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**Critically evaluate the effect of technological application
into global logistics as an innovation for achieving
competitive advantage.**

Service Logistics (M6X01294)

Bsc – Logistics and Supply Chain Management

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Introduction

Technical and technological progress has profoundly changed the way we work since it first appeared. Whether it is the automation of machines or the integration of information technology within companies, progress has been increasing and innovation will continue to evolve in the coming years.

Experts say that these revolutionary technological advances are enabling innovative workforce saving systems to be put in place, leading to the elimination of countless trades and affecting millions of workers around the world, in factories and offices alike.

Other experts, on the other hand, believe that technological change is evolutionary, that it creates more jobs than it destroys over time, and that this is therefore very positive for both workers and society. (William G. CASTELIANO)

A famous economist, Joseph Schumpeter, spoke of "creative destruction". He said:

"The new does not emerge from the old, but appears alongside the old, competing with it to the point of ruining it." (*Schumpeter, 1942*)

Indeed, since the industrial revolution, technological progress has changed the nature of work, destroying jobs and creating new ones, and for that destruction is creative. It is the permanent movement of destruction of activities linked to old innovations and the creation of new activities linked to new innovations, which allows the permanent renewal of production structures.

We will see through this study what effect the application of technology in the logistics sector has had as an innovation to gain competitive advantage. In the first instance we will talk about global logistics, and then we will talk about the integration of technology in logistics through some examples. Finally, we will see what are the current and future trends in logistics technologies.

1 Global logistics

1.1 History

In recent years, logistics has undergone a major boom, and the players in this sector have turned it into a global logistics business. This boom is mainly due to two successive revolutions: the development of mass distribution in the 1970s and above all the globalisation of trade. (La Croix, 2007)

Today, with the internationalisation of trade and relocations, logistics is an essential sector of the world economy. If we had to give a definition of it, it would seem that global logistics is a vast field made up of many trades whose mission is to deliver, in the shortest possible time and under the best possible conditions, goods sold by a company located in one country to a customer located in another country.

International logistics cannot simply be limited to the transport of goods. Many steps must be included under this heading, including: packaging of the goods, selection and loading of the means of transport (road, sea, air or rail transport) depending on the destination and the nature of the sales contract, storage in bonded warehouses, customs clearance operations on both departure and arrival, delivery to the foreign buyer, as well as insurance on transported goods and payment systems. (*Glossaire International*)

When you want to move from local to global logistics, there are elements that need to be taken into account. Indeed, in addition to the challenges of basic logistics, one must consider others such as:

- A broadening of the network of suppliers and vendors, with different ways of operating.
- Problems related to customs duties and additional costs.
- More complex insurance schemes.
- Different expectations of buyers in terms of logistics quality.
- Different quality assurance norms and standards. (2013, *Logistic Blog*)

Global logistics, therefore, takes more factors into account, making it a highly sophisticated sector that requires a higher level of knowledge on the part of every member of an organisation.

It is also a sector in which a multitude of actors are involved in running the system. Carriers transport containers of goods from one end of the planet to the other by land, river or sea. They then deliver them to gigantic warehouses, the lungs of world trade.

However, if we want international trade to continue in a prosperous and sustainable way, it is necessary to consider changes in the way it operates, as the sector is a major polluter. Indeed, the transfer of goods from one end of the globe to the other is extremely energy-intensive. Container traffic is growing worldwide by 10% per year and it is not expected to stop. The players in the sector must now find solutions to meet social and environmental concerns. (Hugues Valenton, 2007, *La Croix*)

This shift in the economy from local to global, making logistics a pillar of globalisation, is due in particular to the many technological advances and innovations.

2 The application of technology in logistics

2.1 History

Today, we live in a networked world, in which information is disseminated everywhere in real time and anywhere in the world. Indeed, it is possible to share live information with someone living in Canada while in Nigeria.

Moreover, our world is globalised, where the exchanges of goods are increasingly fast and can be envisaged anywhere on the planet. This is thanks to the development of logistics, which has the basic role of linking the informational and physical aspects of the movement of goods. (Visser, 2003)

However, these logistical advances have been possible thanks to technological progress and the many innovations that have been created in recent years.

Indeed, the development and democratisation of the Internet and new information and communication technologies have created a change in the logistics sector, which has modified the organisation of companies in terms of purchasing, production, storage and distribution. These new technologies have made it possible to move from the vision of the "simple" company to that of the extended company, which induces standardised, rapid communication and harmonisation of strategies between the different partners, with the aim of satisfying customers. (2010, *éc&a Etudes & Analyses*)

2.2 Example of technologies in logistics

In order to fully understand the importance of new technologies in logistics, we will see examples of innovations that have revolutionised ways of working in this globalised sector.

2.2.1 Electronic Data Interchange (EDI)

Logistics is a field where the management of physical and information flows go hand in hand. This is why good communication between companies is essential to manage exchanges properly. New technologies have made it possible to facilitate communication between companies, to offer better customer service and to strengthen competitiveness thanks to the speed and fluidity of these communications. Electronic Data Interchange (EDI) is a tool that has greatly revolutionised the way companies work.

Electronic Data Interchange is a business-to-business communication of business documents in a standard format. With EDI, business documents such as invoices, cheques, requests for quotations, loan applications, etc. are sent electronically from one organisation to another. EDI is a move towards paperless transfer of documents or transactions.

This saves time and eliminates the errors of manual processing, which are often costly to resolve. This automated function allows data to be shared quickly instead of spending hours, days or even weeks with paper documents or other methods. (Rajiv Bhandari)

In most cases, these companies are trading partners who frequently exchange goods and services as part of their supply chains and business-to-business (B2B) networks. For example, this is the case with transport companies, which own their own software and have regular customers and suppliers. (IBM)

The advantages of using EDI technology in logistics and supply chain management are as follows:

- Faster transactions, with instant document transfers through the supply chain.
- Just-in-time manufacturing techniques can be adopted.
- Reduced transaction costs through dematerialisation of operations
- Reduction of order and stock cycle times, which contributes to improving customer competitiveness.
- Improving business relations between parts of the supply chain and creating barriers for competitors. (Rajiv Bhandari)

2.2.2 Enterprise Ressource planning (ERP)

Computer tools have revolutionised the way companies work, and ERP (Enterprise Resource Planning) software is one of them. ERP software is dedicated to the management of companies, whether it be commercial management, accounting management or stock management, ERP software ensures the homogeneity of information by centralising it on a single platform. (Benoit FLEURY, 2018, *ECN*)

This is a real innovation, because before the appearance of this software, many companies had several information systems. The fact that there was not a single computer interface was a waste of time but also caused errors because the same information had to be entered several times.

Today, a large number of companies have chosen to implement an ERP in order to standardise their processes and improve their customer relations with a specific tool.

ERP contributes to the optimisation of supply chain management and the development of competitiveness by guaranteeing the following benefits:

- Faster response to customer needs.
- Reduced inventory costs.
- Improved service levels, both internally and externally.
- Improved inventory turnover rate.
- Reduction in the cost of logistics. (Rajiv Bhandari)

2.2.3 Radio Frequency Identification (RFID)

The barcode is a revolutionary invention, which has had a major impact on logistics operations and the supply chain. This code, which allows the rapid and automatic acquisition of data, has been used in many fields, but more particularly in industry and mass distribution. (Audrey Gralon, 2010) However, barcodes have found their limits, leading to the appearance of RFID tags.

RFID is an automatic identification and data capture technology, which allows the wireless exchange of information between a tagged object and a reader. RFID consists of a tiny silicon computer chip and an antenna, which transmits data by a signal to the RFID reader and related software and hardware. (Jacob Gwa, 2021, Lecture 4)

Each chip can give a unique serial number to each product, and the antennas can be read remotely and through the materials. This allows contactless reading, which is useful in factories, where barcodes would not be sufficient.

In addition, the RFID chip gives us precise information about the nature of the product. Indeed, we can know what the product is, where it has been, when it expires, when and where the goods have been manufactured, packaged and shipped. (Jacob Gwa, 2021, Lecture 4)

RFID has had a significant impact on logistics and has enabled certain benefits:

- Enable better and greater visibility on the movement of goods in the supply chain and thus to become more competitive.
- Improve the ability of manufacturers to better manage inventory levels.
- Help to avoid counterfeiting. (Rajiv Bhandari)

3 Current and future trends in supply chain technologies.

Today, other innovations are being created to further improve the functioning of companies in the sector. These innovations will become more and more firmly rooted in companies in the coming years.

3.1 Example

3.1.1 Internet of things (IoT)

In 2018, the number of connected devices was 25 billion, and it is estimated that by 2025 this number could triple to 75 billion. These figures prove that digitisation is here to stay and that it is not about to stop. In the logistics sector, the trend is the same and this encourages supply chain players to adopt digital solutions for their companies. (Ontruck, 2018)

The principle is that each object is linked together via an internet connection. Each intelligent object can be identified by a unique URL and can therefore be accessed by staff via the internet. Operators are in charge of controlling the intelligent objects, even if their influence is limited. Thanks to their connection to the internet, the objects are able to act and react independently to certain scenarios. (Neumuller, 2020, Schafer)

This inter-connectivity between objects allows a larger scale integration of product lifecycles, supply chain and customer data in order to eventually develop a fully digital value chain. (Neumuller, 2020, Schafer)

Companies are therefore able to digitise everything, and this integration enables optimal connectivity, traceability and data collection, giving manufacturers a complete overview of current operations and possible optimisations.

3.1.2 Automation

Automation is also increasingly present in logistics platforms, for example with Amazon's Kiva robots, which are used to lift the products stored in the racks and transport them from the warehouse to the packing hall. This replaces the use of forklift trucks and allows companies to program and automate their activity. (Eustache, 2014)

This type of physical automation improves the efficiency and speed of operations. Using Amazon as an example, thanks to its robots, the company was able to shorten its delivery times from 24 hours to 48 hours. This type of optimisation will spread, resulting in increasing pressure due to the ever-increasing expectations of customers on other companies to meet these standards as well. (Ontruck, 2018)

3.1.3 Blockchain

A blockchain is a large database which has the particularity of being shared simultaneously with all its users, all equally holders of this register, and who all have the capacity to enter data into it, according to specific rules set by a computer protocol which is very well secured thanks to cryptography. (Assemblée Nationale, 2018)

The blockchain is particularly useful for the logistics industry because it could benefit many players at the same time: manufacturers, shippers, customers, suppliers, auditors. It allows suppliers and customers to track products, and auditors to verify transactions. (Ontruck, 2018)

Its great advantage is that the information is stored and thanks to its security, which is based on a mechanism of consensus of all the "nodes" each time information is added, it cannot be modified or manipulated by other individuals. (2019, *Bercy*)

In the coming years, the blockchain will make a major contribution to automating, improving and speeding up the approval and shipment documentation process.

Conclusion

We have seen in this essay, the history of global logistics, the link that there has been between logistics and technological progress, with some examples of the technological tools that have marked this sector and also other examples, which are becoming established in companies.

It was also noted that globalisation and the evolution of the logistics sector are linked to the explosion of new technologies, and therefore the recent advances in logistics would never have come about without these innovations.

As a result of this research, we can see that the application of new technologies within the logistics sector has had a real impact because they have enabled companies to reduce costs, reduce errors, globalise and standardise exchanges. However, companies have no choice but to adapt to technological trends if they want to remain competitive, as competition in the sector is tough and progress is perpetual.

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