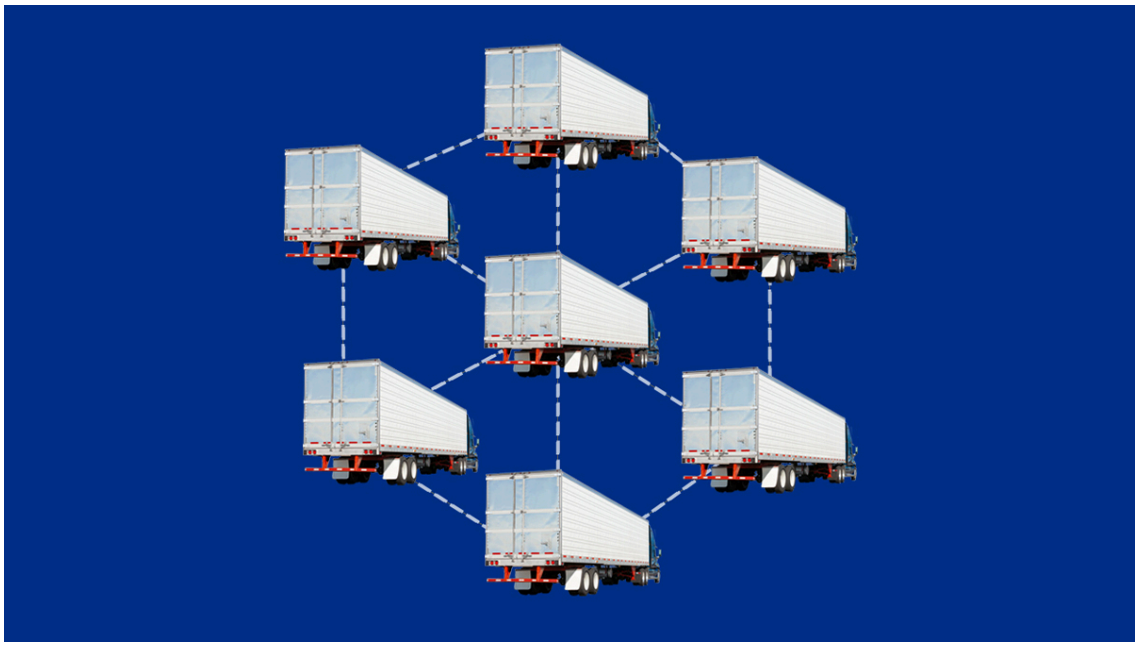
Operations And Supply Chain Management

How Walmart Canada Uses Blockchain to Solve Supply-Chain Challenges

by Kate Vitasek, John Bayliss, Loudon Owen and Neeraj Srivastava

January 5, 2022



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Summary. Walmart Canada applied blockchain to solve a common logistics nightmare: payment disputes with its 70 third-party freight carriers. To solve the problem it built a blockchain network. The system has not only virtually eliminated the payments problem; it... **more**

Walmart has long been known as a leader in supply chain management. However, its prowess could not insulate it from a problem plaguing the transportation industry for decades: vast data discrepancies in the invoice and payment process for freight carriers, which required costly reconciliation efforts and caused long payment delays. Then Walmart Canada pioneered a solution: It employed blockchain, a distributed-ledger technology, to create an automated system for managing invoices from and payments to its 70 third-party freight carriers.

The initiative started when one of us (John Bayliss) and his Walmart Canada team began thinking about new ways to solve the problem. The sheer magnitude of the data was immense. Walmart Canada delivers over 500,000 shipments annually to distribution centers and stores across Canada, using both its own trucking fleet and third-party carriers.

The essential service of moving a massive quantity of goods (many of which are perishable) across borders, time zones, and different climates is an enormous operational challenge. For example, each load shipped requires tracking data points such as stop locations, gallons of fuel, and temperature updates that need to be independently calculated and incorporated into each invoice. With over 200 data points that needed to be factored into invoices, it is easy to see how the invoice and payment process could be fraught with data discrepancies. And with 70% of invoices requiring reconciliation efforts, there were increased transaction costs and unhappy carriers waiting for payments.

An analysis identified the root cause of the problem: the use of multiple information systems between Walmart Canada and its carriers that could not talk to each other. Consequently, reconciliation had to be performed manually — a labor-intensive, time-consuming process riddled with inconsistencies.

One of Walmart Canada's tech leaders suggested automating the process by creating a blockchain network, which would overcome the problem of incompatible enterprise systems and would establish a shared single source of truth for all parties. But there were skeptics because, at that point, blockchain technology had not been used in a substantial, business-critical function. Plus, there were multiple flavors of blockchain. Would it be better to

have a public blockchain network like those used for cryptocurrencies or a private blockchain network?

To help it, Walmart Canada turned to DLT Labs, a leader in developing and deploying innovative enterprise solutions using distributed ledger technology. A short time later, Bison Transport, one of Walmart Canada's carriers, joined the team charged with developing a network. A pilot version, which initially just involved Walmart Canada and Bison Transport, went live in January 2019 after being exhaustively tested. It was successful, and in March 2021, the network, known as DL Freight, was rolled out to the 69 other carriers. The system continuously gathers information at every step — from the tender offer from the carrier to the proof of delivery and the approval of payment. This information is automatically captured and synchronized in real-time and is visible only to the parties involved in the transaction.

By all accounts the system has been a tremendous success. Prior to DL Freight over 70% of invoices were disputed. Today less than 1% of invoices have discrepancies, and these disputes are easily flagged and quickly resolved. Gone are the days of payments taking weeks or months; carriers are now getting paid on time.

Here are the lessons from the Walmart Canada effort that other companies interested in creating a blockchain network can apply:

1. Involve key stakeholders. The participation of Bison Transport, which has one of the largest truck fleets in North America, allowed the design team to get the carriers' view of the problems that needed to be solved and ensured that solutions would work not just for Walmart but also for its logistics partners.

2. Weigh the pros and cons of using a private vs. a public blockchain. A public blockchain network — one that anyone can join without asking for permission — allows unlimited viewing of information stored on it, eliminates intermediaries, and operates independently of any governing party. It is well-suited for digital

consumer offerings (like NFT's), cryptocurrencies, and certifying information such as individuals' degrees or certificates.
But private networks — those that require a party to be granted permission to join it — are often far better suited for businesses because access is restricted to verified members and only parties directly working together can see the specific information they exchange. This better satisfies industrial-grade security requirements. For these reasons, Walmart decided to go with a private network built on Hyperledger Fabric, an open-source platform.

3. Agree on the business rules and calculations. Any complex business has both fixed and variable processes and costs and they are rarely, if ever, the same for any two companies. A fundamental prerequisite for creating a blockchain-enabled system is to get the parties to agree to all the calculations and business rules that the network will employ.

For Walmart and its carriers, this meant working with each carrier's unique data (vendor name, payment terms, contract duration, and general terms and conditions), which is combined with governing master tables of information such as fuel rates and tax rates. The parties should then jointly agree to the formulas that the blockchain will use to calculate each invoice.

The DL Freight blockchain synthesizes all the data points in real time throughout each unique delivery, taking into account information such as fuel costs, offroad milage, and delays at the delivery point. The system creates a running invoice that evolves in real time as costs accrue.

4. Build in checks and balances. Automated checks and balances can and should be built into the blockchain system — both to prevent errors and to identify opportunities to enhance performance. For example, the carrier's information about miles traveled and fuel consumed is automatically compared with Internet of Things (IoT) data reported from independent devices

on the trucks and any discrepancy is immediately highlighted. These checks and balances result in a self-learning system. As multiple carriers travel between identical start and end points over time, the history of the carriers' performance is aggregated and automatically compared to each subsequent trip, helping both Walmart and the carriers optimize their operations.

The financial value of automated checks and balances goes beyond payments. For example, since the system automates all financial calculations and updates them continuously throughout the process, any financial service — such as carrier financing of the invoices due for payment — can also be automated because the blockchain system eliminates the need to determine if an invoice is accurate and valid. This makes possible highly efficient management of working capital and creates a market for financial institutions that can now provide financing at any stage of the supply chain.

5. Don't try to replace legacy IT systems. While legacy systems may be older and rigid, they almost always have unique strengths, and the data they hold is valuable. So rather than insisting the legacy systems be replaced, any blockchain system should rest on top of the parties' legacy systems. Its ability to do so is one of its great benefits.

One of the biggest benefits of the blockchain platform is the unprecedented level of trust its end-to-end supply chain visibility has created between Walmart Canada and its carriers. The original goal of the initiative was to eliminate disputes and wasted resources. But the blockchain solution has also provided Walmart and its supply chain partners with insights that have led to major operational improvements.

For example, it is now possible to determine which specific routes are the safest or best in terms of time and fuel consumption and to optimize efficiency by vehicle, route, load weight, and even the optimal time to travel (i.e., day or night). The blockchain system

has also helped handle the enormous challenge of juggling the arrival of so many loads: By constantly updating and automatically sharing trucks' expected arrival times with the distribution centers or stores, deliveries can be better coordinated.

The success of Walmart Canada's system has demonstrated the potential of blockchain. It has shown that the technology can generate significant operational and financial gains and improve supplier relations.

Kate Vitasek is a member of the graduate and executive education faculty of the University of Tennessee, Knoxville's Haslam College of Business, where she leads the university's research and courses on highly collaborative win-win "vested" strategic business relationships.

JB

John Bayliss is an executive vice president and the chief transformation officer at Walmart Canada.

LO

Loudon Owen is chief executive officer of DLT Labs, a next-generation data management software company specializing in supply chain management and financial services.

NS

Neeraj Srivastava is a founder and the chief technology officer of DLT Labs, a next-generation data management software company specializing in supply chain management and financial services.

   

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