Blockchain in Logistics

What are the opportunities?

Blockchain Technology in Logistics

In the past decade, many leading companies have made major investments and efforts to digitize their enterprise in hopes of increased visibility, efficiency and cost savings. However, most of these companies still find themselves with limited visibility and insight to its operations and products. This is the result of investing in systems which were created for an era of vertically integrated organizations with static supply chains. While they were relevant 30 years ago, times have changed. Today, supply chains are much bigger, collaborative, complex and dynamic than ever before[1]. A fintech that is widely anticipated to be compatible with and bring about great value to a new age of supply chains is blockchain technology (BCT). According to Gartner, BCT applications in global supply chains are expected to support an annual movement and tracking of $2 trillion goods and services globally by 2023[2]. What is BCT? Popularized by Bitcoin, BCT is "a shared database where all transactions of a given asset are registered in cryptographically chained blocks of data in order to become immutable[3]". In this report we explore the opportunities for BCT applications in the logistics industry.

Challenges to be Addressed

To understand the purpose of BCT applications in logistics, let us first understand the current state of (and the problems with) financial processes in the logistics industry. We can distinguish them into 2 main categories: (i) Supply Chain Finance (SCF) and (ii) Payment and Remittance.

Supply chain finance

SCF is "the techniques and practices used by banks and other financial institutions to manage the capital invested into the supply chain and reduce risk for the parties involved[4]". SCF includes, but is not limited to, trade finance, the provision of working capital etc. The SCF market is a large and growing market with an estimated US$9 trillion global value[5]. Over the past decade, the market has been growing strongly, even outpacing traditional trade finance. Oliver Wyman anticipates this trend to continue to accelerate in the next three to five years.

Source: Oliver Wyman[6], 2017

However, according to the International Chamber of Commerce (ICC), there is a finance trade gap of US$1.5 trillion worldwide[7]. Many companies,

especially in emerging markets, are unable to meet their financing needs by tapping on SCF due to issues with compliance obligations, high transaction costs and accounting for SCF transactions. All of which has made SCF inaccessible for some, especially SMEs.

The problem with the lack of access is: The industry is capital-intensive by nature and hence the lack of access to capital makes the barriers to entry higher. SMEs encounter problems to acquire sufficient financing from traditional lenders as financing SMEs' business and compliance models are often regarded as too complex and low scale for traditional lenders to provide for. Adding onto the fact that traditional banks have been wary of SMEs since the 2008 financial crisis, it is hence not uncommon for SMEs to find themselves at risk of insolvency. All of which, severely compromises the growth opportunities that SMEs can offer to value chains.

It is important to minimize SME's exposure to the risks of insolvency as the supply chain is more interdependent than ever. Many SMEs are the few sole providers of critical product components to upstream companies[8]. As a result, the risks and resilience of SMEs are indirectly shared by upstream and larger logistics companies. Considering its ripple effects, it is hence beneficial to address this problem.

Payment and Remittance

Besides SCF, the logistics sector grapples with financial irregularities in payment and remittance[9]. Traditional methods of payment are often tedious, manual and inefficient. Typically, one party issues a document that states the details of transaction and the other party makes cash or check payments. As such, manual intervention, such as tracking, recording, and reconciling these transactions, is required at every stage, which can be very costly. For example, the cost of handling cash in Uganda can amount up to 20% of a logistic company's annual turnover[10].

Across industries, many have been quick to digitize their financial infrastructure. However, the logistics sector has been disproportionately slower to adapt to such trends. While e-payments are now more available and accessible today, there are still many logistic companies that continue with traditional modes of payment. This is evident from an AFP Electronics Payments Survey which revealed that 97% of those surveyed still make check payments to their suppliers[11]. Furthermore, even with the digitalization of payment processes, manual intervention may still be required for cross-checking of orders against invoices, tendering payments through banks, reconciling payment reports with accounts and etc.

What's Wrong with Financial Process Inefficiencies?

A common problem with both the SCF and payment and remittance is the inefficiency of financial processes. This inefficiency generates 3 main concerns:

Inefficient Manual processes

Traditionally, many financial processes are still predominantly paper-based and require manual interventions. The resulting lack of visibility in financial processes also leads to inaccuracies in risk predictions. For example, purchase order (PO) fulfilment processes are typically unable to be tracked with sufficient granularity to make accurate forecasts of its performance risks. Inefficient manual processes hence lead to delays, high costs, coordination efforts and exposure to foreign currency risks, time restrictions and etc.

Reduction in Cash Flows

Due to the time and resources taken to facilitate financial processes and transactions, a majority of working capital are locked up. This is disproportionately damaging to logistic companies, especially SMEs, as it reduces their available free cash flow (FCF) for internal funding. Given the increasingly volatile business environment, access to cash becomes crucial. For example, the COVID-19 pandemic has greatly disrupted supply chains – Logistic companies are finding themselves grappling with slow sales, reduced margins, strained working capital and compromised external funding[12]. In a way, inefficient financial processes deplete internal funding abilities to ride out such difficult times. The combination of the financial impact of the pandemic and weak internal funding abilities are hence causing companies to face a severe cash crunch; or worse, a risk of bankruptcy.

Inaccuracies, Traceability and Security Concerns

Lastly, manual and paper-based financial processes are typically more prone to data errors and inaccuracies. A low visibility and traceability of financial processes also puts companies at risk of fraudulent activities, such as the 2014 Qingdao receipt scandal where warehouse receipts were forged to obtain several bank loans by pledging metal as collateral. All of which can be detrimental and cost companies millions of dollars. In the case of the Qingdao scandal, the fraud was estimated to have costed the victims over US$3 billion[13].

How can BCT be Applied in Logistics?

We foresee logistics tapping on BC in conjunction with digital payment technologies to build BC-driven supply chains. A BC ecosystem has the ability to cover the entire supply chain, from capital fundraising, invoice processing, data documentation to payment, while connecting involved entities in a single BC-driven platform. Information is collected, stored and transferred across all entities, successfully eliminating the inefficiencies in information transfer while maintaining a single source of truth[14]. Currently, there are several existing initiatives and developments of BCT applications in supply chains such as IBM's Food Trust Initiative and consortia such as the Global Shipping Business Network (GSBN). The growth of such initiatives and developments of BCT in supply chains hence signals its prospect for advancement and broad

application in logistics. In fact, IBM Food Trust, a BC-based cloud network that offers a food traceability system for greater transparency, traceability and efficiency, has garnered over 80 brands, such as Walmart, Nestle and Unilever, onboard and currently tracks over 1300 products.

What makes BCT so appealing to the logistics industry is its ability to provide a holistic solution to the aforementioned challenges by improving (i) secured data documentation, the (ii) transfer of funds and (iii) trade finance.

Secure and Transparent Data Documentation

Time-stamped hash-based algorithms of BCT allows information and data to be automatically authenticated when stored, without the need for validation by a third-party, such as auditors. The almost instantaneous documentation of data enhances visibility and traceability of the entire fulfilment process. One successful example is Walmart, whose proof-of-concept found that its Hyperledger Fabric-powered BC system managed to cut the time it took to locate their food products, from 7 days to 2.2 seconds[15]. Evidently, the use of BCT improves operational transparency and internal accountability.

Furthermore, cumbersome data enrichment processes, such as integrating and reconciliating data, are eliminated as information is collected and stored into a singular digital document[16], and transferred across all participants. In terms of accuracy, there is assurance of recorded information in the BC network as they are continually evaluated upon entry. In this way, distributed ledgers and transactions are hence guaranteed authenticity. In terms of privacy, entities within the network are able to maintain control and authority over the sharing of data ahead of trading time. The type of data to be revealed to counterparties are at their discretion, which reduces their risk and/or credit exposure. In terms of security, information shared is secured through the use of smart contracts: Smart contracts are a form of self-enforcing agreement that are automatically triggered and executed if a set of rules are met. They "provide mechanisms for efficiently managing tokenized assets and access rights between two or more parties[17]", thus providing tamper-free assurance. Smart contracts hence help to mitigate the risks of non-payment and trade due to the assurance of legal validity and possibility for real-time adjustment of risks with enhanced tracking capabilities.

Transfer of Funds

In the case of payment and remittance, smart contracts are utilized through the creation of one-layer invoice payment systems. It eliminates the analogue gap between buyers and suppliers as the generated 'smart invoices' are paid automatically at maturity while triggering automatic digital invoicing and payments through banking partners within the network. In fact, a research conducted by MIT CTL revealed that the utilization of smart contracts within a BC ecosystem leads to an average net increase in efficiency of invoice processing by 13%[18].

Evidently, BCT applied in conjunction with smart contracts has the potential to radically simplify existing finance processes, drastically reduce the required working capital, accelerate access to cash and enhance accounts receivables (AR) reporting capabilities. By shortening the cash-to-cash (C2C) cycle, what was once idle capital can now be freed up to increase FCF and improve internal funding abilities.

Trade Finance

With greater transparency, this will increase financing opportunities for traditional lenders and also draw non-traditional providers of capital to SCF. This is due to the ability to gain accurate real-time data through BCT which generates greater trust and drives down performance risks, thus making SCF more attractive. As a result, logistic companies, especially SMEs, can potentially gain greater access to both traditional and alternative sources of financing.

How can fintech companies come into play? With BCT, fintech companies have the potential to act as money-creating intermediaries by using securitization markets to offer simpler and more flexible solutions for businesses to raise capital. Unlike traditional banks, fintech companies are not held to the same regulations and profit-margins. Therefore, this creates an opportunity for fintech companies to carry out SCF transactions in which traditional banks are unable to underwrite.

How does it work? In SCF securitization, capital is raised by selling income-producing assets at a discount to special purpose vehicle (SPV) companies. The SPV then transforms the assets to asset-backed securities (ABS) and sells them to private and institutional investors in the capital market. An example is Skuchain: a BC platform that uses its own SPV to offer asset-backed lending to businesses by allowing the use of inventory as collateral to obtain credit. In the case of Skuchain, the company found an opportunity in inventory financing as traditional banks face limitations in holding title to inventory[19]. This thus offers businesses more financing options on top of traditional means of raising capital. The ability for a direct provision of credit by market processes is thus a potential solution to the US$1.3 trillion of unmet demand for trade finance.

Challenges of Implementation

Nonetheless, BCT applications in logistics do face several challenges that hinder its widescale implementation.

Integration and Compatibility

From a technological perspective, BCT will pose varying degrees of compatibility problems with both the organization and its information systems which will write and read to the BC. Current BC systems are neither capable of seamless synchronization, interoperable nor standardised for ease of implementation. The integration and/or extension of BCT is especially complex for organizations with legacy and embedded systems as they typically heavily rely on relational databases and synchronous transactions. On the other hand, although less complex and simpler systems are not burdened by the same complexities of legacy systems, they typically lack strategic IT management to effectively manage and execute.

Regulation and Governance

There are strong regulatory and legal barriers, such as KYC and AML regulations, that limit the application of BCT in global supply chains. With existing financial and legal systems being highly regulated, it hence inevitably stalls the implementation of BCT in supply chains. Notwithstanding the bottlenecks and inefficiencies, centralized financial systems are however not easily replaceable as they act as shock absorbers to ride over economic crisis. Hence, we foresee that easing existing regulations to make way for a shared global BCT industry standard may take some time, or maybe even years, to realize.

Security and Privacy

BCT applications typically require the linkage of smart transactions and contracts to known identities. Naturally, this raises security and privacy concerns with regards to data that are stored and shared on the shared ledger. Hence, a large-scale adoption of BCT will require a thorough investigation of the purpose and extent of breach of privacy before it can be fully supported by all entities. This is further supported by a case study on ReLog, a 2016 pilot test, that reported: For BCT applications in supply chains to be successful, clear benefits for participants are required before increased monitoring and lowered privacy may be granted[20]. Hence, until sufficient efforts to extinguish these concerns are done, prospective entities may remain skeptical and reluctant to onboard.

Where does the future lie?

The future of BCT in logistics is certainly a promising and anticipatory one. Once a global regulatory framework governing BCT is established and standardized, we can expect an exponential increase in the adoption and development of BCT in the logistic industry. The potential benefits to be reaped from taking advantage of BCT applications are attractive and even has the potential to spawn the development and creation of new, innovative financing solutions, to further optimize processes and drive down costs. In addition, we foresee BCT applications melding with other emerging technologies, such as AI, IoT, MLBT and etc., to better facilitate and offer a range of new and innovative financial products and services to the logistics industry. Nevertheless, for BCT applications to truly address the financial challenges within global supply chains, it will require a collective effort from regulators, financial institutions and industry players to address the challenges of implementation, clarify and harmonize a standardized framework. Only then, can a successful global implementation of BCT in the logistics industry be achieved.

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