Blockchain: A Technology Shift in Financial Services

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Introduction

The global financial system is responsible for movement of trillions of US$ to serve billions of people in a day. Even after use of many high end technologies the system is rife with many evils, increasing cost through fees and delays, using redundant and onerous paperwork, and chances of cheat, fraud and crime. It's well known wonder that regulatory and operation costs continue to climb up and remain a top worry for banks.

Cryptocurrency and its presence are disturbing traditional financial market for nearly a decade. It is emerging as an alternative for ongoing tradition financial system. The history of use of any form of electronic currency dates back to the late 1980s, Bitcoin, started in 2009 by an unidentified developer and miner, Satoshi Nakamoto, is credited as the first decentralized cryptocurrency, (Nakamoto. 2008). Litecoin , other cryptocurrency, was launched in the end of 2011, reporting modest success and having the second highest market cap until it was overtaken by Ripple, launched in 2013, on Oct 2014. Litecoin modified version of Bitcoin's protocol, increasing speed of transaction with the design that it would be more suitable for day-to-day business, (Schwartz, Youngs, and Britto). The total market cap of cryptocurrency is more than 350 billion US$ as of date and growing, with more than 1500 different tradable coins (data from coinmarketcap.com as on 5th Feb 2018). But rather than the currency the technology behind these currencies is showing great impact on financial services operations and method of transaction. The key technology behind these coins is BlockChain. This faith inherent in Blockchain technology is one of the most important reasons for Bitcoin's success. It is changing the ways financial institutions execute lots of of their activities. It is also impacting other related industries; gambling, investments, auditing, contracts, and product validation. BlockChain technology seems to be tremendously revolutionary and empowering computing applications in both public and private sectors.

Wide spreading and acceptance of blockchain technology will be a pivotal moment of financial transactions in future (The Annual Meeting of the New Champions 2016). Blockchain will not only transform financial services and all banking transactions but it is probable that blockchain will change the word 'internet'. By the time our children have children. (Pierre Gramegna, Minister of Finance of Luxembourg).

Many Companies, mainly in financial sector, are experimenting with blockchain to check its feasibility towards acceptance in the industry. During the process of creation of Bitcoin, a system was required to

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verify, record ,validate and secure transactions. This necessity was fulfilled by the development of Blockchain technology. To shorten, a Blockchain is a set of verified and validated pieces of information, called blocks, connected to the others by adding the newest block to the existing long chain. Information in the block consists of various items such as volume of the transaction, to whom and by whom it was paid.

The blockchain is very well-spoken term in newspapers, articles and blogs, but very few have deep understanding of the technology. Generally articles in the field explain either about the technical part only or combination of different statement. A few articles are available to provide complete understanding and application of the block chain, mainly in financial services, in simple language. The study is one of the attempts to fill such gap, explain the blockchain and its perspective in financial services in simple structured language.

To provide a systematic approach to the article, the study has been pided into following sections; the introduction of Blockchain as section 1, understanding and structure in section 2, application into financial system in section 3, Section 4 provides outline of success of blockchain in various field. The summary has been discussed in section 5.

Understanding and structure

The blockchain technology system can register all transactions from different parties without using the trusted services providers. All distributed transactions were recorded at one place and create a long chain and validated by consensus-based computing, that not only save the time and cost but also made system completely transparent,(Crosby et al. 2016).It is frequently believed financial institutions, banking houses; associations of Commerce and Land Registry authorities should keep an eye on this technology. It is even said these bodies (perhaps) will be replaced by this growing disruptive technology. Blockchain has been explained as equivalence with the traditional process, called ledger. This is a system of recording data (transactions, contracts, agreements,), anything that's needs to be recorded separately and confirmed as having happened. (BBC Business News). Originally conceived as the basis of cryptocurrencies, aspects of blockchain technology have far-reaching potential in many other areas. To understand this potential, it is important to distinguish two core blockchain components: **distributed-ledger technology** and **smart contracts.**

Blockchain works on the concept of share ledger that keeps record of holding for any type of physical or electronic assets; a unit of currency, gold units, diamond, or any item. Every participant in the system has a copy of all transactions in a blockchain and update mechanically each0 time a new transaction occurs, Fig -1 explains a simple structure of shared ledger .The safety and accuracy of the data is kept through use of simple mathematics principle, cryptography, to guarantee that all different ledgers in a system match each other.

The shared ledger can have restriction on participants with accuracy .If participants of the process are limited and preselected, this is **Permissioned** type of ledger, but if everyone can have access to the process called **Un-permissioned** ledger. Further it can be a **Private**, **Public** or **Hybrid** distributed network. In case of a private blockchain system, only limited numbers of people, mainly part of same organization, have access as well as control on the network and the system secured by principle of crypto
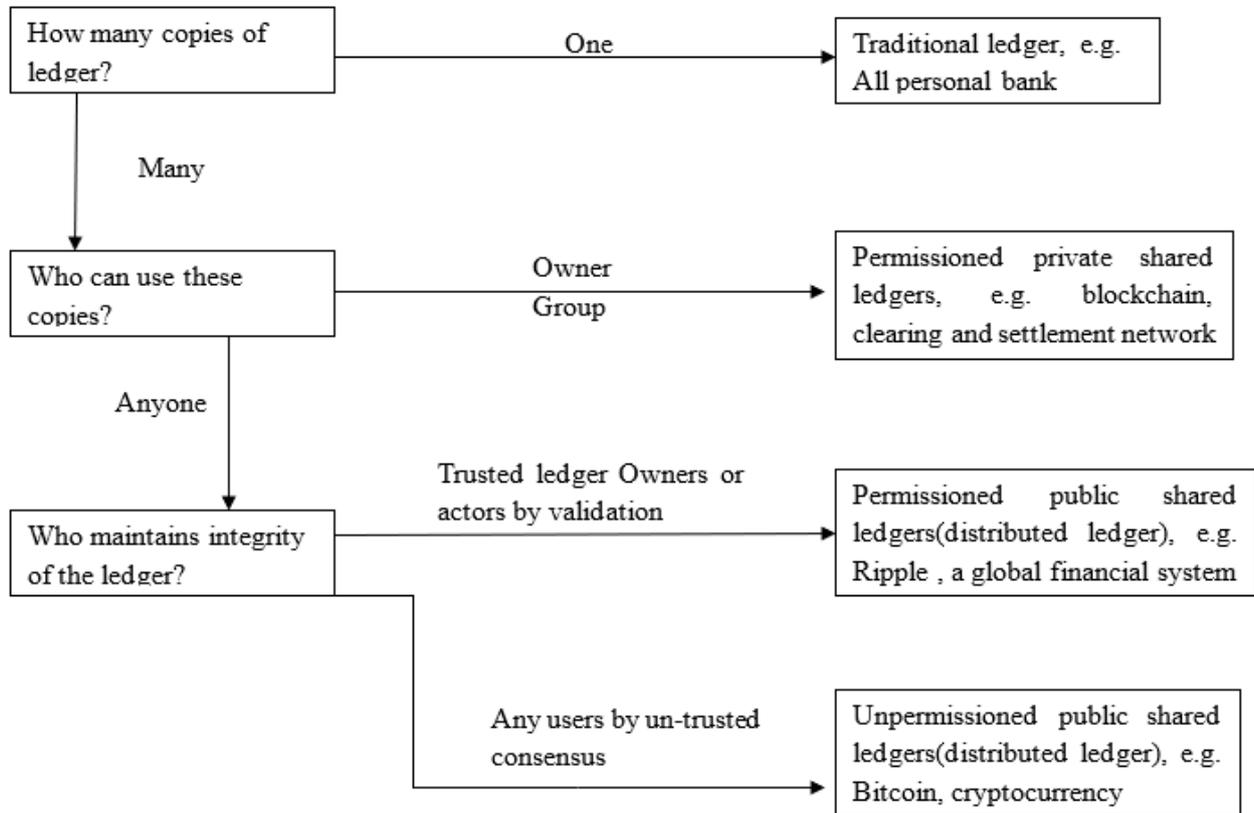
economics.

Fig 1: Distributed ledger taxonomy

The Distributed ledger technology is some way advanced version of currently used centralized and decentralized ledger distribution system by banks. Figure 2 explains the working structure of centralized, decentralized and distributed ledger system.

The financial transactions had many of successes that rely on these approaches, mainly in the Fast Payments Services. The centralized distributions are naturally expensive and, as all data as well as processing is centralized to a point by integration with each participant's own systems. On the other hand, many decentralized databases can sit around the edges of a network while messages move between them. Distributed system, in contrast, connects millions of computers in a network through the internet, with self validation and reliability check. If this technique could be used in financial transaction, all the computers of financial institutions could stay in step with each other without human interference.
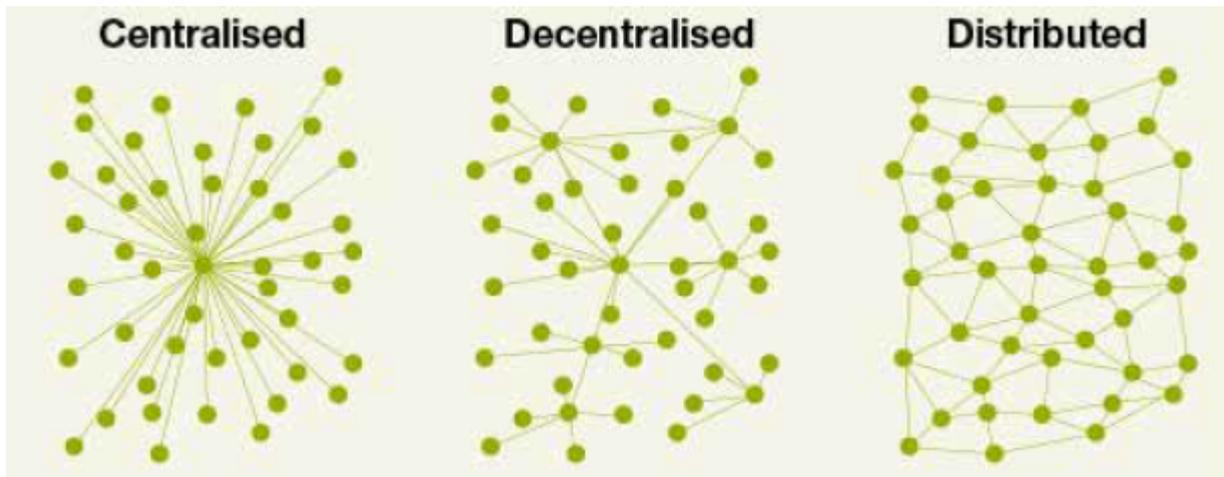
Fig 2: Different ledger structure

In 1994, [Nick Szabo](#), a scholar in field of legal issues and [cryptograph](#)y, studied that the decentralized distributed ledger system could be used for creation of self executing contracts, called digital contracts, blockchain contracts, or smart contracts. The smart contracts are the application layer in blockchain technology that converts many of the features of blockchain technology a reality. Most of the conventional contracts have no straight connection with the digital code that executes them. In smart contract format, contracts could be changed in a digital computer readable code, stored and simulated on the network system and controlled by the network of computers of the blockchain. If users enter into a smart contract, it will then hold judgment that operates on the data in every part of the distributed ledger. This could make possible the elimination of all short of manual process in organizations, which may lead in better efficiencies and growth. This would also effect in ledger feedback such as money transfer and receiving of service or product.

The Smart contracts are being used in various fields, mainly for authoritarian compliance, service management and product traceability, and also to beat fake products and fraud in the many sectors; Financial Services, Health, Aviation, It and Communications, Agriculture , oil and gas , and many more.

The distributed ledgers system, blockchain, has many benefits. First, there is no single point failure as it operates as a peer-to-peer network, even in case of a failure at a node the other nodes will keep on to work efficiently. Second, all transactions by any participants on the network are visible to all other participants, which increases confidence, inspection and trust. Third, changes to such close network are really difficult and in the very uncommon case such a change occurred, it would be noticeable to the all other users. The major characteristics of blockchain have been summarized as below;

- Shared databases
- Multiple writers
- Distributed Validation

- Transaction Validation.
- Disintermediation.
- Time stamping.
- Scalability.

Blockchain application into financial system

"Blockchain is without question the most significant advancement in enterprise IT in a decade, on a par with big data and machine learning. What JAVA is to the Internet, blockchain is to financial services. We have now reached a fork in the road with bitcoin and blockchain. Bitcoin has proven itself as an established currency. Blockchain, more fundamentally, will become the default global standard distributed ledger for financial transactions," said Jeremy Millar, partner at Magister Advisors.

The primary use of blockchain technology is not to replace existing central infrastructure activities like money transfer, wire transfers, but to accompaniment them, generally by storing required 'meta-data'. Ittay Eyal studies how and why the blockchains technology have become the darling of the fin-tech sector. The back-office handling is the first impact point in financial services domain by the disruptive technology. While selling a syndicated loan or a complex derivative contract, the keeping of record for such transaction is very time consuming and also requires oppressive back-office process. The process depends on a negotiated contract with the lawyers, suppliers and users to finish the whole transaction. Generally, it takes 20-25 days to settle such trade. All these back-end activities are not only creating a problem in timely completion of trade but also a very costly affair for the parties involved. This is totally in distinction to the front-end systems of banks, where millions of dollars are spent to attain a millisecond of competitive advantage. In addition, institutions are required to follow a reporting methodology, transparency, privacy and dissemination of data. They want a technical breakthrough to solve such major problems. Blockchain can be an answer to streamline these financial transactions with optimal way. The use of blockchain technology could save more than $20 billion annually for financial institution in form of regulatory, transactions, settlement, and cross border payment costs.

All big banks and financial institutions are trying to find out the way to remove the requirement of any sort of intermediaries in transaction by adopting the new technology to connect users directly, and according to the Financial Times, UBS, a Swiss based bank, is one of the first company that has been trying transfer and transaction processes by controlled internal blockchain system. Some institutions have developed their in-house system, such as Citicoin by Citigroup, digital money being created in the bank's laboratory. Goldman Sachs led a $50m financial support for Circle Internet Financial, to use bitcoin as transaction currency for consumer payments. Another route is to find a partner; Commonwealth Bank, a leading bank of Australia, has contracted with Ripple, a open source software provider company, to build a secure network based on blockchain protocol for transactions between its subsidiaries.

Some institutions are working even with start-ups of blockchain through a technology incubator. More than 40 leading international financial institutions, including UBS, JPMorgan and Barclays, have invested in r3- CEV project, a start-up venture, for setting up a private permissioned blockchain network with limited participantion. It forms part of an effort to build an industry-wide platform to standardise use of the technology.

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Blockchain network can also be used for other banking operation apart from payment and transactions; such as storing client identities, clearing bond and equity trades by making self executable smart contracts, regular interest payment on bonds and many more.By dint of daily improvement in the bloackchain technology, it still has many shortcomings. There are several scalability challenges; the transaction limits are low (only 20 transactions per second for Ethereum network , a advanced blockchain system), the energy consumption for consensus based systems is enormous (bitcoin distributed network system is anticipated to utilize energy equivalent to the republic of Ireland), as distributed amongst many participants , each node has to keep a copy of whole transaction ledger which increase the cost of storing of data (this is controlled in some other form of distributed storage systems, IPFS).

Success of blockchain in various fields

The function of blockchain can be explained as a digital ledger. It serves very similar function as a good Land Registry system: it discloses who owns what at a time, always ensures single-ownership of an asset and records when a transaction took place. There is possibility to 'track back' as well. Blockchain can even give some added certainty in comparison with a 'classic land registration system'. It saves costs as well by remediation of mediators (lawyers, Notaries) and administrators. It provides more safety than the tradition system as non-owner cannot transfer ownership in blockchain network system, (Vos , 2015)

Blockchain based platforms are frequently used in area of art; two prominent projects pertaining to contemporary art are Plantoid and Monegraph. Monegraph (short for 'monetized graphics') is created by technologist Anil Dash and artist Kevin McCoy in 2014 based on block chain cryptography technology. Plantoid, based on the Ethereum blockchain smart contract technology, exemplifies a system of distributing art by directly funding the artwork instead of artists. (Lotti, 2016 ,Dash 2014).

Blockai, Bitproof, Verisart, Stampery, OriginalMy, Proof of Existence and Crypto-Copyright, are some examples of blockchain based platform for authorship , digital copyright and ownership management.

Blockchain technology based network platforms are also used in cannabis, cash-heavy business. Serica, brings crypto finance, financial custody, software engineering and blockchain technology to traditional custodian finance. It use Socket Layering security technology to encrypt all interactions between a user's personal wallet and platform. It uses blockchain to record every purchase order of medical marijuana, making the business a simple way to allow payments online.

Goldbloc and uphold are block chain based platform for transaction in real assets. The platform's gold-backed cryptocurrency creates a extra layer of control and transparency to gold investors.

Due to high level of challenges in transaction of diamonds and precious stones, there is a big need of blockchain based network. Everledger, the tech pioneers in the sphere, gives an absolute ledger for diamond identification and transaction verification for different stakeholders; buyers, sellers, insurance companies and law enforcement agencies. Everledger provides a "digital passport" to every diamond that will go with each stone similar to a unique fingerprint mark.

Energy Blockchain Labs is designed to cater the need of entire value chain of the energy industry. The lab

is functioning as revolution in field of energy to develop a range of energy-based Internet functions on blockchain distribution technology, covering energy production, consumption, trading, management and other links.

The block chain technology has been used in many other existing and new fields; First Blood, Etheria, Etheroll, CoinPalace, , Rollin, Ethereum Jackpot are in gaming and gambling fields ; Follow My Vote provides secure system of voting ; BITNATION a virtual nation platform ; Verbatm ,Appi , Satoshi Talent and coinality are in field of job market ;Augur.net for market forecasting ; Bittunes , PeerTracks , Jaak in media and content distribution ; Ethereum and ChromaWay in real estate industry; Alice, Helperbit, GiveTrack , Start Network in the area of Philanthropy transparency & community service and many more.

Summary

Looking at the structure and applications of blockchain network technology, many of the thoughts of Good Governance in finance industry can or will be met. The constituent of efficiency, transparency, privacy and past record keeping of all transactions without interference of a human being is one the major reasons behind wide acceptability of the technology for financial transaction. Furthermore the network can be designed for limited and public participation as per requirement of transactions. The reliability and validity of each transaction can be checked and stored by use of unique identifiers number generated. In current well-functioning Land financial system this is mostly executed by support of back office and intermediaries, by a contract method.

Therefore, one may conclude that in case to perform all financial transaction, internal or external, in automated way, blockchain perhaps could be one of the most important possibilities.

In case of the implementation of a blockchain-based financial transaction system, one should not underestimate the privacy and complexity linked to the legal system, the complexity and variety of different transactions.

This complexity would even grow when a cross-border transaction platform of blockchain would be used. In such a case, a big interconnected and common platform is required. The project like r3-cav can be a solution to handle such complex transactions. At this moment it is not sure whether all preconditions can be met. Some the possible risks is the transaction are accuracy, privacy and speed without the interference of a human.

Now and then many professionals and other passionate policy makers express their opinion that the technology can replace banking quite easily. Without the support of banking and legal professionals who indicate the usage, application and its implications, the techniques will not be applied in the correct method. Sudden implementation of the techniques as replacement of existing system would result in pure chaos. To implement the blockchain technique in all financial transaction, one does need the professional expertise of the experts in the field. For paying in different currencies to different places this is the (licensed) exchange market or central banks.

To ensure financial transactions in future, for old banking system and professionals, it is correct time and

condition to shake hands with the 'disruptive technology', the technology using everywhere as new solutions for different purposes, Whether clearing of cheques, settlement of trade, cross broader payments and formation legal contracts. Furthermore it is important that someone is able to solve the problems that occur in case something might go wrong. The role of bankers and financial professionals is not anticipated to be replaced completely by the technologies. People rely on technology, but want to keep a human relation with bankers mainly in case of some problems. In my opinion, all existing professionals in financial system should be facilitated by this technology. As this can be of great help to simplify or fasten certain procedures.

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The Data Science Foundation is a professional body representing the interests of the Data Science Industry. Its membership consists of suppliers who offer a range of big data analytical and technical services and companies and individuals with an interest in the commercial advantages that can be gained from big data. The organisation aims to raise the profile of this developing industry, to educate people about the benefits of knowledge based decision making and to encourage firms to start using big data techniques.

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