



Blockchain and the fresh-food supply chain

Seven supply chain industry experts weigh in on blockchain, sharing their unique perspectives regarding challenges and adoption, with a focus on the fresh-food supply chain.

BY JIM MCMAHON

ON JANUARY 4TH, 2011, PRESIDENT BARACK OBAMA SIGNED INTO law the Food and Drug Administration's (FDA) Food Safety Modernization Act (FSMA). One provision of the Act stated that the "FDA will have access to records, including industry food safety plans and the records firms will be required to keep documenting implementation of their plans." The intention of this mandate was clearly to safeguard the health and safety of the American public.

But there is a problem here. These records are stored all over the country on paper in file cabinets located in thousands of places. Currently, if there is a serious problem of contamination with, say, romaine lettuce, it can take the FDA anywhere from 45 to 60 days just to locate the records, with potentially thousands of farms under review for contamination. If these records were accessible through blockchain, the potential contaminated farms would be whittled down from thousands to less than 10, and identified within a matter of seconds.

Scenarios like this make a strong use case for blockchain, and it is why food supply chain industry leaders are focused on establishing a universally accepted blockchain platform, with particular focus on the fresh-food supply chain.

Building a blockchain ecosystem for the fresh-food supply chain is a seemingly insurmountable challenge to many of us in the industry. Luckily, there are people who do have a keen perspective on blockchain, with not only an optimistic view of it, but solutions as well. I recently had the opportunity to interview seven key supply chain thought leaders on the subject of blockchain and the fresh-food supply chain. Here's what they had to say.



JOHN HAGGERTY

Vice President Business Development, Burris Logistics

Burris Logistics operates an expanding network of temperature-controlled warehousing and distribution centers from Florida to Massachusetts, and west to Oklahoma. The company provides logistics, transportation, and supply chain solutions coast to coast through four distinct business units: Custom Distribution, PRW Plus (Public Refrigerated Warehousing), Trinity Logistics (freight management), and Honor Foods (a redistributor of foodservice products). (www.burrislogistics.com)

“Producers, distributors, and retailers of fresh produce are finding it necessary to interact with new technology in the supply chain. Compliance with food safety regulations, an increasing need to manage produce quality, and more timely demands for tracking product movement in real time are driving them to seek new solutions.

“In support of this initiative, Burris Logistics recently introduced a cloud-based, real-time produce inspection capability, incorporating a suite of multimodal options such as voice recognition and integrated real-time image capture. Designed to simplify and speed up produce inspection and the negotiation process for produce procurement professionals and suppliers, it enhances product quality outcomes for both retailers and consumers.

“This produce inspection capability was designed from the onset to be blockchain-enabled. It can be digitally integrated into the blockchain when the time is right.

“Burris also designed one of the most customer-interactive digital supply chain portals in the temperature-controlled distribution industry, which retains a tremendous amount of data relative to our customer base and their shipments throughout the United States. This portal is also

ready to be digitally integrated, when the time is right, with the blockchain.

“There are systems of data exchange already in place in the fresh-food supply chain that support blockchain. For example, the GS1-128 bar code used in the meat industry provides a global standard for exchanging data between different companies, enabling serialization and expiration information to be encoded.

“We are constantly testing ourselves and readying ourselves to partner with those vendors and customers who want to integrate with blockchain. But as a solution provider, we are a participant in the process. We are blockchain-ready, but those suppliers producing the products and those retailers receiving the products need to be the initiators of blockchain.

“Utilizing blockchain to validate temperature-controlled services and product integrity is an extremely valid and attractive option. But only a small percentage of participants in the fresh-produce supply chain, such as Dole and Driscoll’s, provide continuous tracking of products from producer to retailer via blockchain.

“The challenge with blockchain in temperature-controlled foods, and indeed for the entire supply chain, is more fundamental than integrating blockchain-enabled companies; it is system standardization. Establishing a universal language with developed and managed standards from a recognized independent standards agency, which enables the openness we enjoy with the Internet, is where we need to focus our efforts. A uniform standard for blockchain is still a long way away from being ready and effective across multiple channels.”



STEVE TRACEY

Executive Director Center for Supply Chain Research (CSCR), Penn State Smeal College of Business

The Center for Supply Chain Research connects researchers and professionals from leading organizations within a community that is shaping the future of the supply chain discipline. It is member strong and intellectually active in many facets of supply chain management and the enabling technologies used for collaboration, visibility, and integration. (www.smeal.psu.edu/cscr)

“If you look at the Gartner Hype Cycle, blockchain is probably somewhere between *afraid of expectations* and *disillusionment*.” (The Gartner Hype Cycle provides a graphic representation of the maturity and adoption of technologies and applications, and how they are potentially relevant to solving real business problems and exploiting new opportunities.)

“The underlying technology of blockchain is a distributed

ledger technology and encryption, which has been around for a while. It got popularized with bitcoin, and although it uses the same underlying technology, [the supply chain use case] is almost completely the obverse of how it is used for bitcoin. In a bitcoin use case, the trans-actors are anonymous, and the transactions are public, across a large network base. In a supply chain, the trans-actors are public, and the transactions are private, across a very small network base. You might have 50,000 or more network nodes around a bitcoin transaction, while in a supply chain use case, you are talking about much smaller numbers, maybe 10s or 100s.

“The other thing that I think is different in a supply chain use case is there has to be a way to track and monetize the value of the data, so that the system is sustainable. And that is a concept that has fallen short for many com-

panies. If I am a company that is looking to implement a blockchain use case, I'm looking at the return on capital investment. The capital investment may be significant, and the cost/benefit ratio may be low. Are the people that need to be in the network going to buy in? And how are we going to divide up the costs? I think that in the future, what is going to drive adoption rates will be the monetization of the data.

"Another adoption control, as I see it, is the ability for a distributed ledger network technology to maintain various streams of data both privately and publicly. So, for example, you may have a network that has a number of suppliers and companies and customers, and they want to see where the transactions are going. But they certainly don't want things like pricing to be publicly available. So, you have to be able to segment out what is private data and what is public data, and you have to be careful of standardization.

"And the last thing is the speed of the network. The speed of network transactions is improving, but they are not currently at the rate they need to be to enable widely dispersed supply chain networks to respond quickly. For example, I

believe VISA processes like 60,000 transactions per second, and current blockchain technology does not allow for anything even approaching that network speed in terms of the response rates.

"Another great use case is chain of custody in the food business—being able to track and trace chain of custody from point of origin to point of use. This is another case where you could have big data streams managed with data integrity, creating a high trust value.

"From a data-security perspective, one of the myths about blockchain is that it is perfectly accurate. It is not. If you put bad data into a blockchain, the only way to correct that bad data is to go back and append that block with the correct data. So blockchain doesn't eliminate data-quality issues. What it does do is encrypt data in such a way that you can trust the data. The combination of the encryption technology, the blockchain itself, and the distributed ledger system, where you are actually verifying the same data on multiple nodes in the network, creates a high level of data trust. As long as you put the right data in and it is verified from the nodes in the network, you have a high level of trust that the data as input is trustworthy."



KEVIN OTTO

Senior Director Community Engagement, GS1 US

GS1 US is a not-for-profit information standards organization with more than 300,000 members. GS1 standards are the most widely used supply chain standards in the world. GS1 US administers the universal product code (UPC) bar code as well as other information standards and data carriers. (www.gs1us.org)

"In our cross-industry blockchain discussions encompassing healthcare, foodservice, retail grocery, apparel, and general merchandise, supply chain visibility is the first use case that companies are looking at to see how blockchain can fit into their operations.

"Because GS1 already has universally accepted standards in place for visibility that can be used in blockchain and other data-sharing mechanisms, we are in a unique position to foster interoperability between blockchain users. Essentially, GS1 standards are fundamental to the evolution of blockchain.

"Unique identification in the supply chain goes beyond product identification by batch, lot, and serial number. Physical locations are being uniquely identified as well. So when we talk about visibility and traceability, we refer not only to the ability to mark the package, but also to know which facility it came from and which facilities it was shipped to. Trading partners are leveraging GS1 Global Location Numbers (GLNs), which identify the location in a supply chain, enabling and enhancing visibility.

"Because of consumer demands to know more about the quality and origin of the foods they are purchasing, we are seeing a considerable increase in discussions around the ability to constantly monitor the quality of food products as they go through the supply chain and then feed this information into a blockchain. This need is making it less practical to record and maintain this information on paper, but it also presents a barrier to getting participants onboard to record this data digitally, like at the farm level, where they may not be electronically equipped.

"In food, companies in the supply chain definitely have to know where a product came from and where it went, per FDA and U.S. Department of Agriculture (USDA) guidelines. Since GS1 standards are broadly adopted in the food industry, these standards are being shared electronically by and large. The challenge of getting smaller upstream suppliers (farmers and other producers) to use GS1 standards for identifying, capturing, and sharing information is therefore a first-step and prime concern, while the challenges of adopting blockchain are being discussed and evaluated. One hundred percent supply chain visibility cannot be achieved without all participants in a blockchain ecosystem on-board with the same standards of capturing and reporting data. I think it is necessary to have bigger players come forward to push and facilitate smaller participant companies to come to the table."



RICK STEIN

Vice President Fresh Foods, Food Marketing Institute (FMI)

The Food Marketing Institute advocates on behalf of the food retail industry, which employs nearly 5 million workers and represents a combined annual sales volume of almost \$800 billion. FMI member companies operate nearly 33,000 retail food stores and 12,000 pharmacies. (www.fmi.org)

“FMI guidance to its members is to work with their supply chain partners and focus on prevention of contamination, increase communication with FDA and supply chain partners, and provide simple and agreed-upon data elements for traceability and flexibility in how those data

elements are shared. Our members want to be able to make technology choices on their own, and we fully expect technology to advance as it has done in the past.

“We firmly believe in the importance of the safety of products and the increased use of technology as a tool to share information among supply chain partners. Our members will choose which technologies they adopt but are moving toward the ability to trace their products back to its origins. Blockchain is among the technologies used, but it’s the data within that is critical to the success.”



RICK BLASGEN

President and CEO, Council of Supply Chain Management Professionals (CSCMP)

The Council of Supply Chain Management Professionals (CSCMP) is a global network of more than 6,000 supply chain professionals. It is a professional association dedicated to the advancement and dissemination of research and knowledge on supply chain management. (cscmp.org)

“To me, blockchain is almost like RFID was some years ago. We have this technology that is probably ahead of business practice. People don’t know exactly what to do with it.

“There are a lot of pilots and use cases in progress—people trying to figure out how the technology and the business process will work. But at this point, who knows where it will go. It is a bit of a leap of faith, in a way. But this is how new ways of doing business are accomplished.

“As a technology that is enabling movement of data

between partners, if blockchain produces productivity and offers a more accurate and secure way of transacting business, it will lend itself toward being accepted by the supply chain. The question to be asked is: What do I get out of it that improves my business process?

“I think the track-and-trace capability will be the main draw for blockchain. Greater visibility into where the inventory has been—and where it is at any given time—will increase productivity. This will drive supply chain leaders to pilot it and try to figure out how to best employ it in their supply chain.

“Another key factor is, what is the standard? We have a lot of companies that will try to drive standards. It remains to be seen what group will emerge to establish itself as the standards organization.”



STEPHEN ROGERS

Vice President Blockchain Initiatives for Supply Chain, IBM

Since 2016, IBM has worked with hundreds of clients across financial services, supply chain, government, retail, digital rights management, and healthcare to implement blockchain applications. IBM operates a number of networks running live and in production. The cloud-based IBM Blockchain Platform delivers the end-to-end capabilities that clients need to quickly activate and successfully develop, operate, govern, and secure their own business networks. (www.ibm.com/blockchain/industries/supply-chain)

“Nobody is an island anymore from a supply chain perspective. In the supply chain, you are working with buyers, resellers, partners, logistics providers, and others. You have to work with all of them and be able to exchange information. Today, we are all using different operating systems, nomenclatures, databases, and software, and it becomes tremendously difficult to agree on how we are going to

share this information.

“The industries that appear to be the most interested in blockchain are those that have a particular set of challenges. When I look at the major supply chain use cases for blockchain, I put them into four categories.

“The first one is chain of custody. An auditable trail of where this product has been, where did it come from. The data I am looking at would be intimate information about those activities. Anyone who needs to track and provide original records to any kind of governmental authorities would fall into this category. So food is important. Where was it grown, where was it aggregated, who transported it, etc. Chain of custody is the most significant use case for blockchain and will probably be the biggest market for blockchain.

“Second is shared visibility. When products are moving



through multiple and different hands, tracking the goods and assets, managing the transactions across the value chains, and making sure that everybody has visibility to them is of critical importance. So for anybody involved in global trade, lifecycle management of transactions, financial and insurance matters, and shipment and ports—having shared visibility allows everybody to manage their piece of the process more efficiently.

“I would say that the third biggest category would be dispute resolution for contracts, procurement, invoices, and payment, which today occupies a considerable amount of back-and-forth between companies to reach agreement. If we can agree to put our information on a shared database that we know is secure and we know is commissioned so that only the appropriate people can have access to this information, then I think this would be a huge advantage in eliminating disputes upfront.

“The fourth major use case category for blockchain in the supply chain is identity management—streamlining and securing that cumbersome process of qualifying, verifying, and onboarding a trusted entity, and the records

associated with that trusted entity. This is a capability blockchain is really good at.

“Food, and its supply chain, is one of those areas where you really want to make blockchain an industry solution. Because having gaps in your information between the store that is selling [the food] and the farm that produced it means you really don’t have a solution. You need to have information of where it was grown, where it was shipped to, and if there was any kind of an aggregation point, where that was shipped to for packaging, and where it was shipped for distribution and then shipped to the stores. You want to make sure you can capture all of that information.

“The technology of blockchain still has a ways to go. It still needs to be able to support higher levels of transactional throughput. There are a lot of people who describe blockchain as the golden hammer. It is not that. It is a technology. Just like robotic process automation or hybrid cars or [artificial intelligence], it addresses a specific set of problems. It’s just that these problems happen to be big intractable problems, so it is really important.”



DAVID SHILLINGFORD

Industry expert and leader in supply chain risk analytics, Resilience360

Resilience360 was developed in DHL’s Global Innovation Center and has since become an independent company receiving venture funding from Columbia Capital. The company is an innovative supply chain risk management software platform that helps businesses predict, assess, mitigate, and react to supply chain disruptions and delays. (www.resilience360.com)

“Assessing blockchain from a risk management perspective is an important part of the blockchain paradigm.

“There are a number of different ways that blockchain relates to supply chain risk. Ultimately, at the heart of it, is having accurate supply chain visibility that you can trust and sharing this data with all parties involved. This can be done with today’s technology, but in some cases, it can be done better with blockchain, because it is data that can be trusted.”

“This extends to the legality and paperwork associated with product movement. When a container is moving from point A to point B, specific financial transactions relate to what is in the container, who owns it at any particular point on the Earth, and having location verification. This permits financial transactions to be initiated

through smart contracts, which would be difficult to do without blockchain.

“Today, the state of the art in supply chain risk management encompasses bringing together two sets of data. One relates to supply chain assets, which could be manufacturing locations or distribution centers or the shipments that are made between them. This, of course, is being mapped or tracked in real time in the system.

“But this is then overlaid with future risk indicators or information about an event that has happened that might be a disruption to the supply chain. These can include weather and geological disruptions, labor issues, political upheavals, anything that might disrupt the supply chain.

“This level of insight and analytics brings together what a company’s supply chain looks like in real time, combined with what might happen to it given known data. Ultimately, what a company wants to know is what it should be concerned about and the actions it should take to mitigate any disruptive events. At its core, a blockchain-enabled supply chain can outperform traditional supply chains because it is powered by accurate data, leading to better evaluation and decision-making.”

Jim McMahon is chief executive officer at corporate communications firm ZebraCom Inc. His features have appeared in more than 2,500 trade and business publications worldwide.