




BLOCKCHAIN FOR PRODUCT TRACEABILITY

Abstract

Product traceability is a crucial requirement for all CPG companies today. Consumers are more conscious of what they eat, wear, and use, and how their actions impact the environment. They want CPG companies to provide them with specific product details so they can make informed choices and buy authentic products. Achieving this level of visibility is a challenge for CPG companies due to multiple stakeholders in their supply chains.

This article analyzes how blockchain technology can support organizations in achieving end-to-end product traceability. It discusses use cases and implementations of blockchain and outlines the benefits that an organization can reap through proper blockchain implementations.



The Need for Supply-chain Traceability

In 2021, reports estimated that the global market for track-and-trace was US \$4.1 billion, a figure that is projected to reach US \$7.3 billion by 2026, growing at a CAGR of 12.1% over the five-year horizon.

These are large numbers indicating positive growth. However, a glance at the numerous instances of product counterfeiting unveils the wide gaps in ensuring provenance and traceability. Consider the following statistics:

1. The OECD finds that total trade in fake merchandise was nearly 3.3% of global trade in 2016 and is rising¹
2. As per estimates, the total losses to the luxury industry in 2017 due to counterfeiting of products such as apparel, footwear, cosmetics, handbags,

watches, and textiles amounted to almost US \$98 billion, of which online counterfeit accounted for roughly 31%²

3. According to Michigan State University's Food Fraud Initiative, the food fraud industry costs global consumers around US \$30-40 billion annually³

When the consumer knowingly buys knock-offs and counterfeits, it is purely an economic loss. But when the consumer is unaware that the article is fake, it affects legitimate brands from a reputational and commercial perspective and can adversely impact consumer health.

The upshot is that brands spend significant time and resources on managing large teams of intellectual property lawyers and lobbying with various governments to implement effective control mechanisms.

But in today's digital world, it is fairly easy and affordable for fraudsters to set up a dot-com website or register themselves as one of thousands of third-party vendors for leading e-commerce marketplaces. This makes the issue of counterfeiting very hard to resolve, and brands often take extreme steps to prevent damage to their reputation. Nike's decision to pull their entire product range from Amazon in 2019 and cancel their partnership arrangement is a well-known example.

Today, consumers want brands to take on the burden of ensuring product genuineness and sustainable sourcing practices. In this scenario, it becomes a business imperative for brands to be able to trace products and establish proof of provenance of the product and the raw materials used.

¹ Trends in Trade in Counterfeit and Pirated Goods, a 2019 report by OECD

² Global Brand Counterfeiting Report 2018

³ Food fraud is an act of altering, substituting, or tampering with the ingredients or raw materials, and misrepresenting or mislabeling a food product or packaging at any point in the food supply chain for economic benefit.

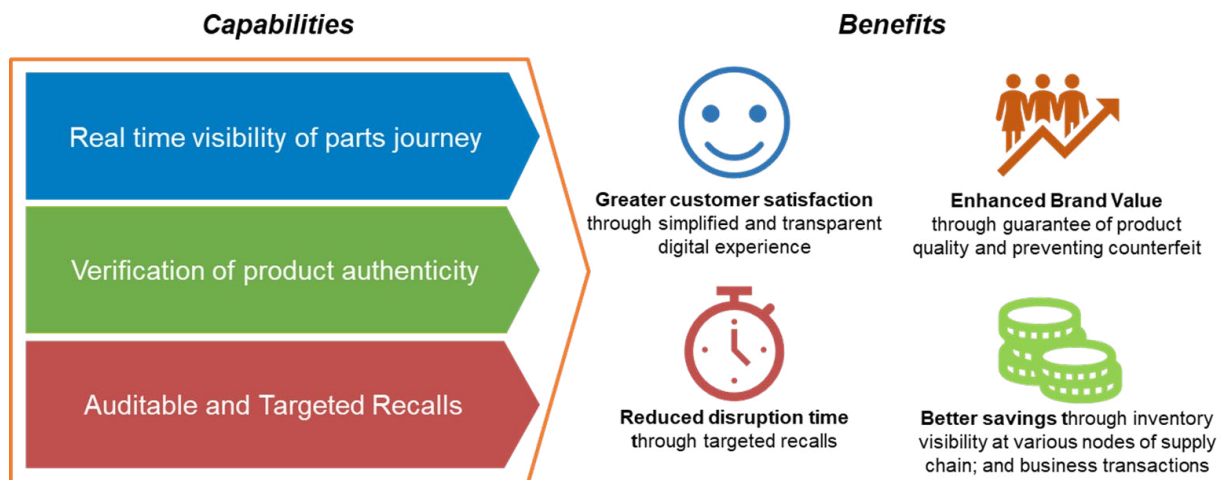
Enter Blockchain

Blockchain fundamentally is a system of records wherein data is stored in groups or 'blocks'. These blocks are linked together such that one block references the previous block in a chronological sequence of events. This chain of blocks is distributed over a network of participant computers called nodes. Hence, blockchain is called the distributed ledger technology (DLT). The activity of distributing the chain of blocks happens every time a new data block needs to be attached to the blockchain.

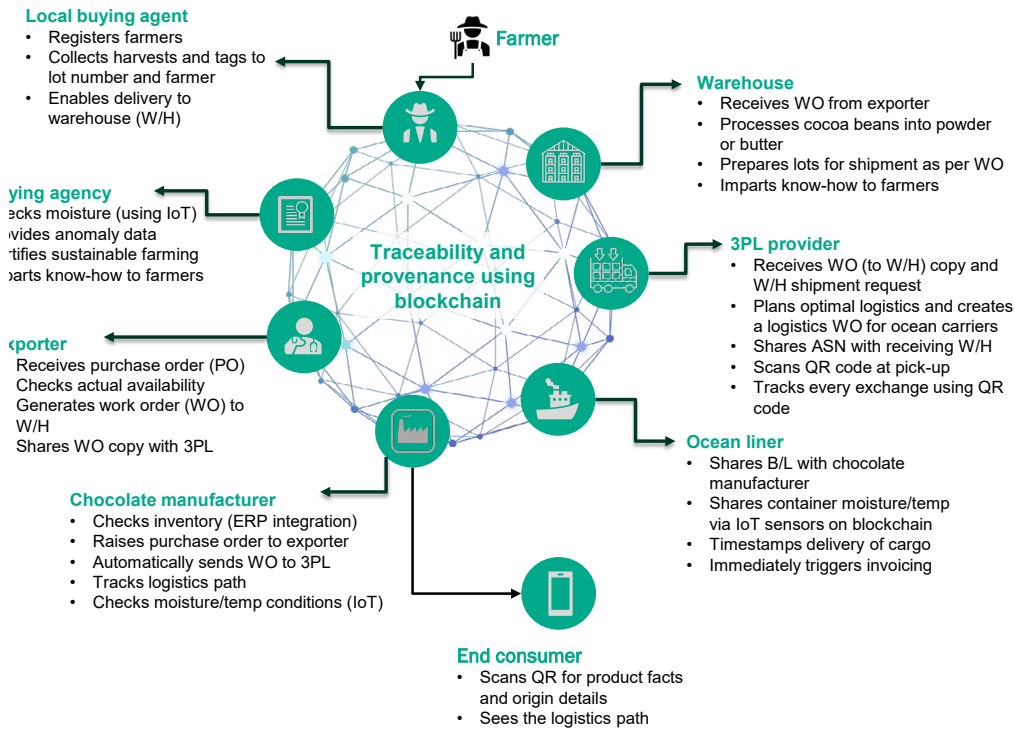
The twin actions of referencing any new block to the previous block and distributing the system of records to all nodes in the blockchain network make the overall system highly secure. Any incorrect or illegal change in the data, even when identified post-facto, will not match the records held by other network nodes and, hence, will be invalidated.

As a distributed and immutable ledger of records, blockchain presents a strong case for an end-to-end traceability solution. A well-defined, federated, or permissioned public blockchain enables multiple entities to participate in updating information and product records to every node and member on near real-time basis.

Infosys has deployed a blockchain solution for a farm equipment manufacturing company that wanted to ensure parts authenticity in their after-market space. The digital supply network had multiple participants and the manufacturer wanted information to flow seamlessly in near real-time. Now, through blockchain, the manufacturer can confirm exactly what parts must be manufactured and in what quantity while the suppliers execute the production with each article having a digital twin. In addition, the whole supply chain is tracked from suppliers, certifying agencies, logistics providers, dealers, and consumers. Finally, the end-consumer can establish product authenticity using a code scanner.



In another example, Infosys delivered a blockchain solution for a leading agricultural products trader to address the challenge of establishing product and raw material provenance. Blockchain is helping the trader boost sustainable farming practices. Automation of the workflow from purchase orders to invoicing has reduced payment cycle time, improved auditing, and reduced cost. A map of the solution implementation is presented in the figure below.



Tracks journey of the cocoa lots (origin, movement, materials used) across the supply chain and provides information in near real-time

Seamless integration with client's production system to source procurement transactions

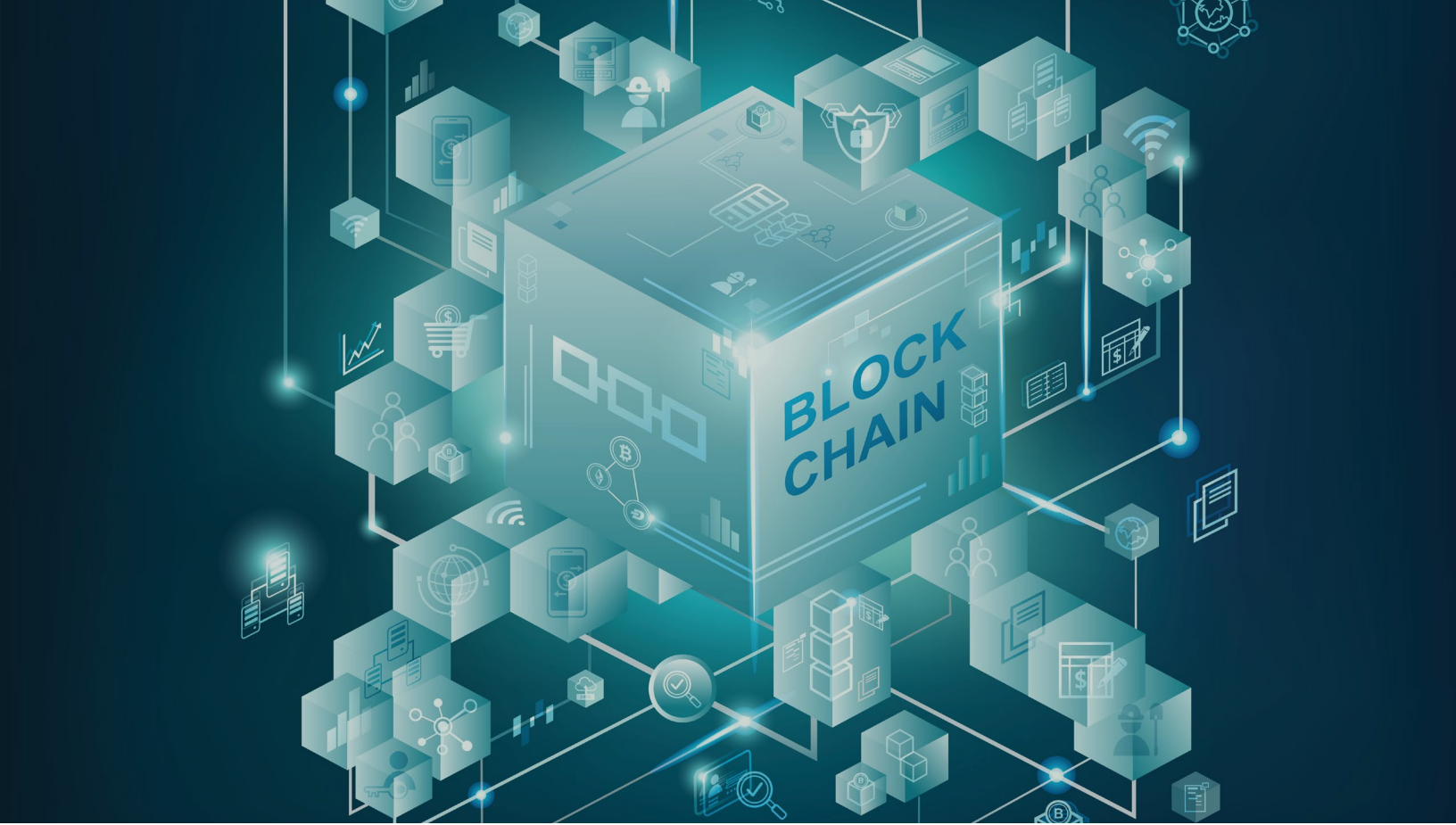
Guarantees integrity of certificates by ensuring that the produce has followed sustainability standards

Distributed ledger acts as a unified, single source of truth across procurement and supply chain processes

Integrated timeline view provides an immutable audit trail across five different stakeholder nodes

Optimizes reconciliation by mapping POs, invoices, and shipment related artifacts all the way till the farmers who contribute to respective constituent lots














Traceability as a Key Enabler

The two Infosys implementation examples explained earlier cover supply as well as demand-side scenarios. Beyond this, there are many use cases where end-to-end product tracking is beneficial for product companies. Infosys has executed several pilot and full-scale blockchain solutions for retail, CPG, and logistics organizations to demonstrate these benefits. Some examples include:

1. Implementing a pilot blockchain solution using Hyperledger for Walmart to gain source traceability of its food items. The objective was to achieve precise traceability of all food products originating from a particular source. This was particularly important when dealing with contamination issues and enabling targeted product recall. Now, the time taken to establish the place of origin (and logistics path) is 2.2 seconds
2. Walmart has also deployed a Hyperledger-based blockchain solution comprising 27 nodes for shipment tracking, documentation, invoicing, and settlement. The solution provides smart contracts for payment processing
3. Plantaze, a premium winemaker, implemented a blockchain solution to establish traceability of over 15,000 wine bottles. The intent is to assure consumers that the product is genuine and share interesting product data and insights
4. With the support of the World Wildlife Fund, SeaQuest Fiji implemented an Ethereum blockchain solution to verify when, where, and how tuna is caught. Earlier, the purchase and selling of Pacific tuna were recorded on paper, allowing for tampering, illegal fishing, and human rights abuse. With the new system, fishermen must register their catch (fish type, weight, etc.), which is fed into RFID tags
5. LVMH, along with MS Azure and Consensys, unveiled AURA, a private blockchain based on Ethereum. Other brands can become members of the blockchain. Consumers can use the app to know more about product provenance, customer loyalty, and product stories including raw materials, design, production, distribution, product care, and warranties
6. New Balance implemented a pilot solution using Cardano blockchain on their OMN1S footwear range that was launched in 2019. Each shoe has a Realchain card to track sale records and authenticate shoes. By scanning the QR code and typing in the code on the card, a consumer can claim ownership, thereby reducing the likelihood of theft
7. ABInBev implemented a pilot blockchain to improve visibility and payments to cassava farmers, the bottom tier of the supply chain. They mapped nearly 2,000 farmers on the network to ensure they receive messages with product prices, weight, and expected pay-outs. By partnering with Airtel Africa and Mobile money service MTN, the solution ensures that payments go directly to the farmers' bank accounts

The urban consumer is spoilt for choice. Therefore, brands should tailor customer benefits such as loyalty programs to maintain customer engagement. This requires a sharp understanding of customer buying patterns that, in turn, define targeted loyalty programs. Traceability data made available through QR scans can provide a rich dataset for such analytics. End-to-end traceability can also give brands detailed insights on actual demand scenarios, channel infringement, and geographic white spaces.

Some of the benefits of deploying end-to-end product traceability are illustrated in the Fig below:

 <p>Prevents channel infringement</p> <p><i>Review the logistics path of products to highlight cases of distributor cross-trading. Prevention reduces dealer dissatisfaction and churn</i></p>	 <p>Supports provenance tracking</p> <p><i>Build consumer confidence and achieve sustainability goals through immutable records of place of origin and associated details</i></p>	 <p>Deploys effective loyalty programs</p> <p><i>Tailor loyalty offers with visibility into consumer purchases (typically secondary or tertiary sales). Onboard participating partners onto the blockchain</i></p>
 <p>Unveils demand in white spaces</p> <p><i>Identify opportunities to realign dealers and salesforce in different territories using data on actual demand areas and product offtake</i></p>	 <p>Enables inventory visibility</p> <p><i>Achieve downstream inventory visibility and improve demand forecasting through end-to-end traceability</i></p>	 <p>Captures audit history and document logs</p> <p><i>Ensure auditing compliance through real-time documentation. Smart contracts enable reconciliation and immediate settlement</i></p>
 <p>Supports anti-counterfeiting</p> <p><i>Improve customer trust and brand loyalty through alerts and notifications in case of fake or counterfeit product scans</i></p>	 <p>Enables focused product recall</p> <p><i>Identify faulty products immediately to minimize business disruption and avert reputational damage</i></p>	 <p>Error-free product handling</p> <p><i>Integrate IoT devices with blockchain to monitor product handling and receive alerts in case of any anomaly</i></p>

Organizations focused on luxury goods, F&B, and lubricants, among others, are increasingly seeking end-to-end traceability solutions to gain the necessary data that will support business decisions and profitability. Blockchain, with its inherent strengths of immutability, redundancy, cryptographic security, smart contracts enablement, and the ability to integrate with IoT devices, provides a ready solution for marketers to achieve traceability.





Conclusion

The global market for product traceability is growing. Customers want specific product information in order to make authentic buying decisions. Organizations on their part want to eliminate instances of counterfeiting and contamination to cement profitability and avoid reputational damage.

Through its distributed ledger technology, blockchain allows CPG companies to verify product provenance, track the authenticity of raw materials used, and ensure fair production processes for the end product. As suppliers, certifying agencies, logistics providers, dealers, and consumers are mapped to the same network, every stakeholder receives immutable information about product journeys. Besides improving supply and demand cycles through strong visibility, blockchain solutions support various use cases around customer loyalty, behavior analytics, product ownership, and more. These, in effect, boost profitability for CPG organizations and ensure customer retention.

About the author

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