Block-Chain Technology & Its Application in Financial Services

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Abstract: *The global financial services industry is going through a series of technological disruption. In recent years, the financial service industry has witnessedseveral financial innovation and one of them is the Block Chain Technology - (BCT). Block Chain leverages technology and has great potential to change the way as to how the business operates. It has gained widespread acceptance because of the immense benefits it offers in terms of de-risking operations and reducing inefficiencies across the value chain.Block chain is just one of the many tools as analytics, artificial intelligence, robotics, and cloud computing and are being independently incubated or developed in innovation labs across the globe especially in advanced economies. Technocrats call the emergence of block chain as the foundation of fourth industrial revolution but critics consider it as just a trend in the development ofa new technology. Block Chain Technology - (BCT) service providers are experimenting the application of this technology in financial service domain in collaboration with banks and large financial institutions.Astronomical amount of investment has already gone in its development but as of today the investments far outweighs the benefits received. Obviously, there are some pain areas that the business will face and need to address but in the end, it will reshape the modus operandi of financial service infrastructure. World Bank's group ambitious goal of Universal financial access by 2020 will boost the growth of this technology and will be a game-changer for financial services. This paper is an attempt to educate the readers give a deeper understanding about the areas in financial service where the technology can be used and derive maximum gains from business.*

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1. Introduction

Block chain had its early origin as a data structure concept in Computer Science. The historical form of block chain was the Merkle tree named after Ralph Merkle, an American Computer scientist who extensively worked on data structure and patented it in 1979. Block-chain had its roots from the data structure concept of Computer Science & later developed by SATOSHI NAKAMOTO in 2008-09. Block chain first evolved as a bitcoin and an electronic peer-to-peer cash system launched by SATOSHI NAKAMOTO. Initially, it worked on cryptographic proof where two willing parties can transact without the need for any third party intermediary. The evolution of the technology was more than expected and is being explored in various sectors and disrupting every industry. Block-chain is just a file by itself. Data is logically sequenced put together and stored. Every transaction creates a block which is added to the previous block of records and hence the name Block-chain. Block-chain usually comprises of the financial transactions & works on real time hosted on a peer-to-peer network spread geographically. Block chain uses cryptography & digitally secured signature (DSS) for identity and authentication with read or write only access. The records once entered cannot be altered or erased unless authorized. All transactions are approved through a consensus mechanism and contains a time stamp and an audit trail on the network. Block chain network could be private, public or hybrid. Public networks are permission less and the participants are free to transact on the network without any interference or authentication of the transaction. Generally, the participants are anonymous and the network has no control of anyone. Private networks has certain entry restrictions on, the participants are preselected, and a prior approval is required from an administrator of the network. Typically, this network is closely-knit where the participants interact very frequently among themselves with due permission and therefore known as permissioned

networks. Hybrid networks integrates the features of both the public as well as the private block chain.

Know Your Customer (KYC) & Anti-Money Laundering (AML) -

Block chain's technology has the capability to store client's data at a central location. This would enable the financial service sector to explore the use of this technology for meeting the Know your customer (KYC), Anti-Money Laundering (AML) regulatory needs. Financial service companies operate in multiple geographies and therefore it will be possible to access clients or customers data from a different location. Due diligence is automatically strengthened as customer data is stored and recorded on the network using a unique client identification system. Block chain's immutable audit trail enables the customer to know that their information has been accessed. Block Chain therefore has full control of customer's privacy of information. Block chain has the capability to streamline the entire KYC process and can facilitate an open, secure, transparent & efficient solution in compliance with continually evolving regulatory requirements. The block chain architecture is operationally designed to find the shortest route for settlement of a financial transaction. The more the channels of transactions the more would be the chances of money laundering and therefore Block chain eliminates this by routing transactions in the shortest possible ways thereby preventing cross border financial crimes.

Terrorism Financing–

Terrorists operate through a fragmented links of multiple players spanning across geographies. They have been ingenious in discovering new ways of financing their terror network. Terrorists rely on cryptocurrencies, which is a digitally traded virtual currency. Cryptocurrencies do not have any government backing or status of legal tender. Cryptocurrencies are attractive to terrorists Organizations because they are financially inclusive and extend service to unbanked areas, avoid

complicated paperwork's, clerical procedures and bypass Government control. Cryptocurrencies opened the door for illicit financing and drug trafficking. It usually depend on network protocols and cryptographic techniques and enables counterparties to transact and transfer illicit terrorist money. Cryptocurrencies facilitate rapid cross border transaction on a peer-to-peer basis and the terrorists can transfer money without any reliance on any financial institution to process or settle the transaction. They are further anonymous or pseudonym which makes the origin or the trace of the transaction difficult. Block chain can be a potential aid for preventing the growth of cryptocurrencies for terrorist financing. Block chain contains a series of mathematical formulas which records who is the owner of the money, how it appeared and to whom the money went. Any illegitimate or suspicious source or transfer can be immediately tracked and raise red flags for prompt action. Block chain can provide banks, regulators and enforcement agencies to dig deeper into transactional & cross-institutional data. It can further help investigate financial networks to identify potential funders of terrorists. The distributed nature of this technology makes the terrorists difficult to cover their tracks and the transaction they executed. The real time execution speed also prevents the terrorists to conceal identity giving law enforcement agencies sufficient time to identify terrorist's plots before they happen. Block chain can be integrated and interfaced with the virtual currency network so that any suspicious transaction occurring can be mirrored in the block chain network. Block chain is therefore an essential technological tool to combat the financing of terrorism.

Fraud Prevention- Fraudulent transactions can also be prevented. As the network is spread across locations, which will make it difficult for fraudsters' to conduct fraudulent activity. Block chain networks are permissioned network and no outsiders can access the network and corrupt the records. This technology is great for fraud prevention because it will restrict participants and they can join only on invitation and after validation of their authority and capacity. Block chain data's are impossible to erase or amend once it is authorized. All parties to the transaction must agree and validate through a process called consensus and post that the transaction would be assigned a time stamp. Any attempt to tamper or hack the network or records would trigger a danger signal and the network is put to a temporary state of suspension, access revoked until the cause is established & resolved. Therefore, the origin of the transaction can be traced, any approved changes will be visible and the original transaction can still be accessible. Thus, in short, the history of the entire transaction will be available on the network. Block chain has a system of identifying parties in the network, which will detect persons who has evaded sanctions or enforcement actions. Block chain works on distributed ledger technology & potential suspicious transactions will be flashed through the entire chain and make it available to each node on the network so that it is visible to the participants. Alerts are generated andbroadcasted on to the concerned participant and the transaction can be immediately flagged for further investigation. The Block chain network is up-dated in real-time with the record of such alert. This technology will also allow regulators, risk managers, auditors and all stakeholders to effectively seek a record of complex and suspicious

transactions from the network and ensure prompt punitive action. Sharing & storing information collectively on the network would free up more time for bankers & regulators to speed up enforcement actions.

Trade Finance – In a traditional trade finance, system the documents, e.g. letters of credit, bill of lading, invoices, bank guarantee are recorded by each parties on their individual database and is required to be reconciled against each other. This increases paper work and is time consuming. For example, in a typical letter of credit based trade finance transaction, the paying party because of mismatches and errors in trade documents does not honor the LOC. The documents are required to be re-presented with no guarantee of payment. With implementation of block chain, a smart contract can be executed among the parties and the need for multiple copies of the same document can be eliminated. There can be single version of the LOC draft at any given time and all the parties will be able to view it and work on it based on their levels of access to the network. One single master document, the digital ledger can be stored on the network accessible to all participants, the exporters, importers, transporter, and banker. This will enhance the trade's settlement time, risk of non-payment, remove ambiguities & paperwork, increase transparency & speed up the capital flow between the parties. Visibility to the trade finance transaction can be enhanced with an oversight on pending actions required to solve any discrepancies. Under the current system, banks spend huge amount of time to monitor debit, credit advises, and end of day statements, which significantly adds to the cost of trade transaction, Block chain, can help reduce costs and operational risk more accurately, efficiently and timely. Very recently, SWIFT, The society for worldwide Interbank Financial Telecommunication has initiated a pilot project to utilize block chain in trade & receivable finance in January 12, 2017. SWIFT announced the launch of a Proof of Concept (POC) to determine if Block chain or the distributed ledger technology can help reconcile NOSTRO, VOSTRO & inter-account databases in real time to optimize global liquidity. Hong Kong Monetary authority (HKMA), Monetary Authority of Singapore (MAS) also announced plans to use block chain in trade finance. Mizuho financial group of Japan recently concluded a trade finance transaction via block chain in 2017.

Trading Clearing & Settlements– When an investor purchases an exchange-traded security the transaction needs to settle first before the actual exchange of money & shares happen. Clearing refers to the exchange of money & settlement refers to the exchange of securities. Traditionally the cycle is (T+2), settlement occurs after two days of trading. This cycle is a lengthy process of buy/sale order placing, order execution as per requirements, contract note preparation, delivery, clearing & settlement of shares. The parties involved are the broker, buyer, seller, clearing house, the banker. Block chain technology can help completing the cycle in (T+0) days in a secure an effective manner. As all the participants in the trade will be on the network all transactions, can happen in real time and conclude immediately. This will eliminate the need for clearing house, reduce administrative overheads, and increase transaction speed of securities trade. Australian Stock Exchange has

successfully deployed the block chain based clearing & settlement of securities transactions in 2016. Australian Stock Exchange has acquired Digital Asset Holding to develop new systems for clearing & settling trade transactions. They replaced the legacy Clearing House Electronic Sub register System (CHESS) with the block chain technology and became the pioneer of the use of block chain in financial markets.

Cross-border International Payments – The current system of cross border payment suffers from several limitations such as the uncertain conversion rate of currency, duration of transfer, multiple financial intermediaries and complex procedures causing costly delays and inaccuracies. Further, the associated fees and charges also adds to the friction & frustration for both the receiving and the paying parties. The cost of services is also substantially higher in under developed areas or areas with reduced access for payments. Block chain solutions has the potential to overcome this weakness as it is an interconnected network, time stamped blocks of transaction and offers near instant settlement of cross border payments. This technology additionally offers greater reliability, increase liquidity, tamper-proof record, and enhanced security with lower costs of operation. Block chain also matches automatically the currency conversion rates to securely settle a FOREX transaction. Block chain networks are integrated with currency exchange rates providers who provide real time feed, which enables speedy settlement & reduce transaction costs. SWIFT has already tested block chain in 2017 as part of its global payment initiative and has been successful so far. More recently, JP Morgan, MasterCard & IBM have started to implement block chain in business-to-business (B2B) space to neutralize the challenges of accuracy, transparency & cost. State Bank of India in 2017 formed a separate platform called "bank chain" to explore block chain technology in the banking sector and several projects are currently underway. Bank chain is a community of 27 banks from India & Middle East and if successful will be rolled out by other member banks. Block chain also offers solution for equipment finance transactions where the transfer of ownership and title in leases can happen electronically through the equipment finance agreements. Toyota Financial Services have joined a block chain consortium to explore the possibilities in auto financing transactions.

Execution of Smart Contracts – Smart contracts are computer codes stored on the block chain network and execute automatically when participants validate it. Smart contracts work when pre-determined terms & conditions of the contract are fulfilled. Smart contracts are self-executing and eliminates the need for third party intermediaries to resolve disputes or enforce settlement of contracts. For e.g. assume a person applies for a car loan and there are several steps that must be followed, submit an application, documents, do a credit check, bank verification, negotiation of commission of sales person & finally payment to car dealers. Block chain can streamline all of these by executing a smart contract between the lender, dealer and the customer. Block chain will identify the parties on the network and initiate a smart contract and the lender will release the funds to the dealer. The dealer on receiving the money will transfer the title of the car automatically to the customer via the smart contract. The copy of the contract is retained on the network and can be referred to by the participants in future if needed.

Syndicated loans – Syndicated loans are funds pooled by a group of lenders to finance projects. These loans are generally huge with risks shared by all the lenders. A complicated manual process is involved in processing syndicated loans and the legacy systems prevalent does not support the demands of stakeholders such as audit, compliance, sales, clients & regulators. The complexity is further increased when the loan is purchased or sold in the secondary market with multiple players interacting and creating confusion. Often miscommunication and operational difficulties creates position breaks in the books of customer, creates confusion between the lender and the broker who underwrote the loan and lot of time is spent in reconciliation of the records. Different regulations in different geographies increases compliance costs causing delay in funding & release of funds. This further leads to loss to lenders in the shared revenue generating syndicated deals. Block chain is a useful technology to speed up the lending process from origination to pay off by integrating database, facilitating real time settlement, speed up execution, error free processing, better visibility, reporting and analytics. Very recently, BBVA, a Spanish banking multinational collaborating with MUFG of Japan, BNP Paribas of France completed a 150 million Euro funding to Spain's national grid, Red Electrica Corporation. The entire loan negotiation, contracting were completed live on the block chain network. British bank NatWest also announced its plan to start syndicated lending using block chain based platform. World Bank recently tested the pricing of bonds using block chain to improve traditional bond buy-sell practice.

Insurance Claims Processing– Insurance claim processing involves a time-consuming paper work, broker mediation in settlement, manual underwriting process, claim loss surveyor validating the loss coverage & liability, calculation of the amount of loss. Block chain can streamline the claims processing by introducing smart contracts where the entire end-to-end process is electronic. Broker interference is eliminated, processing time is reduced, and surveyor submitting the report in less time based on correct assessment of risk. The back office team without any manual intervention executes payment based on calculation. The potential for fraud and manual rework is eliminated, as the decentralized digital repository will verify the authenticity of customer policies and transactions by providing historical records. Block chain can also provide the cash reserve position in real time enabling the property and casualty insurers to manage their exposures better against risks underwritten. Reinsurers will have increased confidence in handling claims and improving business operations. AEGON, Allianz, Munich Re, Swiss Re and Zurich have launched "Block chain Insurance Industry Initiative B3i, "aiming to explore the potential of distributed ledger technologies to better serve clients through faster, more convenient and secure services."

Proxy Voting
Proxy voting is a system of indirect Investor participation where the investor is not able to attend the shareholders meeting to discuss the issues before the Company. Investors

could be institutional or retail and a low voter turnout causes a skewed decision being taken and a tilts the balance of power more towards the Investor who were present. In the current system, the proxy statements contain summaries, which could be misleading and erroneous. Further, these statements are complicated to understand and requires intensive scrutiny to make an informed voting decision. The cost of distribution is also high and in majority of cases, it is outsourced to a third party resulting in delays. The investor do not receive them at all, either wrongly delivered, or not delivered at all. Block chain can help improve the voter participation by streamlining the voting process. When an investor buys a share, a record is generated in the distributed ledger. A smart contract executes the communication of the proxy statement with the Investor and the Investor's vote creates another record on the ledger. The smart contract again matches the number of votes with the ownership record to confirm validity. The Company finally is able to secure votes and the Investor is able to participate in the proxy voting process. This enables investors to have a say in the decision making process. Broad ridge, a financial service provider has been granted a US patent for block chain to use in proxy voting. Banco Santander has also completed a block chain pilot project to process proxy votes during Annual General Meetings.

2. Conclusion

To summarize, block chain technology can disrupt every industry & dramatically change the way of doing business. The basic structure and concept is the same but the applications are different. There are certain prerequisites for adoption of this technology like educating the end users and the awareness of the potential benefits that the business could derive. The business should work with senior leadership and identify areas where implementationwith least risk and high material gains is possible. Experimentation can be done simultaneously to discover new areas for improvement and collaboration with counterparts should help. There will be challenges of business transformation and the financial infrastructure will need commitment of time & investment. The IT system & hardware's should be re-calibrated, make them more robust & foolproof. There might be resistance to change where the interests of all might have to be realigned. The collective efforts of all business units will have to be mobilized to make the transition successful. The technology cannot be developed in silo and would require participation from all and the late entrants would lose out to competitors. The deeper the experimentation the better will be the understanding of this technology. Lot of groundwork in terms of jurisdictional & specific legal requirements will need to be addressed. It is advisable that the business join small networks initially to have hands on experience before a full-fledged implementation takes place. The mistakes made in the past could be an aid for future implementation. The business may also have to onboard a dedicated team working on the new project to make the effort visible across the Organization, win support of all the stakeholders and reap the benefits of this technology.

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