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CASE STUDY

Using Blockchain Technology to Fight Counterfeiters

Ensuring end-to-end traceability and authentication in the supply chain can help prevent counterfeiting. Photo credit: ADB.

A tech startup in Australia is piloting the use of blockchain in ensuring traceability, provenance, and authentication in the supply chain.

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Overview

Blockchain, combined with the Internet of Things (IoT), has the potential to protect supply chains and combat counterfeiters by providing end-to-end supply chain visibility and traceability.

Counterfeit goods are a global problem. The value of imported fake goods is estimated at $461 billion in 2013, compared with total world imports of $17.9 trillion.

OECD imports of counterfeit and pirated goods are worth nearly half a trillion dollars a year, or around 2.5% of global imports, with many of the proceeds going to organized crime.

Up to 30% of all drugs in circulation are fake, leading to up to a million deaths annually, including 450,000 preventable deaths from malaria alone. A World Health Organization pooled analysis of 100 studies from 2007 to 2016, covering more than 48,000 samples, showed 10.5% of drugs in low and

middle-income countries to be fake or substandard. With pharmaceutical sales in these countries running at nearly $300 billion a year, this implies that trade in fake medicines is a $30-billion business.

Food fraud, "the fraudulent, intentional substitution or addition of a substance in a product for the purpose of increasing the apparent value of the product or reducing the cost of its production," is estimated to cost the global food industry $10 billion to $15 billion per year.

A tech startup in Australia is using blockchain technology to combat fake goods by ensuring traceability, provenance, and authentication in the supply chain. TBSx3 (to-be-sure-times-three) is helping brands to secure and optimize their supply chains and connect with consumers.

At a knowledge-sharing event at the Asian Development Bank, TBSx3 chief operating officer Pieter Vandevelde said the company has started testing the effectiveness of the TBSx3 system by shipping a container with bottles of wine from the Coonawarra region in Australia to Qingdao in the People's Republic of China (PRC).

Watch this interview with Nick Giurietto, CEO and managing director of the Australian Digital Commerce Association, who wrapped up the solutions and lessons shared on blockchain technology at a workshop held at the Asian Development Bank.

Challenges

It is hard to gauge the scale of wine counterfeiting in the PRC, but there is a lot of anecdotal evidence in the wine industry. For example, in March 2018, police in central PRC seized some 50,000 bottles of fake Penfolds top-shelf wine in one of the biggest hauls so far of counterfeit liquor. Journalistic and anecdotal sources estimate that 30% of all alcohol in the country is counterfeit and 70% of wine is fake.

A major challenge to counterfeit protection is ensuring traceability of products in the supply chain. The rise of global supply chains has made tracking of goods, from assembly line to store shelf, more difficult. Currently, supply chains involve a complex network of players, each operating their own system. This makes coordination challenging and provides brand owners with a limited view of their operations.

Counterfeit protection involves generally four elements: the product that is consumed, its packaging, its label and the cover that is used to open and close it. The use cases described below were restricted to the packaging and label. Naturally, a product's origin is best identified and verified using "fingerprints" derived from the chemical compositions of its ingredients, compared against tests samples. Although that data can be appended on the ledger, it was left "out of scope" for the sake of simplicity.

Solution

Three considerations guided the design for this use cases:

1. The solution needed to re-assure the brand owner, its logistic partners, and the consumers that the captured data stored on the ledger could not be edited. Therefore, creating trust was very important.

2. Scalability and a flexible architecture were paramount to able to plug in Systems of Record (SoR) or other technologies, such as Near-Field Communication tags (NFC) and temperature loggers.
3. Empower consumers and leverage the background story and origins of the product and the brand through a mobile app. Brand origin is a decisive purchase driver.

TBSx3's solution strategy in this use case worked at two levels:

1. **The ability to provide end-to-end supply chain visibility for all partners involved, including the retailers and the consumers.**

Supply chain visibility means vertical aggregation from trade items, to pallets, to containers - but also horizontally from the packaging line to retailer.

2. **The ability to serialize and track every trade item which means a unique QR code for each bottle.**

Serialization regulations to combat counterfeiters have been implemented in the pharmaceutical industry: Drug Supply Chain Security Act in the United States and the Falsified Medicines Directive in the European Union.

How does it work?

Tokenization on blockchain

TBSx3 designed a "private" or permissioned distributed ledger which means that parties require permission to read the information on the blockchain and that the parties who can transact on the blockchain are restricted.

Every authorised partner will access and operate the blockchain through a node. The function of a node or a validator is to validate the data before it is appended on the blockchain. The validation is based on a scalable protocol that is embedded in the blockchain platform.

Each trade item and logistics unit in the physical supply chain is mirrored by a digital asset in the blockchain. This digital asset is called a utility token. These utility tokens exist conceptually as entries on a distributed ledger. Parties own these "tokens" because they have a key that lets them create a new entry on the ledger, re-assigning the ownership to someone else. They do not store tokens on their local computer but store the private keys that let them confirm and sign token transactions (i.e., a container, pallet, case). The blockchain maintains a timestamped archive of each token transaction, i.e. movement in the supply chain.

The benefit of this approach is that all supply chain participants are linked in a singular "data collaboration platform," instead of using a silo-based patchwork approach, traditionally used in individual corporate databases, which is outdated and inefficient.

Pilot implementation

In 2017, TBSx3 ran a pilot of its system to ship bottles of wine from Ius Wines in the Coonawarra region in Australia to Qingdao, PRC. The wines were transported by train from Adelaide to Melbourne and by sea from Melbourne to Qingdao.

Australia's prime container port and supply chain operator, DP World Australia, was the lead partner for TBSx3's initial shipping trial.

Container shipping company Hamburg Sud and logistics firm DB Schenker also worked with TBSx3 on the trial. Hamburg Sud transported the container from Melbourne to the PRC. DB Schenker carried containers from DB World's port in the PRC to the distribution warehouse.

Results

The pilot implementation of the TBSx3 system achieved the following outcomes:

- **Counterfeit prevention:** A blockchain platform, combined with innovative packaging technologies, significantly improves control over the supply chain and empowers customers to verify the product prior to consumption, therefore combating counterfeiters.
- **Customer retention:** Customer relationships are improved and increased in value because the brand can provide, an otherwise not achievable, greater level of data granularity.
- **Customer experience:** Customer satisfaction was improved as Asian customers expect transparent, verifiable provenance information about the wine brand and the specific contents of the item they are considering purchasing. Quality, unique characteristics, and sustainability of brand can be documented and optimized (i.e., evidence-based provenance). Blockchain enables irrefutable proof of provenance.
- **Building sales:** Brand owners typically have only limited visibility regarding consumption and consumer data. The mobile app for consumers that can be integrated with WeChat provides atomic granularity to brands about consumption and consumer information: what, where, and when. That data can be overlayed with other data sets, such as shopping center locations and weather.
- **Supply chain collaboration:** A key benefit of blockchain for supply chain networks is the establishment of shared, secure, information flow records—a "shared version of events" across networks of the relevant supply chain transactions, processes, and partners. This shared version of events enables improved supply chain efficiencies, better multi-party collaboration, and streamlined resolution processes when exceptions or disputes occur.
- **Stock control:** Because distributor networks tend to be opaque in most Asian economies, there is a risk that unsold items will be stockpiled, negatively impacting prices. Blockchain technology provides additional information that enables "real time" audits.

Impact on counterfeits was difficult to measure, given that this was just a pilot implementation of the application with restricted timeframe and scope. Based on data extrapolation, the application could significantly improve control over the supply chain and empower customers to verify the product prior to

consumption, making it more difficult for counterfeiters to operate. New pilots are running in 2018, including for pharmaceuticals.

Resources

K Patrick. 2018. Australian Tech Company, Hamburg Sud Launch Blockchain Consortium. *Supply Chain Dive*. 5 February.

J McKevitt. 2017. DB Schenker, Hamburg Sud Test Blockchain Tech in Wine Shipment. *Supply Chain Dive*. 6 June.

P Burnson. 2018. TBSx3 Launches Blockchain Consortium with DB Schenker and DP World to Protect Global Supply Chains. *Supply Chain Management Review*. 7 February.

Related Links

Insight: How to Turn Blockchain Fintech Hype into Reality

Insight: Lessons from Asia's Blockchain Pilot Projects

Explainer: How Blockchain Can Revolutionize Access to Finance

Pieter Vandevelde
Chief Operating Officer, TBSx3

Prior to TBSx3, Pieter was VP Asia-Pacific for a leading supply chain software company and held leadership roles in global fintech players, such as FIS. He started his career at BNP Paribas Fortis and obtained master's degrees at the University of Ghent in Belgium and the Goethe University Frankfurt am Main in Germany. He holds several qualifications, such as a Postgraduate Certificate in Financial Modelling from the London School of Business and Finance.