## **VIEW POINT**



# TOWARDS A SUSTAINABLE SUPPLY Chain with Blockchain

#### Abstract

Sustainability is important for organizations that are conscious of their environmental impact. However, any effort in this regard needs to be enabled by the right technology. This paper discusses how Blockchain and smart contracts have the potential to transform the way organizations approach sustainability, especially in supply chain management.



## Resolving real-world problems with technology

Digital technology continues to disrupt traditional ways of conducting business through enabling innovative business models and efficient processes. In recent times, there has been an increased awareness that technology can also enable responsible innovation in sustainable supply chain management. A game-changing digital technology that has proven to be pivotal in this area is Blockchain. It builds trust, transparency, and confidence among different stakeholders by allowing information sharing across networks. This feature can revolutionize the way we approach the concept of sustainability and resilience across supply chains. Before exploring its applications any further, it is important to unravel the concept of blockchain and how smart contracts enable its use across industries. With a right view of the technology's current level of maturity, we gain a realistic expectation of those supply chain issues — including sustainability that blockchain can resolve.





## Understanding the basics

Blockchain technology allows information in the form of transaction blocks to be shared, stored, and recorded among a set of users or stakeholders, using open accounting databases or servers that are called distribution ledgers. Each transaction block is encrypted and connected to its previous and subsequent blocks which helps preserve the complete history of all transactions in any financial or material transfer or provenance of assets. It is this aspect of blockchain that helps prevent the risk of tampering or fraudulent intervention thus building confidence amongst participants of that blockchain network.

For example, consider a used car reseller who needs access to multiple public databases to gain insight into a vehicle's history, pending loans, insurance claims, penalties imposed, and so on, before finalizing a sale. With Blockchain, the reseller can simply use a unique vehicle code to access every transaction associated with the vehicle and speed up the transfer of ownership with complete transparency. This unique vehicle number can be used to maintain information throughout a vehicle's lifetime up to its final disposal.

Blockchain can also enable faster vehicle recalls and speed up the claims process. It can be integrated with radio-frequency identification (RFID) technology to deliver innovative solutions. For instance, when integrated with RFID tagged spare parts, blockchain allows for transparency in each transaction thereby eliminating the risk of fraudulent parts.

Any discussion about blockchain needs to include the concept of smart contracts, given their role in executing blockchain projects. Smart contracts are codes of instruction written on a blockchain that executes automatically based on predetermined terms and conditions. They eliminate the need for intermediaries to interact with each other while ensuring that all parties are confident of the outcome at each stage. These contracts can be used to automatically execute various aspects of a supply chain simultaneously.

For example, consider a product that proceeds from a raw material supplier to a manufacturer, onto the production line, the final product is then shipped, and finally reaches a buyer. Using smart contracts, the money owed to each of the above-mentioned parties can be simultaneously transferred to an escrow account and released by the bank as soon as the shipment receipt is submitted. Since all parts of the transaction are executed automatically, miscommunication among intermediaries as well as messy paperwork is eliminated.



#### Blockchain and the sustainability agenda

Environmental consciousness, social responsibility, and governance and execution (ESG) are three pillars that help organizations build sustainability into their operations. But for organizations to be able to prove their progress on sustainability goals, the data used to drive the ESG agenda needs to be reliable, trustworthy, and visible. Blockchain, with its unique and secure way of handling data, offers many potential use cases in this area.

Blockchain and smart contracts, along with major digital technologies like artificial intelligence (AI) and the internet of things (IoT), can help solve many of the challenges involved in handling ESG data. Here is a brief look at some of the elements such as reliability, trust, and visibility that are imperative for the success of an ESG agenda, to understand how blockchain can fill the gaps.

 Visibility and transparency: By maintaining a complete history of all transactions, blockchain allows transparency that is crucial for environmentally conscious industries. While paperless payments are one way to be environmentally conscious, visibility and transparency enabled through blockchain and smart contracts can go a long way in building a green ecosystem of all suppliers. A real-world application of Al and blockchain is in the case of vehicle emissions where the emissions data can be monitored in real-time using artificial intelligence in conjunction with blockchain, and the alerts can be automatically sent to the owner as well as the service partner for immediate action.

 Traceability: Blockchain has proven its ability to enable secure and traceable transactions. A practical application of this feature is in the ability to track products in a supply chain from start to finish. For example, consider palm oil which is a major ingredient in many consumer products. The demand for palm oil has been consistently rising leading to severe deforestation in tropical countries and causing climate change as well as human rights challenges in local communities.

To tackle this, several organizations like Unilever<sup>1</sup>, PepsiCo<sup>2</sup>, and Nestle<sup>3</sup> have started consciously implementing sustainable sourcing strategies. Blockchain can help in this process by providing more than 98% traceability and ensuring compliance to verification protocols, including the development and onboarding of smallholding farmers. Blockchain solutions can be similarly applied to other industries where traceability and sustainability in sourcing are important, such as in farming, fishing, meat, metal, and coal mining.

Trust: Trust, along with visibility, transparency, and traceability, is crucial for the success of supply chain operations, especially for organizations attempting to incorporate ethical, environmental, and social practices. By enabling supply chain management with blockchain, the 'onus of proof' in the case of information exchanged by participating intermediaries at each stage is handled by the technology. This proof of interaction can then be audited independently. This brings visibility into each transaction, traceability at each stage of the supply chain, and transparency through the act of securely capturing and managing auditable data.

<sup>1</sup> https://www.unilever.com/sustainable-living/reducing-environmental-impact/sustainable-sourcing/transforming-the-palm-oil-industry/

- <sup>2</sup> <u>https://www.pepsico.com/sustainability/palm-oil</u>
- <sup>3</sup> <u>https://www.nestle.com/csv/raw-materials/palm-oil</u>

## Potential applications for blockchain and smart contracts

Blockchain offers immense benefits in terms of tracking raw materials in a supply chain from farm to store shelves in industries such as clothing, pharmaceutical, or the food industry. Here are some potential applications:

- Tracking carbon footprint: By creating

   a blockchain-enabled ecosystem of
   supply chain intermediaries from parts
   manufacturers, main manufacturers,
   distributors, logistics, service partners,
   and end customers, organizations can
   responsibly and accurately report the
   carbon footprint at every stage. The credits
   accrued for the carbon footprint can then
   be converted to cryptocurrency.
- Creating audit trails: Blockchain can enable the creation of permanent audit trails and provide proof of ethical production as well as help in sourcing sustainably, starting from raw materials to finished products.
- Enabling collaboration: The technology can enable corporate and government entities to collaborate and establish responsible sourcing practices and supplier networks.
- Digitizing transactions: By creating paperless transactions, blockchain can simplify auditing requirements which reduces the carbon footprint and helps streamline processes, resulting in cost savings and early payments.
- Reducing wastage and mitigating risk: By modeling transactions using predictive analytics, organizations can accurately predict demand and supply. Blockchain can also be used with integrated weather technologies and serve as an early warning system to predict impending delays in shipments due to weather conditions.



## Barriers to implementation

While some of the applications discussed above are visionary in nature and in the early stages of conceptualization, blockchain holds great promise in its ability to drive the sustainability agenda. Yet, the technology is still in its infancy and on the threshold of entering the 'peak of disillusionment' as per Gartner. Besides, the technologies that enable enterprise blockchain projects to be executed are also in a nascent stage as per Gartner's Hype Cycle for Blockchain Technologies 2020 report<sup>4</sup>.



## What the future holds

The next few years are crucial for leading organizations as they adopt blockchain technologies to solve pressing issues. Although there are various barriers to adoption currently, the impact brought in by the convergence of public and private blockchain networks and other connected technologies is expected to be significant in the next three to five years. With this in mind, the time is right for companies to begin strategizing on digitization, with sustainability as the guiding principle.

<sup>4</sup>·https://www.gartner.com/en/documents/3987450/hype-cycle-for-blockchain-technologies-2020

## About the Author



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Srikrishna (Kris) has over 30 years of experience in Sourcing and Procurement (S&P) in Manufacturing Consulting and EPC companies with exposure across wide variety of equipment, commodities, and services. As a global practice head for S&P at Infosys BPM, Kris is one of the pioneers for building and offering next generation procurement systems, services, and innovative delivery models for Infosys' clients.



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Riya has 16 Years of experience in various functional domains of Supply Chain Management with over 9 years of S&P solution design experience. At Infosys BPM, she is currently responsible for managing the Center of Excellence function within the S&P practice, and supports the knowledge building initiatives. In her past assignment, she has worked as procurement lead manager for a UK-based charity organization and as a Captain in the Supply Chain vertical (Army Ordnance Corps) of the Indian Army.

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