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Smart Application Possibilities in Supply chain Management: The Role of IoT

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Abstract:
Research topicality established on the assertion that the modern economy is changing rapidly in line with consumer needs and technological advances: information technology, robotics, Internet technologies, business automation, AR and VR technologies, etc. Such words are called Digital Economy and 5.0 Industry. This provides a massive amount of supply chain management (SCM) requirements by increasing service level and delivery time demands of customers. In this regard, this article aims to expose the importance of IT in the logistics sector. That was noticed in the 1970s as an information and data rate becomes a competitive advantage. Smart systems have since developed profoundly and are now transforming a business and supply chain paradigm. The leading approach to addressing this issue is the integration of the different studies and analyzes in practice, which allows a thorough review of the current information technologies in SCM. The article presents the SCM industry's challenges, the SCM concept of the Internet of Things revealed, and it finds that IoT-based SCM is a bridge component between IoT and Industrial IoT customers for SCM.

Keywords: *Industry 4.0, Smart supply chain management, Internet of Things, Digital economy, Supply chain management*

1.Introduction

As the concept was a new business paradigm in the late 1980s and now intellectual supply chain management can attain the same objective, for example reducing costs, increasing profitability and allowing for competitive benefits to organizations Rosing J (2018), Turban E et al. (2018)& Van Krane burg R (2014), the topic approved for modern SCM applications. The problematic issue is that a growing range of products and services, multi-channel sales and sales across all channels, made it necessary to expect the demand in the supply chain precisely. Every aspect of Supply Chain Management is complex and not the only experience should be the basis for us.

Current researchers argue smart supply-chain management is shifting the rules of the game to the IoT use of traditional warehouses (Blockchain in the Trucking Alliance (BiTA))[Ray B (2018) & Rosing J (2018)].

The research purpose is, therefore, to investigate the and to find out about:

1. Detecting the definition and the complexion of the IoT - based SCM
2. Declaring the SCM IoT concept model
3. Defining SCM IoT application fields.

An analysis of the customer's behavior takes the first steps for IoT. Customer purchases and online businesses have been trackable. Benefits of these SCM product activities to be more appropriately tracked, transported more quickly and warehoused better. Business Insider has estimated that by 2020 further 24 billion IoT devices will be available on

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the world, according to premium research [Meola A (2018)]. This is four times the Earth's population of modern people. About 6 billion dollars are to invest in IoT solutions and 13 trillion dollars is to generate by 2025[Meola A (2018)].

The booming start-up culture and the need for unlimited access to data around the clock have helped to record abundant growth in the cloud service sector in India.(Krithika.M &Rajini.G,2018)

Businesses need familiarizing existing business models or finding new models to do well to IoT opportunities and competitive advantages. Today is a new era in the use of smart technologies in SCM, which is a time to invest. However, we must first realize the key aspects of its implementation and the problems we face.

2 Methods

This study based on wide-ranging scientific methods such as an investigation of existing theoretically accepted methods and the combination of the various views of the research. We concluded the IoT implementation and future business trends by an efficient approach that reflects the subject matter from the perspective of the system theory and unified approaches based on IoT applications in the Supply chain area. The conventional methods used authorizes that the research is objective and valid.

3 Results

SCM requirements of modern consumers are rapidly increasing. Customers are using diverse sales networks and expect all of them to achieve the same level of service. Increasing flows of materials and information flows (including return flows) make it much more complex and costly to meet the demand. Suppliers, retailers, distributors and other connections to the supply chain face new challenges

SCM has different challenges: future volumes of sales, prices of products, promotion offers, stock volume, the volume of safe stores etc.

The use of extensive data analytics, profound learning algorithms, machine learning, IoT allows modern technologies to be a tool for optimum choices for managing supply chains. As Jason Rosing says, Intelligent supply chain management only requires a connection between everything and anything in the warehouse, distribution center, storage and e-commerce portal, with a lot of information to better choose and use advanced techniques and to gain operational insight [Rosing J (2018)].

As stated below, the "Internet of Things" is the basis for the smart SCM. Life began as the heading of the K presentation with the definition "Internet of Things." Ashton linked the new idea of RFID in the supply chain of P&G and the attracted topic of the Internet at Procter & Gamble (P&G) in 1999[Ashton K (2009)]. The sloppy idea of IoT by K. Ashton is, we have to enable computers to collect information with their means so that they can "see," "hear." Computers can monitor, identify, and understand the world with RFIDs and sensor technology— without the limitations of entered personal data[Ashton K (2009)].

IoT based on machine technology (M2 M) means that devices "communicate" without a human being. IoT is the next automation step for exchanging data via the Internet using TCP / IP protocols. IoT benefits from collecting and building networks and helps to change business models in the various fields of the economy. IoT creates new economic rules called "shared economy," which exclude dealers from the business model.

Research identifies two ways to use IoT, i.e., "Customer IoT" and "IoT Industry 4.0." We can indicate that the main objective and the end-user of IoT concern the difference in IoT variants. Customer IoT includes the use of smartphones and tablets, smart house technology etc. Industrial IoT used in comparison with client IoT. IIoT combines the technology for M2 M, BigData and automation production. IIoT is a lot more human being advanced, then by continually collecting and rating accurately and error-free data. IIoT enhances product quality control and organizes a lean manufacturing process, ensures high supply chain reliability and optimizes manufacturing processes. The primary

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purpose of IIoT is to automate and optimize business processes, reducing material and time costs. The same technical basis and ecosystem apply to both IoT applications.

The way of IoT development is not the definition of "customer IoT" and "Industrial IoT." SCM is traditionally connected to the production and the circulation sphere. Acknowledged below, we can say that an IoT-based SCM is like a chain that combines two fields of IoT between customer IoT and Industrial IoT. In SCM. 2.

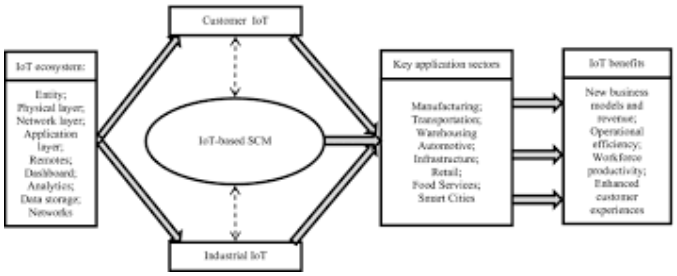

Fig. 1. The theoretical model of application of IoT-based Supply Chain Management (Source: Evtodieva, T. E., Chernova, D. V., Ivanova, N. V., & Wirth, J. (2019)

A sum of mechanisms of the IoT ecosystem are joined together by IoT. A. Meola describes the following to all of them:

- Entity: various IoT user groups and providers, including companies, governments, and consumers. • Physical layer: IoT material-devices, sensors or other equipment.
- Network layer: required for data transfer between physical layer collected devices.
- The layer of application: consists of communication device protocols and interfaces.
- Remotes: various remote devices that connect and control IoT devices with the mobile application.
- Dashboard: This is a part of the control system exposing information about the IoT ecosystem. That might include smartphones, smart cameras, tablets, smart televisions etc. It's usually a remote part.
- Analytics: the various software programs necessary for the analysis of IoT devices collected data. This data analysis could be used for predictive analytics;
- Data storage: Server for IoT data collected by IoT devices to be stored;
- Networks: communication layer realized via Internet IoT devices to communicate with the entity and each other [Meola A (2018)].

The technology used is one of the most critical components of IoT. In SCM, all IoT technologies, such as application program design interfaces and extensive data management tools could be used. The SCM can also use predictive analytics, AI and machine learning, cloud and radio frequency identification (RFID) systems. The critical thing that slows the IoT expansion is the absence of an IoT-enabled unit protocol and platform.

A. Meola mentioned different areas that benefit mainly from the IoT (Fig. 2).

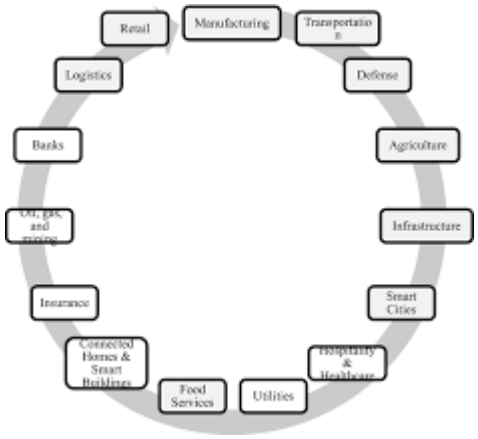

Fig. 2. The beneficiaries of IoT applications (Source: Evtodieva, T. E., Chernova, D. V., Ivanova, N. V., & Wirth, J. (2019)

For all application areas, IoT systems become more efficient, and all depend on SCM. We have marked the part of them that is close to SCM and must first examine for the implementation of IoT. IoT-based SCM will soon implement the following AI technologies:

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Demand forecasting predictive analytics.

Numerous advanced analysis tools combine in predictive analytics: ad-hoc, data mining, data mining, optimization, real-time analysis and machine education [Predictive analytics (2018)]. • AIforWarehouseManagement. Warehouse automation is increasing rapidly as the costliest and easy to automate the SCM sphere. These tools help companies to forecast various forthcoming events accurately. The "learning warehouse" concept established by the Swiss log.

Procurement chatbots.

Chat boxes are conversational interfaces that can potentially benefit companies by replacing people in procurement processes [Bharadwaj R (2018)], including lower transaction costs and sales cycle times* Transportation. Intelligent transport systems move people and freight around the globe. **To maximize all transport processes and charges from engine effectiveness, safety, and logistics to supply chain management** does not appear to be modifying the subject of **thousands of IoT sensors**.

System of navigation.

Yandex. Navigator is the most beautiful example already available. Yandex collects data from users that have analyzed on the server of your company. An application will automatically display the route on the handset or tablet screen with driver detour options. Yandex will soon begin to reorganize the cargo on city roads with artificial intelligence. It will provide routes with optimal loading of highways and minimizing traffic jams, taking account of the accumulated statistics

Location Tracking.

Revealing information in real-time on the location of cargo offers the option of monitoring and management of incoming and interior flows [Ray B (2018)]; Périshable or sensitive products should remain fresh. Transport and storage of these goods require certain ecological conditions to preserve quality. The IoT application allows the temperature and humidity of the goods in the storage area to monitor. The shock and vibration levels during shipment could also be measured. These data can use to inform the supplier or the driver of damaged cargo and to decide on the damaged goods [Ray B (2018)]. So, we most likely mentioned SCM spheres for the use of IoT-based technologies. And information safety and its proper use are some of the essential topics by IoT devices. The risk of cyber-attacks is real if connected vehicles, critical infrastructure and even people's homes are to be informed. Because of these increasing threats, cybersecurity is the focus of several companies. IoT-based SCM requires security technologies as these concentrate a massive flow of information on private consumer data and commercial secrecy. Data should also not use to harm the environment and humanity and this is a matter of ethics.

4 Discussion

A lot of scientists have been studying the SCM paradigm and discussing it. The list includes Bowersox[Bowersox DJ, Closs DJ (1996)], Stock[The Internet of Things Council (2018).], Lambert[Shapiro JE, Singhal VM, Wagner SN (1993)], Shapir[Martin Ch (2005)], Christopher[Christopher M (2011)], Van Hoek[Harrison A, Van Hoek R (2011)], Collins[Collins J, Arunachalam R et al. (2004)] and others. Other sources include Bowersox, Stock and Stock. The main idea of the papers from these authors is to integrate supply chains and gain economic impact across the entire supply chain.

In the 1970s, Bell[Bell D (1999)] described the aspects of the digital economy and digital society. Arntzen[Arntzen BC, Brown GG, Harrison TP, Trafton LL (1995)], Brown[Arntzen BC, Brown GG, Harrison TP, Trafton LL (1995)], Kumar[Kumar K (2001)], Minis[Minis I (2011)], V. I. Sergeev[Sergeev VI, Grigoriev MN, Uvarov SA (2008)] and the intelligence technologies ideas now expanded in business and supply chains. The concept of the information technology application in logistics and SCM presented in the following articles. The supply chain now called Intelligent Supply Chain Management contains a range of

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intelligent technologies and its applications. In the research of the following authors, smart SCM ideas introduced:

Ho, Lau, Yücesan, Van Wassanhove, Zubair Khan, Al-Mushayt.IoT in the SCM says that in 1999 during a presentation he made at P&G, the definition "The internet of things" was first employed by Kevin Ashton. Nearly 20 years have passed but the meaning is not standard. The topic discussed by researchers worldwide: Ashton[Ashton K (2009)], Meola[Meola A (2018)], McFarlane[McFarlane D (2015)], van Kranenburg[Van Kranenburg R (2014)]. The IoT definition, e.g., Microwave, Google, IBM, SAP, Amazon, etc., will also be given to companies and other companies. The public organization also established for issuing the IoT application in different areas such as the European Internet of things Council and the Russian Research Center Internet of Things.

5 Conclusions

The forthcoming is by nowhere. Millions of devices are every day, "smarter." The efficient use of smart devices and technologies brings new ventures to the business to gain competitive advantages, cut costs, deliver a higher level of service and increase customer accuracy by allowing companies to be able to manage devices, scrutinize data and systematize workflows. Through material flow, SCM links consumers and producers and distributors.

Planning and management of the flow is a challenge in any way. Today, SCM is a vital facet of nearly all industries and has, unfortunately, been not so focused in comparison to the health care sector, financial sector and retail sector by AI startups and vendors [Bharadwaj R (2018)]. The supply chain associations collect a wide range of data that benefit from adequately using them. That is why, to enhance supply chain efficiency and reduce costs, Supply Chain Management must be a model in IoT implementation.

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