Unlocking supply chain benefits through blockchain technology

As the advantages of blockchain technology become clear among all organizations, it is poised to revolutionize supply chain logistics.

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Where did your product come from? How did it get here? What happened along the way? You may know your customer, but how well do you know your vendor? Once upon a time these were easy questions to answer. Now, as concerns over product quality and ethical sourcing drive demand for greater clarity over a product’s journey, organizations across all industries are challenged to derive clear answers for increasingly complex supply chains.

This is where blockchain and Internet of Things (IoT) technologies are poised to reshape the supply chain environment.

Complex times, sophisticated measures

Globalization and cost-reductions are among the forces adding complexity to modern supply chains. Organizations are going to great lengths to deliver their products at cheaper costs, and the pressure is on procurement managers to seek more cost-effective solutions either by sourcing materials and services overseas or enacting cost-cutting measures among their partners. As a result, supply chains are expanding to include touchpoints across the globe, creating intricate manufacturing plans, shipping routes, and regulatory challenges – and that is before products even land in Canada for distribution.

Entire industries have risen up to help companies make sense of this complexity. Still, with stronger scrutiny over the source and quality of products – especially among global players – there is a need for capabilities that will allow companies to not only track a product's complete migration from source A to shelf B, but disentangle our increasingly complex supply chain logistics.

Enter: Blockchain and IoT

Digital ledgers and peer-to-peer transactions are terms more commonly associated with the technology and finance sectors. Yet as the advantages of blockchain technology become clear among all organizations, it is poised to revolutionize supply chain logistics.

The technology would take a paper in itself to explain, but the concept is (relatively) straightforward. Digital ledgers unite all supply chain partners along a decentralized ‘chain’ of tamper-proof nodes which contain real-time information pertaining to a product’s journey. Parties within that resulting ‘chain’ of information have the ability to both add their data to those nodes and view what has already been uploaded, helping them keep better track of the process and their role within it.

Traditionally, companies have only had access to information about a product’s journey after the fact. Working in tandem with key technologies, however, a blockchain can help organizations track every aspect of the product (e.g. volume, location, condition, and even temperature) and can be instantly recorded and uploaded to the blockchain’s nodes.

Those technologies include IoT devices, which can be embedded in the form of sensors and self-reporting devices at each step of the product journey (e.g. on a cart, in a factory, in a truck, etc.). Each device is connected to the blockchain as a specific identity, where it uploads real-time information to the blockchain regarding everything from sourcing locations to shipping updates, and product volumes to environmental conditions – information which can keep all parties in a blockchain informed about the product journey every step of the way.

Securing the links

The strength of a blockchain is also determined by the trustworthiness of its tools. And while IoT sensors and related real-time devices play a critical role in unlocking the aforementioned benefits, their relatively minimal design can raise concerns over their ability to adequately uphold blockchain security.

More specifically, while there are many IoT and blockchain device solutions in the market that are made to uphold high levels of security, the possibility that some manufacturers may leave critical security features on the cutting room floor in order to save costs and simplify their designs is real. For this reason, implementing IoT sensors and related self-reporting devices benefits from a comprehensive IT strategy that includes a robust cybersecurity assessment of the IoT component.
Marrying blockchain and IoT with supply chains can certainly have its advantages. Consider the following examples:

**Operational efficiencies**
The ability to track a product’s journey from farm to fork (or mine to finger, factory to shelf) gives organizations the means to spot delays and logistical speed-bumps along the ‘chain’ and respond accordingly. Knowing where product is coming from, and the conditions in which it was produced, can also provide greater peace of mind in regards to product quality, thereby avoiding costly recalls, delays, or dysfunctions in the future.

**Total recalls**
The ability to better track part origins enables organizations to develop more efficient and cost-effective recall strategies. For example, the ability to trace a defective parts origins to specific sources from specific regions (and even specific factories) can narrow the scope of a recall dramatically, saving both time and resources associated with less-informed recall strategies. This would also be extremely applicable in the pharmaceutical world, where drugs may need to be recalled due to regulations, new research or defects.

**Negating reconciliations**
The immutable nature of blockchain ‘nodes’ suggests that organizations may no longer need to spend time and resources conducting reconciliations, provided the proper controls are in place and monitored.

**Minimizing losses**
Consider a shipment of one million tomatoes that makes it to Canada with 10,000 fewer units than expected. It would normally take weeks to investigate and reconcile those losses. Using IoT sensors, organizations would know where the discrepancy originated, when conditions might have caused spoiling or damage, or if a transportation accident occurred along the way. Combined with self-reporting devices, and it is possible to create a system wherein these incidents are automatically logged, tracked, and reconciled securely within the blockchain to be seen and validated by relevant parties. All told, these insights can help mitigate and reconcile product losses due to fraud or other unforeseen circumstances.

**Ethical sourcing**
A majority of customers want the peace of mind of knowing their products are coming to them by way of fair, legal, and conflict-free means. That can be difficult to verify for a procurement professional who may have hundreds of files on their desk and little leeway to visit every site in their chain. IoT sensors and blockchain technology can therefore help organizations track their products’ origins to ensure they are being ethically sourced, and continue to do so on a consistent, real time basis.

**Food safety**
Being able to track products from their originating farms to their treatment on grocery shelves gives retailers the backing to certify their goods are being made according to the highest standards or, in the case of food, that they are verified 100 percent vegan, organic, kosher, etc. And as noted, these technologies can also make it possible for stakeholders to narrow the scope of food recalls by tracking corrupted products down to their originating factories or farms.

**Maintaining product standards**
As with food safety, similar assurances can also be embedded in the non-food retail world, where organizations can use self-reporting, blockchain, and real time sensors to ensure their products are being manufactured in accordance to relevant industry standards (or for example, ISO certifications).

**Stronger negotiations**
In a typical deal, a procurement team may sign a contract with their supplier, get their 20 percent discount, and assume all will go as planned. The challenge with this approach is they may be unaware of product delays or errors along the way. By embedding IoT sensors from the point of origination to the final drop-off, parties can leverage real-time blockchain data to gain insight into what is actually occurring throughout the product’s transportation. And given the added assurances that blockchain can provide – especially in the event connected devices go dark at various stages – one can see why this data can be useful in informing an ongoing and reactive negotiation process.

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**Efficient trade financing:** It is possible for consumers on a blockchain to include their bank as a node and give consent to provide details of their account to suppliers of their choosing. Doing so can help side-step lengthy transaction times and credit processes, and give suppliers the means to make real-time decisions based on their client’s current resources and product journey updates via IoT sensors and self-reporting devices. The banks could be added as a participating node to settle payments as transactions are recorded (rather verified on a real time basis), increasing cash flows for all participants on the chain.

**Smarter contracts:** Blockchains can be set up with self-executing protocols that automatically link all support parties to the transaction, thereby saving time and process costs. Adding financial institutions to the chain, for example, enables parties to conduct timely transactions, while including insurance could enable real-time rate fluctuations based on any number of factors (e.g. weather, road conditions, regions), and service providers could equally adjust their conditions on the go based on up-to-date feedback.

**Guarding the chain**

Like all data-driven technologies, users must consider the ‘garbage in, garbage out’ principle; that is, the quality of a digital ledger is intrinsically linked to the security and effectiveness of its controls, protocols, and cyber security measures. *In addition, you need to be sure that the technology being used is the right solution to the right problem.*

Indeed, the value of blockchain governance cannot be overstated. The risk of uploading fraudulent, corrupt, or inaccurate data will always exist – especially as long as real people are part of the equation. That is why it is critical for blockchain technology to be embedded into supply chains alongside the proper controls and cyber security measures. Using the right technology to solve the problem is critical, including considering which sensors to use, and how to ensure they are not being compromised.

And as more and more industries become wise to the advantages of blockchain and IoT innovations², it is critical to ensure those controls are suitable, monitored, and ready for the challenges ahead.

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