Chapter 12
A Review on Pragmatic Prerequisite Utilization of IoT in SCML for Industry 4.0

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ABSTRACT

Embracing digital transformation has led to a major industrial change in the field of supply chain management qualitatively. This research deliberates emerging technologies identified as IoT (internet of things) which with other technologies like AI and ML, big data, and cloud computing an inevitable requirement for industry 4.0 implementation based on the complex needs following organizational structure. Study in the region of utilization of IoT in SCML is scarce in developing countries. However, the following inevitable SCM drivers such as real-time realization, barriers in enabling demand flow, value optimization from the business perspective, including elements of sustainability, the rising expectation of customers, and cutthroat competition amongst the manufacturers and service providers, have led to the utilization of IoT SCML industry. Especially when the constraints like time management and flow of materials are in high focus.

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1. INTRODUCTION

Manufacturing industries in large sectors are going towards mass customization, complete automation, and digitalization in operations, which has increased productivity and efficiency (Accorsi, et al., 2018). The adoption of Industry 4.0 in large industries has reduced production costs and effectively managed customers (Afsharian, et al., 2016). Industry 4.0 is considered the biggest industrial technology which promises sustainable businesses. Smart manufacturing and effective communication are considered central to Industry 4.0 digital manufacturing (Aggarwal, et al., 2013).

In this new technological era, the world economy has developed robust participation for businesses in advanced manufacturing tools and techniques (Cui, et al., 2021). It is no longer adequate to produce quicker, more economical, and more advanced quality products/services than the competitors, protecting USP and sustainability (Aho, 2015).

Globalization has led to the dynamic, ever-changing environment of the supply chain. It is also evident that the trend also influences inventory and warehouse management (Alayli, 2023). The pressure on supply chain and logistics management organizations is growing, and IoT has become an innovative and integral technology for every industry to find better solutions (Arslan, et al., 2021). Adopting IoT in supply chain management and logistics comprises installing devices and sensors which enable tracking operations and inventory, observing their processes and locations, and building an intelligent warehouse system (Aryal, et al., 2018).

IoT is well demarcated as the internet-aided universal intelligent platform of distinctively accessible components by detecting, associating, and inclination capabilities that enable the exchange of human-to-device, device-to-human, and device-to-device information in diverse ecosystems (Attaran, 2020). IoT sensors can help track inventory, provide real-time data, and help to predict future needs, avoiding the contingencies and situations of stock-out (Cirillo, et al., 2023). Thus, implementation of IoT can help to prevent loss and optimize processes (Bavassano, et al., 2020).

It is showing its full potential in supply chain management and logistics. All supply chain management and logistics processes can progress with IoT utilization (BRIC in vitro diagnostics (IVD) Market by Product, Service, Technology & Application, 2022). Real-time tracking of shipments and inventory monitoring becomes crucial for the industry to manage its processes effectively and efficiently (Christauskas, et al., 2016). At the organizational level, when focusing on streamlining logistics processes, firstly, we need end-to-end product tracking and forecasting of the movement (De Vass, et al., 2018). The blend of mobile utilizations, analytics, and cloud services is powered by IoT, which is varying how distribution and fulfillment firms are directing their processes and the arrival of goods; secondly, we need strong analytics to process the information and enable decision-making, thirdly we need to focus on the security of the goods and keeping track of pilferage issues, and last but not least, employee safety on the shop floor (Coronado Mondragon, et al., 2021).

Industry 4.0 prerequisites project IoT as a fundamental tool of computerized-environmental structures owing to greater effectiveness and efficiency (De Vass, et al., 2021). Its ability to induce the power of the internet to aid information sharing and independence is vital to the "world-class manufacturing" idea, which is categorized by independent, information- and sensor-based, automated manufacturing systems (Feng, et al., 2020). Combined with the Internet-enabled businesses having catalyzed the competition globally, market uncertainty and consumer insistence pose additional encounters to organizations, and their cluster of people come together in the production & delivery of merchandise and facilities to mandate a new value chain in the ecosystem (Jeba, et al., 2023). Whereas it was argued that this model