The research article is based on literature – which describes principles of "Blockchain Technologies". The research is exploratory in nature due to contemporary phenomena across the world. Hence, the study comes under qualitative research. The data have been collected from various secondary online resources. The data were collected during 1/1/2018 - 31/6/2018. The data is in text, pictures, audio, and video formats. The google, google scholar, EBSCO, knimbus and other scientific databases were used for investigating the data. All articles have come across; and content analysis done. The final report based on thematic narration technique; is written after the content analysis. The research pointed out that "Blockchain Technologies" is gradually changing the way we do business. Specifically, all the traditional financial transactions will be disrupted by this new technology. The blockchain technologies will bring in the efficiency in financial transaction irrespective of native of personal, official and business operations. There will be transparency, cost reduction in operations, full security, and non-mediatory financial transactions. The cryptocurrencies like bitcoin, ripple, blackcoin, zcash, and other cryptocurrencies will drive transactions across the globe. The smart contracts, proof-of-work, mining, and digital signatures plus hash techniques are base for blockchain technologies.

Keywords: Blockchain, Cryptocurrency, Smart Contracts, Mining, Proof-of-Work, Bitcoin, Zcash, Ripple

JEL Classification: D47, D53, G21, O31, O33

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Section I
Introduction

Nowadays new digital technologies are at the core of every successful company's journey. So all the global companies are concentrating in planning, designing, and innovating of the novel technologies related to software, hardware, networking products, and other services. In this line, the Internet of Things, Big Data Analytics, Robotic Process Automation, Machine Learning, Deep Learning, and Blockchain technologies are some of the predominant digital technologies across the globe which are predicted even in the Gartner's IT Hype Cycle – 2018. As per the IT Hype Cycle, it is leading the shift from compartmentalised technical infrastructure to ecosystem-enabling platforms. These technologies are simplifying our day-to-day activities, whether personal, official, or entertainment, etc. They are touching all the domains of governance, agricultural, educational, business, tourism, entrainment, mobility, and finance related services to name a few. The latest and more vital digital products, which are relating to financial institutions and firms, are the "Blockchain" technologies. The "Blockchain," concept provides new paradigm shift in how business can interact, transact and how assets are represented. If look back to our financial system evolution over a period, the first financial transactions started with the "barter system", which means exchange of goods of equal price, without any money. Later the financial services are taken in the form of coin transactions, equal to goods/things/commodities manufacturing price, then followed by currency notes issued by financial institutions (banks) of the countries with regulations. The last but not the least and latest in this 21st century, the financial services of digital technologies, i.e. smart cards plus virtual currency. We are well versed with these online money transactions 24/7 with the help of our Personal Digital Assistants (PDAs), which are smart devices. These new financial service systems are really reducing the customer's traditional queuing timings in the banks while depositing cash and withdrawing money, no worries at any time money transactions and insecurity in financial operations. However, the constant change with novel technologies is the only way for the better Quality of Services. In this scenario, many global financial institutions, a couple of years back set out in developing the best ways of advanced financial services in the existing systems, innovating new products and services in these systems. Finally, the innovation was none other than technology "Blockchain". The "Blockchain" technology is the new bandwagon in financial services systems.

Section II
Need of the Study

The main purpose of this article is to explore the "Blockchain Technologies" phenomenon. There are very few general/research articles, book/chapters, white papers, blogs, along with informative videos and PPTs. However, for the better
and complete understanding, this information is not at all enough for the aspirant researchers, computers programmers, information scientist, financial analyst, bankers, students, and the end users in this field. The growing importance of these technologies, applications and lack of academic literature motivated the authors to write in detail descriptions about Blockchain Technologies. This article mainly serves to help the complete understanding of Blockchain Technologies. We have seen diverse financial products and services over a couple of decades with a distributed ledger, identity management, security protocols, key management, electronic payment systems, digital currency, online money transfer, e-wallet, debit and credit cards, smart cards, cryptography, etc. Now we are with Blockchain technologies in the area of digital currency. The latest blockchain technologies or applications can address the human needs and make a huge difference in people's lives by providing Quality of Life (QoL). Many researchers across the globe are rigorously working on the key distribution, registry maintenance, health record management, decentralized authentication, and decentralized Domain Name Service (DNS), etc. of blockchain related technologies because of its immense benefits. If we are using the Blockchain technologies as the backbone, the cost and the speed of settlement of international trade transactions are far more efficient. The IT corporate giant M/s. Microsoft believes that a blockchain technological systems can help businesses to increase the operational efficiency and speed up the process, reducing cost and time related to reconciliations and disputes, as well as possibly enable new business models by increasing revenues and savings. The best case study is that the Dell has already set out the 'Practice of Blockchain' to help customers in learning, understanding, and adapting blockchain technologies to reduce costs as well as generate more revenue. In addition, M/s. Medici Inc., the private banking company believes that blockchain will advance the financial industry by advancing the efficiency, security, and transparency of the industry. Four years back, even the World Bank projected that over $430 billion money transfers were sent in 2015. There is a high demand for blockchain technology developers in the future. Besides, academic work says that Bitcoin is of interest to economists as a virtual currency with the potential to disrupt existing payment systems and perhaps even monetary systems (Böhme et al., 2015).

Section III
Methodology

As shown in the Figure 1, the study comes under exploratory in nature, as the phenomenon is upcoming new technology or contemporary research area across the globe. The author observed that there are few studies are available on this subject. The author used the keywords like blockchain, cryptocurrencies, smart contracts, and proof of work, etc. from the google, google scholar and some of the companies' websites who are into this business for fetching the articles. That means the study (Literature Review) is completely based on the secondary
data analysis reports or we can say that on Blockchain Technologies. The data have been collected from 1/1/2018 to 31/6/2018. Research articles, blogs, white papers, PPTs and videos relating to this phenomenon are considered. Since this data is qualitative – the content analysis was done and based on that this article is written in thematic narration. Therefore, article will become base papers for the readers who wants to know more details about this phenomenon.

**Figure 1**
The Research Methodology Design

- **Keywords used for Literature Search**
  - Cryptocurrency, Digital Currency, Blockchain, Smart Contracts, Proof of Work, Bitcoin, Ethereum, Ripple, Bitcoin Cash, EOS.IO, Litecoin, Stellar lumens, Cardano, IOTA, Tether, Neo, TRON, Monero, Dash, Ethereum Classic, nEM, Binance, VeChain, tezos, Otum

- **Databased Used**
  - Google
  - Google Scholar
  - Company’s URLs

- **Research Type**
  - **Exploratory in Nature**
  - This is new phenomenon, contemporary with huge potential of societal impact

- **Data Format**
  - Research Articles, Books, Blogs, White papers, PPTs, Videos

- **Duration of Data Collection**
  - Secondary Data: Online
  - 1/1/2018 – 31/6/2018

- **Content Analysis**
  - The data was collected from various articles and analysed relating to Blockchain

- **Themeic Narration**
  - background, Cryptocurrencies
  - Descriptions, Smart Contract, Business Applications, patents
Section IV

Literature Review

The research manuscript is the conceptual notes for understanding the Blockchain Technologies and different sorts of cryptocurrencies and techniques. The beauty of this article is that it explores the 360 view of "Blockchain Technologies". The article is edited systematically based on scientific manuscripts. This will be new benefit to the existing body of the literature in both accounting, financial systems, computer science and Information Technology fields. The Blockchain technologies applications touching everybody in the world. This paper will be the base for upcoming researchers to carry out their academic research on "Blockchain Technologies"

"Blockchain is a Disruption – We Simply Have to Embrace".

– HuffPost Business

The blockchain is the new technology to build a radically better financial system. Although "Blockchain" is still in its infancy, blockchain technologies are gaining considerable popularity. Blockchain truly is a mechanism to bring everyone to the highest degree of accountability. A kind of self-auditing ecosystem of a digital nature, the network reconciles every transaction that happens in ten minute intervals. Blockchain solves the problem of manipulation. However, long before the advent of the blockchain, digital cash had been conceptualized in a setting with a central server trusted to prevent double spending (Chaum, 1983; Chaum, D et al, 1983). Blockchain technologies are an emerging platform for developing decentralized applications and data storage, over and beyond its role as a platform for cryptocurrencies. The basic principle of this blockchain platform is that it allows one to create a distributed and replicated ledger of events, transactions, and data generated through various advanced Information Technological (IT) processes with strong cryptographic guarantees of tamper resistance, immutability, and verifiability. It depends on a well-known cryptographic standard SHA-256. Blockchain technology has shown its considerable adaptability in recent years as a variety of market sectors and sought ways of incorporating its abilities into their operations. While so far most of the focus has been on the financial service industry, several projects in other service-related areas such as healthcare show that this is beginning to change (Mettler, 2016). Blockchain characteristics such as decentralization, verifiability, and immutability, can be utilized to ensure the authenticity, reliability, and integrity of data and business activities underpinning our modern society and economy. Its characteristics include (1) Transparency of data is embedded within the network as a whole, meaning the records it keeps are truly public and easily verifiable (2) Has no single point of failure, meaning there by that of cannot be corrupted altering any unit of information (3) Requires a huge amount of computing power to override the entire network, as it hosted by millions of computers simultaneously, its data is accessible to anyone on
the internet from anywhere at any time. Every node is an "administrator" of the blockchain. Besides there are still unexplored characteristics of it as it is in the budding stage.

"To understand the power of blockchain systems, and the things they can do, it is important to distinguish between three things that are commonly muddled up, namely the bitcoin currency, the specific blockchain that underpins it and the idea of blockchains in general".


There are no standard operational definitions of "Blockchain". All the definitions are working definitions only, at present. However, the idea of these definitions is to give clarity on the concept of Blockchain. That means defining the Blockchain technologies is like six blind people, who are defining an elephant in six different ways. Many industry experts like chief financial officers, financial analysts, bank managers, bankers, cashiers, accounts, financial advisors and tech savvy developers, etc. Demonstrated many definitions, a Blockchain is a digital, distributed transaction ledger, with identical copies maintained on multiple computer systems controlled by different entities. Moreover, it can be put into or defined in an easy way as given below.

Block Chain = Public Digital Ledger

Across the world, the "Blockchain", which means "Connection of Chain", has been largely perceived as financial industry 2.0. This secured technology has the potential, which safely and easily executes exchanges and payments in different virtual currencies. The blockchain is the best-known distributed ledger technology. The blockchain is a potentially game-changing innovation that could disrupt and replace traditional payment and information-recording systems as said by Aaron (2018). Naughton (2016) also wrote that blockchain technology could be the most important IT invention of our age. A couple of years back, M/s International Business Machines (IBM) predicted that 15 per cent of the banks were expected to use the Blockchain technologies. The Blockchain technologies are at present being practised by many global companies. One among them M/s ABRA is a financial service and technology company that produces a consumer peer-to-peer mobile payment service. ABRA is a global cryptocurrency investing company really simplifying the financial transactions including buying, selling, storing and investing in cryptocurrencies. Besides managing all crypto investments in a single place, the blockchain technology has the ability to make many organizations to use it transparently, in democratic, decentralized mode, more efficiently, and in a secured way. The ABRA mobile app enables users to store money digitally on their phone, send that money to any phone number in the world and then, using a network of Abra tellers or traditional bank routes, exchange that digital money for $ cash. Because all the money is stored directly on the phone, ABRA never touches the
money (Laura, 2015). The BARCLAYS bank has already set out its operations using blockchain technologies. Mougayar (2016) says that Blockchain technology is 'at the same level as the World Wide Web in terms of importance. The "Blockchain" technology is unique in its potential to transform every single industry, including traditional ones. That means the Blockchain phenomenon will change the landscape of how – organizations manage transactions. Therefore, blockchain is one such technology that has the potential to disrupt the industry and bring huge business efficiencies, reducing threats to network security faced by most organizations.

M/s. Blockchain of Things, AlphaPoint, Bitcoin Foundation, Ethereum, Blockchain Alliance, Ledger, Singular, Steptoe, Overstock, Solarcoin, and Monax are some of the global companies working on blockchain related products. M/s Blockchain of Things provides enterprise software, which allows organizations to quickly leverage the capabilities of blockchain technology. The "Blockchain of Things" created by this company is the first globally accessible blockchain enabled device network. It is now possible for devices to autonomously track and information exchange on assets, record proof in manufacturing, trigger logistical events to verify the chain of custody and communicate high-value information. All on globally distributed, cryptographically secured ledgers, backed by the world's largest computational network. An intuitive code free blockchain integration application assembly pallet for hobbyists, tinkerers, and companies that want to design enterprise-grade, secure IoT or proof of concept applications. Another company M/s AlphaPoint based in New York and Philadelphia (USA) has developed the "AlphaPoint Distributed Ledger Platform™ (ADLP)™", a general-purpose blockchain platform, from the ground up to streamline the deployment of distributed financial applications. The AlphaPoint Distributed Ledger Platform provides firms and institutions a secure, flexible means of engaging with digital asset issuance, confidential smart contracts, and automated workflows. M/s Ethereum firm has been developed by the Ethereum Foundation, a Swiss non-profit organisation, with contributions from great minds across the globe. Ethereum is a decentralized platform that runs smart contracts: applications that run exactly as programmed without any possibility of downtime, censorship, fraud or third party interference. The Ethereum Wallet is a gateway to decentralized applications on the Ethereum blockchain. It allows us to hold, secure, and other crypto-assets built on Ethereum, as well as write, deploy and use smart contracts. "Vyper" is a general-purpose, experimental computer programming language that compiles down to Ethereum Virtual Machine (EVM) bytecode, as does Solidity. The "Vyper" language designed to enormously simplify the process in order to create easier to understand the "Smart Contracts". These Smart Contracts are more transparent for all parties involved and have fewer points of entry for an attack. M/s. Ledger is developing security and infrastructure solutions for cryptocurrencies as well as blockchain applications for individuals and companies, by leveraging a distinctive, proprietary technology. This is based in three cities including Paris, Verizon (USA), and
San Francisco. The "Ledger" company was launched by eight experts' way back in 2014 and have over 80 employees as on 5/7/2018. Moreover, the Central Banks across the world are growing very fast and very much interested in understanding and issuing the "Digital Fiat Currency (DFC)". They are also trying to recognize the critical questions about DFC's implications for macroeconomic stability, its technical implementation and leading to its subsequent security.

The experts from the International Monetary Fund (IMF), the Bank for International Settlements (BIS), the United States Federal Reserve and the United States Department of Treasury are expected to join in New York to offer their financial analyses, critiques, and recommendations based on country, touching on these Digital Fiat Currencies. M/s. Blockchain Alliance is the public-private forum that enables the blockchain community and law enforcement to work together to help combat criminal activity. The Blockchain Alliance is comprised of 20+ state, federal and international law enforcement agencies. The Blockchain Alliance body serves as a resource for law enforcement and regulatory agencies by providing educational, technical assistance and periodic informational sessions regarding the use of blockchain-based technologies. Automation of the way we pay for goods and services is already underway, as can be seen by the variety and growth of electronic banking services available to consumers. The ultimate structure of the new electronic payments system may have a substantial impact on personal privacy as well as on the nature and extent of criminal use of payments. Ideally, a new payment system should address seemingly conflicting sets of concerns (Chaum, 1983). Qualcomm believes that the transparency, as well as the security of blockchain systems, could help alleviate these current issues in the client-server based information systems. Thus, many firms are working on different products of "Blockchain". However, the blockchain technology is still in its early stages, Cisco hopes to fully maximize blockchain technology to serve a wide array of services including security. In early 2017, NEC joined Hyperledger to reinforce the company's commitment to the blockchain and presently fortunately NEC, has seven blockchain patents filed in its accounts. M/s Fujitsu Laboratories also announced in the same year 2017, a series of products that are tied to using blockchain technology. M/s Accenture, a global management consulting and professional services firm is investing tremendous resources into blockchain innovation to better understand the practical, real-world application. Monograph Inc. looks to utilize the distributed ledger to create new products in the name of "Monegraph Everywhere". Whereas, the Lucent Technologies hopes to revitalize their business with new blockchain products in the coming years. Hewlett-Packard filed eight patents and plans to release a wide range of enterprise cloud-based services based on the blockchain, which is also called "Mission Critical Distributed Ledger Technology". The Microsoft currently has filed more than 40 blockchain patents. Fidelity Investments has filed 14 patents. Whereas M/s Qualcomm, telecommunication company has well over 20 blockchain patents. Toronto Dominion Bank is one of the first banks in Canada...
to push for the adoption of blockchain technology and the use of digital assets and in its credits, it has 20 patents. The Red Hat company collaborated Fintech start-ups and Independent Software Vendors (ISVs) to help push forward the adaptation of blockchain applications in 2016, and it has filed over ten patents. Google Company is one of the largest investors in blockchain technology and has filed nine patents. Whereas M/s IBM company at present has filed 27 patents. A few of the patents are related to the creation of blockchain enterprise systems (Taylor, 2018). The below Figure 2 is depicting the Blockchain Patent Holders (Source: PatentVue, 18/1/2018). The Bank of America with highest patents with 43; whereas MasterCard filed 27, and American Express with six and the list goes on and may have increased as of now. The patents filed by these companies and other financial firms, are indicative of continues research, development, and innovations with respect to the Blockchain technological products and services. Therefore, it is the need of hour to adopt this disruptive technology in our day-to-day business operations with optimism and caution.

**Figure 2**
Blockchain Patent Holders

![Blockchain Patent Holders](http://patentvue.com/2018/01/12/blockchain-patent-filings-dominated-by-financial-services-industry/)
PatentVue

**Cryptocurrency**
The cryptocurrencies are mushrooming in financial transactions by pushing back physical currency notes across some of the countries. The Bitcoin and
Cryptocurrency technologies introduced the revolutionary yet often misunderstood new technologies of digital currency (Narayanan et al., 2016). Initially, there was a confusion between the bitcoin and cryptocurrency. The public seldom used interchangeably both these words, but not actually. Moreover, the “Cryptocurrency” is a part of digital currency, which uses cryptography technologies. We knew that the cryptography is the conversion process of plain text into cipher text using encryption techniques at the time of sending and then followed by reconverting it back to plain text at the receiving end using decryption to secure data transaction. A cryptocurrency is a digital asset designed to work as a medium of exchange using cryptography to secure the transactions and to control the creation of additional units of the currency. The cryptocurrencies are a subset of alternative currencies, or especially of digital currencies (Osterrieder et al., 2016).

**Figure 3**

**Total Market Capitalization**

As per Alisha Rajpal, dated on 29th October 2017, cryptocurrency is the virtual currency with decentralized control and hence no mediators like the banks. The cryptocurrency networks have given birth to a diversity of start-ups and attracted a huge influx of venture capital to invest in these start-ups for creating and capturing value within and between such networks (Kazan et al., 2016). The cryptocurrency market surpassed the barrier of $100 billion market capitalization in June 2017, after months of steady growth (ElBahrawy et al., 2016).
The Ether, Ripple, Litecoin, altcoins, Ethereum Classic, Monero, Dash, Augur, MaidSafeCoin, Waves are some of the cryptocurrencies, which are slowly being accepted by the world. The seven cryptocurrencies that we have chosen out of the top fifteen are Bitcoin, Dash, Litecoin, MaidSafeCoin, Monero, Doge, and Ripple. In general, marketplace and the users determine the value of the crypto-currency itself. Most notably, we have omitted Ethereum, with an initial release on July 30, 2015, Ethereum Classic, which only started trading in 2016, Augur and NEM, which came into existence in 2015 onwards (Osterrieder, J., 2016). Some of them are:

**Bitcoin**

The "Bitcoin" is one form of cryptocurrency. It is universally accepted digital currency. Before the term "blockchain" technologies, people are familiar with Bitcoin. The word "Bitcoin" has been the first application of Blockchain technologies. Bitcoin has been also called "Digital Gold". It was created in the year 2008. Moreover, the core technology of Bitcoin, the blockchain has recently emerged as a disruptive innovation with a wide range of applications, potentially able to redesign our interactions in business, politics, and society at large (Atzori, 2015). Beyond Bitcoin, the Blockchain technology has potential to revolutionize applications, and redefine the digital economy (Underwood, 2016). That means Bitcoin, is a decentralised peer-to-peer digital currency. As one of the most successful cryptocurrency, Bitcoin has enjoyed a huge success with its capital market reaching 10 billion dollars in 2016 (Zheng et al., 2017).

Bitcoin became the most decentralized cryptocurrency in 2009 among the numerous cryptocurrencies that have been created. It is also said that as of November, 2016, Bitcoin is the largest of its kind in terms of total market value, representing over 81 per cent of the total market of cryptocurrencies (CoinMarketCap 2016). The bitcoin currency itself is highly controversial but blockchain technology has worked flawlessly and found a wide range of applications in both (Crosby et al., 2016). Many companies started doing business with Bitcoin digital currency. As per Kondor et al. (2014) academic study, Bitcoin network is a standard complex networks framework and show that network characteristics of the Bitcoin evolve in time and these are due to bitcoins increasing acceptance as a means of payment.

**Ethereum’s (ETH)-Ether**

The "Ethereum" cryptocurrency is a decentralized platform that runs smart contracts that means applications that run exactly as programmed without any possibility of downtime, censorship, fraud or even third-party interference. The "Ethereum" cryptocurrency is an open software platform based on blockchain technology that enables developers to build and deploy decentralized applications. In 2016, the Ethereum-based Decentralized Autonomous Organization (DAO), raised an astonishing $200 million USD in just two months. If we look at the structure of the "ethereum" blockchain technology – it is very
similar to bitcoin's, in that it is a shared record of the entire transaction history. Every node on the network stores a copy of this history. Ethereum Virtual Machine runs on "Ether". As suggested by some of the experts, it has many advantages.

- **Immutability**: A third party cannot make any changes in the data of creation, update, modifications and deletion during the transactions.

- **Corruption and Tamper Proof**: Apps are based on a network formed around the principle of consensus, making censorship impossible.

- **Secure**: No central point of failure. Completely secured using cryptography techniques. All the applications are well protected from malware functions, virus and prevent the third party hacking attacks. No chance of fraudulent activities.

- **Zero downtime**: Cryptocurrency services and Apps never go down. Can never be switched off. The services will be 24/7 round the years even when there is no internet connection.

**Litecoin (LTC)**

Another cryptocurrency, which is more familiar with the digital financial systems, is "Litecoin". The Litecoin has moved beyond fiat money and the rise of Litecoin mining was born as early as October, 2011 as per Gibbs and Yordchim, (2014). Another supporting study says that the Bitcoin and its cryptocurrency alternatives such as Litecoin and Primecoin have been affecting financial services for nearly a decade (Fanning & Centers, 2016). In a similar way, both the bitcoin and Litecoin have more demand in the financial markets. Charlie Lee is the father of "Litecoin". The Litecoin is defined as a peer-to-peer cryptocurrency and open source software project. This digital currency functions under the MIT/X11 license. Some of the 2018-cryptocurrency predictions say that the Litecoin seems to be on the rise in the long term. That is why many of the investors across globe are trying to invest in this cryptocurrency. The beauty of this technology is that with this, it is possible to conduct even smaller transactions in shorter amounts of time. Another advantage is that making it possible for more people to participate in using smaller amounts of coins in quicker transactions. Among the market cryptocurrencies, it is ranking in sixth position as of 6/7/2018 with the market CAP of $4.73 B and volume (24H) of $ 284.02 M. One Litecoin current price is $ 82.51 (US). Litecoin features faster transaction, and improved storage efficiency than the leading math-based currency. Litecoin uses the script in its proof-of-work algorithm: A sequential memory-hard function requiring asymptotically more memory than an algorithm, which is not memory-hard. Litecoin network will produce 84 million Litecoins / four times as many currency units as will be issued by the Bitcoin network (Gibbs & Yordchim, 2014). Litecoin every 2016 blocks, which are produced at a higher rate, are approximately in 3.5 days (Eyal, et al., 2016).
Ripple (XRP)

The "Ripple" cryptocurrency is another a Real-Time Gross Settlement (RTGS) system, currency exchange, and remittance network. M/s Ripple Company created this. This company started its operations worldwide including in London, San Francisco, New York, Sydney, Singapore, and Luxembourg. It has already had more than 100 customers. The Ripple currency connects the banks, payment providers, digital asset exchanges and corporates with the help of RippleNet to provide one frictionless experience to send money across the globe. The customers’ can do payment transactions anywhere in the world instantly, reliably and cost-effectively. Amongst over 600 traded cryptocurrencies, Bitcoin and Ripple are the two popular cryptocurrencies with around 81 per cent and 2.8 per cent of the entire cryptocurrency market capitalization respectively (Fry & Cheah, 2016). Some companies such as UniCredit, UBS, and Santander already use the Ripple currency. Ripple is actually unconstrained in the year 2012 as a subsequent iteration of Ripplepay. As said above Ripple is a Real-Time Gross Settlement system, that is used in currency exchange and remittance network operations. Using a common ledger that is managed by a network of independently validating servers that constantly compare transaction records. Ripple does not rely on the energy and computing intensive proof-of-work used by Bitcoin currency. Thus, the Ripple cryptocurrency is slowly increasing in the global market because of its features.

BlackCoin

One more upcoming cryptocurrency under the umbrella of Blockchain technologies is "BlackCoin". Bitcoin is the basis of BlackCoin cryptocurrency. BlackCoin is a peer-to-peer digital currency. It is distributed, that means it is based on decentralized public ledger. BlackCoin is similar to a conventional account, but with the difference, that BlackCoin is always free of charge and cannot be influenced by external organizations due to denationalization. BlackCoin was notably the first digital coin to use a Proof-of-Work creation cycle followed by a transition to full Proof-of-Stake. Proof-of-Stake is an eco-friendly and efficient way to avoid the vast waste of energy and hardware overhead of Proof-of-Work based networks. BlackCoin is a decentralized digital currency with near-instant transaction speeds and negligible transaction fees build upon Proof-of-Stake 3.0 as the "Blackcoin" development team introduces it. That means developer Rat4, with the goal of proving that BlackCoin's way of disabling Proof-of-Work is stable and secure, created BlackCoin. Transactions in BlackCoin were called "significant". Now you can trade BlackCoin for other currencies like Euros (European Currency), US Dollars (United States of America) and Indian Rupees, etc.

LibrexCoin (LXC)

The world's best coin is the "LibrexCoin". LibrexCoin is abbreviated as "LXC".
It is an X11 based alternative cryptocurrency. The LXC is the next generation of lending crypto, which is based on Ethereum blockchain framework. The LXC was first released in June 2014. LXC Coin has launched a crowdfunding campaign on Crowd for Angels. The LXC cryptocurrency coin will be investing in the Peer-to-Peer (P2P) lending market. It is based on the code from the world’s most famous Cryptocurrency-Bitcoin, mixed with BlackCoin technology. LXC has purchased M/s. Prostaker Ltd. a poker company in Malta as a gateway into the gaming market. Lending LXC is simple and it is about to invest in your own Luxury Coin to get the return on a daily basis from the LXC lending system. The interest flexibly changes every day based on volatility software interest. As market is new, and regulations are not standardized, people are still thinking to whether to purchase cryptocurrencies. However, like other cryptocurrency start-ups companies, will definitely get first/second/third mover advantage in this business.

MaidSafeCoin

MaidSafeCoin is the cryptocurrency for the SAFE network. MaidSafe, a Scotland based company, started developing the Secure Access For Everyone (SAFE) network in 2006. The MaidSafeCoin is a token that is listed on the bitcoin blockchain and can be purchased on a number of exchanges. The network aims to do away with third-party central servers in order to enable privacy and anonymity for Internet users. It allows users to earn tokens by sharing their computing resources that is nothing but storage space, Central Processing Unit, and the bandwidth of the network. Maidsafecoin was released on the Omni Layer (Chen et al., 2016). The main objective of cryptocurrency development is to save the digital world from the perils of centralized data storage. That means the beauty of this cryptocurrency is more secured and available for every person.

Zcash (ZEC)

The ZEC launched in the year 2016. The founder and CEO of Zcash Company is Zooko Wilcox-O’Hearn. Zcash is a decentralized and open source cryptocurrency with strong privacy protections like Monero. As per Hopwood et al., (2016), one of the biggest differences between Zcash and Bitcoin is the Proof-of-Work system, where Zcash relies on zero knowledge proofs. Zcash is an implementation of a concept called Zerocash (Ben-Sasson et al. 2014). which describes similar concepts to Zcash but the architecture behind Zcash is different (Tarasov & Tewari, 2017). The Zerocoin protocol was improved and transformed into the Zerocash system. Hoping that in future, this currency will capture the market, along with other cryptocurrencies.
Monero (XMR)

Monero is an open source cryptocurrency similar to Bitcoin – was launched back in April 2014. Monero is a private, secure and untraceable currency. This currency development is completely donation-based and community-driven. Monero is a privacy-centric cryptocurrency that allows users to obscure their transaction graph by including chaff coins called "mixins", along with the actual coins they spend (Miller, et al., 2017). Mixing is one of the two predominant techniques that are used in electronic voting protocols and utilizes mix networks (mixnet), a protocol that takes in multiple input messages from the users and shuffles these messages in random order before passing them to the next destination (Chaum, 1981). As of April 2017, it is the sixth largest cryptocurrency by market capitalization. The main objective of this cryptocurrency is decentralization and scalability. Monero enables complete privacy by using a special technique called 'ring signatures". The original Monero protocol was based on CryptoNote, which uses ring signatures and one-time keys to hide the destination and origin of transactions (Noether, S, 2015). A few studies are conducted on the Monero cryptocurrency, especially Monero Sun, S F et al. (2017) and revealed that the necessary properties and security requirements of Ring Confidential Transaction (RCT) protocol deployed in the popular anonymous cryptocurrency. Another study by Eskandari and among others (2018) say that the Monero cryptocurrency is preferred seemingly for its unfriendliness to large-scale ASIC mining that would drive browser-based efforts out of the market, as well as for its purported privacy.

The Bitcoin Exchange Guide

Financial trends are changing constantly and very rapidly in this 21st century. There is a huge demand for new financial products and services even in countryside. Many tech-developers and financial institutions are moving towards development of new technological products. Some money lending institutions are escalating cryptocurrencies individually. Some of the companies are in collaboration developments. Few standardizing firms are working for conversions, comparisons of cryptocurrencies. Now more than 100 cryptocurrencies have mushroomed and are available in the global market. Table 4 gives an overall idea on top 20 cryptocurrencies. These are listed top companies as per the bitcoin exchange guide as on 7/7/2018. The First column represents with their origination, full forms and logos. Second column gives the different exchange rates in US $ as on. Therefore, the bitcoin has the highest price, followed by ethereum, ripple and so on. It also explains the market cap, which means the total value of all company's shares of stock. Here bitcoin, ethereum and ripple are having high market of $113.94 B, $47.60 B and $18.55 B. fourth column represents the +/- of value of the currency. Fifth represents the graphic representation of movement against US$. Cryptocurrencies, these are variables with different values based on market situation. However, these exchange rates are dynamic.
### Table 4
**Bitcoin Exchange Guide**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Coin</th>
<th>Price</th>
<th>Market Cap</th>
<th>24HR +-</th>
<th>7D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BTC</td>
<td>$6,649.38</td>
<td>$113.94 B</td>
<td>1.20%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ETH</td>
<td>$473.41</td>
<td>$47.60 B</td>
<td>2.12%</td>
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<tr>
<td>3</td>
<td>XRP</td>
<td>$0.47</td>
<td>$18.55 B</td>
<td>1.29%</td>
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<tr>
<td>4</td>
<td>BCH</td>
<td>$728.45</td>
<td>$12.55 B</td>
<td>1.27%</td>
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</tr>
<tr>
<td>5</td>
<td>EOS</td>
<td>$8.66</td>
<td>$7.76 B</td>
<td>2.47%</td>
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</tr>
<tr>
<td>6</td>
<td>LTC</td>
<td>$83.17</td>
<td>$4.77 B</td>
<td>1.11%</td>
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<tr>
<td>7</td>
<td>XLM</td>
<td>$0.21</td>
<td>$3.86 B</td>
<td>2.23%</td>
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</tr>
<tr>
<td>8</td>
<td>ADA</td>
<td>$0.14</td>
<td>$3.71 B</td>
<td>0.93%</td>
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</tr>
<tr>
<td>9</td>
<td>MIOTA</td>
<td>$1.08</td>
<td>$3.02 B</td>
<td>-1.64%</td>
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</tr>
<tr>
<td>10</td>
<td>USDT</td>
<td>$1.00</td>
<td>$2.62 B</td>
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<tr>
<td>11</td>
<td>NEO</td>
<td>$37.26</td>
<td>$2.42 B</td>
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<tr>
<td>12</td>
<td>TRX</td>
<td>$0.04</td>
<td>$2.40 B</td>
<td>1.24%</td>
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Source: [https://bitcoinexchangeguide.com/luxurycoin/](https://bitcoinexchangeguide.com/luxurycoin/)
Blockchain Technology System

How Does It Work

In the age of globalisation, the blockchain technology is playing an important role. This decentralised financial technology is for peer-to-peer via fully connected digital networks. These blockchain technologies are completely open to the public in the network and are transparent, bringing the end customer service 24/7 round the year without any transactional processing cost. The best part is that the trust of business transactions is relying on software-defined smart contracts. The hash and digital techniques are prime parts of the security mechanisms. However, there is no standard model up to now for Blockchain Eco System functioning. The author Neocapita (2017) has given the four (4) main components of any blockchain ecosystem. These are (i) Node Application (ii) Shared Ledger (iii) Consensus Algorithm (iv) Virtual Machine. It is describing the good understanding of blockchain system process functions. The following section will explore the Blockchain Eco System interconnected components. The general components in Blockchain Technology Eco System are (i) Digital Ledger (ii) Smart Contracts (iii) Mining (iv) Proof-of-Work (v) Hashing and Digital Signature. The hash of each block of transactions is linked to the next, thus forming a chain (Peters et al., 2016). Imagine, Employer A in Singapore is having 20000 and did pay the salary of 50BTC to his worker B on 01/2/2018 at 11 pm. B transferred 30BTC to his friend C who is in Paris on 4/4/2018. C purchased a laptop using 20BTC in the month of June 2nd, 2018. Now in the case of B, if he wants to send the money 30BTC to his friend D who is in Germany, he cannot. Because he is having insufficient funds, the miners, who are other nodes in the connected network, are witnessing this transaction process. These happened through Proof-of-Work security mechanisms including digital signatures. All these transactions are replicated in every node. The illustration is in Figure 5.

![Blockchain Eco System](image-url)
**Distributed Ledger**

Ledger is the principal book for recording and totaling economic transactions measured in terms of a monetary unit of account by account type, with debit and credit in separate column, a beginning and ending monetary balance for each account. While the distributed ledgers are the digital ledgers distributed across the peer-to-peer network. A distributed ledger is an online database that is usually synchronized and shared across connected computers networks. These networks are spread across multiple individuals, organizations, locations, countries or geographies. These openly distributed ledgers allow transactions to have public witnesses followed by making no more cyberattack/s. The participant at each node of the network can access the recordings shared across that network and can own an identical copy of it. Any changes and additional transactions at one node will reflect the other nodes of the network. So all the transactions with a/c details including customer's name, id, location and time of transactions will be recorded as a block. This block will be added in the previous blocks of participants of the network. Thus, each participant will have blocks of all transactions with links. Since the database systems keep all the blocks in arrays with consecutive arrays, they seemed to be blockchain of transactions. Hence, the process is called as "Blockchain". Distributed ledgers enable the coding of simple contracts.

**Smart Contracts**

The contracts are generally the bonding procedures between individuals or among firms to carry out business activities smoothly. As technological advancements are growing and opening for global business operations, the agreements between different individuals and companies are upgrading. In this context, the new phrase has been introduced, the so called the "Smart Contracts". Smart Contracts are believed to be a disruptive technology. Blockchain technologies enabling digital transactions using smart contracts for decentralized economies, and leading to disintermediated society. A "smart contract" on the other hand is a computer program that can automatically execute the terms of a contract when certain conditions are met, potentially taking a lot of the human involvement out of completing a deal. Another way defining is the "Smart Contract" is a program that controls the exchange of money, property or any other asset globally. So the smart contract defines terms and conditions at the time of cryptocurrency transactions. It defines the encoding of business rules logically into the software. A report by Norman King (2017) stated that the reality within financial services is that the true value of blockchain is in the cryptographically secured records together with smart contracts but there are so many hurdles to overcome and barriers to entry that it is difficult to get a blockchain solution off the ground. The Barclays has tested a way to trade derivatives using the so-called smart contracts (Arjun, 2016). Moreover, Wright, A, et al. (2016) defined that a smart contract is a solution that utilizes Blockchain technology to create contracts between two
or more participants. Similarly, to the use of Bitcoin, smart contracts are done in a decentralized environment, where contract terms are executed by the Blockchain system when the terms are fulfilled. The smart contracts implementation would reduce the need for intermediaries like arbitrators, lawyers, and police. Thus the Blockchain technology enables the creation of decentralized currencies, self-executing digital contracts that is smart contracts and intelligent assets that can be controlled over the Internet including smart property (Wright & De Filippi, 2015). The Bitcoin's rules were designed by engineers with no apparent influence from lawyers or regulators. Solving the puzzle provides "Proof of Work", in lieu of "one person, one vote," Bitcoin thus implements the principle of "one computational cycle, one vote" (Böhme et al., 2015). NEO contracts support many common programming languages via the neoVM compiler (Java, Kotlin, Go and Python). Thus Smart Contracts procedures, polices and rules are using for financial transactions under the umbrella of blockchain phenomenon.

**Proof of Work**

A "Proof-of-Work" system is a protocol or function. It is an economic measure to prevent denial of service attacks and other service abuses such as spam on a network by requiring some work from the service requester, usually, mean processing time by a computer. The Proof of Work was also introduced in Bitcoin and assumes that each peer votes with its "computing power" by solving proof of work instances and constructing the appropriate blocks. The creation of Bitcoin, Proof-of-Work has been the predominant design of peer-to-peer cryptocurrency. The concept of proof-of-work has been the backbone of minting and security model of Nakamoto's design (King, & Nadal, 2012). Proof-of-Work shortly known as PoW, a well-known principle to ration resource access in client-server relations, is about to experience a renaissance as a mechanism to protect the integrity of a global state in distributed transaction systems under decentralized control. The cryptographic currency protocol leverages to prevent double spending and establish scarcity, two essential properties of any electronic currency (Becker. et al., 2013). Double spending problem can be solved by using a Peer to Peer distributed timestamp server to generate computational proof of chronological order of transactions. The Bitcoin protocol combining its PoW component with a Proof of Stake type of system (Gervais et al., 2016). The proof of activity protocol offers good security against possible attacks on Bitcoin and has a relatively low penalty in terms of network communication and storage space (Bentov et al., 2014). The specific Proof of Work in Bitcoin is taken from Hashcash (Kroll et al., 2013).

**Mining**

One of the fundamental concepts of Bitcoin is "mining". Mining is nothing but the process of checking all monetary transactions, which in turn creates Bitcoins as a reward. Bitcoin mining has been profitable compared to the energy cost of
performing the mining, and specialist hardware is usually required to make Bitcoin mining profitable (O’Dwyer & Malone, 2014). So for the better understanding, the Bitcoin mining is the process of adding transaction records to Bitcoin’s public ledger of past transactions. This ledger of past transactions is called the blockchain as it is a chain of blocks. The Bitcoin mining protocol is not incentive – compatible. In the earliest days of Bitcoin, mining was done with CPUs from normal desktop computers. In Bitcoin mining hardware, Application-Specific Integrated Circuit (ASICs) was the next step of development after CPUs, GPUs, and Field Programme Gate Away (FPGAs). These devices are capable of easily outperforming the aforementioned platforms for Bitcoin mining in both speed and efficiency. Bitcoin Gold is a hard fork of Bitcoin. The purpose of the hard work is to restore the mining functionality with common Graphics Processing Units (GPU), in place of mining with specialized ASIC, which is used to mine Bitcoin. However, mining is contingent on solving a computationally demanding problem. Mining can be seen as a type of investment in bitcoins. Miners, who mine new bitcoins as a reward for the certification of transactions in blocks, thus provide an inflow of new bitcoins into circulation. The miners validate transactions. Groups of miners have formed mining pools, with each being paid their relative share for their contribution to the work performed. Besides, miners who set up mining operations face many economic uncertainties such as high volatility (Courtois et al., 2013). M/s. Genesis Mining is a technology company which was founded by Marco Streng in 2013, the world’s leading provider of Bitcoin and Altcoin cloud mining. This company offering their customers easy access to small, medium and large mining contracts. In 2009, one could mine 200 Bitcoins with a personal home computer. By the year 2015, it would take about 98 years to mine just 1 Bitcoin. Thus, mining process is at the base for entire business.

Hashing and Digital Signature

The "Digital Signatures" are becoming more in common in our everyday business activities and are authentication of surety. Since, blockchain technologies are complete online business transactions without any third party, the digital signatures are practiced by various on-line contract vendors. The blockchain relies mainly on two cryptographic methods: digital signature and cryptographic hash function (Lee & Lee, 2017). The hashing function refers to the concept of taking an arbitrary amount of input data, applying some algorithm to it, and generating a fixed-size output data called the hash. Hashes have been widely used for a variety of applications. One of the foremost application is "Digital Fingerprinting". The digital signature can be based on asymmetric cryptography. This generates two mathematically linked keys [private and public]. To use the digital signature, software designed with signing capabilities generates a hash of the electronic data that requires a signature. The private key encrypts hash as well as hashing algorithm behind it to form a digital signature. The public key is shared so that the recipient of the message can use it to verify source of the message. Thus Hashing and Digital Signature securing transactions.
Blockchain technologies is the new buzzword in financial systems. The blockchain is transforming industries by enabling innovative business practices. It seems in the future, no more physical coins and currency notes will be used for the exchange of the goods and services of all business transactions irrespective of the countries. It has primarily changed how business value is being discovered or created, transferred, distributed, and realized in today's digital economics. Blockchain has diverse applications and has the potential to be leveraged in different aspects of management and technology. The entire world will become one business community. The US Dollar (USD), Japanese Yen (JPY), European Euro (EUR), British Pound (GBP), Swiss Franc (CHF), Canadian Dollar (CAD), Australian/New Zealand Dollar (AUD/NZD), Indian Rupees (Rs) and South African Rand (ZAR), etc. will disappear soon. The day is not far when all these nations across the globe will fully recognize and adopt the Bitcoin, Litecoin, Altcoins, Ethereum, Ripple, Ethereum Classic, Monero, Dash, Augur, MaidSafeCoin and many more digital cryptocurrencies for their day to day life activities and business connections. These sophisticated cryptocurrencies will help our life to be more comfortable by 24/7 services, secured, get rid of material oriented notes and coins, and directly and indirectly help for the sustainable financial ecosystems by global acceptance. Hence, there is a huge potential in the business of developing new cryptocurrencies coding, transactions, storages, exchange rates, standardization, and security mechanisms to adopt these disrupting financial technologies. It is the need of the hour to all the business corporates, financial institutions, money lending banks, international standardization bodies, academicians, researchers, politicians, international law practitioners, and citizens of all the nations to work collaboratively to harness this upcoming technology for the benefit of human life. The drawback of manuscript is; it was prepared with a few secondary sources only which were collected for a span of six months. The article is just an informative literature report, which describes the concepts very clear. Lacking perfect explanation of proof of work, mining process, and hash techniques. Moreover, this will help to those who are looking for clarity on Bitcoin, Ethereum, Ripple, Litecoin, Altcoins, Ethereum Classic, Monero, Dash, Augur, MaidSafeCoin many more digital currencies. Let us welcome this new technology of financial systems “Blockchain”.

Section V
Conclusion
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