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Balancing Bargaining Power: The Key to Effective Food Traceability Adoption

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Problem of Practice:

Contamination poses a significant threat to food supply chains, leading to public health crises, costly recalls, food waste and damage to brand reputation. Traceability technology offers a potential solution by allowing companies to identify the source of contamination and respond effectively, thus minimising financial losses. However, its success hinges on widespread adoption across the entire food supply network. A study by Lingxiu Dong and team highlights the challenge posed by opportunistic behaviours among supply chain members, which can undermine the advantages of traceability.[1] *For instance, if retailers notice wholesalers saving costs through traceability, they might demand lower wholesale prices, which could deter wholesalers from adopting the technology. What strategies can procurement and supply chain managers implement to counter these opportunistic behaviours in the food supply chain? The research suggests a simple contractual mechanism to help procurement managers effectively adopt traceability technology*

[1] The article 'Impact of Traceability Technology Adoption in Food Supply Chain Networks' by Lingxiu Dong, Puping (Phil) Jiang and Fasheng Xu, featured in Volume 69, Issue 3 of *Management Science*, talks about how traceability technology adoption affects incentives of supply chain members and how its anticipated benefits can be realized

Need for traceability tech

Traceability technology tracks food products from farm to table, reducing contamination risks and improving food safety. Contaminated food can cause serious public health issues.[2] To limit the damage, retailers often recall and discard entire inventories, as Walmart did during the 2018 romaine lettuce contamination.[3] Such contamination and recall can also result in financial losses and impact long-term consumer trust. For example, American peanut producers lost USD 1 billion due to a salmonella outbreak that hurt peanut butter sales.[4] The average direct cost (including the cost of retrieval and disposal) of a food recall in the US is estimated to be around USD 10 million. The indirect costs, such as the lost sales, the tainted reputation and lawsuits, drive the cost even further.[5] Between 2014 and 2019, more than half the companies in the Grocery Manufacturers Association, including Coca-Cola and Kellogg, faced product recalls due to food safety issues.[6] Rapid response and prevention become critical, as tracing the source of contamination is often time-consuming and complex.

Blockchain-enabled traceability technology can address these issues and offers a secure, decentralised, and transparent way to monitor food movement.[7] Walmart and IBM implemented blockchain-based tracking for mangoes, reducing traceability time from seven days to just 2.2 seconds.[8] Encouraged by this success, Walmart had plans to expand the technology to 25 additional products. Similarly, Majid Al Futtaim partnered with IBM Food Trust to enhance traceability in its microgreens supply chain, aiming to improve end-to-end transparency and efficiency.[9] The food traceability market is expected to grow to USD 26.1 billion by 2025, with a compound annual growth rate (CAGR) of 9.1%.[10]

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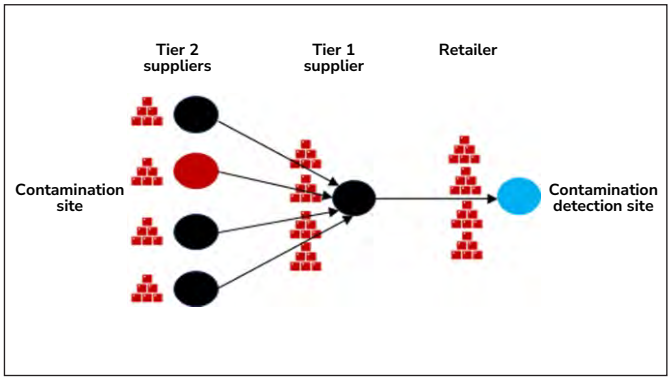
Effective traceability benefits multiple stakeholders. Farmers outside contamination zones can continue operations, preventing unnecessary losses. Consumers gain confidence in food safety, while retailers ensure that only affected products are removed from shelves (*see Figure 2*). The technology also enhances environmental sustainability. California Giant Berry Farms expects to reduce waste through faster identification of quality issues and targeted recalls.[11] Thus, promoting sustainable sourcing. It optimises logistics and automates compliance reporting, thus reducing energy consumption (though blockchain technology itself consumes significant energy).[12]

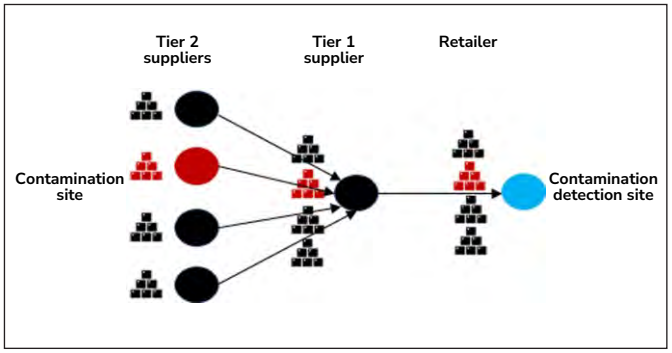
*Figure 1: Food supply network without traceability**



Source: Created by author

**Contamination incident results in the disposal of all products (marked in red).*

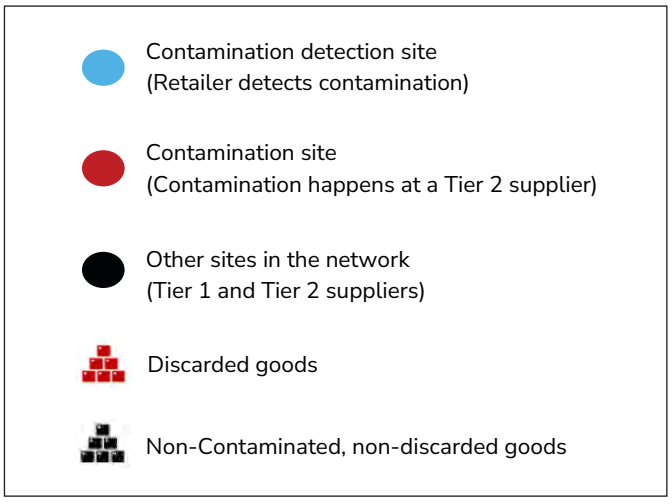
*Figure 2: Food supply network with traceability***



Source: Created by author

***Contamination incident results in disposal of the products from the contamination site only (marked in red).*

Units from non-contaminated sites (marked in black) are safe and available for customers.



Adoption challenges

Despite its benefits, blockchain-enabled traceability faces resistance due to concerns over data sharingand competitive disadvantages.[13] As has been mentioned before, Walmart initially planned to expand traceability to multiple products but it encountered supplier reluctance and could only add green bell peppers after mangoes.[14] Similar adoption challenges have been seen in other industries. The TradeLens shipping platform, launched by IBM and Maersk in 2018, aimed to digitise global trade but was discontinued in 2023 due to a lack of participation from supply chain members.[15]

Research by Dong and the team highlights another critical issue: unequal bargaining power in pricing negotiations. Retailers, benefiting from reduced recalls and improved efficiency, often assume wholesalers will also gain. Consequently, they push for lower wholesale prices, squeezing supplier margins. For instance, Tesco urged its suppliers to lower prices because of lowered energy costs. According to the suppliers, the price cuts significantly exceed the actual cost savings or efficiency gains they achieve. In fact, the suppliers argue that the lower costs were not passed down the supply chain.[16] Such unequal bargaining power favours retailers who can leverage their scale to impose unilateral contract changes. In Europe, such practices are classified as 'black practices' under unfair trade regulations. The research also suggests that farmers and other supply chain members face similar pricing pressures. As buyers negotiate aggressively at each supply chain stage, sellers are left with lower returns, making it harder for them to invest in food safety measures. This imbalance discourages investment in food safety measures, increasing contamination risks.

Encouraging adoption

To promote fair adoption, Dong and colleagues recommend structured supply contracts that prevent unilateral post-implementation changes. Fixed-term agreements ensure stability, prohibiting retailers from renegotiating prices to their advantage after suppliers invest in technology. This approach fosters trust and long-term collaboration, ensuring all stakeholders benefit from technology adoption. Contracts can also include revenue-sharing mechanisms, ensuring cost savings from technology adoption benefit all parties, rather than just powerful buyers.

Regulatory bodies can also enforce fair trade practices to prevent opportunistic pricing adjustments. For example, when Coop Italia unilaterally imposed discounts on its supplier, Celex, and altered contract terms without negotiation, the Italian Competition Authority ruled it an unfair trade practice, setting a precedent for stronger supplier protections.[17] Similar regulatory interventions can deter exploitative behaviour, ensuring that contracts remain fair and legally binding.

Cost concerns are another barrier to its adoption. Blockchain solutions can cost anywhere from USD 15,000 for small-scale implementation to USD 1 million for large enterprises, with additional maintenance and transaction fees.[18] To encourage participation, some retailers offer financial incentives. Carrefour, a leader in blockchain traceability for seafood, expects financial benefits equal to 3% of its seafood gross profit in France. It incentivises suppliers by offering preferential treatment to those implementing full traceability.[19] Initiatives like Fishcoin reward suppliers for accurate data sharing, improving traceability effectiveness.

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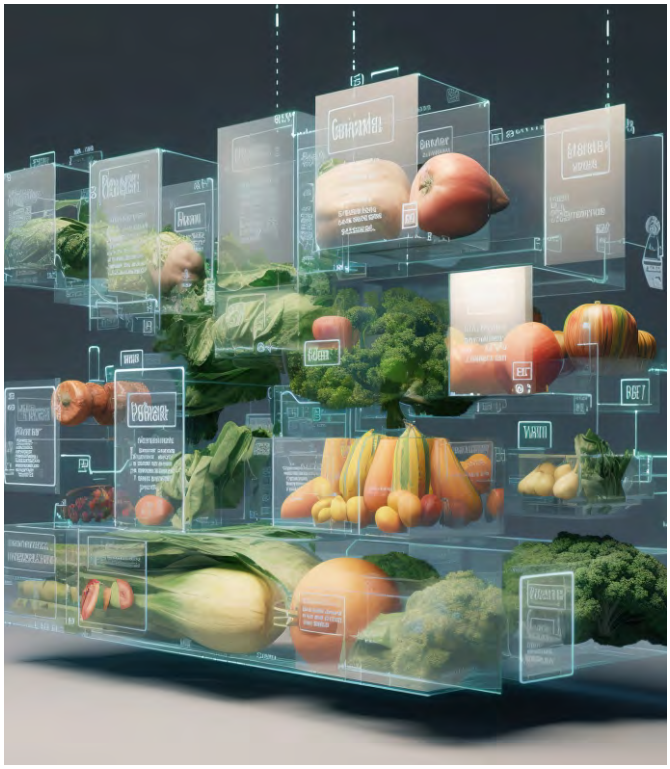

Collective adoption

The benefits of traceability grow as more farmers and suppliers adopt the technology. Large-scale adoption mitigates the negative effects of strategic pricing, as improved contamination prevention benefits the entire network. Instead of focusing on short-term cost reductions, businesses should recognise traceability as a long-term strategic advantage. For example, European regulations now require verified deforestation-free cocoa supply chains, giving digital tracking adopters a competitive edge.[20]

Beyond food, blockchain traceability is gaining traction in pharmaceuticals and textiles. The MediLedger project, launched in 2017 by companies like Genentech and Pfizer, enhances drug tracking to prevent counterfeiting.[21] In the textile industry, traceability verifies ethical sourcing claims, reinforcing sustainability and transparency.[22]

Securing food traceability

Blockchain-enabled food traceability can yield major benefits – economic, social and environmental – as the technology enhances food safety, reduces waste and improves supply chain efficiency. But this potential can only be realised when adoption is widespread and equitable. This means addressing barriers to adoption such as supplier resistance, unequal bargaining power, and cost concerns. A key way to encourage adoption is by structuring contracts to prevent post-implementation price reductions, which ensure fair revenue distribution and protect suppliers from opportunistic behaviour. As we discussed, regulators needs to ensure that fair contract terms are enforced, and opportunistic pricing is penalised. As more industry players recognise its value, the full potential of blockchain-enabled traceability will be realised, securing safer, more efficient and more sustainable supply chains.

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