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The Impact of IOT in Supply Chain Management

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Abstract: *The Internet of Things (IoT) is a term widely used in tandem with supply chain management. Many industries are facing lot of challenges and shortcomings with respect to supply chain management. This paper investigates the various challenges of supply chain management and how IoT can become a solution. It tries to evaluate the impact of IoT on inventory and logistics management. It also throws light on the end-to-end visibility and transparency facilitated by IoT on supply chain management*.

Keywords: Internet of things, supply chain management, challenges, solution, end-to-end visibility.

INTRODUCTION

Supply chain management (SCM) means and includes all those management activities related to the flow of goods in an organization from the time of procurement of raw materials to distribution of finished product to final consumer to ensure that the costs are minimized.

Supply chain activities encompass everything from product development to logistics, including production and manufacturing, sourcing, transportation, inventory and warehouse management, and shipping.

However today lot of challenges is faced by organizations with respect to supply chain management.

Some of the challenges are:

- lack of visibility of assets
- inefficient handling of stock
- transportation or logistic mismanagement
- improper handling of data
- ineffective supply chain risk management

IoT has proved to be one of the emerging optimal solutions to overcome these challenges. Internet of things is network of electronic devices connected to each other by wireless network which can be accessed digitally from anywhere. Here, 'things' refer to objects that have been assigned an IP address and have the ability to collect and transfer data over a network without manual assistance or intervention. By 2025, the total global worth of IoT technology could reach up to $6.2 trillion.

The potential for applying IoT in supply chain management is massive. It helps objects to communicate openly and enables better control over the logistics. It can bring in process efficiency and smart ways of managing things. It also contributes to real time visibility of inventory which brings in transparency in an organization. On one hand IOT will facilitate SCM with real time visibility wherein managers can track the inventory at any given point of time. On the other hand it will also allow mobile computing in SCM.

REVIEW OF LITERATURE

The literature review of this paper includes definition of IOT, SCM and application of IOT in SCM.

1.1 INTERNET OF THINGS (IOT)

The term 'IOT' was introduced in 2009 by Kevin Ashton, RFID expert (radio frequency identification) and cofounder of the Auto-ID. The definition given by Kevin Ashton on the Internet of Things (IoT) is "the network of physical objects embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data, often using the Internet".

In October 2004, Neil Gershenfeld, Raffi Krikorian and Danny Cohen wrote in "The Internet of Things" that giving everyday objects the ability to connect to a data network that would have a range of benefits to simplify the work is what is termed as internet of things.

According to D. Singh, G. Tripathi, A.J. Jara, " IOT is the expansion of the current Internet services so as to accommodate each and every object which exists in this world or likely to exist in the coming future."

Debasis Bandyopadhyay and Jaydip Sen in their journal 'Internet of Things: Applications and Challenges in Technology and Standardization' say that "The phrase Internet of Things (IoT) heralds a vision of the future Internet where connecting physical things, from banknotes to bicycles, through a network will let them take an active part in the Internet, exchanging information about themselves and their surroundings."

1.2 SUPPLY CHAIN MANAGEMENT

According to the authors, Oliver and Webber (1982). "Supply chain management(SCM)" is the process of planning, implementing, and controlling the operations of the supply chain with the purpose to satisfy customer requirements as efficiently as possible.

As explained by Ellram and Cooper (1993), supply chain management is "an integrating philosophy to manage the total flow of a distribution channel from supplier to ultimate customer"

Mentzer et al. (2001) established the concept of supply chain as "a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer"

Deloitte's 2013 Global Supply Chain Risk Survey identified the main impacts and causes of the risks and challenges in supply chain management which include margin erosion and sudden demand changes, ripple effect due to extended value chain, ineffective supply chain risk management, lack of end-to-end visibility and obsolescence of technologies.

1.2 APPLICATION OF IOT IN SCM

According to Brian Ray , the applications of IoT in supply chain management into 3 broad categories namely Location Tracking, Fleet Management and Environment Sensing.

Harry Machado and Karthik Shah, in their journal "Internet of Things (IoT) impacts on Supply Chain" explained the application of IOT in various aspects such as Real-Time SCM, Warehouse Management, Improved Inventory Management, Increased Logistics Transparency and manufacturing communication.

R. B. Dhumale, N. D. Thombare, P. M. Bangare , in their research paper 'Supply Chain Management using Internet of Things' state that the implementation of the Supply Chain Management using IoT will have a positive impact and the effect it will have on the supply chain will contribute to our future economy.

This research clearly proved that IOT has a positive impact on simplifying the supply chain management process.

OBSERVATION

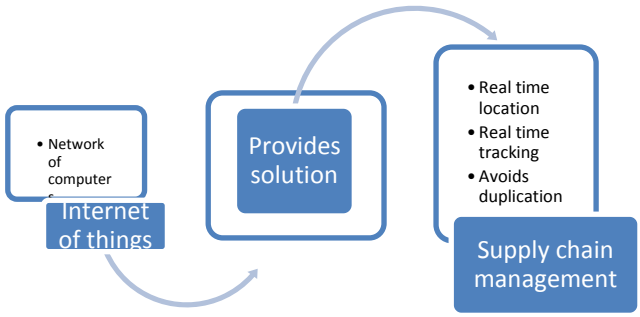
On completing an extensive secondary research and literature review, the following conclusions can be made.

1 IOT is an emerging solution to the shortcomings of supply chain management, majorly in bringing real time visibility in inventory.
2 It also enables efficient management of supply chain and logistics.

RESEARCH GAP

There has been extensive research conducted on IOT as a solution to improvise supply chain management. Yet there has been a research gap on how IOT can enable real time visibility of inventory. This research is aimed at filling the gap by exploring the various advantages of IOT in facilitating end-to-end visibility.

CONCEPTUAL MODEL



The Conceptual Model explains that IOT, through network of computers, helps in overcoming the shortcomings of supply chain management by providing solutions in the form of :

- Real time location
- Real time tracking
- Avoiding duplication.

CONCLUSION:

On doing an extensive Secondary Research and Literature Review about the impact of IOT in supply chain management it can be concluded that IOT helps to bring in real time visibility and transparency in supply chain management. Through the interconnection of various devices in the process of production, it becomes easy to track the inventory and monitor the production process. It

avoids duplication, pilferage and any deviation in quality and quantity, thus solving the discrepancies of supply chain management.

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