

Blockchain and The Economics of Customer Satisfaction

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Abstract:

Companies can satisfy their customers' by delivering high value. They can do so by reducing product costs or by improving customers perception of benefits of the products. Blockchain can help achieve these goals.

Keywords: blockchain | supply chains | consumer satisfaction | economics | cost reduction

Article:

To satisfy customers, companies need to make every effort to deliver high customer value with appropriate product features and benefits. Customer value is the difference between the benefits received and the costs associated with a product. In order to enhance customer value delivery, organizations need to do at least one of the following: First, reduce product costs, and, second, improve customers' perception of benefits or quality of the products. Blockchain offers inherent promises that are relevant to the fulfillment of both of these goals.

Table 1. Different value delivery mechanisms using blockchain

	Reducing costs	Increasing perceived quality
Organizational level	<ul style="list-style-type: none">•Chateau Margaux: elimination of counterfeits•Artists can sell directly to consumers without the services of a label, financial intermediary, or technology company	<ul style="list-style-type: none">•Chateau Margaux: consumers' high degree of confidence about the quality of wine
Interorganizational level	<ul style="list-style-type: none">•Walmart: low cost in the case of a crisis such as a food borne illness•Toyota's tracking of auto parts with various suppliers: reduction in costs associated with automobile recalls.	<ul style="list-style-type: none">•Walmart: food is not adulterated•Bext360's solution: assurance that coffee growers would be paid fair wages.

MEASURES AT ORGANIZATIONAL AND INTERORGANIZATIONAL LEVELS

Table 1 presents different value delivery mechanisms using blockchain. In some cases, efforts to improve blockchain-led value creation need to be made mainly at an organizational level. The

organization that leads the effort may need some cooperation from value chain partners, but in a limited manner.

To take an example, consider the French wine producer Chateau Margaux. Everledger and wine expert Maureen Downey's company Chai Consulting developed a blockchain-based system to track wines for Chateau Margaux. In 2016, Everledger recorded the first certification of a 2001 bottle from Chateau Margaux. The Chai Wine Vault system (<https://www.winefraud.com/chai-wine-vault/>) gives each bottle a unique digital identity with over 90 pieces of data related to ownership and storage history. The data include high resolution photographs and information from the label, capsule, cork, and glass.¹ As the wine bottle moves along different participants in the supply chain, digital data is updated with ownership and storage records. To verify provenance, retailers, warehouses, auction houses, and other sale platforms can link the bottle to its digital identity. As of December 2016, Downey's company was in the process of developing a tamper-proof tag with a chip that detects and registers when a bottle's cork is pulled, or when it is pierced by a system such as Coravin. The ID of such bottle will not "check in" when logged into the system.¹

In other cases, significant interorganizational measures that involve key value chain partners, such as suppliers and distributors, are important. In 2016, Walmart trial-tested a blockchain-based solution to monitor pork products in China and produce imported to the U.S. from Latin America. The Chinese trial took place in a farm operated by a company called Jinlao located in northeastern China's Lingyi city. Jinlao provided data about the pork products such as the farm inspection report and the livestock quarantine certificate. These documents were digitized by an industrial personal digital assistant (PDA): a smartphone-like device in a rugged case. These data were uploaded to Walmart's blockchain in real time.² Without significant cooperation from Jinlao, Walmart will find it impossible to implement the project.

To take another example, Denver's coffee roaster Coda Coffee uses blockchain to track coffee from African farms to coffee shops (<https://sprudge.com/132380-132380.html>). It uses solutions developed by blockchain startup Bext360 that consist of Stellar blockchain, cloud-based software, and smart contracts. The goal is to bring transparency to the supply chains of coffee and other commodities, such as cocoa and cotton (<https://techcrunch.com/2017/04/11/bext360-is-using-robots-and-the-blockchain-to-pay-coffee-farmers-fairly/>). First-hand data related to product evaluation and payment to coffee growers are provided by different participants including farmers' co-ops and Uganda-based coffee exporter Great Lakes Coffee. In April 2018, Coda Coffee sold what it claimed to be the world's first blockchain-traced coffee (<https://www.foodlogistics.com/technology/news/21000940/coffee-brewers-turn-to-blockchain>).

Dutch startup Moyee Coffee is using similar solutions. It teamed up with the blockchain firm FairChain Foundation and Bext360 to launch a blockchain-traced coffee product called Token. By June 2018, Blockchain was used to track 60,000 kilograms of coffee exported from Ethiopia to Amsterdam.³

Likewise, the Chinese e-commerce companies Alibaba's international marketplace Tmall Global uses blockchain and product tagging with unique QR codes to track and monitor food products and make the information available to consumers. Each step in the supply chain is authenticated

and verified. AusPost and Blackmores provide relevant information and in-market testing across their supply chains (<https://www.zdnet.com/article/alibaba-and-auspost-team-up-to-tackle-food-fraud-with-blockchain/>).

BLOCKCHAIN DEPLOYMENT AS A COST REDUCTION MECHANISM

Blockchain helps cost reduction in a number of ways. Some of the key mechanisms and processes are highlighted as follows.

Cutting Production Costs

Blockchain deployment in supply chains can result in lower prices that the end customers pay thanks to the reduction in production costs. In the coffee industry, for instance, costs related to paperwork and physical inspection are estimated to be as high as US\$0.91 per pound of coffee (<https://moyeecoffee.ie/blogs/moyee/world-s-first-blockchain-coffee-project>). Blockchain-based details provided by Bext360 can drastically reduce these costs.

Blockchain deployment would also reduce the wastage of resources. Swiss start-up Modum's blockchain system ensures a safe delivery of pharmaceutical drugs. Most medicines need to be transported under exact temperature, humidity, and light conditions. Modum's sensors constantly measure these conditions on drugs that are being transported. Under the current system, cargoes involve many people and a lot of paperwork, which can be tampered with (http://www.swissinfo.ch/eng/joining-the-blocks_how-blockchain-could-soon-affect-everyday-lives/43003266). Modum's solution aims to address these issues.

The EU regulation, Good Distribution Practice of Medicinal Products for Human Use requires companies to report any deviations in temperature or other conditions to the distributor and the recipient of the medicinal products. Currently, the only way to comply with the new regulations would be to use refrigeration trucks. These trucks are four to eight times more expensive than normal logistic services. However, 60% of about 200 million yearly shipments in the EU do not contain products that are temperature sensitive. This means that an estimated US\$3 billion is wasted annually for unnecessary cooling.⁴

Modum is focusing on so-called ambient products that need to be stored in the 15 to 25 °C range. Every medicine, however, has so called "stability data," which states that the medicine "can stay for X hours in temperature range Y, [which is] usually 72 hours between 2 °C and 40 °C."⁴ This means that some medicinal shipments may not require refrigeration if there is a way to prove that the stability conditions that included in the stability data are met. Modum does exactly this. Medicinal shipments are tracked with Modum sensors to monitor the temperatures of the medicines. This means that no cold chain truck is required. When the medicine reaches the destination, the data is transferred to the Ethereum blockchain.

A solidity-based smart contract compares the data against various regulatory requirements.⁴ If all the conditions are fulfilled, the product is released. The sender and the receiver are notified if the tracked conditions deviate significantly from the regulatory requirements.⁴

Reduction in the Market Power of Intermediaries

The current model in industries, such as those related to creative works intermediaries, reaps most of the profits. Blockchain-led transparency can also help reduce market power of intermediaries and even force them out of the market.

According to Musicoin, intermediaries take over 80% of royalty fees in the music industry (www.nasdaq.com/article/how-the-blockchain-lets-musicians-connect-with-fans-and-get-paid-cm755712). The current model is that streaming services first pay off the record labels, publishers, and public rights organizations before paying artists.

With blockchain, artists can know how much their record label/publisher is paid for their services (<https://www.enterprisetimes.co.uk/2017/04/10/music-societies-turn-blockchain/>). Companies such as Mycelia want to address this unfair situation using blockchain. Mycelia was founded by Grammy-winning British singer and songwriter Imogen Heap with an aim to create a “fair trade” music industry.⁵ Mycelia has developed intelligent songs with built in smart contracts. The system enables artists to sell directly to consumers without the services of a label, financial intermediary, or technology company.⁶ The reduced costs could lead to lower prices for consumers of music.

Elimination of Fake and Counterfeit Products

There are substantial frauds related to counterfeit products, such as medicines, fine wines, and luxury fashions. One estimate suggested that the value of fraudulent fine wine is about \$1 billion annually.¹ It was reported that counterfeiters had reverse-engineered the Coravin system so that they can refill a bottle. According to Everledger, one fifth of the sales of international “fine wine” are of counterfeit bottles.⁷ This type of fraud related to counterfeit products can be effectively deterred through the use of blockchain.

Efficient Handling of a Crisis

A crisis situation can be handled more efficiently if blockchain is deployed in the supply chain.⁸ For instance, in the case of a foodborne illness crisis, retailers such as Walmart can easily and cost-effectively identify the source by scanning a barcode on the packaging. Likewise, automobile companies such as Toyota can reduce automotive recalls due to manufacturing defects and minimize the potential harms in such cases. Blockchain’s use in handling crises thus will result in lower prices to consumers and, hence, higher value creation and delivery.

BLOCKCHAIN TO ENHANCE CUSTOMER PERCEPTION OF BENEFITS OR QUALITY OF A PRODUCT

Blockchain solutions also help assess indicators related to product quality. Everledger’s tamper-evident radio-frequency identification tag is attached on the bottle’s cork. Everledger’s system did not track factors such as bottle temperature. The organization argued that the reputation of the organization storing the wine was sufficient.⁷ The diamond industry uses a certificate system.

For older wines, factors such as a label's design and paper used by a producer in the stated year of production are used in the authentication.⁷

The fact that records in the blockchain cannot be manipulated and individuals or third parties can prove authenticity of the records gives consumer high degree of confidence about the benefits they are receiving. As of July 2018, the Stellar platform used to track coffee had 30 nodes to validate transactions (<https://cryptodigestnews.com/stellar-platform-what-you-should-know-1e7b38a340da>). Since data are validated by multiple participants, they are likely to have a high degree of authenticity.

Bex360's Bextmachine is a Coinstar-like device, which employs machine vision, AI, IoT, and blockchain to grade and track coffee beans.⁹ The system relies on machine learning to categorize the grade and accordingly assign a price.

The bextmachine sorts coffee beans to assess the quality. Farmers that supplied bigger and riper cherries are paid more. The bextmachines link the output to cryptotokens, which represent the coffee's value. New tokens are automatically created when the product passes through the supply chain. The values of tokens increase at each successive stage of the supply chain (<https://moyeecoffee.ie/blogs/moyee/world-s-first-blockchain-coffee-project>). The supply chain is transparent due to this step-by-step and detailed process. It makes sharing the value added among various supply chain participants fairer and easier. Details of the transactions, such as farmer identification, quality, purchasers, and payouts, are recorded.³

From customers' viewpoint, each coffee packet has a QR code, which lets all relevant details be seen, such as those related to times and locations of transactions. They include collection at the coffee farm, as well as other details such as when they were washed, dried, roasted, exported, and sold at retail stores. Transaction data include farmer identification, quality, purchasers, and payouts, all recorded on the blockchain (<https://globenewswire.com/news-release/2018/04/16/1472230/0/en/bext360-and-Coda-Coffee-Release-The-World-s-First-Blockchain-traced-Coffee-from-Bean-to-Cup.html>).

Consumers are increasingly concerned about sustainability issues such as fair trade and environmental protection. Consequently, there are increasing demands of blockchain-based supply chain tracking solutions in many economic sectors. Unsurprisingly blockchain-based solutions providers such as Bext360 are expanding into other sectors. Bext360 announced a partnership with Amsterdam-based startup accelerator Fashion For Good, which focuses on social and environmental impact in the fashion industry. The goal is to track the entire value chain of cotton. Clothing companies are facing pressures to ensure fair trading practices. Market pressure has also forced these companies to use organic cotton.⁹

In the coffee tracking example, using a mobile app, relevant parties negotiate a fair price (<http://www.nasdaq.com/article/innovation-percolates-when-coffee-meets-the-blockchain-cm774790>). In this way, a key benefit that blockchain-based solutions provide to buyers is an assurance that coffee growers would be paid fair wages. For instance, Moyee Coffee provides a proof that living-wage payments were made to farmers.³ This is important since coffee producers are estimated to receive only 2% of the price of a cup of coffee

(<https://moyeecoffee.ie/blogs/moyee/world-s-first-blockchain-coffee-project>). The Bext360 app also determines the identity of the person selling the product.¹⁰ Crops grown by women farmers could be of some benefit that some consumers value enough to pay a premium price.

CONCLUSION

Blockchain can help create and deliver customer value in many different ways. When blockchain is used, several layers of intermediaries can sometimes be avoided. This means that products and services can be directly sold to the end consumer at a lower price. Using blockchain, a crisis situation could be dealt with at a low cost, which would lead to the reduction in the price that consumers have to pay. Blockchain-based solutions have detailed, relevant, and verifiable information about a product, which provide a high degree of certainty about the quality of the products consumers are buying.

The level of transparency discussed above is not possible without blockchain. Moreover, in a blockchain world, consumers are empowered due to the decentralized nature of information flows.

Supply chains of food and other products are typically characterized by complex information flows. This means that the success of a blockchain project is a function of how many participants in the supply chain networks possess the ability and willingness to adopt blockchain solution. In Walmart's case, the success of the solution requires significant cooperation and effort by pig farmers and the growers of fruits and vegetables. Even if a few participants use blockchain, there is likely to be a significant gain in efficiency and consumer trust. A larger network effect is likely to be created if there is a wider participation.

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