**Technology Innovations and its role in Logistics Overtime**

Technology is now a big part of our lives, and it is going nowhere, since the world is developing with technology businesses are also keeping up with this trend. Every business now uses some sort of technology to help them manage the work processes effectively and get results. What is logistics? Logistics is the process of managing how resources are acquired, stored, and transported from raw products till the product gets to its destination. ‘Probably the first application of logistics was for military purposes. Like China and Egypt, various ancient civilizations needed an efficient way to expand their influence through trading and warfare. They needed adequate methods to transport goods to distant parts of the known world. However, they were also looking for solutions to deliver weaponry and provision supplies to their conquering armies.’ (Cargo, 2021)

There has always been a need for producing goods, storing them and distributing these goods in the industrial industry. We will go over how these was achieved and the improvement in logistics over the years. The goal of logistics is to have the right product at the right time and place for the customer.

When thinking about technology we think about ways it has changed our lives and ways, people who live thousands of miles apart can now communicate in a split second, distances that may take months and years are covered within hours and days. The input of technological innovations into logistics can help stabilize the flow process. This is to say we now live in a very fast paced world where if you do not keep up, you get kicked out. There is a higher demand of customers wanting to receive their products at a faster time and a cheaper rate, the adaptation of technology in business can help reduce unnecessary expenses and errors. Logistics is not just the management of a process but the management of people, employees’ efforts is one of the determinants of the success of a company. It is important that the employees of a company are also involved in the technological change of processes.

Logistics involves a lot of data storage and retrieval, and accurate management of this data and applying it to the business would allow things run more efficiently and effectively. ‘Supply chain managers get the information they need to make data-driven decisions. Meanwhile, smart tools can be trained and automated. Now, advancements in technology make logistics tools even better for optimizing supply chains.’ (Lee, 2022).

Logistics uses different types of technology to advance their business from the software used to manage the processes and communicate with other businesses or customers to the use of artificial intelligence that participate in warehouse packing and shipping processes. Artificial Intelligence uses algorithms combined with machine learning support companies to be proactive in dealing with demand fluctuations. ‘Over the past several years, the logistics industry has started to integrate Artificial Intelligence solutions including intelligent transportation, route planning, and demand planning in their operations — but this is only just the beginning. From last-mile delivery robots and sustainability solutions, to warehouse automated picking systems and predictive optimization software, Artificial Intelligence is already making a huge difference in logistics. Shippers, carriers, suppliers, and consumers can all expect to benefit from these logistics technology trends continuing in 2021.’ (Transmetrics, 2021). Self-driving AI and smart road technologies are making a positive effect towards delivery service automation. In addition, AI-based cognitive automation technology brings intelligence to automate administrative tasks and speeds up information-intensive operations. Artificial intelligence also assists in goods transportation, artificial intelligence systems do everything from selecting efficient routes to monitoring and correcting storage conditions. Artificial intelligence paired with Internet of Things networks, AI can make a big difference in supply chain efficiency and oversight. As Internet of things allows smooth communication and AI selects the best routes for efficiency and making sure the product of quality is intact on the road or in storage.

Examples of the different types of technology innovations that paly a big role in logistics includes artificial intelligence, blockchain, artificial intelligence, 3D printing, cloud computing, digital twins, data analytics and so on. ‘By 2025, the global blockchain in the transportation and logistics industry is expected to be worth over $765.5 million. The advantages of blockchain technology for logistics companies are clear: blockchain helps solve problems like fraud and human error, reduces costs and increases efficiency. One primary way to achieve this is through smart contracts. Transactions in logistics are carried out based on multiple documents like bills of lading, consignment notes, warehouse warrants, insurance certificates, etc. For example, clearing goods through the authorities involves numerous steps and approvals from various bodies like port authorities, customs agents, or other government organizations. Blockchain-based smart contracts can help streamline these processes by providing a single source of truth for all parties involved in the transaction. These contracts remove manual processing because they automatically execute themselves when certain conditions are met. A blockchain solution enables multiple organizations to work together while reducing costs by eliminating duplication of data entry and the need for multiple reconciliations between parties.’ (Industrial, 2022). Blockchain reduces the amount of human error as it reduces the manual processes that needs to be carried out, as it is an automated process. Through cutting down on human errors, it has helped saved any additional costs that may arise from fixing such errors.

Internet of things enhances communication between departments, it has changed the game of logistics as it allows full transparency between departments. They are devices embedded with certain technology that helps to share and carry data. IoT sensors can track location, temperature, humidity, and other environmental factors to help ensure that goods are stored under the right conditions. ‘IoT is a connection of physical devices that monitor and transfer data via the internet and without human intervention. IoT in logistics enhances visibility in every step of the supply chain and improves the efficiency of inventory management. Integrating IoT technology into the logistics and supply chain industries improves and enables efficiency, transparency, real-time visibility of goods, condition monitoring, and fleet management.’ (Startus, n.d.)

A digital twin is used to virtually reflect the accuracy of an object, the purpose is to help you have a knowledge on what the product looks like. ‘Modeling in its current state doesn’t take into account how parts wear out and are replaced, how fatigue accumulates in structures, or how owners make modifications to suit their changing needs. However, digital twins technology is changing this once and for all: Now, physical and digital worlds can be melded into one, thus allowing us for the first time to engage with the digital model of a physical object or part just like we would with their physical counterparts.’ (Startus, n.d.).

Cloud computing helps a company store data securely and have access to this data from anywhere in the world and you can even share this information with partners outside your location. Clou computing can globalize a business and help reduce costs from multiple IT infrastructure. ‘Cloud-based SaaS solutions for logistics companies allow for pay-per-use models that require low capital investment. This minimizes the risk and cost of maintaining the IT infrastructure. Cloud-based logistics solutions also address communication hurdles and allow companies to collaborate and share data in a secure way. In addition, cloud integration allows data collection from management systems to analyze overall logistic processes. Finally, cloud-integrated logistics offers universal accessibility and is not confined to any physical space.’ This allows employees to have a bit more free time to handle other tasks while improving efficiency. Cloud computing has become increasingly popular in the logistics industry, as it can help businesses reduce their operating costs, increase efficiency, and improve back-office operations.

Robotics in logistics ranges from the driverless cars to the bodysuits, robots can increase speed and efficiency in the warehouse. ‘Integrating robotics into logistics increases the speed and accuracy of supply chain processes and reduces human error. Robots offer more uptime and increase productivity when compared to human workers. Robots, however, do not take up the jobs of humans but rather work collaboratively alongside them to increase efficiency. Physical robots, such as collaborative robots (“co-bots”) and autonomous mobile robots (AMR), are used to pick and transport goods in warehouses and storage facilities. Moreover, software robots perform repetitive and mundane tasks that free up time for human workers.’ (Transmetrics, 2021).

Lastly, we have something call last mile delivery. The concept of the last mile delivery is to deliver the end product directly to the customer while ensuring customer satisfaction. This innovation was brought about to increase customer satisfaction as delivery form the hub can be inefficient, although last mile delivery can be quite costly it is best to find the best strategies to manage costs. Examples of last mile delivery includes ‘Delivery of goods by drones resolves the problem of traffic congestion in the last mile. Drones have the capability to reach remote areas, thus reducing the delivery time and cost. Irish startup Manna offers drone delivery as a service to restaurant chains with its aviation-grade fleet of delivery drones. Manna’s drones are capable of flying at an altitude of 80 meters with a speed of 80 km per hour. Smart Lockers

Smart lockers provide flexibility for customers to receive parcels and reduce the last-mile challenges for returned deliveries due to customer unavailability. Italian startup Pakpobox offers smart lockers for both indoor and outdoor conditions. Pakpobox has a wide range of smart locker configurations that are customizable for various scenarios. These smart lockers offer parcel security by protecting them from adverse weather conditions as well. Moreover, Pakpobox provides temperature-controlled smart lockers for the storage of perishable goods.’ (Startus, n.d.)

In conclusion, technology innovations are what has improved logistics to the point it is at now. We now have cheaper and more stabilized supply chain processes. The best way to support the expanding global market by incorporating the right tools, picking the best tools for logistics will help achieve good results. Fortunately, with IoT, blockchain, and AI, more comprehensive supply infrastructures are available to businesses.

# Works Cited

Cargo, U. (2021, April 27). Retrieved from Universal Cargo: https://www.universalcargo.com/a-brief-history-of-logistics/

Industrial, G. (2022, February 4). Retrieved from Global Industrial: https://www.globalindustrial.com/knowledge-center/article/5-technological-innovations-that-are-transforming-the-freight-and-logistics-industry-in-2022

Lee, I. (2022, March 11). Retrieved from EuroScientist: https://www.euroscientist.com/logistic-technologies-supply-chains/#:~:text=Transformative%20Logistics%20Innovations&text=Primarily%2C%20these%20technologies%20include%20the,supply%20chains%20for%20the%20better.

Startus. (n.d.). Retrieved from Startus Insights: https://www.startus-insights.com/innovators-guide/top-10-logistics-industry-trends-innovations-in-2021/

Transmetrics. (2021, July 2). Retrieved from Transmetrics: https://www.transmetrics.ai/blog/supply-chain-logistics-technology-trends/