

# Technology Application in Logistic and Supply Chain Management

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## Abstract

Technology of the modern era has brought an overhaul to the supply chain management and logistics systems completely. With apps that enable easy tracking of the product and supply distribution, even small businesses are flourishing exponentially. This paper discusses the literature review on the applications of these systems, concerning technological advancements, in operational and supply chain management strategies and how managers implement these systems using technology and modern applications. The introduction of computers and machine intelligence has changed the way of the organization doing the supply chain management. From robotic packaging of products to drone delivery systems, artificial and augmented intelligence is the future of logistics as opposed to the traditional supply chain management, where it was based upon physical delivery systems and vendors selling the product or franchises and distributions among markets for a certain product. The implications and negative aspects of technology with the inclusion of risks affiliated with Web 2.0 type cloud servers are also discussed in depth.

## Keywords

Logistics Technology, Organizational Management, e-Commerce, Seller-Customer Interaction, Supply-chain Management.

## 1. Introduction

Supply chain processes have been put on the fast track and are being upgraded with every passing day to increase efficiency and reduce the cost of managing the supply of products (Tadepalli, 2014). The Last Mile Delivery system is now massively used in e-commerce businesses where the product is picked from the distribution hub and is delivered to customers at their house (Tadepalli, 2014). This system has been around for a long time and is now being integrated into everyday necessities like groceries and food which are ordered and delivered on the same day through an app. Companies like Amazon have started working on taking traditional last-mile delivery to the next level with automated drones dropping products off at customer's residence via satellite information channeling (Sharma, 2020). Supply chain apps like Kintone help in staff recruitment, HR management, keeping notes and updates of tasks, managing day to day task completions, and basic organizational management processes (Menear, 2020). When researched further, apps for logistics and supply chain are analyzed. Logistimo is an app that handles supply chain logistics even in rural businesses. It helps sellers manage their product and track their inventory in order to sustain constant supply. Another app called Mobile SCM (supply chain management) helps in cutting costs for the supply chain by monitoring transportation and inventory from warehouse to supply distribution to customers' residence. Scandit is an app that helps in easy to manage stocking of inventory by scanning and processing barcodes. When all of this information is added and stored in a cloud-based software on computers, managing, transferring and sharing it becomes a matter of seconds thus saving time and investment in the long run (Russell, 2018).

When it comes to machine learning logistics, Alibaba would be the best example to be studied and evaluated. The warehouses used for product packaging, stocking, tagging, distribution, and transport are entirely robot operated. The founder of the multi- billion-dollar enterprise Jack Ma has been constantly updating the supply chain management and logistics technology of their transport especially with the massive number of sales the company has per day. An example of their *modus operandi* is the Single's Day Shopping Festival (Liao, 2018). Alibaba announced this annual event in 2009 and has since made billions of dollars with hundreds of millions of sales on the day. In 2013, the business giant announced Cainiao Logistics as their new mode of supply chain management that has since grown to become the largest operational supply chain management of China (Lei, 2017). The company uses state of the art cutting edge technology and software's for managing the supply of their sales across thousands of distribution centers that operate to provide a vast range of products to the entire continent. Their biggest market comes from countries that do not have competitors like Amazon or eBay thus enabling the Chinese company to become the strongest incumbent of Asia. The logistics team of the company is said to be the most efficient in matters of machine learning supply chain processes. This helped the company boost its sales to a market-exploding 30.8 billion dollars in a single day in 2017 that surpassed Black Friday and Cyber Monday sales combined that year. This proves the accomplishment of logistic technology when implemented successfully into the supply chain organization (Cranberry, 2018).

Digitalization improvises and enhances the entire organization system to its core. However, the implications of this digitalization may have some negative impacts for workers and laborers, or even on a company if the implementation was not successfully accomplished. These aspects can result in loss of jobs as machines replace basic vendors and laborers. This means that skilled labor requirements are being eliminated and replaced with artificial intelligence that can be stored with certain information and machines can be then commanded to carry out the process of supply chain practically better than humans. An example of this system is drone operated delivery mechanism Amazon has in mind for the next decade where large numbers of heavy-duty quadcopters will be stationed in various resting spots like on a certain tower with solar charging mechanisms. When an order is placed in the specific area, a drone flies off to a close by distribution to collect the package and deliver it to the customer (Amazon, 2020). This is a potential revolution in logistic technology and supply chain management as it saves cost of travelling, cost of fuel, cost of potential damage to the product, time of transportation and time of collection (Grazia Speranza, 2018). The company also aims to launch large scale commercial blips in center spots of all drone stations so the collecting process becomes much more efficient thus decreasing time of delivery as well (Lardinois, 2019). These systems are bound to reduce the necessity of humans eventually as artificial and augmented intelligence today can process petabytes of data in a few minutes making efficiency of logistics an inevitable task for robots. The investment required for such systems indefinitely demands cost-cutting and downsizing employee numbers which leaves a lot of basic workers out of jobs. Furthermore, a threat of digital logistics and apps looms over the companies as well. Systems of these apps are all eventually connected to a cloud software one just like Web 2.0. In case of cyber-crimes, if a cloud has been hacked into from one single source, the virus can be spread throughout the software resulting in every single app of supply chain logistics leaking information of clients and customers to the hackers. This can result in loss of massive business markets and lawsuits for privacy violations of such magnitude against the company that can lead it to bankruptcy. Last but certainly not the least, the transition from traditional logistic systems to modern systems can be challenging throughout the chain of command especially for senior citizens working as chief employees with a company for decades. This means learning new software will prove to be just as difficult as understanding the basics of the machinery that handles them. Prevention of these adverse aspects of technology is a primary concern to a company implementing modern apps into its supply chain organizational management (Humayun et al., 2020).

This paper discusses about the detailed research and evaluation of how technology in logistics helps a business grow, where it is explaining the apps used for the supply chain. With that, it will help to provide understanding of supply chain management of the modern world. In addition, it will be noting on results brought about in growth of a business due to machine-intelligence based logistics and supply chain processes. By doing that, it will be clarifying the difference between traditional and modern methods of logistics and operational supply chain.

## 2. Methods

This paper collects information on the use of technology in supply chain and logistics through reviews of the literature. The data was collected intricately, and personal knowledge was used as the basis for the paper. The

literature is reviewed in depth with examples from various organizations using the technology and apps for the management and supply of a product. All literature from books and journals to blogs and articles are peer-reviewed and referenced authentically without any bias for systematic categorization.

## 2.1 Data Collection

AliBaba made 30.8 billion dollars in one day for 100 million sales. E-Commerce has accounted for 14.3% sales and 15% year-by-year. 44% fleet managers will invest in technology for supply chain processes. 17% intend to follow last-mile delivery systems. These retail sales are expected to grow to 17.5% globally due to e-commerce by (Sasso, 2019). 72% enterprises will implement technology in logistics and supply chain management. 50% of companies have adopted cloud computing. Artificial Intelligence can increase asset productivity by 20% and reduce maintenance cost by 10% while prevention of crashes during transportation can be reduced by 40% as can be seen from Figure 1 (Klubnikin, 2020).

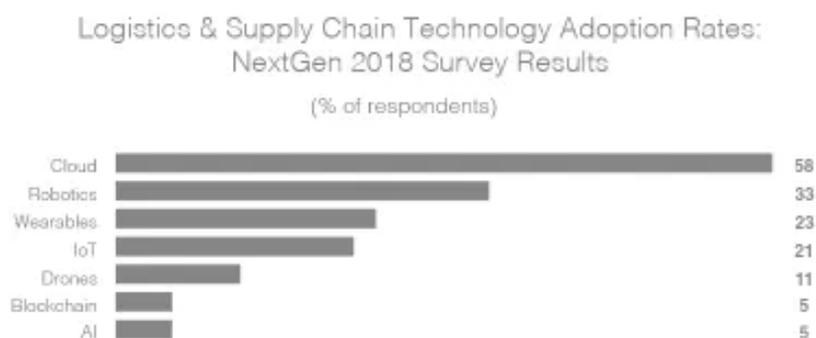


Figure 1. Implementation of technology in logistics and supply chain management (Klubnikin, 2020).

## 3. Results and Discussion

The data collected from the research describes the effects of these apps on the supply chain and logistics in the business world. Apps like Logistimo and Scandit prove the efficiency claim of technology is true and modern software can make supply chain processes much better. The data shows how many companies are implementing modern technology into logistics and supply chain as these apps are the future of supply chain organization. Example can be seen from Amazon where they show how the sales can be generated with their propriety software as in Figure 1 (Pandiri, 2018). Big companies like AliBaba, Amazon and Walmart are already on the road to upgrading their delivery and distribution systems to reduce costs of the supply chain processes and to increase time efficiency (Chiles & Dau, 2005). These results will lead the companies to becoming global market leaders in every city, state and country of the world. Management of these large-scale distributions will come with its challenges especially in the implementation of technology. Companies need to keep these systems in check regularly to ensure there aren't any anomalies or disruptions in the flow of supply (Frazelle, 2002).

During the third quarter of 2020, Amazon generated total net sales of almost 96.15 billion U.S. dollars, surpassing even the 69.98 billion U.S. dollars in the same quarter of 2019. The majority of Amazon revenues were via net product sales (Sabanoglu, 2021).

Average sales by industry

industry	segment	sales	Average by industry
Agriculture	Enterprise	142,230.08	83,355.12
Agriculture	SMB	24,480.16	83,355.12
Communications	Enterprise	511,227.04	392,413.12
Communications	SMB	426,568	392,413.12
Communications	Strategic	239,444.32	392,413.12
Consumer Products	Enterprise	632,574.4	579,350.4533
Consumer Products	SMB	948,126.4	579,350.4533
Consumer Products	Strategic	157,350.56	579,350.4533
Energy	Enterprise	1,048,211.2	799,749.1733
Energy	SMB	903,030.24	799,749.1733
Energy	Strategic	448,006.08	799,749.1733
Finance	Enterprise	1,181,389.12	1,397,735.4133
Finance	SMB	2,351,588.16	1,397,735.4133
Finance	Strategic	660,228.96	1,397,735.4133
Healthcare	Enterprise	703,153.12	634,667.36
Healthcare	SMB	781,722.4	634,667.36

Figure 2. The algorithm that Amazon used via AWS website to determine the sales of Amazon by industry (Pandiri, 2018).

#### 4. Conclusion

The management of logistic can be leveraged with the application of STI technology drivers. The incorporation of apps or software in supply chain management leads to the smart handling system. Besides that, it can reduce the reliance on manpower in every process of the organization. Hence, the future of handling warehouse is governed by robotic and cloud software instead of human handling and hard copy such as tagging. Moreover, the sustainability of software and cloud server are assessed with the amount of logistic information that will be programmed in the system. Indirectly, the incorporation of technologies in supply chain management transforms the process into industry 4.0 with a drastic overhaul in the working procedure. Capacity and capability development to up-skill the knowledge of operators and consumers will be enhanced. The growth of business will penetrate the local market and reached the emerging markets in a global level to be on par with the developed countries. As a concluding fact, the revolution in logistic management creates a whole new ecosystem and serve as an example for other business operations.

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