: Survey Demography (Income of Respondents)

4.1.2 General Awareness about Crypto Currency

About 45% respondents had heard a lot about crypto currencies but at the same time there were about 16% who had little knowledge about the same. More than 90% of the respondents didn't own any crypto currency and only 27% showed definite willingness to own it in future. 49% respondents were inclined to own some but similar number (47%) weren't aware of the available crypto currencies for such investment. A sizable portion of the sample was also not aware of the risk profile of cryptos. Next few questions assessed the respondent's knowledge about Bitcoin in general. The details of the data so collected are as under:

(a) **Prior Knowledge.**

How much, if at all, have you heard about cryptocurrencies such as Bitcoin, Litecoin, Ripple etc?
45 responses

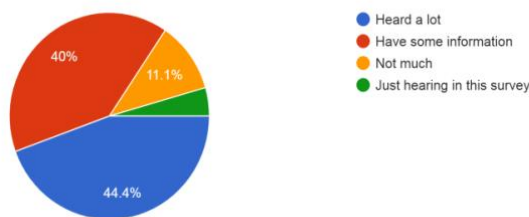


Chart 5: Previous Knowledge of Crypto Currencies

(b) Ownership of Crypto Coins.

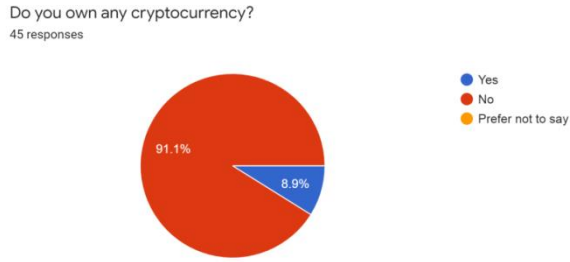


Chart 6: Ownership of Crypto Currency

(c) Future Interest.

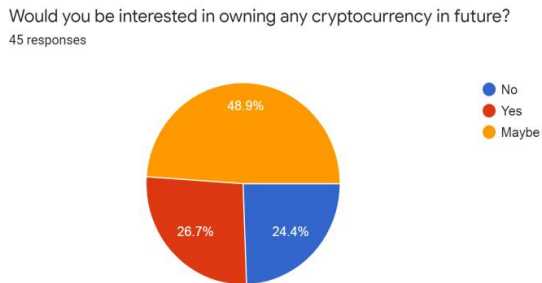


Chart 7: Future Interest in Ownership of Crypto Currency

(d) Crypto Preference for Investment.

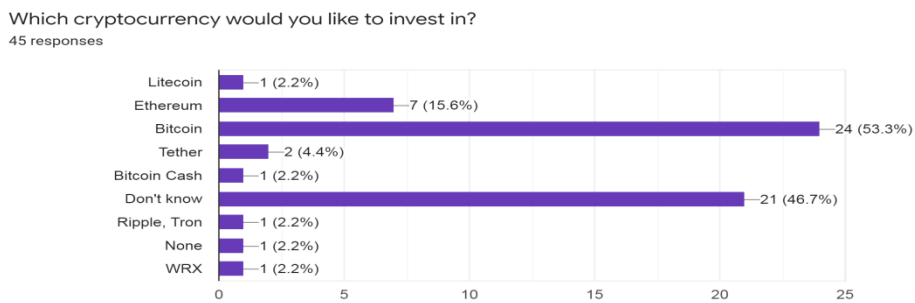


Chart 8: Preference of Crypto coin for Investment

(e) **Risk Expectations.**

In your opinion which is more risky- investing in stock market or investing in cryptocurrency
45 responses

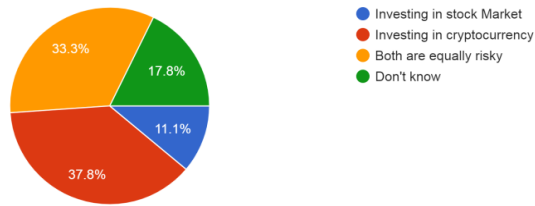


Chart 9: Stock Market vs Crypto Investment (Risk)

(f) **Profitability.**

Which is more profitable according to you- investing in stock market or investing in cryptocurrency?
45 responses

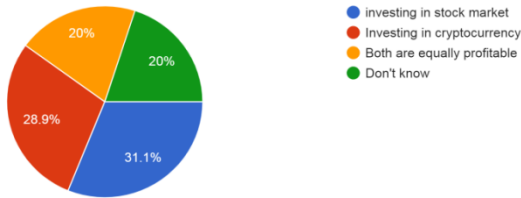


Chart 10: Stock Market vs Crypto Currency (Profitability)

(g) **The First Crypto Currency.**

What was the first cryptocurrency?
45 responses

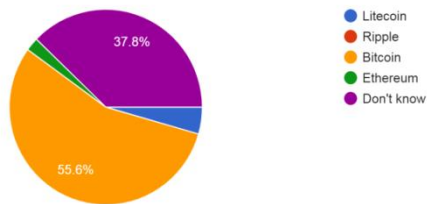


Chart 11: Which is the First Crypto Currency?

(h) Future Value.

According to you, in 5 years cryptocurrency, like Bitcoin, would be worth more or less than today?
45 responses

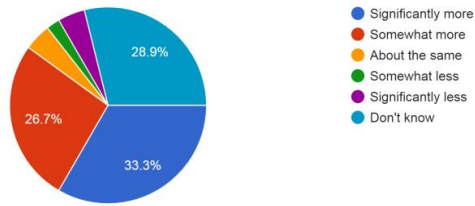


Chart 12: Future Valuation of Bitcoin

(i) Crypto Market.

Where can you buy cryptocurrency?
45 responses

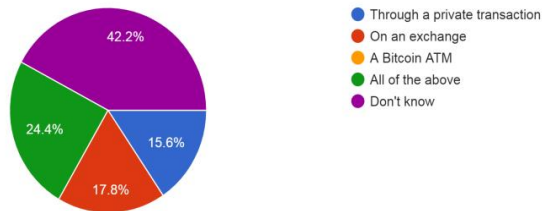


Chart 13: Where to Buy Crypto Currency?

(j) Creation Methodology.

How many Bitcoins can be created?
45 responses

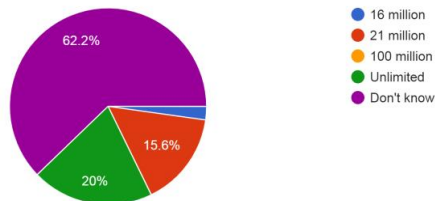


Chart 14: How are Bitcoins Created?

(k) **Silk Road.**

Which website run by Ross Ulbrich was shut down by the FBI for letting people buy drugs using Bitcoins?
45 responses

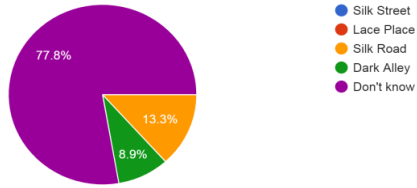


Chart 15: Heard about Silk Road?

(l) **The Beginning.**

When did Bitcoin network began working?
45 responses

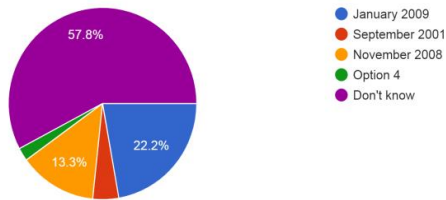


Chart 16: When did Bitcoin Start?

(m) **Bitcoin Network Ownership.**

Where is Bitcoin central server located?
45 responses

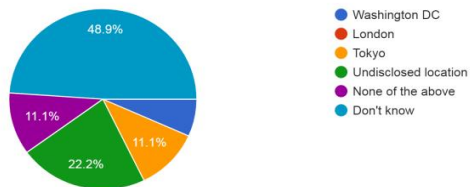


Chart 17: Who Owns Bitcoin Network?

(n) **Bitcoin Regulator.**

Who regulates cryptocurrency?
45 responses

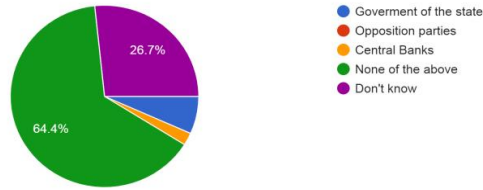


Chart 18: Who Regulates Bitcoin?

4.1.3 General Awareness about Block Chain Technology

This section assessed the awareness of the respondents regarding the Block Chain which is the underlying technology for crypto currency and has much wider acceptance generally. Almost 25% respondents had little knowledge of the same with additionally 16% heard about the same during this survey itself. The general awareness about crypto currencies fared better than the block chain technology awareness amongst the respondents. The summary data so collected in the section is displayed as under:

(a) **Prior Knowledge.**

How much have you heard of Blockchain technology?
45 responses

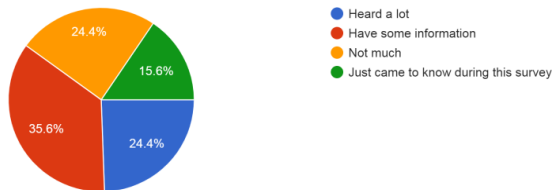


Chart 19: Heard about Block Chain Technology?

(b) Block Chain Concept.

What is a blockchain?
45 responses

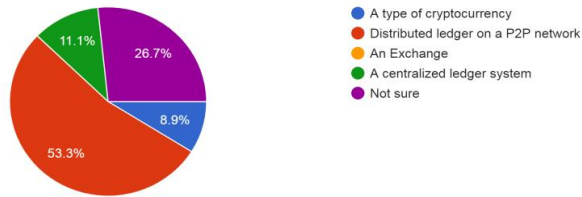


Chart 20: What is a Block Chain?

(c) Bitcoin as a Block Chain.

Are cryptocurrencies, like Bitcoin, a blockchain?
45 responses

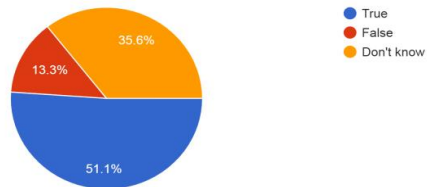


Chart 21: Is Bitcoin a Block Chain?

(d) Block Chain vs Crypto Currency.

Can blockchain and cryptocurrency be separated?
45 responses

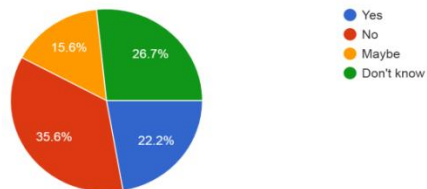


Chart 22: Difference between Block Chain and Crypto currency?

(e) **Fraud.**

What makes Blockchain tamperproof?
45 responses

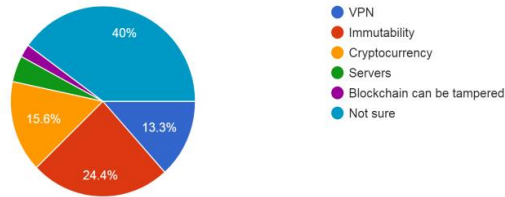


Chart 23: Tempering with Block Chain

(f) **Miner.**

What is a miner?
45 responses



Chart 24: What is a Miner?

(g) **Modifying Block Chain.**

Once records are submitted on a blockchain, can they be altered?
45 responses

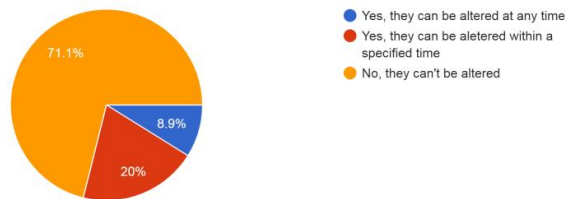


Chart 25: Alterations to Block Chain?

(h) **Block Chain in Industry.**

Do you think that Blockchain technology will dramatically disrupt the industry or line of business that your company operates in?
45 responses

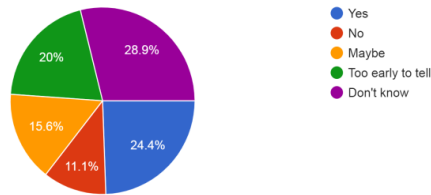


Chart 26: Applicability of Block Chain in Industry?

(i) **Block Chain Adoption.**

Is your organisation working towards adoption of Blockchain technology in business operations?
45 responses

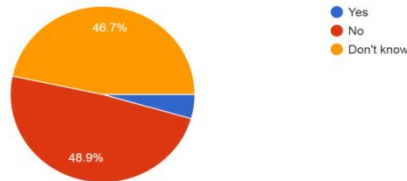


Chart 27: Adoption of Block Chain in Industry?

4.1.4 Applicability in Indian Economy

The last section was designed to assess if the respondents were aware of the general applicability of crypto currency or the lock chain technology in Indian economy. About one third respondents were totally unaware of the legal status of crypto currency in India. While 50% were in favour of granting legal status to digital currency, about 40% were not sure of the same. The future of cryptos in India was also not clear to about 38% respondents. Gauging benefits and disadvantages of virtual currency majority recognised advantages like anonymity, low transaction cost, international acceptance and no intermediaries, while disadvantages included various associated risks. Respondents identified govt approval and regulation as most important factor for adoption of crypto currency in the country. Also financial services and logistics sectors were seen as major beneficiaries of cryptos and block chain. The most important

challenge to the adoption was identified as lack of understanding of potential of these disruptive technologies. Summary data so collected is as under:

(a) Legal Status of Crypto Currency in India.

What is the status of cryptocurrencies in India?
45 responses

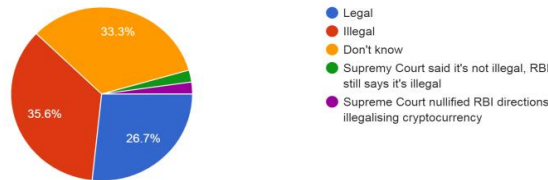


Chart 28: Crypto Currency- Legal or Illegal in India?

(b) Banning Cryptos in India.

Do you think that cryptocurrencies should be banned in the country?
45 responses

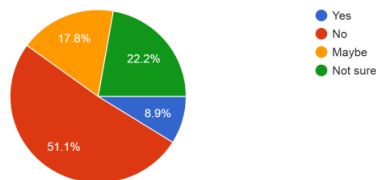


Chart 29: Should Crypto Currency be banned in India?

(c) Crypto Advantage.

How important are the following factors as advantages of virtual currencies?

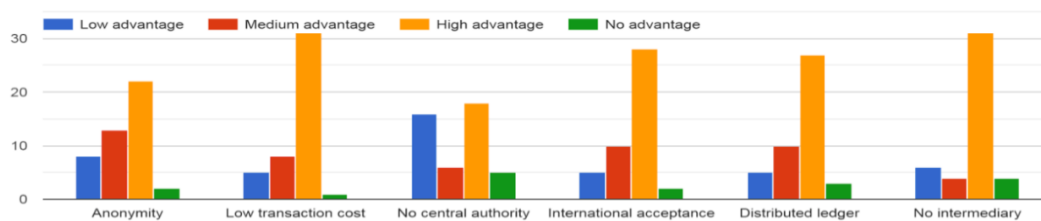


Chart 30: Advantages of Crypto Currency

(d) Crypto Disadvantage.

How important are the following factors as disadvantages of virtual currency?

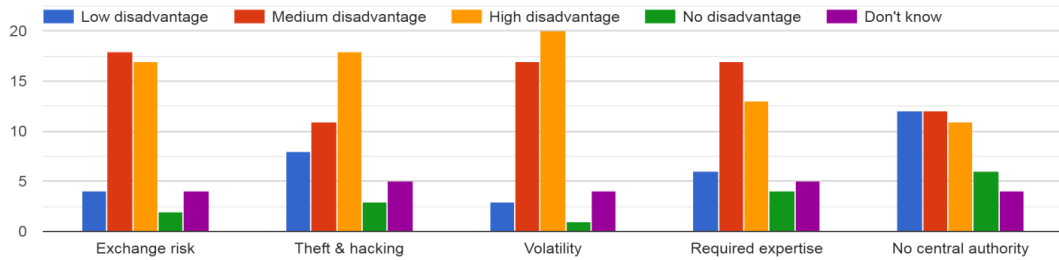


Chart 31: Disadvantages of Crypto Currency?

(e) Factors for Adoption in India.

Please rate the following factors which you consider important for adoption of cryptocurrencies in the country?

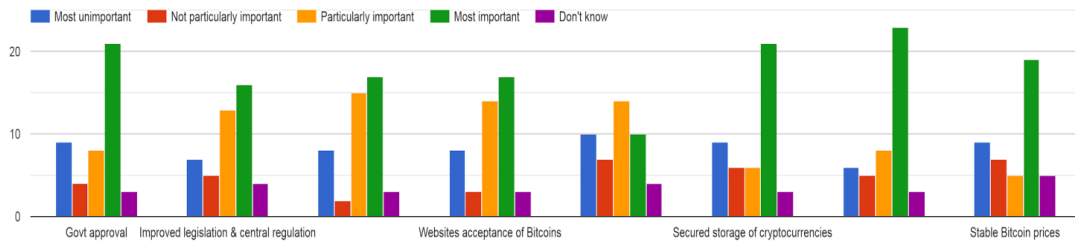


Chart 32: Important Factors for Adoption of Crypto Currency in India

(f) Application of Block Chain.

Which industry or domains do you see having significant potential for blockchain technology?
45 responses

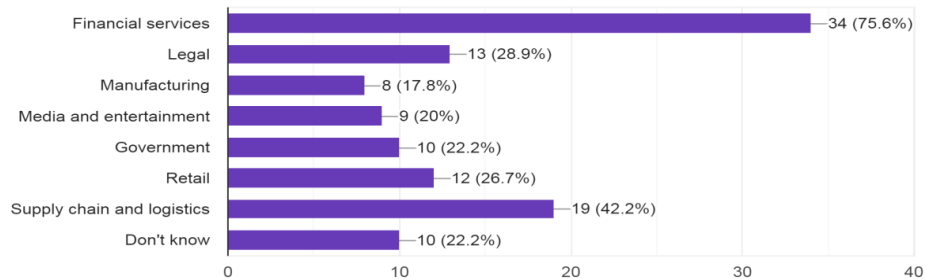


Chart 33: Where to Apply Block Chain?

(g) Challenges to Adoption of Block Chain.

What are the biggest challenges to adoption of Blockchain in industry?

45 responses

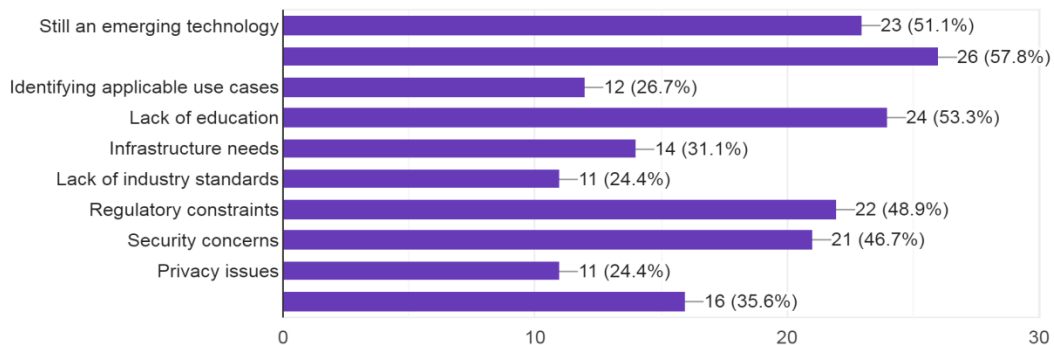


Chart 34: Challenges to Adoption of Block Chain Tech?

(h) Future of Crypto Currency in India.

How likely are you to invest in any cryptocurrency in future?

45 responses

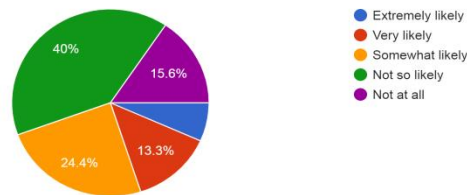


Chart 35: Would You Invest in Crypto Currency?

4.2 Findings

The study survey was conducted to assess the level of concept awareness in respect of Crypto Currency of general public at large. Given the constraints, the survey was able to get adequate responses to meet the objective and the researcher was able generally grasp the mood of respondents. The study was conducted on a reasonable well educated and well placed group of respondents. A majority of the respondents were between the age group 45-54 years (57.8%) with good educational background (46.7% held PG degree and 20% were pursuing PG courses). Only about 18% were unemployed and

about 54% respondents were earning above Rs20 Lakh p.a. This signified that the sample group was reasonable mature and experienced people who should be in touch with the innovation on economic front which would also include crypto currency. However there was a significant part of the sample i.e. about 15% who had little to no knowledge of the topic. Not surprisingly about 47% had any knowledge of crypto coins potential as an investment asset. Most were aware about the risks associated with stock market yet were not aware about risk profile or profitability of virtual currency.

In fact a majority of the respondents showed little understanding of the concept of crypto currency or the block chain. This was a surprise given the educational and employment levels of the respondents. Given the flip flop of the RBI in the issue, it was however understandable that a major part of sample wasn't aware of the actual legal status of crypto currency in India. Though respondents were aware that there is an issue related to legal regulatory support to crypto coins, they seemed to be confused on the actual standing of RBI on legality issue. About 40% respondents though felt that the crypto system should grow out to be a complementary financial system while almost an equal number (37.8%) could not make up their mind about the future of virtual currency in India.

Respondents identified “Low Transaction Costs”, “No Intermediary”, “Distributed Ledger System”, and “International Acceptance” as major advantages of crypto currencies. They also identified “Exchange Risk”, “Fraud” and “Volatility” associated with virtual currency as major disadvantages. As such they also considered “Govt Approval” as the most important factor for adoption of cryptos in the country.

As far as adoption of technology is concerned, not surprisingly, most respondents rated “Financial Services” sector having significant potential for usage in line with their assessment of cryptos complementing the existing financial system in future. The next sector for adoption of this technology as rated by the respondents was, also not surprisingly, “Supply Chain and Logistics”.

The respondents also identified “Lack of Understanding of the Potential” and “Lack of Education” about the technology as biggest challenges to adoption. The respondents also identified “Regulatory Constraints” and “Security Issues” as major challenges to adoption of technology in India.

CHAPTER 5

Conclusion and Recommendations

5.1 Conclusion

The aim of this study was to establish the understanding of crypto currency system in Indian economic context and clarify the concept of virtual currency at the basic level. It was seen through the study that crypto currencies are poorly understood even by the educated people. The study tried to review the evolution of existing monetary system and understand the relevance of crypto currency in the same.

There are flaws in the system, yet to be rectified:

(a) The crypto currency is a recent concept but definitely a powerful one. Unfortunately, despite the entire buzz about it, there are certain powerful restrictors. The alternative solution as represented by the Bitcoin may not be a valid one. As an alternative to current financial system it does not essentially rectify the inherent defects in the existing system. Instead the Bitcoin network seems to offer an escape to avoid addressing these issues which begs the questions as to how to address the basic flaws in the economy. Though the system may offer benefits to some social class, there may be little that can be achieved by the society as a whole this way.

(b) There are concerns raised about the carbon emissions of the crypto ecosystem. The mining process is completely automated. To maintain a steady supply of Bitcoin in the market till the last of it is mined, the difficulty of the mining process is automatically adjusted by the algorithm itself. This means that to be able to keep mining a worthwhile effort, miners need newer hardware to keep it profitable. Many view it as wasteful expenditure either way- hardware up gradation or while using older hardware which uses more electricity with diminishing returns.

(c) There is a contrast of stated benefits in the concept itself. It seems difficult to reconcile the need to make Bitcoin profitable while ensuring social and economic

inclusion. The question of social solidarity by the Bitcoin network keeps fluctuating between two contradictory issues of making profits and social inclusion or welfare.

(d) With time, there has been a manifold increase in emerging alternate crypto currencies. This one aspect is perhaps the most hindering issue at least in the current stage of crypto acceptability. With competing products in the market it is extremely difficult for the volatility to settle down and the Bitcoin attaining stability.

(e) The underlying block chain technology is itself evolving and is yet to be understood so as to ensure wider acceptance. The issue of exploiting the algorithmic flaws to commit a fraud is a possibility. Not only the algorithm but also the issue pertaining to large blocks of transaction being orphaned due to network issues, it is only a matter of time that someone picks up holes to negate the positive sentiment regarding crypto currencies.

In spite of above mentioned flaws which seem to be more of teething troubles in an unaccepting, rigid and fearful economic world, there are significant advantages which far outweigh the issues being raised:

(a) Convenience offered by the fast and secured payment methodology due to block chain technology reduces the additional workloads like the KYC and background checks. Digital wallets are easy to set up and operate with crypto coins.

(b) Low cost transactions are a huge boost to the user as far as financial power is concerned. Removing intermediaries from payment chains make for more efficient system. Even with decentralization and little regulation the system offers potentially more secure transactions than the existing monetary system offers. Moreover the payment system is much more transparent than the existing system.

(c) There has been huge initial interest shown by investors due to little correlation between crypto currencies and the external shocks. This makes them a perfect asset for hedging investments.

(d) The technological age of Internet and IoT has potentially unlimited use cases for the underlying block chain technology.

(e) Virtual currency by virtue of its anti-inflationary characteristic is more suited for the demands of contemporary economic system than the existing system. The existing monetary system also suffers from the same flaws despite the huge infrastructure and massive regulation it is subjected to.

(f) Bitcoin, being most widely spread crypto currency can be used as an intermediary between fiat currencies to act as a facilitator for real time, cheap and credible remittances. This is where there needs to be no additional requirements of infrastructure except integration with the existing network and availability of liquid market. Those countries where the population is largely looking at remittances from abroad can utilize the existing financial networks, provided there is ease of exchanging the currencies to and from crypto coins.

(g) Nations with lesser developed economies have difficulties in getting access to the international markets. With Bitcoin it is much easier to provide an alternative financial system with access to the same international markets with relative ease.

(h) There is a large population across globe which does not have access to formal banking facilities, reasons are many but we won't delve into those. The formal banking networks need a longer time to develop and are costly to maintain. The virtual aspects of Bitcoin reduce the overheads by reducing the requirements for physical network of banking infrastructure. Thus it can easily empower people to financial inclusion and reliance.

(d) With the demise of gold standard there has been an increased inflationary pressure on the money system. With countries no longer bound, they increase or decrease money supply in the market at will along with arbitrary valuation of their currency. This has led to inflationary issues across globe. However Bitcoin is going to be released in the network in finite quantity, with no scope of increasing the supply at a later stage. Thus Bitcoin, like the gold can control currency valuation and consequently exercise better control over inflationary factors.

The concept of crypto currency as shown by the oldest one, Bitcoin, is a very powerful game changer in the financial world. The underlying Block Chain technology holds lots of promise in the ways it can affect global economic sphere. However the concept is in infancy stage with newer understanding of issues involved, surfacing at an alarming rate. The system is technology driven and needs a reliable network for the technology to get established. The acceptance by the end users is increasing albeit still not high enough to gauge the strength of the concept as such. Furthermore there is a major lack of data in case of crypto currencies except the exchange rates. In many countries cryptos have been banned thus not only data is lacking but also there is a lack of relevant data which is glaring. The subject needs to be studied more in depth and detail with the world acknowledging the need to do so together. Further the internet penetration is still inadequate to draw and relevant and concrete results about the same. A lot has been done but a lot is yet desired.

5.2 Recommendations

The virtual currency and block chain are innovative technologies which need to be studied in much greater detail by academics and economists alike. It would be better if such studies are undertaken independently and also with state sponsorship. Furthermore the impact cannot be geographically limited and hence need collaborations at international level i.e. between countries. The states which have legalized the same are in a much better position to identify potential issues. The confusion in the economic circles with regards virtual currency being a payment system or an asset needs to be addressed. As in the case of US and Europe, acceptance of crypto currency as a payment system and a commodity may be studied to clear the confusion. In Indian context there is definitely a great need for a govt understanding of the concept. RBI should formalize their ideas of crypto currency including an Indian crypto, in order to adopt a professional stance in the matter. There needs to be an emphasis on the block chain technology as a separate entity with related links with crypto coins as such. As of now the system doesn't seem mature enough to replace the existing monetary system but it can be nurtured as a complementary system.

5.3 Contribution of Study to Crypto Currency Adoption in India

The study is important for general understanding of crypto currency concept and its potential benefits. Lack of awareness in this regards is hindering the full use of the system and also its underlying block chain technology. There is no standard platform across globe which has tried to take a holistic view of the concept as applicable to current monetary system. The study would also be beneficial for casual reading as also for generation of interest in all stakeholders and it is hoped that the study may be used at least for fueling academic interest in the concept.

5.4 Significance of Crypto Currency in Covid19 Environment

It's been no secret that the world economy was slowing down in recent past. In fact, after 2008 there were signs of global economy improving but problems in recent past paint a different picture. Now with Novel Corona virus (Covid19) spreading as a pandemic, world economy has come to a hard stop. However, like in the past, it is being emphasized that world's largest economy would bounce back soon and that way take the world economy also out of this hole. But can it?

A recent inclusion of Chinese Yuan as reserve international currency status by the IMF has much wider implications for the economic outlook. World held US Dollar (USD) as the favourite currency along with Euro, Yen, Swiss Franc and Pound Sterling, of which most circulated one being the USD. That meant that while other nations benchmark their currencies against these in general and USD in most cases, there would always be a demand for the greenbacks. That enables the US Treasury to keep the interest rates lower than most countries and also enjoy lower costs of borrowing due to this demand for USD. It was for this reason that the US economy did better than rest of the world post 2008 as US was able to borrow and spend more than any other nation. In spite of mounting US debt the country is the leading world economic power, may be due to reserve currency status, in no small measure, which provided stability to world.

However, with Yuan now being in the basket, the currency wars may be on the horizon. Chinese aspirations to have Yuan as reserve currency were never hidden and it seems that the global currency market is about to shake for power struggle between individual nations pushing their national currency internationally. This is bound to have a destabilizing impact in a global economy facing a looming depression.

So why this reference in this study? It may be appreciated that Bitcoin is essentially a monetary system and a currency by many views. As such it has not shown correlation to such crisis as Corona Virus. In fact it saw an initial dip due to pandemic as whole world was affected in every possible way but it soon bounced back showing the strength of a strong financial system on the whole. Not being controlled by any nation of central bank means Bitcoin or any other such currency is dispassionate about the crisis and means business. Since it cannot be inflated or deflated at will but only reacts to market rules, it seems capable of providing a much needed stable underlying monetary system to the world in this period of crisis. Only if the powerful nations can stop fighting and look this way, or may be other nations can identify the strength of crypto currency to free them from the stranglehold of powerful economies if it is felt so. It would be a worthy case for further study in this direction where in a global currency system may be studied based on crypto currency.

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Annexure 1

Survey Questionnaire

4/17/2020

An Academic Survey on Cryptocurrencies and Blockchain Technology Awareness

An Academic Survey on Cryptocurrencies and Blockchain Technology Awareness

I am an MBA student pursuing a study in the Cryptocurrencies and Blockchain technology. I would like to express my gratitude to you for participating in this educational survey. The following questionnaire would assess the level of awareness of the participants in the field of cryptocurrency and blockchain technology.

This questionnaire is divided in four sections dealing with general awareness and applicability of such technology in Indian markets.

- (a) Section I - Respondents Details
- (b) Section II - General Awareness Cryptocurrency
- (c) Section III - General Awareness Blockchain Technology
- (d) Section IV - General Awareness Indian Economy

This survey is conducted for purely academic purposes and your answers would be completely confidential. Personal information shared by you would not be published anywhere or be shared with anyone or used for any other purposes.

Your feedback is very important and much appreciated.

*** Required**

Respondents
details

This section deals with your personal details so as to correctly identify the attributes of the sample. The information given out by you will not be shared with anyone. This information is needed to classify the participants for academic purposes only.

1. Your Name *

2. Your email id *

3. Your gender *

Mark only one oval.

- Female
- Male
- Prefer not to say
- Other: _____

4. What is your age *

Mark only one oval.

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74
- 75 or above

5. Your educational level *

Mark only one oval.

- High school
- Pursuing graduation
- Graduate
- Pursuing post graduation
- Post graduate
- Professional qualification

6. Your employment status *

Mark only one oval.

- Unemployed
- Government servant
- Corporate employee
- Business owner/operator
- Professional services

7. Whats your average annual income *

Mark only one oval.

- Upto Rs 5 Lakh
- Between Rs 5-10 Lakh
- Between Rs 10-20 Lakh
- between Rs 20-30 Lakh
- More than Rs 30 Lakh

General
Awareness
Cryptocurrency

We want to hear about your views on Cryptocurrency. A cryptocurrency is a digital or a virtual currency designed to work as a medium of exchange using cryptographic methods for securing and verifying transactions as well as controlling and limiting creation of new units of a particular cryptocurrency.

8. How much, if at all, have you heard about cryptocurrencies such as Bitcoin, Litecoin, Ripple etc? *

Mark only one oval.

- Heard a lot
- Have some information
- Not much
- Just hearing in this survey

9. Do you own any cryptocurrency? *

Mark only one oval.

- Yes
 No
 Prefer not to say

10. Would you be interested in owning any cryptocurrency in future? *

Mark only one oval.

- No
 Yes
 Maybe

11. Which cryptocurrency would you like to invest in? *

Check all that apply.

- Litecoin
 Ethereum
 Bitcoin
 Tether
 Bitcoin Cash
 Don't know

Other: _____

12. In your opinion which is more risky- investing in stock market or investing in cryptocurrency? *

Mark only one oval.

- Investing in stock Market
 Investing in cryptocurrency
 Both are equally risky
 Don't know

13. Which is more profitable according to you- investing in stock market or investing in cryptocurrency? *

Mark only one oval.

- investing in stock market
- Investing in cryptocurrency
- Both are equally profitable
- Don't know

14. What was the first cryptocurrency? *

Mark only one oval.

- Litecoin
- Ripple
- Bitcoin
- Ethereum
- Don't know

15. According to you, in 5 years cryptocurrency, like Bitcoin, would be worth more or less than today? *

Mark only one oval.

- Significantly more
- Somewhat more
- About the same
- Somewhat less
- Significantly less
- Don't know

16. Where can you buy cryptocurrency? *

Mark only one oval.

- Through a private transaction
- On an exchange
- A Bitcoin ATM
- All of the above
- Don't know

17. How many Bitcoins can be created? *

Mark only one oval.

- 16 million
- 21 million
- 100 million
- Unlimited
- Don't know

18. Which website run by Ross Ulbrich was shut down by the FBI for letting people buy drugs using Bitcoins? *

Mark only one oval.

- Silk Street
- Lace Place
- Silk Road
- Dark Alley
- Don't know

19. When did Bitcoin network began working? *

Mark only one oval.

- January 2009
- September 2001
- November 2008
- Option 4
- Don't know

20. Where is Bitcoin central server located? *

Mark only one oval.

- Washington DC
- London
- Tokyo
- Undisclosed location
- None of the above
- Don't know

21. Who regulates cryptocurrency? *

Mark only one oval.

- Government of the state
- Opposition parties
- Central Banks
- None of the above
- Don't know

General
Awareness
Blockchain
Technology

Blockchain is the underlying technology of used in cryptocurrencies. This includes technological questions which are inescapable for assessin the level of awareness of the respondents in the matter. Please don't get disheartened by the questions. It is imperative that true answers are provided.

22. How much have you heard of Blockchain technology? *

Mark only one oval.

- Heard a lot
- Have some information
- Not much
- Just came to know during this survey

23. What is a blockchain? *

Mark only one oval.

- A type of cryptocurrency
- Distributed ledger on a P2P network
- An Exchange
- A centralized ledger system
- Not sure

24. Are cryptocurrencies, like Bitcoin, a blockchain? *

Mark only one oval.

- True
- False
- Don't know

25. Can blockchain and cryptocurrency be separated? *

Mark only one oval.

- Yes
- No
- Maybe
- Don't know

26. What makes Blockchain tamperproof? *

Mark only one oval.

- VPN
- Immutability
- Cryptocurrency
- Servers
- Blockchain can be tampered
- Not sure

27. What is a miner?

Mark only one oval.

- A type of Blockchain
- An algorithm that predicts next part of the chain
- Person doing calculations to verify a transaction
- Computers that validate and process a transaction
- Not sure

28. Once records are submitted on a blockchain, can they be altered? *

Mark only one oval.

- Yes, they can be altered at any time
- Yes, they can be altered within a specified time
- No, they can't be altered

29. Do you think that Blockchain technology will dramatically disrupt the industry or line of business that your company operates in? *

Mark only one oval.

- Yes
 No
 Maybe
 Too early to tell
 Don't know

30. Is your organisation working towards adoption of Blockchain technology in business operations? *

Mark only one oval.

- Yes
 No
 Don't know

Applicability in
Indian economy

This section is primarily aims at assessing the applicability of the above technology in indian context.

31. What is the status of cryptocurrencies in India? *

Mark only one oval.

- Legal
 Illegal
 Don't know
 Other: _____

32. Do you think that cryptocurrencies should be banned in the country? *

Mark only one oval.

- Yes
 No
 Maybe
 Not sure

33. How do you see cryptocurrencies in the country over next 5? *

Mark only one oval.

- As a financial asset
 As a new financial system
 As a complementary system to existing financial system
 Can't say
 Other: _____

34. How important are the following factors as advantages of virtual currencies? *

Mark only one oval per row.

	Low advantage	Medium advantage	High advantage	No advantage
Anonymity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low transaction cost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No central authority	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
International acceptance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Distributed ledger	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No intermediary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

35. How important are the following factors as disadvantages of virtual currency? *

Mark only one oval per row.

	Low disadvantage	Medium disadvantage	High disadvantage	No disadvantage	Don't know
Exchange risk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Theft & hacking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Volatility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Required expertise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No central authority	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

36. Please rate the following factors which you consider important for adoption of cryptocurrencies in the country? *

Mark only one oval per row.

	Most unimportant	Not particularly important	Particularly important	Most important	Don't know
Govt approval	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improved legislation & central regulation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Education about Bitcoin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Websites acceptance of Bitcoins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Brick & Mortar stores acceptance of Bitcoins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Secured storage of cryptocurrencies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Easy convertability among crypto and fiat currencies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stable Bitcoin prices	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

37. Which industry or domains do you see having significant potential for blockchain technology? *

Check all that apply.

- Financial services
- Legal
- Manufacturing
- Media and entertainment
- Government
- Retail
- Supply chain and logistics
- Don't know

38. What are the biggest challenges to adoption of Blockchain in industry? *

Check all that apply.

- Still an emerging technology
- Lack of understanding of its potential
- Identifying applicable use cases
- Lack of education
- Infrastructure needs
- Lack of industry standards
- Regulatory constraints
- Security concerns
- Privacy issues
- Limited market for blockchain solutions

39. How likely are you to invest in any cryptocurrency in future? *

Mark only one oval.

- Extremely likely
- Very likely
- Somewhat likely
- Not so likely
- Not at all

40. Optional - Would you like to share any other thoughts on the subject?

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