


Chapter 7


Addressing and Modeling the Challenges Faced in the Implementation of Blockchain Technology in the Food and Agriculture Supply Chain: A Study Using TOE Framework

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ABSTRACT

Blockchain technology has gained a lot of attention in the supply chain of many organizations. This technology is being used in sectors like food, healthcare, manufacturing, retail, automobile, etc. The aim of this research is to identify the problems faced in the food and agriculture supply chain in implementing blockchain technology in their organizations. To determine the barriers to blockchain technology in the food and agriculture supply chain, the authors have used technological, organizational, and environmental frameworks. All the barriers are divided into three constructs having some variables. Data is collected through questionnaires using survey methods. Empirical methods used are exploratory factor analysis and structural equation modelling. This study also provides empirical evidence and developed three structural equation models. This study will help the service providers to address the problems that are being faced by the firms in the implementation of blockchain technology in their firms.

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INTRODUCTION

Blockchain technology (BTE) has recently gained significant attention and hype as a disruptive technology. BTE has many advantages like proper tracing, tracking the materials, proper flow of information, etc. (Kshetri, 2018). BTE is expected to grow at an annual growth rate of 87 percent and from \$45 million in 2018 to \$3314.6 million by 2023 (Casino et al., 2019). However, the investment rate in BTE has dropped – surprisingly – in 2019, while 82 percent of Fortune 100 companies are exploring BTE. These are the primary motivators for this research. BTE characteristics such as dependability, traceability, data immutability, and intelligent contracts lead to more reliable environments in which intermediaries are less necessary (Chang et al., 2020; Ivanov et al., 2019). There are many applications for BTE use; one of the main is the sustainability of the supply chain (SC).

BTE is defined as decentralized blocks containing transactions, with blocks linked by cryptographic pointing to their predecessors. First, the chain continues to block the creator. A new block is always connected with its predecessor when added to the system (Ahl et al., 2020). All critical characteristics are distributed, secure, traceable, verified, and transparent (Angelis & Ribeiro da Silva, 2019). Many companies, including Walmart and Glencore, have been encouraged to incorporate BTE into their SC to enhance efficiency and performance. BTE allows traceability in the agriculture supply chain (ASC), while intelligent contracts make agri-business easy. In addition, the BTE-based system offers sustainability for each activity in the SC operations by tracking conformity (Andoni et al., 2019). BTE has an excellent potential to bring about substantial ASC reform, but its actual implementation remains early in practice (Andoni et al., 2019). India is looking to unleashing the BTE potential to meet growing demands and needs similar to technology-oriented nations. An inquiry into the current BTE adoption barriers is therefore needed.

The global blockchain in the agricultural and food supply chain market is estimated to amount to 133 million dollars by 2020; the CAGR is expected to grow by 48.1% to 948 million dollars by 2025. Blockchain's benefits in agriculture include easy and affordable food batch reminder in emergencies, full product status history, increase customer confidence and loyalties, fair payment, approved vendors, and proper compliance management.

The research questions that we are going to address are:

RQ1: Why is BTE not being implemented in the food supply chain (FSC) and ASC?

RQ2: Can the firms overcome the barriers and move forward in the implementation of BTE?

RQ3: What is the level of importance and relationships amongst the barriers?

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