Walmart

Staying ahead of the industry with Blockchain technology
Walmart is reshaping its supply chain with blockchain

**Why?**

- Start to use new technology at scale to understand how it functions
- Onboarding suppliers will take significant time and effort, so better to start now
- Quick wins on data collection
- Discover potential threats from competitors or new disruptors
- Prepare roadmap for future solutions
- Gain halo effect from new tech potential

265 million weekly customers visits

- more than 11,200 stores under 55 banners in 27 countries
- eCommerce websites in 10 countries
- fiscal year 2018 revenue of over $500 billion
- employs over 2.2 million associates worldwide.

Note: Insolar is not providing any services to Walmart
In an increasingly globalized society, knowing where your products and, more importantly, food comes from is growing more difficult.

Over 40,000 food miles, 8 countries/ independent regulatory bodies, countless hands.

Source: Walmart food safety
The cost of today’s food supply chain mistakes

600 million
fall ill after eating contaminated food every year (almost 1/10 of the global population)

$55.5 - $93.2 billion
total annual cost in US caused by food-related concerns (medical costs to economic loss due to halted productivity)

$14 billion
Global Food traceability market value by 2019

20% increase
in this cost over the last four years, according to IBM

Source: IBM Blockchain for food safety
Today’s supply chain complexity introduces safety and cost risk at each stage

**Compromise**
Tampering, misrepresentation, substitution

**Contamination**
Toxins, insects, bacteria, viruses

**Spoilage**
Temperature, humidity, expiry

Multi-ingredient foods may include elements from a variety of sources and multiple countries, further complicating traceability

Source: adapted from CBInsights
4 core challenges the agriculture supply chain faces

Food from across the world is available to consumers today, regardless of the season, location, or environment. This growing complexity and expanding ecosystems place more emphasis on trust than ever before.

1. Food fraud
   - Substitution, tampering, misrepresentation

2. Illegal production
   - An estimated 10-22% of total global fisheries production is unreported/unregulated

3. Foodborne illness
   - 1 in 6 Americans fall sick from contaminated food and/or beverages per year

4. Food recall/ loss
   - Average cost of recall to company: $10 million, excluding brand damage & lost sales

Little visibility into the status of goods as they move through the supply chain, as well as provenance at the product end destination

Resulting in three costs that affect the food supply chain:
- The cost of human health and life
- The cost of recalling tainted food
- The cost of food wasted due to consumer fears
The number of food SKU’s available in the average grocery store has more than tripled with the advent of e-commerce and globalization.

- **1980’s**: 15,000
- **2000’s**: >50,000
Food contamination and fraud scandals have damaged consumer trust

**2006**
In 2006, the Dole Spinach E. coli outbreak in the US resulted in 205 illnesses, 104 hospitalizations and four deaths across 26 states.

**2011**
In 2011, the Listeriosis Cantaloupe outbreak in the US resulted in 143 hospitalizations and 33 deaths across 28 states.

**2013**
In 2013, horsemeat was discovered in burgers sold by four major supermarket chains in the UK.

**2014**
In 2014, Walmart recalled donkey meat sold at some outlets in China after tests showed the product contained fox meat.

**2017**
In 2017, papayas in the US were linked to a multi-state outbreak of Salmonella. There were 173 cases in 21 states with 58 people hospitalized. There was a single confirmed death.

Source: The Journal of The British Blockchain association
In 2016, Walmart established the Food Safety Collaboration Center in Beijing, to develop its food provenance pilots using Hyperledger Fabric, with plans to invest $25 million over five years to research global food safety.

- Walmart concurrently ran two pilots to test food traceability and transparency along the supply chain. The pilots involved tracking a pork supply chain in China, and mangos from South America to the US.

- Walmart has successfully completed two blockchain pilots: pork in China and mangoes in the Americas (IBM, 2017). With a farm to table approach, Walmart’s blockchain solution reduced time for tracking mango origins from seven days to 2.2 seconds and promoted greater transparency across Walmart’s food supply chain (Yiannas, 2017). IBM called it “complete end-to-end traceability”
Life of a Walmart mango

1. 5 to 8 years for a mango tree to mature and bear fruits
2. Mangoes grown by small farmers in Central or South America
3. Shipped to a packing house to get washed and boxed
4. Shipped to the US by air, sea or land (custom border)
5. Washed, peeled, sliced and put into containers in a facility center
6. Shipped to Walmart distribution center to get refrigerated
7. Transported to one of Walmart’s 11,200 stores, refrigerated and shelved

The Walmart mango tracking challenge:

<table>
<thead>
<tr>
<th>Before blockchain</th>
<th>After blockchain</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 days, 18 hours, 14 mins</td>
<td>2.2 seconds</td>
</tr>
</tbody>
</table>
Walmart is combining AI, IoT and blockchain to radically improve the quality of the food supply chain from end to end.

Tagged with numeric identifiers, status updates signed and logged at each step, it now takes seconds to trace a mango back to its farm.

IoT technology, such as sensors and RFID tags, enable real-time data to be written on blockchain as food products pass along the supply chain. Both technologies serve to help Walmart enforce systems such as the Hazard Analysis and Critical Control Point and comply with food safety regulations and regulators such as the Food Safety Modernization Act and the Food Safety and Inspection Service.

Walmart also uses artificial intelligence to predict patterns in retail by analyzing policies and variables that influence the supply chain.

In addition to speeding up how food is traced, Walmart can also speed up deliveries by predicting road traffic.
The pork supply pilot also tested other technologies in capturing supply chain data

- The process begins in pens where every pig is smart-tagged with bar codes
- RFID and cameras in the slaughterhouse capture the entire production process
- Shipping trucks have temperature and humidity sensors, along with GPS systems to ensure meat arrives under safe conditions
- Procurement managers at distribution centers can remotely trace all product information, from expiration dates to warehouse temperatures

China is both a leading importer of pork and producer of nearly half of the world’s pork (annual consumption of 12.7 million tons). As consumer focus has shifted to safety and quality, trust is critical to purchasing decisions. The Chinese government is investing heavily in its food system, putting pressure on production systems, and partnering with corporate retail giants.
Benefits of the initiative

- Increase trust & transparency to Walmart’s end consumer
- Improve shelf-life management and waste of expired products
- Minimize fraudulent products that either harm consumers and/or result in PR damage
- Build a more sustainable food system by detecting food fraud, increase safety, reduce spoilage & waste with analytics
- Create a global view of the provenance across Walmart’s supply chain
- Increased monetization from specific segments by validated organic beef vs. non-organic OR wild vs. farmed salmon
- Meet the requirements of demanding regulations
“Enhanced ability to trace a contaminated food back to its source will help government agencies and companies to identify the source of a foodborne disease outbreak, coordinate more effective recalls of foods thought to be contaminated, and learn where past problems began.”

Dr. Robert Tauxe
Director of Foodborne, Waterborne, and Environmental Diseases Centers for Disease Control
A secure and transparent solution for tracking the provenance of food

1. Each organization owns its data on the network and has control over who can access different data elements, accessible only as data owners grant permission to share relevant records.

2. Solution software adapters can provide automated data import from existing data stores (e.g., SAP) to leverage existing business records including inventory lists, order records, and supplier information.

3. For network administrators already managing complex information environments, a connector API is designed to automate the integration of legacy system data and network data.

4. Once onboarded, users can interact with the network in several ways:
   - Employ user-friendly interfaces for desktop or mobile use
   - Use the certifications module to upload regulation and inspection documents for sharing with food supply chain partners
   - Use the customized interface to view and manage data that has been shared by business partners

5. Data connector APIs allow enterprise IT teams to efficiently upload supply chain data from existing data stores (such as SAP) for seamless integration of data from enterprise systems to network. Smaller organizations can onboard data through an easy-to-use web experience. Users automatically upload transaction data to the solution network, based on the organization’s data specifications.
In crisis or recall, being able to quickly answer the following questions mitigates great cost and safety:

- How widespread is the problem?
- Are there products that may have been purchased but not yet consumed?
- What is the source of the contamination?
- Was anything else contaminated?
- How do weights tie off to the original contract?
- Was this batch of grain shipped through a warehouse with shoddy safety practices?
- Has this grower been inspected recently?
The key drivers for supply chain blockchain adoption are:

- **89%** Cost saving
- **81%** Enhancing traceability
- **79%** Enhancing transparency

Source: Capgemini Research Institute
Product recalls are expedited through immediate access to end-to-end traceability: provenance, real-time location, and status of any food product.

Leveraging solution and global standards to share data with any network participant authorized by the data owner, data is shared only with need-to-know business partners in a secure and confidential environment.

Digitize business critical certificates and inspection documents to optimize efficiency for information management, certify provenance, and ensure authenticity.
Predefined roles grant users authorization to execute specific network tasks on behalf of their organization.

**Account owner**
User can manage organization account settings and subscriptions

**Account administrator**
User can add, delete, and modify users and can modify organization settings

**Certifications manager**
User can add, delete, and modify certifications and documents

**Food safety team member**
User(s) view data (organization-level authorization), trace products, and view certifications

**Onboarding team member**
User(s) can create product scenarios and upload data

Account administrators can easily control the level of access provided to each individual user in their organization.
Walmart will garner significant advantage through reduced costs and waste, and improved consumer trust

**Attributes**

**Food safety**
Securely trace products in seconds to mitigate cross-contamination, spread of foodborne illness, unnecessary waste and the cost of recalls.

**Food freshness**
Gain unprecedented visibility into supply chain data to improve freshness, increase shelf life and reduce product loss.

**Reduced waste**
Maximize shelf life, optimize the supply chain and provide quick response to food recalls, all helping to reduce waste.

**Confidence and sustainability**
Digitize essential certificates and documents to optimize information management, certify provenance, and ensure authenticity

**Benefits**

- Ability to quickly identify when food is contaminated and react immediately
- Ability to prove product is safe during a foodborne outbreak
- Reduce product waste
- Increased customer satisfaction and trust
- Direct insight into inventory and supply chain inefficiencies

“Our customers deserve a more transparent supply chain. We felt the one-step-up and one-step-back model of food traceability was outdated for the 21st century. This is a smart, technology-supported move that will greatly benefit our customers and transform the food system, benefitting all stakeholders.”

Frank Yiannas, vice-president of food safety
Today, transferring information between parties relies on many different modes of communication.

- Inconsistent information across organizations
- Complex, cumbersome, and costly P2P messaging
- Manual, time-consuming, paper-based process
- Lack of information for risk assessment and dispute resolution
- Prone to error
- Susceptible to fraud
Blockchain serves as a supply chain information pipeline

Provide end-to-end supply chain visibility that enables all actors involved in a global shipping transaction to securely and seamlessly exchange shipment events in real time.

- Fast, secure access to end-to-end supply chain information with a single version of the truth
- Verifiable authenticity and immutability of digital documents
- Improved availability
- Trusted cross-organizational workflows
- Reduced costs
Blockchain will serve as a business service layer for supply chains

Current state supply chain

- Data is stored in disparate systems
- Visibility only possible one step ahead/behind
- Imprecise tracking and accountability
- Data is siloed

Walmart

Insolar blockchain enabled business network

- Precise track and trace capability
- Automation
- Common wallet payment service
- Improved supplier accountability
- Improved food safety

Walmart

Business network common services

- Identity
- Wallet
- Reputation
- Domain logic

SubDomain

Supplier A

Account
Frontend application
Closed data

Supplier B

Account
Frontend application
Closed data

Supplier C

Account
Frontend application
Closed data

Supplier D

Account
Frontend application
Closed data

Supplier A

Account
Frontend application
Closed and shared data

Supplier B

Account
Frontend application
Closed and shared data

Supplier C

Account
Frontend application
Closed and shared data

Supplier D

Account
Frontend application
Closed and shared data
Backup
Corporate participation

- Following the completion of the mango and pork pilots, Walmart recently sent a letter to suppliers telling them that a year from now, they will be required to use blockchain software to track leafy greens they sell to Walmart.

- Walmart is also a member of a consortium with 10 major food suppliers.
Let’s discuss how we can generate value for your business

Drop us a note to business@insolar.io or visit insolar.io

Jon Himoff
Business Development Director
Email: jon.himoff@insolar.io
Mobile: +44 7734 051075