



**U.S. House of Representatives
Committee on Science, Space, and Technology
Subcommittee on Oversight, and;
Subcommittee on Research and Technology**

February 14, 2018

Hearing on:

“Beyond Bitcoin: Emerging Applications for Blockchain Technology”

**Testimony of Frank Yiannas
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Chairmen Abraham and Comstock, Ranking Members Beyer and Lipinski, and members of the committee:

Introduction:

On behalf of Walmart Inc., (Walmart) I thank you for the invitation to testify here today on the use of blockchain technology and its potential applications beyond cryptocurrency and finance.

My name is Frank Yiannas, and for the past ten years I've served as the Vice President of Food Safety for the world's largest retailer, Walmart, where I am responsible for all food safety compliance as well as other public health programs. Prior to joining Walmart in 2008, I was the Director of Safety and Health for Disney where I worked for 19 years. I am also the author of two books on Food Safety Culture and Behavior.

Company Background:

Walmart helps people around the world save money and live better whenever they shop in our stores or online with us. Each week, more than 260 million customers visit our nearly 12 thousand stores in 28 countries or shop with us on our e-commerce websites. With fiscal year 2017 revenue of \$485.9 billion, Walmart employs approximately 2.3 million associates worldwide.

In regards to food, our grocery sales accounted for approximately 56% of our revenues in our Walmart U.S. format last year.

Food System Complexities:

Operating that many formats in so many countries around the world also presents us with a daunting challenge. Our customers rely on Walmart to act as their trusted buying agent. They trust – and indeed expect – that we know as much as we can about the food we sell in our stores and online. With that responsibility, we are always looking for ways to advance food safety and improve public health.

Too often people talk about the “food supply chain”, but in reality, it isn't a linear chain at all. Today, the way we get our food from farm to table, the “food system”, has evolved into a complex network interdependent on many entities. And while there is no question that today's food system has provided consumers with a more diverse, convenient, and economical source of food, it also, at times, presents new challenges.

For example, in today's food system, the output from one ingredient producer could end up in thousands of products on a grocery store shelf. We saw evidence of this during the peanut butter outbreak in 2008 and more recently with flour in 2016.

This complexity is one of many reasons we were looking for a technological solution to help us achieve enhanced food traceability and transparency.

What is Blockchain and Why is Important to the Food System?

Blockchain is a distributed, decentralized digital ledger that makes it possible to store and share digitized data across complex networks in a more secure, effective, and democratic way.

Using advanced cryptography and consensus algorithms, a blockchain protocol takes data inputted by a network participant as a block and converts it into a unique alpha-numeric sequence called a hash, which can be permissioned and shared with other actors in the system in a secure and trusted way.

Features of immutability, consensus, and the ability to conduct transactions in a complex network without a central authority, allow blockchain systems to create **one version of the truth and rapidly scale TRUST**, which is good for business.

Coming back to food, in today's food system, many participants involved with producing and distributing food still use paper-based systems to manage records. Even if they capture information in digital form, the data is often in disparate systems that do not speak with each other. Therefore, being able to track how food and food ingredients flow from farm to table can be a very difficult, labor intensive and lengthy task. Each participant in the continuum must disclose their product's path "one step forward and one step back." Regulatory bodies and retailers must take that data and piece it together manually to determine the source of an issue.

For example, in 2006, in a nationwide outbreak of E coli O157:H7 linked to bagged spinach in the United States, consumers were advised, rightfully so, to avoid eating bagged spinach, regardless of brand, until the exact source could be identified. Retailers and restaurants pulled all bagged spinach, regardless of source, off of store shelves and menus. It took regulators two weeks to conduct the trace back and determine the exact source of the outbreak. When it was all said and done, the outbreak was linked to only one producer, one day's production, and one lot number. It took the spinach industry many years to regain consumer confidence and get back to previous levels of production and sales.

This is not an isolated scenario. We have seen similar timelines and outcomes in other food scares.

In 2008, we saw weakness in the ability of many food suppliers to quickly trace and report whether or not contaminated peanut paste from a single facility was used in their products. In the end, it took some suppliers up to two months to identify that the potentially contaminated peanut paste was used as an ingredient in almost 4,000 different SKUS (stock keeping units), ranging from peanut butter crackers to chocolates and pet treats.

Walmart's Food Traceability Pilots Powered by Blockchain

In early 2017, Walmart and IBM conducted two proofs of concept that successfully demonstrated that blockchain technology could provide a viable solution to track and verify food from origin to our stores with speed, accuracy, and precision.

- **Sliced Mangoes** - for one proof of concept conducted here in the United States, we decided to do the pilot with sliced mangoes sold in our Stores. In this hemisphere, mangoes tend to be grown on small farms in Central and South America. Once those mangoes start ripening each season, packing crews will harvest the mangoes where they will be shipped to a packing facility where they are washed, hot water treated, and boxed. Those mangoes will make multiple stops before they arrive as packages of sliced mangoes in our stores. The life of a mango is a pretty complicated and amazing journey.

For the mango proof of concept, we worked with a supplier and their supply chain to capture food traceability data attributes, along with other data attributes, into the blockchain. We captured information about where the mangoes were grown, when they were harvested, how they traveled, and so on.

At the conclusion of the pilot, we were able to demonstrate that our ability to trace the origin of sliced mangos from our stores back to the farm could be improved **from 7 days** using traditional methods **down to 2.2 seconds** by using blockchain platforms. That's "food traceability at the speed of thought."

- **Pork in China** - as the food system is global in nature, our second proof of concept was conducted in China and it involved pork, one of the region's most important animal proteins. It also focused on a growing concern of the grocery industry, economically motivated adulteration, also commonly referred to as food fraud. Proving that this technology could be used to strengthen confidence in the authenticity of food, whether it is species substitution or a product claim, such as organically grown, was also important to us.

With the use of blockchain technology, not only could the pork be tracked from a single Walmart Store back to the farm, it also increased assurance of the authenticity of the product and its records could be accessed as well. At the store, a case of pork could be scanned with a simple QR code to pull up digitized authentic production and veterinary records from the corresponding farm where that animal was raised.

Beyond Traceability – Food Transparency

Enhanced traceability is one of the many reasons why we are interested in blockchain technology. However, we believe blockchain could enable more than traceability. It could lay the groundwork for other benefits. Let me mention just a few:

- **Optimizing Supply Chains** – small improvements in supply chains can yield huge benefits. Blockchain technology as the basis for a new information highway, coupled with Artificial Intelligence and the Internet of Things (IoT), could enable instant access to large amounts of data and insights that could result in a safer, more efficient, and sustainable food system.

- **Reducing Food Waste** – one third of all food produced goes to waste. One of the outcomes of a smarter food system could be enhanced food flow, allowing fresher product to reach consumers and reducing food waste at home and along the entire food continuum.
- **Enabling Transparency** – today’s customer expects more from their food system. Customers want to know more about their food. Where did it come from? Was it sustainably grown? Blockchain could serve as the foundation to capture this information and ultimately make it available to the customer, resulting in enhanced consumer confidence and trust.

Democratizing the Benefits – Creating Shared Value

One last concept that we would like to emphasize is how blockchain technology is different than many current digital protocols. Its benefits are decentralized and more democratic. In many of today’s digital systems, data tends to exist in silos and is owned by a central authority. For example, a retailer might ask their suppliers to disclose information about their suppliers, where they source ingredients and more. Suppliers that disclose such information often have to do similar disclosure activities in other retailers’ systems that they do business with, resulting in redundancies and inefficiencies. Moreover, sometimes, they never benefit from seeing any insights gained as a result of such data disclosure.

In contrast, in a permissioned blockchain system, the data is shared among system participants and it allows everyone to benefit and gain value. For example, farmers can benefit from not having their unaffected crops they grow inaccurately implicated in overly cautious product withdrawals. Food processors often get blamed when products do not meet shelf-life, when in reality it might be temperature abuse that occurred somewhere else in the distribution continuum.

Therefore, we believe blockchain will help democratize the benefits of digitizing data and allow the entire food system to get smarter together.

Expanding, Testing, and Scaling Across Multiple Companies

After our successful proof of concepts, Walmart and IBM contacted leaders of some of the most influential food companies to share our results, and invite them to participate in additional testing of blockchain applications. Today, we have a coalition of 11 Foundation Partners comprised of Walmart suppliers and peers in retail including: Walmart, Kroger, Wegmans, Tyson, Driscolls, Nestle, Unilever, Danone, McCormick, Dole, and Golden State Foods, all committing to work together in testing the technology.

We believe that partnership is critical in order to create an open, collaborative solution that works for everyone, rather than each company attempting to create solutions in isolation. Many of the inefficiencies we experience during outbreak investigations are due to utilization of different data formats in separate systems that don’t speak to each other. Therefore, we are placing an enormous emphasis on the importance of interoperability of blockchain systems and the use of existing industry standards. Where those standards don’t exist, we will work with industry leaders and associations to

create them. Without the utilization of standards in an open system, we won't be able to realize the gains in speed and efficiency that we intend to make.

Walmart, IBM, and the Foundation Partners have moved rapidly to scale and implement blockchain enabled traceability and we are now testing it on dozens of strategically selected SKUs.

Conclusion

Again, our ultimate goal is food transparency. By getting rid of the anonymity that exists in the current food system, blockchain technology will shine a light along every step of the way in how food travels and get produced. This enhanced transparency will lead to greater accountability and, ultimately, help create a safer, more efficient, and sustainable food system, so that people can save money and live better.

Thank you for the opportunity to share our thoughts on blockchain applications in the food system, and I look forward to answering any questions you may have.