



# How Blockchain Can Benefit the Food Supply Chain

The technology could bring visibility, efficiency and security

by CRAIG GUILLOT

**B**lockchain remains an obscure concept to many, but experts say the technology could have big implications for grocers and retailers that carry food products by enabling them to better trace the origins of items and more quickly handle recalls. From farms and processing facilities to the shelves of grocery stores, experts say a blockchain-based system could create a reliable and trusted network to share information about food products.

While retailers are continually finding ways to reduce risk and optimize supply chains, food products can be especially challenging because of their perishable nature and potential hazards. The fact that farmers, processors, manufacturers, shipping companies and distributors often use their own reporting systems only adds to the

complexity. Even in today's era of the Internet of Things, cloud-based technology and real-time reporting, it can be difficult for retailers to precisely track the origins of food products.

That is a big problem, considering that food can be dangerous when it is not handled properly in transit. According to the federal Centers for Disease Control and Prevention, food-borne pathogens such as E. coli, listeria or salmonella are responsible for 48 million illnesses, 128,000 hospitalizations and 3,000 deaths annually. And because contamination or mishandling can occur at any point in the supply chain, it can often be difficult to trace the source.

Data from the Stericycle Recall Index indicates that food product recalls

have risen over the past five years, skyrocketing 93 percent since 2012. A survey by the Grocery Manufacturers Association found more than half of companies surveyed were impacted by a food recall in the five years prior.

Peter Mehring, CEO of Zest Labs, says while the United States has a "very trusted" food supply chain, certain parts have less reliable information than others. Seafood has been one area of concern; it can also be challenging to confirm the validity of organic and locally grown products. Even among big brands, seasonal outsourcing of cultivation or manufacturing can lead to inconsistencies.

"Getting product-level visibility is the ultimate goal, but we don't know many retailers that are getting that today.

There are some inconsistencies and overlapping data,” Mehring says. “And while they have trusted partners, you don’t know how reliable that is from day to day.”

### ‘AN IMMUTABLE RECORD’

Regulators and those in the industry have been working on improving food safety and visibility. The FDA Food Safety Modernization Act of 2011 aimed to shift the focus from response to prevention of food-borne illnesses. It implemented several rules that called for accredited third-party certification, new manufacturing practices, supplier verification programs and higher standards for growing, harvesting and packaging produce.

Experts and industry insiders say blockchain could be a valid infrastructure to support many of those capabilities. Blockchain technology was initially developed to support Bitcoin cryptocurrency but Chris Burruss, president of the Blockchain in Transport Alliance, says there’s a big difference between the two. While regulators and authoritative bodies question the legitimacy of Bitcoin and other cryptocurrencies, the underlying blockchain infrastructure is widely accepted to have beneficial applications in many industries.

“The original blockchain was developed for Bitcoin to have an immutable record of all the transactions,” Burruss says. “It’s really just the system for tracking it, but it’s very effective.”

Unlike traditional centralized systems controlled by one party, blockchain’s “distributed ledger” system stores data in a shared database synchronized across a network hosted at multiple sites by a variety of institutions that

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constantly verify and update records in the chain. Experts say the combination of transparency and redundancy makes tampering extremely difficult.

Blockchain is a “reliable, trustworthy and secure” way to store and present data, Mehring says. Zest Labs uses the technology on its Zest Fresh platform to create an added layer of trust and security throughout the supply chain.

“Blockchain is a nice technology that we leverage for building a standard interaction for retailers. It’s more important to them than growers and farmers because the further you go down the supply chain, the less trusted the information is,” Mehring says.

Blockchain can take data on an operational basis and in real time, and incorporates the food safety concept of “hazard analysis critical control points” so stakeholders proactively know the food has passed all required tests. In a perfect deployment, blockchain can offer a permanent, tamper-proof record of a product’s entire journey and touchpoints through its entire lifespan, from farm to table.

Zest Labs produced a white paper with ChainLink about blockchain’s role in the produce supply chain. It found that the detailed traceability can offer stronger assurance of origin and chain of custody, faster and more precise recalls, fresher food with less waste and fewer contamination incidents.

### THE ROAD TO ADOPTION

Blockchain is still in its infancy, and it could be at least a few years before widescale adoption in the food supply

chain. For such a system to work there will need to be industry-wide collaboration and acceptance of data standards and formats. Blockchain-based technology will also have to be easy for participants to integrate into their own systems, Mehring says.

That could take some time, as executives in many industries still don’t understand the technology or approach it with skepticism. A recent survey by Deloitte found that 39 percent of senior executives have little or no knowledge about blockchain. “It is fair to say that industry is still confused to a degree about the potential for blockchain. ... about a third consider the technology overhyped,” says Deloitte Managing Director David Schatsky.

Some large stakeholders are already piloting and testing blockchain programs. In August 2017, Walmart, Nestlé, Kroger, Tyson Foods, Dole and several other consumer product companies worked with IBM to integrate blockchain into their supply chains. (STORES previously wrote about blockchain and food safety in the February/March issue.) Laurence Haziot, global managing director and general manager of consumer industries at IBM, says much as the internet has changed retail in profound ways, so too will blockchain, and even more so in food.

The biggest impact blockchain will make is in reducing what Haziot calls the “multiplicity of information” that comes from fragmented systems throughout the supply chain.

“If you want to trace back, you have to deal with data coming from so many systems. It is completely fragmented today,” Haziot says. “Blockchain could offer one indisputable version of the truth.”

IBM also recently worked with Walmart and ecommerce company JD.com in China to show how blockchain could work in a broad-based

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food safety system. One test followed a package of mangoes through the entire system to the store shelf, and from there they tried to trace it back to its origin. While the old system took six days and 18 hours to trace a product to a particular farm, the blockchain-based system identified the journey and origin in just over two seconds.

“Think about that in a scenario that could be life-threatening,” Haziot says. “If you can trace it back very quickly [and identify] the name of the source, you can save a lot of lives or reduce illnesses.”

#### A 'TRUSTED ENVIRONMENT'

Blockchain can significantly improve visibility, safety and compliance because it creates a fully “trusted environment” for data, Haziot says. In the blockchain, records are organized chronologically into “blocks” that are then tied together. Records can be accessed by private keys for the owner of that record and with public keys by participants with whom they want to share information. The system is intended to enable the user to have full control of the data while allowing participants to gain access to trusted information and the state of the food for their transactions.

“It’s a huge database that can be safely shared among a huge number of people. They can put in all of their data but only share what they want to,” Haziot says.

IBM is continually seeking new ways in which blockchain can benefit food

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systems. It has since introduced one of the first fully integrated, enterprise-grade production blockchain platforms for organizations to quickly activate their own networks. The IBM Blockchain Platform is available via the IBM Cloud and builds off the success of work with more than 400 organizations. The platform operates through an open source collaboration in the Hyperledger community and allows multiple parties to jointly develop, govern and operate their own secure blockchain.

Frank Yiannas, vice president of food safety at Walmart, says blockchain technology enables a “new era” of end-to-end transparency in the global food system that will further promote responsible actions and behaviors. “It also allows all participants to share information rapidly and with confidence across a strong trusted network,” Yiannas says. “This is critical to ensuring that the global food system remains safe for all.”

Aside from security and visibility, there are many other use cases for blockchain in food supply. It could improve transportation and make it more efficient through “smart contracts,” Burruss says. These smart transactions could initiate when milestones are reached or a product reaches a certain point

in the supply chain. That could create an automated system that could verify checkpoints and milestones, giving retailers more insight and security about the supply chain.

“Every event that happens with that truck is right there and out there for everyone to see,” Burruss says. “That can include temperature, provenance, detention time, delivery. It’s all being recorded for everyone and eliminates questions.”

To fuel more widespread adoption, Haziot says it will need to be cost-effective for all parties to join the network. There will also need to be seamless onboarding with software that takes only a minimal amount of internal effort for participants to put their data on the network. IBM is currently working on these issues, Haziot says.

“Retailers will need to take the lead in requiring it,” Mehring says. “Growers feel like they’re usually getting squeezed the most on margin, on the cost of product, and they’re only going to do what’s [minimally] required.” **STORES**

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