Chapter 18
Integrating Blockchain and IoT in Supply Chain Management:
A Framework for Transparency and Traceability

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ABSTRACT

Internet of things(IoT) is the conception of interfacing the devices to the internet to make life more efficient. It comprises the large amount of data in its network where it fails to assure complete security in the network. Blockchain is a distributed ledger where it mainly focuses on the data security. Every block in the blockchain network is connected to its next block, which prevents threats like large data loss. In the area of agri-food supply chain, where IoT plays a very important role, there occurs data integrity issues or data tampering. This can lead to improper supply chain management, timely shortage of goods, food spoilage, etc. So the traceability of agri-food supply chain is necessary to ensure food safety and to increase the trust between all stakeholders and consumers. Many illegal activities can be prevented, and cold chain monitoring can be achieved by bringing in transparency and traceability.

INTRODUCTION

The 21st century is all about technology that increases the need for transformation in day-to-day life. People from all over the world are ready to accept the modern tools and technologies by using a remote for controlling devices to voice notes. In the past decade, technologies like Augmented Reality and the Internet of Things played a vital role in humans. Now there is a new addition to the pack called Blockchain Technology (Aung, M. M., & Chang, Y. S.; (2014)). One reason why the modern world is seeing more and more wealth created is that the economics and markets are connected via ever more sophisticated routes of global trade. Whether be it by air, sea, or road, billions worth of goods are being taken from continent to continent every single day, to satisfy demand and meet supply quotas. However, while new methods of storage and route tweaks are still developed to further propel this vital aspect of the global economy, the sheer volume of transport information processed on a daily basis means there is huge inaccuracy of data when trying to monitor an individual product's journey. Major business leaders are dependent on physical supply chains that have long pushed for additional transparency, price-efficiency and data insight, beginning at the creation of a product to its final destination (Storøy, J., Thakur, M., & Olsen, P.; (2013)).

SUPPLY CHAIN MANAGEMENT (SCM)

A supply chain is an entire network of entities, directly or indirectly interlinked and independent in serving the same consumer or customer. It comprises vendors that supply raw material, the producer who convert the material into products, warehouses that store the products, distribution center that deliver to the retailers, and retailers who bring the product to the ultimate user. Figure 1 explains the management of the flow of goods, services, and information involving the storage and movement of raw materials, building products as well as full-fledged finished goods from one point to another are known as supply chain management. Supply chain management includes integrated planning as well as the execution of different processes within the supply chain (Khan, M. A., & Salah, K.; (2018)). These processes include:

- Material flow
- Information flow
- Financial capital flow

Importance of Supply Chain Management

- SCM activities can improve customer service. Effective supply chain management can ensure customer satisfaction by making certain the necessary products are available at the correct location at the right time. By delivering products to consumers on time and providing fast services and support SCM increases customer satisfaction (Mao, D. et al. (2019)).
- SCM decreases overall production costs for the companies. The reduced supply chain costs can greatly increase a business's profits and cash flow.
- SCM can help ensure human survival by improving healthcare, protecting humans from climate extremes and sustaining human life.

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