Blockchains & Food Security in the Supply Chain

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OUR GLOBALIZED INDUSTRIAL FOOD SYSTEM

- Complex globalized market with many stakeholders
- Perishable goods transported across world at low margins
- Increased desire for immediate consumption:
- Increased demand from population growth & foodie/healthy food culture
- Farmers experience pressure to produce high quality food at a low cost
OUR GLOBALIZED INDUSTRIAL FOOD SYSTEM continued…

- Intense competition & increased demand has caused numerous food scandals worldwide.
  - Who should we trust?
- Emphasis on transparency has emerged
  - Telling origin/production story of “honest” products
  - Labeling: fair trade, certified organic, pasture-raised, grass-fed, etc.
- Tough to achieve transparency in current food system structure
- Each company has its own system, handling transactions in separate databases
  - Costly IT system
  - Highly inefficient: delayed financial flow, most notably for farmers & local producers
COMMON PROBLEMS IN FOOD SUPPLY CHAIN

- **FOOD FRAUD** – substitution, tampering, misrepresentation
  - Ex. 2013 UK horse meat scandal, 2008 China milk scandal

- **ILLEGAL PRODUCTION** – particularly in seafood industry
  - Est. 10-22% of total global fisheries production is unreported/unregulated

- **FOODBORNE ILLNESS** – 1 in 6 Americans fall sick from contaminated food and/or beverage per year
  - Total national cost of food borne illness: $93 billion/year (2015 study)

- **FOOD RECALL/LOSS** – major fallout of abuse in food supply chain
  - Average cost of recall to company: $10 million, excluding brand damage & lost sales
“Opaque supply chains are devastating environments and compromising the wellbeing of people, animals, and communities”
- Jessi Baker, Provenance founder
HOW BLOCKCHAINS CAN HELP

- A blockchain is a shared, traceable and transparent ledger for record-keeping.
- Information is captured in each transaction along a supply chain, which is agreed on by the business network members, and made permanent once consensus is reached.

- Blockchains increase:
  1. TRANSPARENCY
  2. EFFICIENCY
  3. FOOD SAFETY
#1 TRANSPARENCY

- Digital tracking and storage of all product information at all stages of supply chain
  - Farm origination data, growing / raising conditions
  - Factory/processing data
  - Batch numbers
  - Expiration dates
  - Storage temperatures and conditions
  - Shipping data

- Strengthens safeguards related to food authenticity, thus avoiding food fraud

- Consumer confidence increases because producers and any related parties are held accountable
“A blockchain is invaluable for brand protection – it provides transparency, security, and authenticity, helping bring trust to an untrusted world.”

- Kieran Kelly, arc-net founder
Case Study #1 – FarmShare, Provenance, arc-net and ripe.io

- 4 start-ups promoting consumer product transparency:
  - **FarmShare**: Decentralized CSA platform that innovates local agriculture markets to optimize resource sharing
    - Local currency to purchase produce, track items, minimize waste
  - **Provenance**: Real-time transparency data platform
    - Empowers brands to be more transparent about product origins
  - **arc-net**: Supply chain security & analytics company
    - Platform uses Unique Universal Identifiers (UUID) to track item across entire supply chain
  - **ripe.io**: Aims to be the “Blockchain of Food”
    - Providing an infrastructure of distributed ledgers, Internet of Things sensors, APIs for a connected food supply chain workflow
#2 EFFICIENCY

- Blockchains improve how food is tracked, transported, and sold
- Inaccuracies caused by traditional paper tracking and manual inspection systems
- Retailers can better manage product shelf-life
- Streamlines distribution process
  - Traditional offline retailers continue to be pressured by Amazon’s efficient supply chain
- Cuts costs & reduces food waste
  - Difference between being able to identify a few tainted packages of spinach or yanking the entire stock of spinach from hundreds of stores
Case Study #2: Wal-Mart Store Inc. ("Walmart") Food Safety Collaboration Center (WFSCC)

- Walmart partnered with Tsinghua University & IBM Blockchain to form WFSCC in Beijing
  - Signed agreement to use blockchains to explore food supply chain traceability & authenticity
  - In Oct 2016, Walmart started study using blockchains to track 2 products, 1 in U.S., 1 in China
  - Walmart serves some 260 million customers a week
  - If successful, other retail giants will follow...
#3 FOOD SAFETY

- Blockchains could create huge progress in food safety - cutting costs and saving lives
- Fewer contamination incidents
- Faster detection of problems
  - Recalls can be addressed more quickly: can be a difference of days and minutes in discovering why/when contamination occurred.
Case Study #3 Chipotle’s E.coli Outbreak

- In 2015, Chipotle had a series of E.coli infections
  - Suffered revenue losses due to recall and withdrawals from market
  - Stock price plummeted by 30% during the year
  - 14.6% decline in restaurant sales during the fourth quarter of 2015
  - Estimated $14-$16 million spent on crisis management
LOOKING AHEAD

- Number of firms entering blockchain supply chain arena is steadily increasing
  - Generating further research and technology
    - Reducing the amount of risk for investors
- Blockchains offer practical solutions to a currently impractical system
- At an inflection point: could arrive at a more transparent food system, depends on who has the leverage to impose their will...
- Successful tracking systems offer better communication:
  - Between consumers and producers
  - Between all parts of the food chain
LOOKING AHEAD

- BUT...there are still many issues that must be worked out.
- Authentication and Permissioning:
  - Who controls what information is legitimate/authentic and gets stored on a blockchain?
  - Who grants permission to access particular information?
- Payment systems:
  - Are payments processed on the blockchains, or separately?
- Is the industry ready for more transparency?
  - How much will existing market participants resist more openness?