

# Chapter 10

## The Internet of Things (IoT) Applications in Inventory Management Through Supply Chain

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### **ABSTRACT**

*Supply chains are affected by globalization and digitalization, and organizations face a great challenge in order to stay up-to date and competitive. As a very significant element of the supply chains, inventory management plays a crucial role in supply chain success. Therefore, traditional approaches in inventory management should be altered according to new trends. From this point of view, this study focuses on Internet of Things (IoT) applications in inventory management with a scope of supply chains. The aim of this chapter is to analyze the current studies related to IoT impacts in inventory management by conducting a literature review and a bibliometric analysis, and propose the future research directions that are interrelated with the current trends.*

### **1. INTRODUCTION**

Globalization and digitalization through the supply chains affect all the stakeholders and processes, and organizations face a great challenge in order to stay up-to date and competitive. As a very important element of the supply chains, inventory management plays a critical role in terms enterprises success. Inventory management is an important part of the supply chains in terms of planning, implementing, and controlling both forward and reverse flow of any kind of inventory (i.e. raw materials, work in process products, finished goods, spare parts etc.) between stakeholders and processes (Singh and Verma, 2017). Although, high amount of inventory holding is considered as waste, and organizations aim to minimize it; inventory management has a crucial role for increasing predictability in production scheduling and capacity planning, it helps to deal with unexpected changes in demand, it is useful for price protection, it

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may provide quantity discounts or lower ordering costs, and it can be served as a protection mechanism against unreliable supplies (Muller, 2019).

Inventory accuracy and process management are essential to achieve smooth inbound and outbound logistics, which are directly related with inventory management (Lee et al., 2018). However, traditional inventory management approaches are not sufficient to deal with the complexity of the current markets, high product diversity, and customer-centric approaches. Therefore, current inventory management practices should be altered according to the new requirements and expectations caused by digitalization. Businesses are leveraging past data related to demand and sales to apply smart inventory management systems as data has become more abundant and data processing tools have improved (Zohra et al., 2021). As a result of digitalization and information technology, demand and inventory data can now be shared quickly and easily across firms in the supply chain inventory management process.

Internet of Things (IoT) is one of a technology that is highly associate with the current digital trends, and refers to “interconnection of computing devices embedded in physical objects to gather and save information without the requirement for human interaction” (Birkel and Hartmann, 2020, p.537). However, it has a longer history, and firstly introduced in 1999 by Kevin Ashton (Li et al., 2015). Ashton (2009) stated defined IoT as: “we need to empower computers with their own means of gathering information, so they can see, hear and smell the world for themselves. RFID and sensor technology enable computers to observe, identify and understand the world—without the limitations of human-entered data” (Evtodive et al., 2019, p. 397). Different technologies such as wireless sensor networks, RFID, barcodes, intelligent sensors, low energy wireless communications are involved in IoT, therefore, it defines the next generation of the internet technologies (Li et al., 2015).

IoT applications play a crucial role in today’s supply chains in terms of achieving operational efficiency as well as integrated supply chain structures. IoT enables supply chain management to make machine-enabled decision making without human interaction, which also integrates ICT technologies such as RFID, machine-to machine systems and wireless sensor networks to improve the operational processes (Zhou et al., 2015). Furthermore, IoT empowers supply chains to deal with uncertainties caused by global competition and adoptability problems by providing continuous monitoring, remote control of equipment and processes, minimizing any kind of wastes by processes and stakeholder integrations (Manavalan and Jayakrishna, 2019)

Under the supply chain processes, Ben-Daya et al. (2019) summarized the impacts of IoT on inventory management as providing inventory accuracy, enabling real-time visibility in inventory levels, avoiding inventory misplacement by using RFID tags. Furthermore, employing IoT increases the responsiveness in terms of changing inventory levels according to changes in demand, and avoids shortages in production lines by increasing the traceability of inventory (Mashayekhy et al., 2022). Explicitly, IoT can decrease inventory costs as well as the bullwhip effect crosswise the supply chain (Mostafa et al., 2019).

The proposed book chapter aims to analyze the current studies related to IoT impacts in inventory management with a special focus on supply chains by conducting a literature review and a bibliometric analysis, and propose the future research directions that are interrelated with the current trends. With this chapter, the author wishes to contribute the production, supply chain, and logistics fields by presenting a detailed review related to IoT and inventory management.

This chapter is organized as follows; after the introduction section a literature review related to IoT in inventory management is presented under the supply chain perspective. In the third section, survey methodology is presented. Fourth section includes the bibliometric analysis for the selected field and discussions related to results. Fifth section includes conclusion part.

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