When Trade Finance Meets Blockchain Technology

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Abstract:- In the area of banking trade finance is considered one of the most beneficial applications of blockchain technology. This intelligent method of exchanging goods across countries is lacking an efficient and reliable platform that can speed up the trade process. By onboarding all the associated parties on a blockchain network, the complex transaction data can be shared between importers, exporters, and banks on one commonly accessible distributed ledger. A trade transaction that would traditionally take 7 to 10 days to complete will now be completed in around 5 to 10 hours over the blockchain-based network. Once the pre-specified conditions of the trade are met, the smart contracts will execute themselves and the related parties can review the actions performed. When put together with the prevailing framework the employment of this technology can minimize cost, reduce counterparty risk and increase transparency drastically. In this paper, we will talk about the merging of these two vital components and discuss how they will aid the trading process.

I. INTRODUCTION

Trade finance is one of the key concepts in today's world which aids the growth of the economy. It can help reduce the risk associated with global trade by reconciling the divergent needs of an exporter and importer. The function of trade finance is to introduce a third-party vendor to get rid of the payment risk and the supply risk. This means that it provides the exporter with the payment according to the agreement while the importer with the fulfilment of the order. The third-party involved is a neutral entity, like a bank, that is an intermediary which supervises the trade.

Trade finance encompasses many financial products that are employed in the banking sector to make trade feasible. Trade finance is, therefore, an umbrella term. It concerns both international and domestic trade transactions.

Over the years, the trade finance procedure has evolved remarkably. Until the 2000's, multiple software systems were deployed exclusively in data centers. While these software systems could handle internal processes and tasks, they were incapable of efficiently handling the grade finance pressure. When it comes to sharing data outside these data centers, they incurred massive amounts of cost, risk, and complexity. Each new addition to the already existing system includes its integration which introduces various challenges to the business model.

During the late 2000's, the streamlining of the trade finance process began. They began bringing users to a central destination platform, where they can carry out trade operations with trade data being stored in a centralized database owned and operated by a third-party vendor.

While, by doing so, it was easier for participants to trade, there was always an issue of data custody, residency, control, privacy, and security. This problem aroused as all the data was controlled and monitored by a single third-party vendor.

In addition, the current status of the banking and finance sector is prone to errors and frauds, due to their dependability on manual networks. This, in turn, could lead to crippled money management systems. Trade carried out by the current method of trade finance could lead to enormous issues due to the lack of automation. Following the current trade method, few problems that the traders face include formulating the contracts, high-cost factors, lack of trust and transparency, delays and high-risk involvement.

The use of blockchain technology in this sector could revolutionize the trade transaction process.

Invented back in 2008, blockchain is an exclusive technology that is waiting to be implemented in various industrial sectors. This phenomenal technology is spreading its wings to gain control over every sector, regardless public or private, due to its features like immutability, decentralization, ease of access and transparency. These exact features make it attractive for the business sector to invest and moved towards a blockchain-based framework. It has become one of the most disruptive innovations in recent years.

Blockchain Technology, that has supported the much-hyped Bitcoin ecosystem and has gained traction in the financial sector. The industry that witnesses millions of transactions worth billions of dollars daily is now beginning to be experimented with, so-called publicly accessible decentralized ledger, blockchain.

According to Global FinTech Report 2017, 77% of Fintech institutes expect to adopt blockchain as part of the production system or process by 2020 [1].

Blockchain is an elegant and solitary technology. In today's world, wherein the focus is on automation and to reduce human interference, blockchain aims to automate away the center. This means that it intends to remove the third-party intervention, which is achieved by decentralization. Being decentralized, it has established a

relationship of trust between faceless participants. This rare technology is being cultivated in different sectors like messaging apps, stock trading, supply chain management, including many more diverse sectors. Blockchain refers to a new form of decentralized data management that ensures the integrity of all kinds of transactions.

Blockchain ledger has three basic concepts: transaction, block, and chain. The "transaction" in blockchain is not restricted for trading, in fact, all the valuable information can act as a transaction to be broadcasted in blockchain network. The blocks are storage units to record transactions, which are created and broadcasted by those users authorized by consensus mechanism [2]. Once a block is created, the corresponding hash is calculated. Changing something inside the block will change the hash of that particular block. This may lead to the block not pointing to the same blockchain. When multiple blocks come together, they form a chain, which is known as Blockchain.

The implementation of this unique technology with the backbone of global finance can result in major advances in the trade finance sector.

The rest of the paper is organized as follows [3]. Section II incorporates the work that has a direct or indirect connection to this paper. It encompasses the limitations of the current trade finance method and talks about the various blockchain consensus mechanisms. Section III comprises of the integration process of the solitary technology and chief component for boosting the economy. Section IV discusses the various benefits of this new integrated method of trade finance. This is followed by Section V that overviews the shortcomings of the same. Finally, in Section VI we conclude the paper by answering the question, "Can Blockchain Reshape Trade Finance?"

II. RELATED WORK

Paper 4 talks about the vulnerability in the current trade finance method that covers the logistics, conveyance of goods and payments without complicated agreements and transaction speed problems. It is then followed by the transformation of the current trade finance method to the blockchain-based method.

In Paper 5, the authors examine the decentralized transaction feature of the Distributed Ledger Technology (DLT). They then outline what we estimate to be the main areas of applications of DLT to finance, whether for capital markets or corporates [5]. The applications include payment systems; cooperate finance and governance; financial reporting and compliance; financial accounting, trade finance, and supply chain management, and crowdfunding. It then talks about the impact created by the DLT market on post-trade infrastructure.

Paper 6 proposes the establishment of "Regular Sandbox". The sandbox delineates a restricted scope with simplified market access standards and procedures. Given

that the consumers' rights are safeguarded, FinTech innovation enterprises or business is permitted to rapidly implement the operation, and are allowed to expand within the testing conditions of the regulatory sandbox [6]. This, in turn, will lead to the development of industry standards.

In paper 7, the authors have carried out detailed market surveys on blockchain technology and the use case of supply chain to focus and streamline the trade finance process.

A. Pain Points of the Current Trade Finance Process

The traditional trade finance method includes many loopholes that may lead to inaccurate and/or unwanted results. It is costly, time-consuming and includes many follow-ups, by either the importer for goods or exporter for the payment. Along with this, there is always a trust factor involved as trade takes place between traders across the globe.

Few drawbacks include manual contract creation wherein the importer sends the aspired financial agreement to the importer bank. The importer bank reviews the agreement and then forwards it to the exporter bank.

It is also possible that due to multiple checks by the middle vendors or due to plentiful communication points, the shipment is delayed. We can call this issue a deferred timeline. The same can happen to the exporter and thereby postponing the payment.

We know that trade finance is a process that takes place globally. It is therefore necessary for all the trading parties in the world to use the same platform for the finest results. But in reality, this is not the case. Every trading party may operate on heterogeneous platforms. This is followed by miscommunication, which results in fraud.

Due to the inability of the third-party vendors to verify authenticity, trade documents, such as letter of credit, may be financed multiple times. This hence points to the multiple versions of the truth drawback. This means that as trade documents are forwarded from one entity to another, it is challenging to keep track of the original document or the versions of the original documents.

To overcomes these drawbacks and to create a single public ledger for transparency and to maintain the integrity of all transactions, we must shift to a blockchain-based technology.

B. Various Consensus Mechanism Used in Blockchain

Protocols that make sure all the participants of the blockchain network are synchronized with each other are known as consensus mechanisms. In this procedure, the users of the network agree on which transactions are reasonable, which are then verified and acknowledged and, only then, are added to the network. There are different consensus mechanisms for blockchains, depending n their type. The working of this mechanism is vital for a blockchain ledger to function precisely. They make sure

that every participant on this distributed ledger has an equal chance of getting access to the next block. The transactions must be checked continuously and the blockchain is constantly audited by its participants.

Consensus mechanisms are the backbone of any blockchain ledger. They are the crux of the network because, without it, the blockchain network will become useless. If someone fidgets with this mechanism, the functioning of the chain will be hampered.

There are many ways to reach majority. Few of them include: Proof of Work (PoW), Proof of Stake (PoS) and Proof of Capacity (PoC).

When the miners in the blockchain network solve a complex mathematical problem, that requires loads of computational power to obtain the solution, it is known as Proof of Work. The first miner to find the answer to the given problem gains control over the next block and receives a reward for the same.

In comparison to the previous consensus mechanism, Proof of Stake is more environment friendly. In this mechanism, the miners can stake their tokens to become a validator, someone who can produce blocks. This means that they lock their tokens up for a specific duration. The procedure that determines the next miner who can produce the block is dependent on a few internal or external factors of the blockchain. Usually, the miner with the largest stake has the highest chance to produce the next block.

Proof of Capacity is a different type of mechanism wherein the miners use a two system: plotting and mining. As the mining algorithm is too complicated to be calculated in real-time, the miners pre-calculate solutions to the complex puzzle and save the solutions in their hard drive. The process of pre-computing the results is known as plotting. The mining process involves the miners to reach out to the solution of the given puzzle in their hard disk, provided they have solved it. The miner to reach the solution first wins control over the next block in the chain. This mechanism is also known as Proof of Space.

Out of all available consensus mechanism, the aptest for trade finance would be the Proof of Ownership (PoO) consensus mechanism. It consists of four main concepts –

- Ownership: Miners should have a signature that should be associated with a private key to prove that they are the owner.
- Existence: Proving ownership of certain data proves that this data existed at a certain time.
- Integrity: The data associated with a cryptographic function which makes it impossible to alter the block content. If the content is even slightly modified, then the whole certificate becomes invalid.
- Authenticity: It is easy to transfer ownership and find the original certificate issuer as every change is logged in the blockchain ledger.

These key concepts enable Proof of Ownership to act as one of the essential consensus mechanisms that can be used in the reconstruction of the current trade finance method.

III. INTEGRATION OF TRADE FINANCE AND BLOCKCHAIN TECHNOLOGY

Blockchain has the potential to drastically alter the worldwide economic system. Blockchain technology allows the formation of a decentralized digital ledger that is accessible by all users on the network. By being decentralized, every user will have their copy of the network and can update the common ledger security, without the fear of data loss, lost update problem or the need for third-party / Central authority. Hence, blockchain is also known as a publicly accessible decentralize ledger.

A single block can contain all the necessary data in a blockchain. The block change or updated instantly and this updated version is viewable by all members of the blockchain at the identical time. Due to blockchain's unique features, like speeding up transaction settlement and increasing transparency between parties, it has unlocked a new set of countries for traders, who would otherwise be held up because of various limiting factors (Out of reach and lack of knowledge about new traders across different countries.)

The ideal flow of events, after the integration is successful, is as follows. The importer and exporter draft a rough agreement regarding the importers' need and exporters' return. Once both parties have enough knowledge about the other's needs, an official agreement is drafted and shared with the import bank. Once the import bank validates the given agreement, it is shared with the export bank via a smart contract. The import bank has the authority to formulate the terms of accountability, review purchase documents and submit obligations to pay the export bank. On receiving the agreement, on the exporters end the export bank reviews and validated the draft. Once it is approved, a smart contract will be generated in the blockchain-based network. This smart contract will cover all trade details and conditions.

When the smart contract is put into effect, the data in the smart contract cannot be changed, meaning the data is immutable. This thereby locks in the shipment and payment obligations. Once the exporter receives the smart contract, he/she will digitally sign a blockchain equivalent letter of credit within the smart contract. This will start the trade process. The exporter will then send the requested goods to the importer. Before the goods are sent out, it will be checked by third party vendors and custom agents in the exporter's country. These entities will have to provide their respective signatures on the blockchains smart contract. The goods will then be transferred from Country X to Country Y. On receiving the goods, the importer will acknowledge the receipt of goods and start the payment procedure. The blockchain will automate the payment from importer to exporter by using provide acknowledgment.

IV. BENEFITS OF THE INTEGRATED METHOD OF TRADE FINANCE

The integration of the trade finance process with the blockchain technology will produce fruitful results. Distributed Ledger Technology is considered to be one of the most versatile technologies because of its various features such as immutability, transparency and speed. These exact features are needed for the advancement of trade finance to a decentralized ledger.

Few benefits offered by this new method of carrying out trade are real time review, disintermediation, reduce counter part risk, decentralized contract execution, automated settlement and reduced transaction fees, proof of ownership and regulatory transparency.

In real time review, as the trade finance process proceeds, the documents on the smart contract can updated instantaneously and can be reviewed by all the other entities present in the blockchain based network. This will thus play an important role in speeding up the initialisation of shipment or payment.

The focus of this integration was the removal of the, otherwise required, trusted intermediary who considers the risk factors. With the entry of blockchain into the trade finance process, the process will not have any dependency on financial institutes, like banks.

As we know blockchains are decentralized and are accessible by anyone on the network, every participant will have a copy which will be instantly updated. This will thus help in tracking bills, goods and payments leading to increase in speed and reduction of counter party risks.

The smart contracts prevalent in the blockchain networks execute themselves. This reduces the transaction fee and also leads to automated settlements of trade bills. In addition, this decentralized ledger will provide its regulators with live updates of essential documents and thereby promoting transparency in transactions.

V. SHORTCOMINGS OF THIS INTEGRATED NETWORK

There are always two sides to a coin, the same goes with blockchain technology. It has its pros which make it ideal for the implementation of trade finance but at the same time, there are some corners it does not currently cover. Encryption, large energy consumption, privacy, legal regulations, and data loss are a few of the limitations of blockchains.

When it comes to trade finance, the major barriers that the integration will face include: interoperability, privacy of data, authorized access to the blockchain network and scalability.

With the increase in cross country trade, interoperability and compatibility are a few of the major hurdles the technology needs to overcome. The integration of the blockchain-based model with the current system possesses a huge issue. On the contrary, removal of the current system is also not feasible, as the trading system will come to a halt.

When it comes to privacy, not all traders would trust this new automated system. The system may be hackable, data may be lost or someone can hamper with the identity of an individual. It is crucial for the blockchain network to maintain data integrity.

There are two categories of blockchain, namely, permissioned and permissionless. Permissionless blockchains are also known as public blockchains and can be accessed by everyone. Correspondingly, permissioned blockchains are distributed ledgers where only authorized personnel get access to the blockchain data. If the blockchain technology is implemented in an organization, the admin will have to keep various levels of authorization to reduce the risk of hacking.

The number of entities involved in the trade finance sector are growing rapidly. The number of transactions is increasing day by day. The growth of databases is unstoppable. This means that the blockchain network would also have to adopt this exponential growth immediately and at the same time maintain data integrity.

VI. CONCLUSION

In this paper, the concept of blockchain and trade finance was introduced. We then moved to describe the pain points in the current trade finance method, and thereby the need to shift to the more advanced and sophisticated method. We discuss the various consensus mechanism used in blockchain and their relevance to trade finance. After gaining enough insights regarding the public decentralized ledger and the crucial element to boost a country's economy, we looked are their integration and how blockchain aids trade finance to reduce unwanted and unnecessary complications in transactions. Furthermore, we talked about the challenges faced regarding this modern method. The promise blockchain offers is that it may have the capability to streamline the trade finance process. Blockchains heterogeneous features such are smart contracts, distributiveness, consensus validation, real-time review and updates, transparency and much more dress discrete functionality will enable trade finance to flourish and grow exponentially. It will help remove bad actors and will ensure that everyone plays fair in a new way of conducting trade, hence virtually eliminating the risk of manipulation by participants in the chain.

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