Innovation of BlockChain technologies in Government Transformation - A Study of Canadian Food Regulatory

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Abstract

Block chain technologies are profoundly affecting industries ranging from education and culture to the law, finance, and international trade. Innovation, Science, and Economic Development Canada (ISED) is examining the potential of blockchain for government transformation. The Canadian Food Inspection Agency (CFIA) is a regulatory body "dedicated to safeguarding food, animal and plants, which enhances the health and well-being of Canada's people, environment and economy." It is relatively new as agencies go, emerging in 1997 as a combination of multiple inspection agencies. Today, CFIA faces an environment different from that of 1997complex global food supply chains, information-hungry consumers, highly mobile and digital workers, rapidly advancing agricultural and food technologies, and the international competitiveness of Canada's food exports. In collaboration with ISED and CFIA, researcher Alan Majer authored this analysis of the promise and potential of blockchain applied to the safety and sustainability of Canada's food. It is an excellent model of the holistic approach that other government agencies could be taking to test blockchain solutions to pressing national problems. Consider America's aging infrastructure. This paper focus more on the relevance of new technologies like blockchain will improve the performance and productivity of governmental organisations internationally.

Keywords: Innovation, Blockchain Technologies, Business and Government Transformation

Introduction

The world has changed, and food safety has changed with it. The forces that have connected us in a global society have also changed how we produce and consume our food. Instead of local agricultural production and consumption, we have complex supply chains, processing technologies, and international trade. Those responsible for food safety face new challenges. They also have an opportunity to lead the development of new techniques for managing agriculture and the food supply. Today, Canada enjoys an excellent global reputation. It is a mixed blessing, in that crises are often the drivers of change and innovation. To expand its reputation at home and abroad, Canada can take supply chain leadership in ensuring the quality and safety of its food and all elements of its production. The transparency and electronic enablement of food supply chains and the information associated with them have never been so important to the safety, integrity, and value of what Canadians eat and produce. Blockchain technologies are new tools for enhancing quality and transparency. As fundamental innovations, blockchains are re-shaping the Internet itself, allowing new distributed collaborative structures, value exchanges, and information sharing that could revolutionize today's supply chains. Like many technologies, blockchain is only as good as its implementation: each use requires trustworthy data and multistakeholder participation for us to realize its potential. This prospective examines how blockchain could assist us in managing modern challenges around a core resourceour foodand facilitating Canadian global competitiveness.

Role of Blockchain Technology in Changing Environment

A changing environment with new risks is our food safe? Answering this question is surprisingly difficult. It depends not only what we see right in front of usa combination of safe ingredients, freedom from contaminants, and transparency in genetic modification and usage of antibiotics and hormone therapiesbut also on its safe handling throughout the supply chain from farm to fork. Ability to access food quality and safety is inextricably tied to the information about the provenance and the world has changed, and food safety has changed with it. Is our food safe? Answering this question is surprisingly difficult. Without information about plants, animals, and food handling practices, some of the greatest risks like pathogens or trace contaminants are nearly invisible, or their harm may also accrue over long periods. "Canada's food sector is among the world's largest. Canadian agricultural product exports amounted to $26.1 billion or 5.7 percent of all global agricultural exports and qualified our country as the fifthlargest agricultural exporter in the world." Forty-three percent of Canadians profess skepticism about whether Canada's food system is "on the right track." With a handful of exceptions, Canada lacks full farm-to-fork traceability, with limited visibility into the environment and conditions under which animals were raised or plants grown. The reasons are complex: Legacy practices have not kept pace with modern requirements. Many processes rely on manual entry or paperbased systems. Those who bear the costs of innovation are not always those who benefit from it. Increasingly complex global supply chains make it difficult to trace food, plants, and animals. Consumers and producers need

easy-to-use systems. Consumers want proof, not hard-to-decipher labels; and producers want systems that are easy to implement. A disconnection between consumers and producers of food undermines the pursuit of quality. Food commoditization has intensified economic pressure and limited the rewards for quality improvements by producers.

Multiple parties in the supply chain must act collectively to achieve industry or nation-wide benefits. Proponents of food safety have failed to show the economic value of, or make the business case for, farm-to-fork traceability systems. Compensation schemes that encourage transparency and mitigate harm to producers from food incidents are disincentives for addressing system-wide risks. Regulatory approaches have traditionally emphasized mandatory compliance over the communication of benefits. "If you look internationally, Canadian products are trusted. We are seen as having pristine water and natural resources."

Benefits to Canada's food, animal, plant handling practices

There are clear benefits to improving Canada's food, animal, plant handling practices, and embracing greater transparencydirect economic benefits that accrue from food and producer excellence, improved safety, and trust. While these benefits are obvious, the path to realizing them is not. Today's supply chain realities and fierce global competition set a very high bar. Agricultural and food leadership require more than reputation: global buyers care not only about the quality and provenance of food, but also about the welfare of animals and the sustainability of farming practices. Canada will have to earn its leadership role. Today's supply chain realities and fierce global competition set a very high bar. Global and integrated supply chains Global trade and new intermediaries mean today's food is subject to handling by more players, both within and outside our borders. One study concluded that "68.7 percent of national food supplies as a global mean are derived from foreign crops.

Product can land in Ontario in the morning and be on a plane and in Vancouver by the afternoon, according to Alyssa Daku, chief data and risk officer of CFIA. Today, even a simple pizza may contain up to 35 ingredients sourced from 60 different countries. The complex realities of the global food trade require careful coordination, handling, and information sharing by all supply chain actors to assure safety. Demand for new and novel products Even the nature of food is changing: novel products such as synthetic foods, spirulina, and other bacterial food candidates, genetically modified organisms (GMOs), and the use of products to control disease or accelerate growth can all amplify risk management challenges. Some issues and risks (declining honey bee health, for example) are inherently complex, requiring multi-disciplinary approaches to address them. Others, like the use of antibiotics in animal feed (and the risks it may create for antibiotic resistance and human health), are not only complex, but politically sensitive too. Fortunately, technology also provides tools to help us overcome some of these challenges.

Importance of Technology in Food Handling Practices

According to Wacker, "new technologies and advanced analytical tools now allow us to test for chemicals and substances that we didn't even think about 10 years ago. Food fraud We face threats not only from inadequate food handling practices or unsafe ingredients but also from intentional forms of food fraud, which consultant and analytical scientist John Points estimated to be five to twenty percent of all food-related incidents, "depending on whether [we take] a cynical or a charitable view of documentation and labelling errors." Bad actors may attempt to inject unsafe food at the weakest links in global food supply chains. Today we produce more pepper than the world's supply of peppercorns would allow. "There are not enough honey bees in the world to satisfy the claimed sales of honey," said McArthur of Nourish Marketing. What risk does this represent? Food industry analyst HirokazuKawagishi told Japan Today, "The concealment of point of origin and reshipment of items meant for disposal are widespread practices in the food and wholesale industries. Much of this fraud is economically motivated, but the same criminal mindset that profits from false food may care little about its safetywhether it's horsemeat sold as beef or infant formula laced with melamine. "The optimistic answer is that awareness and fraud protection processes will have strengthened, and criminals will have switched their attention to another industry that is perceived as a softer touch," Points explained to New Food Magazine.

"New technologies and advanced analytical tools now allow us to test for chemicals and substances that we didn't even think about 10 years ago. Today's food safety, animal health, and plant protection requirements demand traceability and accountability of our food supply, as well as the ability to respond rapidly to threats. Traceability practices like "one up, one down," while standard for international trade, no longer suffice in the wake of an outbreak where we need to track down sources of harmful food, animals, or plants in hours, not weeks.

Global shift towards new businesses and Governance

It's a global shift that businesses and governments ignore at their peril, and many players around the globe have focused on farm-tofork traceability and sustainable practices. Some countries see it as a great catalyst for international growth. "If we want to continue to grow as an industry, and remain viable while we grow, we need to listen to the marketplace," recalled Padraig Brennan, director of Ireland's BordBia. Industry is acting on these new consumer expectations. Companies like Amazon (which recently purchased Whole Foods) view supply Today's food safety, animal health, and plant protection requirements demand traceability and accountability of our food supply, as well as the ability to respond rapidly to threats. The eventual shift to transparent traceable food is already a foregone conclusion, industry and trading partners require it, and consumers demand it.

Food supply chains and access to data will ultimately change, for the simple reason that customers demand it. Digitalization we can leverage the same technologies that expanded international trade and supply chain coordination to improve the processes and flow of information that assure food safety and create business value. Focusing on digital service delivery not only helps businesses and consumers to access the information they need more easily, but it also encourages collaboration and process automation. It's about using information to compete and serve the customer. Brian Solis, principal analyst at Altimeter, told Forbes, "We will see a renaissance in physical space and a new paradigm for online shopping that merges intelligent technologies, hyper-personalization, and seamless cross-channel engagement." While these tools benefit information transparency for customers, they also reach back far into the supply chain. Digitalization is affecting the flow of processes and materials in nearly every industry paper and manual methods are being replaced by smart data collection and networking. A 2016 survey of disruptive supply chain technologies put "digital supply chain" near the top of the list, with 68 percent of respondents citing it as disruptive and important, exceeded only by "big data analytics." Blockchain promise and potential at its simplest, a blockchain is a distributed record-keeping system that allows trusted and accurate record keeping among multiple participants. The system works, regardless of whether system participants trust one another and records are permanent and immutable. This arrangement is unusual because typically "trust" in an electronic system (whether it's a bank or a stock market) requires trust in the institutions that operate it. For example, while our bank may have the ability to wire our funds into an account of its own, we trust that it won't do that. In a blockchain, math and cryptography enforce the behavior and rules of the system instead, so that it functions even when the entities and participants running it don't fully trust one another. "Trust is the main benefit of blockchain," said Matt Jackson, research director of the Institute on Governance.

The same features that allow us to trust blockchains for storing units of currency also make them extremely well suited for storing data, code, records, and contracts. Such a system holds enormous potential, not only to create a single version of the truth that is easy to update and share in a distributed manner but also to offer an infrastructure for value exchange and transactions that improve the flow of information, processes, plants, animals, and food. With 60 percent of large companies contemplating the use of blockchain, it's an ecosystem that's expecting rapid growth. According to market researchers, "services and products related to blockchain are set to reach $7.7 billion in 2022." Yet blockchain is still in its infancy and continues to evolve rapidly. Modern blockchains are beginning to act as global distributed computers, allowing network participants to interact directly with each other, reducing the number of intermediaries which do not add value.

Benefits of Digital Supply Chains

The benefits of digital supply chains today, most examples of blockchain-enabled food, plant, and animal supply chains are still in their infancy. In fact, supply chain digitalization is often a prerequisite to more interesting options for blockchain technologies. Still, the advantages of such initiatives (blockchain-based or not) are worth repeating: Rapidly isolate food incidents and speed recoveries. Greater transparency means explicit assignment of responsibilities at each step of Walmart's supply chain. As stated by Brigid McDermott, vice president of Blockchain Business Development and Ecosystem at IBM, We want transparency of who has responsibility for the food at what given time." Enhance consumer visibility. Walmart's ability to track crucial data from receipts also enhances consumer visibility, allowing possibilities like sharing customer feedback with supply chain participants. Streamline efficiency. Digitization aids interoperability: forcing removal of paper (one of the reasons outbreaks can be so difficult to track down), connecting disparate systems, and facilitating adoption of standardsall of which increase efficiency and save costs. "It's amazing when you start accumulating data the changes in efficiencies you can find and how much more profitable you can become," said Wilson.

Enhanced buyer visibility also increases the value of food and agricultural products;Wal-Mart's ability to track crucial data from receipts also enhances consumer visibility, allowing possibilities like sharing

customer feedback with supply chain participants. One of the challenges with early blockchain rollouts is that many of their benefits are indistinguishable from similar initiatives using other types of supply chain digitalization initiatives. an economic opportunity that is arguably the single most important factor in motivating supply chain participants. Verified sustainable supply chains are key to export growth, said Brennan of BordBia, a body responsible for Ireland's innovative Origin Green program. Brennan saw a sustainable supply chain as "something that was really growing in importance with a lot of the key global players." Combat error and fraud. "Without digitalization, it is very difficult to get to autonomous workflow situations and it's very difficult to remove humans from our supply chains in terms of some of the more banal tasks and the data entry points which is often where the points of error and fraud are in our supply chains," said Weston of AgriDigital. While these benefits of supply chain digitization are not directly attributable to blockchain, in practice blockchains solve key problems that help make digitalization feasible. Specifically, it offers the opportunity to engineer digital supply chains that more effectively conform to the trust and sharing requirements of participants.

Conclusion

Blockchain technology helps build supply chain systems that are easier for participants to trust. Blockchain offers the opportunity to engineer digital supply chains that more effectively conform to the trust and sharing requirements of participants. The ability to correlate information related to an animal, plant or food product, to a unique identity on the blockchain makes reliable provenance possible. This can be done in a variety of ways from labels and Internet of Things (IoT) sensors to genetic fingerprints and other unique measurable product attributes. Smart contracts make it easy to tailor automated supply chain processes to individual needs as items move through the supply chain. "We really like the interoperability of dynamic smart contracting solutions for moving product. Blockchain contracts are Turing-complete meaning that they can interact with any other software that is Turing completewith definitive states for each block of records, making them excellent candidates to communicate a single version of the truth. Walmart has used blockchain to help solve traceability issues that have stymied it in the past. In the wake of pork and mango food scares, the company implemented a blockchain traceability pilot with remarkable results: in the past it took up to seven days to track the source of contaminated mangos, now it takes 2.2 seconds. Yet these promising results raise larger questions about the role of public regulators. Private companies also can use blockchain to achieve tasks and functions that were formerly useful to government and public institutions.

References

1. Morris, David Z. (15 May 2016). "Leaderless, Blockchain-Based Venture Capital Fund Raises $100 Million, And Counting". Fortune. Archived from the original on 21 May 2016. Retrieved 23 May 2016.

2. Popper, Nathan (21 May 2016). "A Venture Fund with Plenty of Virtual Capital, but No Capitalist". The New York Times. Archivedfrom the original on 22 May 2016. Retrieved 23 May 2016.

3. "Blockchains: The great chain of being sure about things". The Economist. 31 October 2015. Archived from the original on 3 July 2016.

4. Narayanan, Arvind; Bonneau, Joseph; Felten, Edward; Miller, Andrew; Goldfeder, Steven (2016). Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton: Princeton University Press. ISBN 978-0-691-17169-2.

5. Iansiti, Marco; Lakhani, Karim R. (January 2017). "The Truth AboutBlockchain". Harvard Business Review. Harvard University. Archived from the original on 18 January 2017.

6. "Blockchain may finally disrupt payments from Micropayments to credit cards to SWIFT". dailyfintech.com. 10 February 2018. Archived from the original on 27 September 2018.

7. Hampton, Nikolai (5 September 2016). "Understanding the blockchain hype: Why much of it is nothing more than snake oil and spin".

8. Bakos, Yannis; Halaburda, Hanna; Mueller-Bloch, Christoph (February 2021). "When Permissioned Blockchains Deliver More Decentralization Than rmissionless". Communications of the ACM. **64**(2): 20–22.

9. Sherman, Alan T.; Javani, Farid; Zhang, Haibin; Golaszewski, Enis (January 2019). "On the Origins and Variations of Blockchain Technologies". IEEE Security Privacy. **17** (1): 72–77.