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INFLUENCE OF IOT ON SMART LOGISTICS

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Abstract

The aim of this study is to present smart solutions to all logistics issues in an organization. Innovation in logistics is an indicator of modernity. The Internet of Things (IoT), which enables items to connect with one another and to other platforms, is one of the most significant developing technologies. In addition, the factors influencing the implementation of IoT in smart logistics should be studied to solve the current issues faced in the logistics industry. The IoT is a global network of

smart devices that integrate the digital world, enhancing a logistics organization's productivity and efficiency. The Internet of Things is a logistics industry revolution enabling operations, transportation, storage, and all other necessary information at each logistics activity. Current models, in which enormous volumes of data are gathered and regulated, are called into question by the recent surge in the adoption of modern technologies into all managerial procedures. The key tenet of smart logistics is believed to form the foundation for the industry of the fourth industrial revolution. This change is built on various concepts in smart logistics. Over the next ten years, the Internet of Things (IoT) will witness a significant shift in logistics. The implementation of IoT Logistics, practical instances of its application by transport businesses, and thoughts on the creation of new technologies are the main topics of this work. This study examines the potential of smart logistics to solve current supply chain management issues. The theoretical framework that guides this paper's investigation of IoT's impact on smart logistics.

Keywords:
Supply Chain Management, Sustainability, IoT, Smart Warehousing

1. Introduction

A future where the real, digital, and virtual are merging to create smart settings that improve the intelligence of cities, transportation, energy, and many other areas. The Internet of things, or IoT, makes this world a reality. Data from IoT devices differs from data from traditional computers. Data transmissions can be small and frequent. IoT nodes are more heavily networked than typical PC nodes. Due to machine-to-machine communication, businesses may interact with machines and obtain information from hardware and networks.

Without relying on centralized or cloud-based apps and services, businesses can automate a number of key operations thanks to machine-to-machine connectivity and intelligence from devices and networks. The Internet of Things can be read, identified, located, and addressed via information-sensing devices, and/or entirely compatible with the concept of general items that can be controlled over the Internet, regardless of the communication method. The phrase was initially used, hence its reach was expanded and many definitions were suggested based on the development of new technologies as well as the incorporation and modification of existing ones. Also, as IoT has grown too widely or as a result of the usage of technology, new phrases have appeared. IoT has the promise of significant benefits for logistics providers, their corporate clients, and final consumers. They also have an impact on things like new business models, consumer experience, operational efficiency, and safety and security. With IoT, we can start answering

challenging operational and business issues in novel and fascinating ways. One thing stands out in the midst of the IoT frenzy today: the logistics sector is a crucial actor positioned to gain from the IoT revolution. It is not surprising that logistics and IoT are a good fit given the daily movement, tracking, and stowing of millions of shipments by numerous tools, vehicles, and individuals. IoT in logistics may meaningfully connect various assets along a supply chain, and then analyze the data produced from these connections to gain fresh insights. IoT makes it possible for logistics companies to achieve this.

2. Research Problems and Questions.

This research is based on the research gaps solidly supported by high-quality literature and feedback from the clients, and logistics management teams on the gains and the drawbacks. The following research questions were offered

- Does the supply chain a driving force of smart logistics?
- How do smart logistics lead to support sustainability practices in the supply chain?
- How does IoT speed up logistics functions toward clearance and delivery?

3. Research Objectives

The following research objectives are obtained to address these research problems and evaluate various aspects of smart logistics acceptance in supply chain management.

1. To establish smart logistics with the support of IoT in order to enhance the performance of supply chain partners consisting of customers, suppliers, and other stakeholders.
2. Exploring the sustainability of the supply chain is the effort made by businesses to take into account the effects. This includes the procurement of raw materials, production, storage, delivery, and all transportation hubs in between.
3. To examine how productively IoT can be applied among customers when it comes to clearance and delivery and to identify how fast the process can be done.

4. Literature Review

As part of the literature review, the most recent academic papers, journals, and business reports on the use of IoT in smart logistics are analysed. Adoption of IoT in logistics results in a quick and fruitful result. This technology makes it feasible to keep track of people, shipments, and other goods in real-time across the whole value chain. Corporate procedures could be automated to eliminate human labour, improve quality and predictability, and reduce operating costs. Additionally, the Internet of Things provides monitoring and controls the process, enabling the optimisation of collaborative efforts between people and technological entities connected to a computer network. To find even more potential for expanding and using best practices, analysis can be applied across the full value chain. (Chin et al., 2020).

This study is conducted by evaluating four independent variables:

1. Supply chain management
2. Sustainability
3. IOT
4. Smart Warehousing

4.1. Supply Chain Management

Supply chain management has changed from being viewed solely as a logistical function to a sophisticated, multifaceted corporate activity that encompasses everything from distribution and after-sales support to demand forecasting and procurement. People frequently define supply chain management differently based on their own experiences because it is such a broad issue. For some, managing the supply base, choosing what to outsource and to whom, and maintaining relationships with the numerous suppliers is the entirety of supply chain management. Others view it as an effective method of moving commodities between locations while taking into consideration the expenses of distribution and transportation. Another group of people focuses on how the many businesses in the value chain or distribution channel interact with one another. In the modern world, supply chain management has developed into a complex network of partners and suppliers. As it has been raised by Mentzer et al. (2001), perhaps the origin of the SCM concept dates back to the 1950s in a publication of Forrester (1958), who states "Management is about to make a significant advancement in its comprehension of how the interactions between the flows of

information, materials, money, labor, and capital equipment affect an industrial company's ability to succeed.

4.2. Sustainability

The economy, society, and environment are the three components of existence that makeup sustainability. These sustainability tenets are designed to protect people for the long term on Earth. By fostering social trust in areas like food sustainability, IoT can be developed and applied in supply chain systems to assure sustainability.

An IoT-enabled product ownership system lowers the cost of managing items, ensuring aspects of economic sustainability. With the support of IoT smart logistics systems improves cross-disciplinary collaboration to bring about change and are anticipated to bring many work areas, including policies, societal and economic development, trade and commerce, and the environment, into synchronization on a global scale By increasing system efficiency and lowering costs, IoT capabilities make it possible to implement the circular economy and sustainability. Uncertain government regulations on the Internet of Things in a number of countries make it difficult to handle supply chain sustainability challenges.

The implementation of an IoT based system can address societal sustainability challenges relating to a lack of ethical behaviours and openness with clarity and proper policy formation. By incorporating a number of tasks, such as demand forecasting, sales planning, supply requirements, inventory management, and product distribution, logistics enables the control of the company's physical flows.

Technology advancement and the advent of the fourth industrial revolution helped to create a number of issues for logistics. They can hasten the technological integration of all logistics procedures. As a result, a brand-new idea known as "smart logistics" or "logistics 4.0" has emerged. Smart logistics, in McFarlane's opinion, revolve around effective planning and management techniques. He affirmed that the level of intelligence is dependent on the applications and techniques employed from product traceability and identification of environmental factors to the detection of the issue, the decision, and the automatic application of the remedy [8]. On the other hand, Ackermann [9] defined smart logistics using the ideas of smart products and smart service.268 Procedia Computer Science 160 (2019), 266-271, Yassine Essaouira et lampricide Computer Science 00 (2018) 000-000 Yassine Essaouira 3 is the use of technology to gather data on material flow, followed by data on treatment for reasons like monitoring and control.

All supply chains are becoming more efficient and effective thanks to the following advancements that can be attributed to intelligent asset tracking tools and machinery:

Significant end-to-end visibility, improved product routing, and Inventory management, including replenishment, control, and detailed management of marketing experience.

4.3. Internet of Things (IoT)

IoT makes the impossible possible, from shipping to delivery (Mithila, 2020). Among the key sectors embracing IoT at scale are logistics and transportation. As expectations for efficiency and accuracy in logistics operations climb, technology enables businesses to provide outstanding customer service while minimizing expenses.

IoT solutions for logistics are a real driving force behind the sector's digital transformation since they handle a wide range of use cases along a typical supply chain, from warehousing to fleet management and cargo monitoring. The top 7 examples listed below show how IoT technology may be strategically used for complete supply chain management.

IoT can have a substantial impact on the supply chain in terms of efficient resource utilization, transparency and visibility of the whole supply chain, real-time supply chain management, supply chain optimization, and increased supply chain agility.

IoT, AI, and cloud computing are common examples of modern technology that are used in smart logistics. Moreover, it enables the transmission of intellect, autonomy, and machine decision-making. The proliferation of data collecting tools and the technological revolution have brought to light concerns about the security of data and the dependability of communications.

4.4. Smart Warehousing

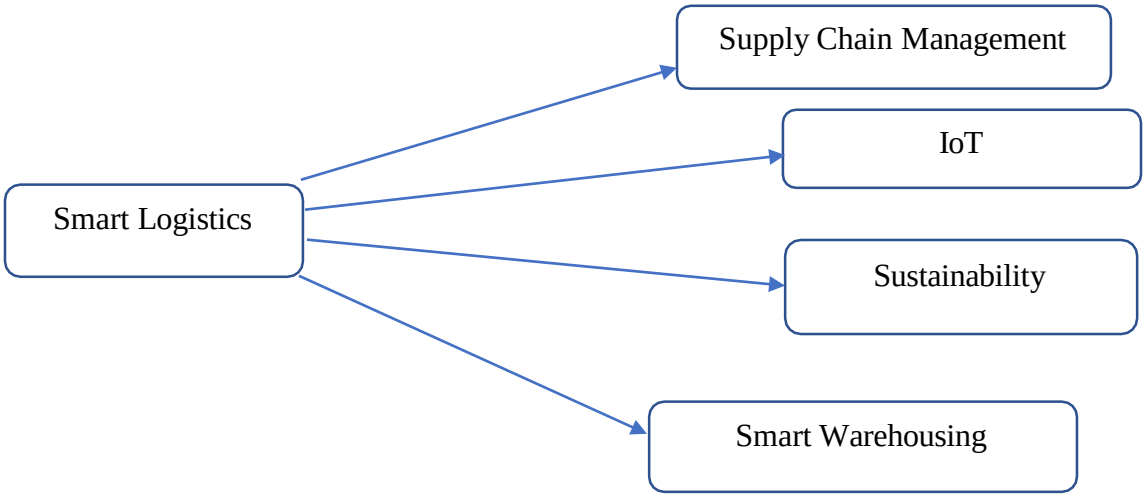
The “smart warehouse” system, which is studded with innovative warehousing technologies, has captured the attention of industry and technology giants increasingly and more as an effective answer for the anticipated expansion of warehouse in the future. In order to accommodate the enormous growth in e-commerce logistics demand, retails and technology experts are making investments in smart warehouse.

The goal of smart warehouses is to increase overall service quality, productivity and efficiency while reducing expenditures and failures. As a result of smart innovations, smart logistics evolved, triggering a wave of industry transformation with the potential to bring about significant transformations.

5. Research Framework

The adoption and applicability of IoT in smart logistics are still in their infancy and require more research to be effective in resolving supply chain difficulties. A number of obstacles must be overcome before implementing the IoT application used by the logistics and supply chain industries. Listed below is the suggested structure for using IoT in supply chain management.

Figure 1: *Structure of IoT in Supply Chain Management*



(Source: Author's own illustration)

6. Discussion Analysis and Outcome Measures

Customers can save time and money thanks to the introduction of new, effective technology. On-time arrival and departure are required, especially when involving necessities. Customers were previously tracked solely based on their anticipated arrival and departure times. Contrarily, IoT now monitors cargo tracking due to the introduction of smart logistics. Clients are informed as a result without the need for shipping or logistics firms' assistance. The problems posed by rapidly evolving customer expectations, the opportunities provided by new technology, and the facilitation of new business models can all be successfully met with smart logistics.

6.1. Supply Chain Management

"Management is poised to make a significant advancement in its comprehension of how the interactions of information, materials, money, labor, and capital equipment affect the

possibility of success for an industrial company. The interaction of these five flow systems to amplify one another and produce change and volatility will lay the groundwork for anticipating the consequences of actions, policies, organizational structures, and investment decisions. Despite the fact that this statement leaves out some details, such as the demand for multi-enterprise analysis and links between them, it is undeniably the first attempt at what is today known as SCM.

Outcome - A better collaboration with suppliers

Proposition - In order to provide value to clients, place, time, and quantity utilities work together. A fantastic illustration is Disney World's ability to provide temporary refreshments along a parade route on a hot day. A sufficient distribution of cold beverages is offered wherever and wherever there is a need thanks to these dynamic supply systems.

6.2. Sustainability

The term "sustainable logistics" refers to procedures and methods used to increase the sustainability of supply-chain operations, including the procurement of raw materials, processing those materials into finished goods, storing and distributing those goods, and managing the end of a product's lifecycle.

Outcome - Improved system for the future.

Proposition - A sustainable value proposition, or the advantages a firm hopes to provide to its customers and society through its product, is the foundation of every sustainable business model.

6.3. Internet of Things

The market for IoT supply-chain software is still growing now when IoT applications for logistics have been integrated into business processes in many nations. The rapid growth of e-commerce and the requirement for highly coordinated transportation operations are among the factors driving this growth.

Outcome - Productivity Boosting.

Proposition - IoT value proposition discusses the long-term worth of all the data generated as a result of working with your organization. That is a well-rounded value proposition.

6.4. Smart Warehousing

The objective of smart warehousing system is to give firms with real visibility allowing for process optimization and the capacity to implement rapid modifications to boost operating speed and accuracy. It can also rectify human error and can increase security and privacy.

Outcome - Speed and accuracy

Proposition - The technological partnership enables warehouse workers to raise the production, performance and operational effectiveness. Reduce the amount of manpower.

7. Research Implications

The analysis makes a significant contribution to the literature. However, there are certain issues with this study that deserve attention. Despite the sample from the Scopus database is comprehensive, it is not exhaustive and the sample may be skewed due to the selection criteria that were used. Our focus was on scholarly journal articles that were published in English, as is customary in academic literature reviews. The categorization by affiliation or region and the academic findings addressed by our research should also be noted.

8. Limitations

There have been multiple limitations on this study. The research did not cover all aspects of IoT. Additional research is required to expand the study to include further variables. The study provides insights into IoT in smart logistics. Logistics companies can utilize the advantages. It is important to conduct a comparison between local and global companies.

9. Challenges and Future Research Scope

Modern management practices are rapidly evolving, especially in Smart Logistics. Smart Logistics currently incorporates new technology into all management activities, resulting in significant evolution, and being one of the fundamental pillars of the fourth industrial revolution 'Industry 4.0'.The idea of smart logistics is still somewhat challenging. Smart logistics is still a rather complicated idea, but it can be employed in geographically separated places for the acquisition of goods. It can be used in geographically dispersed locations to obtain the best raw materials for the lowest price or to advertise products to a large customer base.

Numerous research has looked at real-time temperature monitoring systems for perishable commodities such as fresh food, frozen food, and medications. Studies that examine

IoT-enabled technology from the perspective of identifying leakage and theft in refrigerated containers are few and far between. Consequently, a perishable commodities logistics management system based on the Internet of Things is suggested in this research article.

In a supply chain network, it's critical to monitor the current temperature, humidity, and physical location, and communicate real-time data. In addition to theft and leakage detection, an attempt has been made in this study to construct an IoT-based intelligent monitoring solution for the logistics sectors of the pharmaceutical and food industries. Complete monitoring data can be provided by combining several information technologies, such as GPS and wireless data connections.

10. Conclusion

Four clusters were used to categorize the application for this job. In terms of smart logistics, IoT-based technology is still the subject of numerous research investigations. IoT applications are actually very popular, our study's objectives were to outline IoT applications for smart logistics and provide specific examples of each use which is why many companies are creating them. Smart logistics applications of IoT have a variety of limitations and space for improvement in data collecting and data security, in particular.

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