VIEW POINT

TRANSFORMING SUPPLY CHAIN FINANCE WITH BLOCKCHAIN

Abstract

In a post-pandemic world, Supply Chain Finance (SCF) processes have gained greater relevance. This paper demystifies SCF concepts and elaborates on how the strengths of Blockchain technology make it a potential game changer in the industry.

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Due to the prevailing pandemic, several enterprises are facing acute financial challenges. Credit tightening has affected trade flows and has increased financial pressure on buyers, suppliers, as well as intermediaries in global supply chains. Resultantly, there is a huge focus on optimizing working capital and on reducing costs of financing and operations. In helping companies meet these objectives, supply chain finance (SCF) processes have a huge role to play.

Supply Chain Finance and its challenges

In a normal scenario, when a buyer purchases upstream goods, the seller is paid on standard credit terms - typically 30 days or more after delivery of goods. However, especially in today's cash-starved economy, when sellers are in need of immediate funds to procure raw material for further production, a supply chain financier can come to the rescue.

In an SCF framework as shown in the illustration, on a seller delivering goods to the buyer, the buyer's financier provides an immediate cash payment to the seller, however at a small discount on the invoiced amount. The financier also extends the payment period for the buyer to settle funds, for example, from 30 days to 60 days. Thus, SCF offers distinctive advantages to both suppliers and buyers by providing much-needed liquidity to the supplier and improving the buyer's working capital.

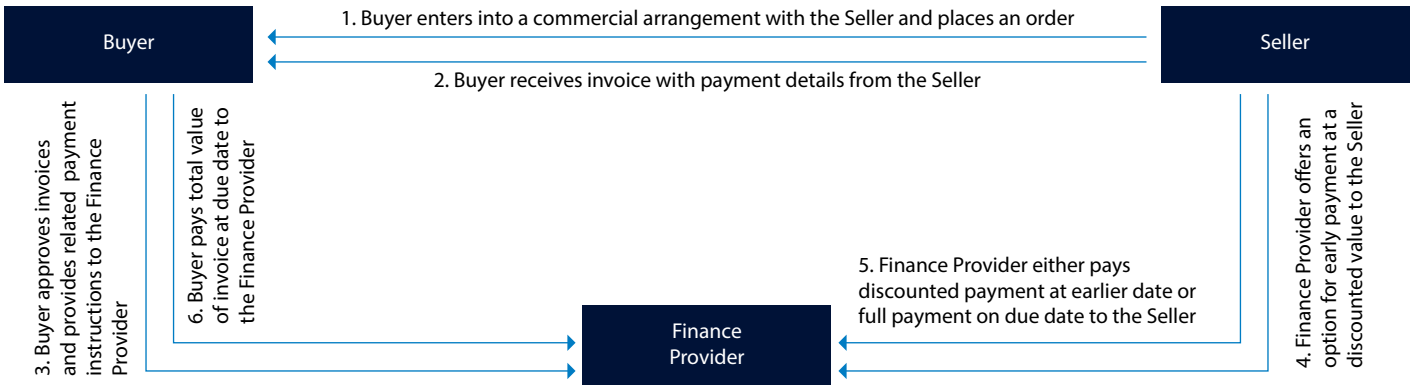


Fig: Fundamental Illustration of SCF Transaction Flow

In a real world supply chain, many more participants such as raw good suppliers, distributors, financial institutions, insurance firms, inspection services firms, warehouses, logistics providers, custom agents, and transporters are involved, in addition to the buyer, seller, and financier. This complex network requires a centralized SCF platform governed by a trusted intermediary to manage collaboration, communication, information exchanges, and financial needs between participants.

However, such centralized systems often face challenges including trust dependency, transparency, cost and time efficiency, and financial inclusion, as detailed in the graphic.

Trust Dependency

- Complex network consisting of multiple participants
- Dependency on a centralized platform governed by a trusted intermediary
- Possibilities of information abuse, record tampering, unverifiable transactions

Maintaining Transparency

- Risk of incorrect and forged financial documents and contracts
- Possibilities of double financing, incorrect sanctioned amount/ information exchange

Limited Financial Inclusion

- Small and medium scale enterprises (SMEs) often lack the infrastructure to provide real time view of their financial situations
- Challenges for financiers in credit portfolio assessment and onboarding of such SMEs leading to reluctance in including them in SCF

Operational Cost

- Complex operational activities such as compliance check, reconciliation, verification, confirmation and settlement of trade finance documents and contracts
- High labor cost to perform them

Cycle Time

- Multiple subsequent and parallel dependencies
- Participants maintain their own records of transactions and complete their own operational works to clear the transaction for next level processing
- Increased cycle time to meet financing need

Fig: Challenges in traditional SCF

The revolutionary technology of Blockchain has the potential to help build a system that can address these challenges, while keeping intact the benefits of SCF.

The facets of Blockchain

A Blockchain is a shared, trusted ledger of transactions that anyone in a peer-to-peer network can inspect, but can only be modified by the consensus of all parties in the network. Using cryptography, an immutable ledger is built using a chain of successive digital blocks where each block contains transaction details such as date, time, dollar amount, participants' information, and description. Below are key features of the technology to help understand its applicability for SCF:

- **Peer-to-peer network:** Blockchain is implemented in a distributed network of users, each holding an identical copy of the ledger. This eliminates the need for a centralized platform to administer transactions, thereby addressing the issue of trust dependency.
- **Shared digital ledger:** The transaction details are stored digitally, making many manual tasks such as reconciliations, reviews, and verifications redundant. Being shared, the ledger provides a complete view of the supply chain life cycle, enabling participants to identify opportunities for operation optimization, cycle time improvement, and cost efficiency.
- **Cryptography:** Using two main cryptographic techniques — hashing and digital signatures, Blockchain hides sensitive information from unauthorized people on the network. Using the transaction details to be included in a new block, Blockchain's hashing algorithm generates a fixed-size identifier called a hash for the new block, which also points to the previous block. Any tampering of transaction records changes the hash value of the associated block and all subsequent blocks. Thus, network participants can notice and reject these changes, thereby ensuring immutability of the ledger records. Blockchain also uses digital signatures to ensure authenticity of information in the ledger.
- **Consensus:** Blockchain's consensus mechanism plays a pivotal role in establishing trust among the many participants in a network. A new block can be added to a ledger only after all or a majority of participants validate its transactions and reach consensus. No backtracking is allowed after this point, ensuring that the Blockchain is secured, immutable, and immune to attacks.
- **Smart Contracts:** SCF transactions are secured through contracts, which are triggered at different stages such as purchase order approval, invoice generation, or claims and settlement. Legal contracting fees and costs for using trusted intermediaries to settle such contracts can be substantial and often challenging for small players. Blockchain addresses this challenge through self-executing smart contracts on the shared ledger. Agreements between participants are auto-enforced through computer programs, and coded to be executed at different stages using pre-defined business rules.

A view of Blockchain-driven SCF

In a Blockchain driven SCF, participants such as buyers, sellers, financiers, and others come together to form a peer-to-peer distributed network. Each participant represents a node, and can act as a client or a server to another node. Each node has equal power and performs the same tasks. Transactions are digitally recorded and broadcasted to all participants in the network and each participant stores the same information.

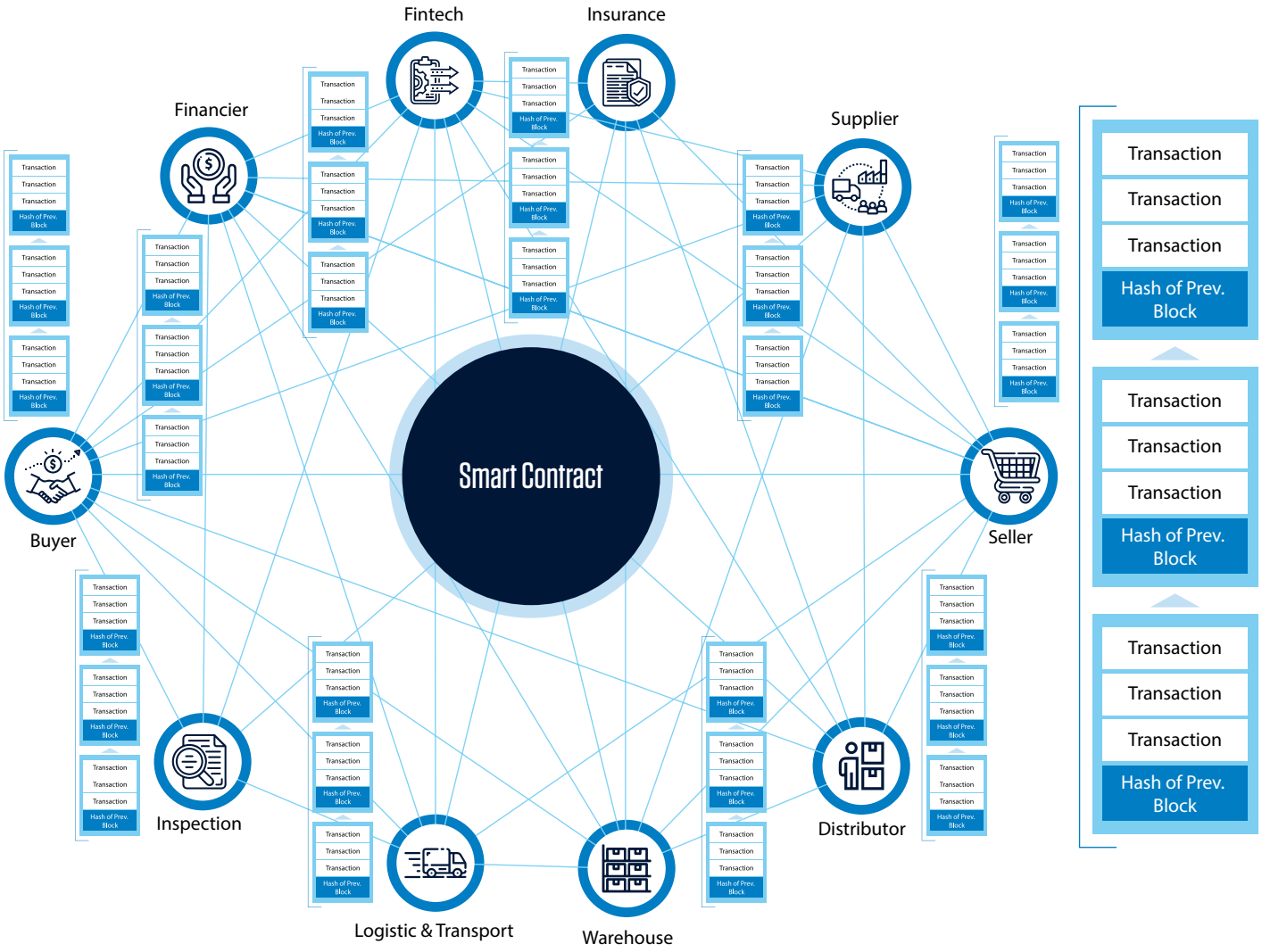
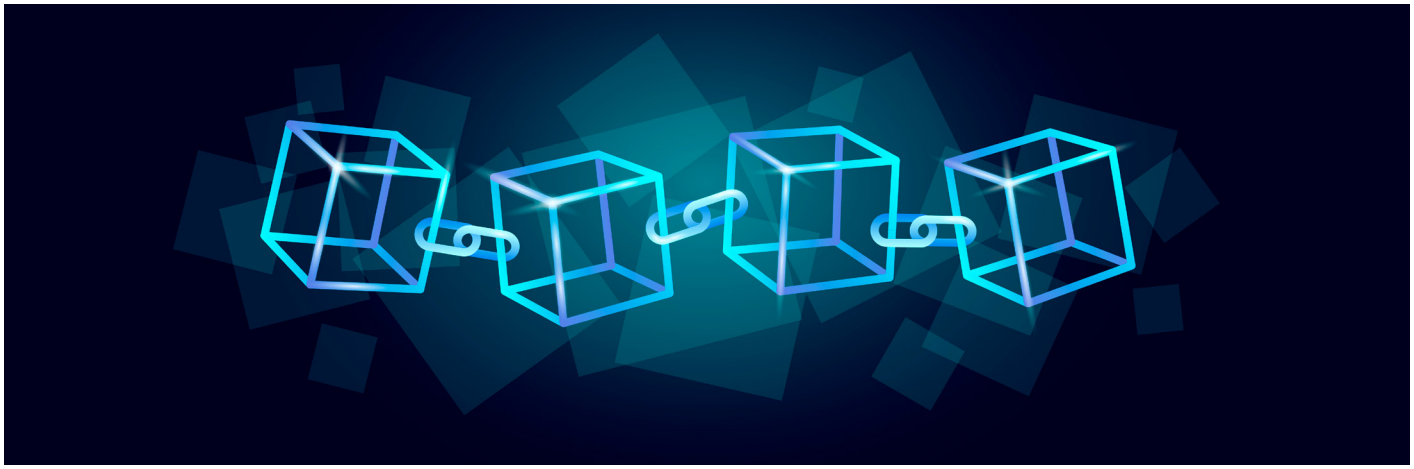


Fig: Blockchain network for illustrative supply chain



The hash for the first block of the Blockchain called 'genesis block', is calculated using transactions inside that block. For the hash of every subsequent new block, transactions applicable for that block as well as the hash of the previous block are taken as inputs. Participants then follow a consensus protocol to provide agreement on adding this block to the Blockchain.

Some common yet evolving consensus protocols are proof of work (PoW) where participants are required to perform complex computations to reach consensus and create a block, and proof of stake (PoS) where participants are required to stake funds to create a block. While PoW is a fundamental consensus protocol, yet its complex computations require a lot of computational and energy resources and hence is expensive. In the PoS protocol, participants put coins into the network which are selected randomly by an algorithm. The participant to which the coin belongs, gets the opportunity to create the next block. Without complex computations involved, PoS consumes less energy and resources making it cheaper and cleaner. Yet, other protocols are still evolving towards more cost and time efficiency as well as security.

All transactions that constitute the block are digitally signed using public-private key pairs. For example, a seller making a transaction, encrypts it using a private key. Other participants in the network validate the encrypted message using the public key of the seller to access the message. If the seller wants a particular action from a buyer, the seller will transmit an encrypted message using the public key of the buyer. The buyer decrypts the message using its private key for further action.

Agreements between participants in the Blockchain, say for example, between buyers, sellers, and financiers can be programmed into smart contracts. Thus, a seller can invoice for an order in advance to the buyer, who approves payment instructions and sends them to the financier. The smart contract then automatically debits the amount from the financier's account into the seller's account as per their contracted agreements. The seller uses the finance to produce the product and deliver to the buyer. If the buyer approves the delivery, the smart contract automatically debits the amount from the buyer's account on the due date and credits it into the financier's account.

Thus, smart contracts auto-update the distributed ledger with appropriate transfer of assets' ownership and flow of finance between participants. Participants verify all transactions for authenticity and follow a consensus protocol to add a new block of transactions to the Blockchain.

These mechanisms address the challenges of conventional supply chain finance by ensuring trust and maintaining transparency and integrity. In addition, with participants having a complete view of the supply chain, and with digital records aiding automation of operational activities, real-time collaborative decision making on financing is enabled, reducing cycle time and improving efficiency.

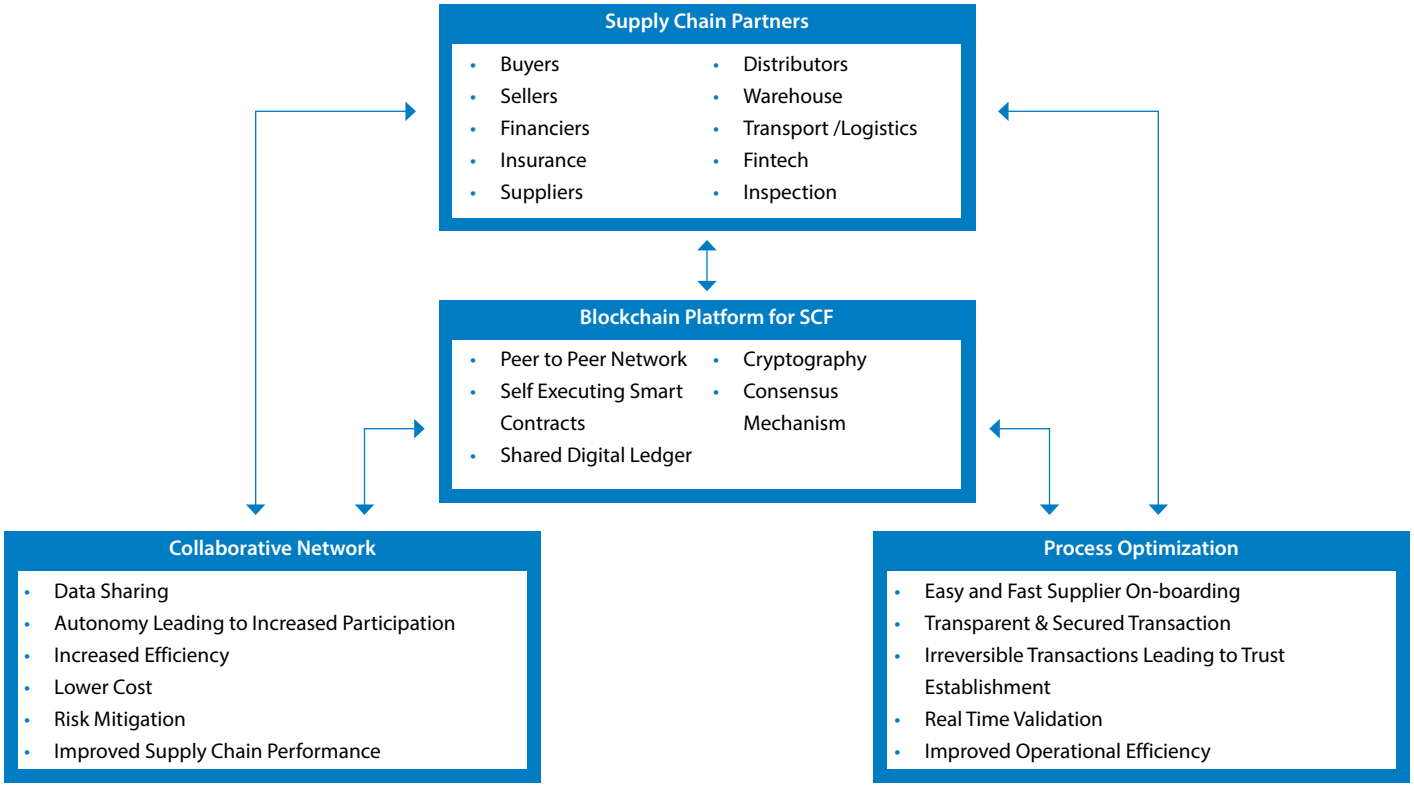


Fig: Blockchain Framework for SCF

Towards SCF disruption

In these challenging times, when there is an immense focus on cost efficiency, working capital optimization, and operational efficiency in SCF, Blockchain can provide a truly disruptive solution.

Several organizations have already warmed up to Blockchain SCF projects. Claimed to be the first ever Blockchain platform in SCF, Chained Finance — developed by Dianrong, a China based electronic firm and FnConn, an online marketplace lender as well as a Foxconn subsidiary — is benefitting SMEs in China[1]. Similarly, IBM and Sichuan Hejia, a chinese SCM firm, have jointly launched their Yijian System for pharmaceutical procurement which transparently tracks the flow of drugs, encrypts trading records and provides transaction authenticating mechanisms[2]. Similarly, Sofocle Technologies' sofoCap uses blockchain for seamless invoice discounting[3].

As Blockchain adoptions gain ground, all types of supply chain participants will increasingly be able to share and monitor financial information transparently while ensuring authenticity, security, and greater collaboration. With Blockchain, SCF disruption is not merely a pipe dream but rather just around the corner.

References:

[1] https://www.dianrong.com/mkt/newsletter_201704/en/en.html

[2] https://newsroom.ibm.com/2017-04-11-IBM-and-Hejia-Launch-Blockchain-based-Supply-Chain-Financial-Services-Platform-for-Pharmaceutical-Procurement?mhsrc=ibmsearch_a&mhq=Yijian%20System

[3] https://www.sofocle.com/solutions/blockchain-in-supply-chain-finance-sofocap/

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Abhishek is an IT Professional with over 10 years of experience in Business Development, Consulting, Pre-Sales, Delivery and Corporate Training. Abhishek's expertise has been in managing strategic deals from Banking and Financial Services clients to transform their Capital Markets and Retail Banking landscape. His current role involves assessing current state of clients' processes, identifying gaps and proposing digital solutions to address those gaps as well as meet clients' business objectives in Financial Services.

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