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INNOVATIONS AND SOLUTIONS IN BUSINESS LOGISTICS

Ndaghi PADISCO, Vytautas Magnus University Agriculture Academy, Faculty of Bioeconomy Development, email: padisco.ndaghi@stud.vdu.lt

Summary

Innovations have always been judged as the growth engines of society and in the field of logistics, their importance is still underestimated. This is because they have not been exhaustively analysed. Innovations in logistics can therefore help improve efficiency and effectiveness across many sectors of the economy in general and the logistics sector in particular. The study examined the innovative tools and processes in business logistics services, and it was carried out on existing literature and in-depth interview of experts (in our case, business executives like logistic managers, quality managers, supply chain managers, procurement managers, and transportation managers were targeted). The mean and standard deviation statistics showed that innovation is a multi-perspective concept and the innovative tools such as IoT, CPS, Big Data Analytics, cloud computing, Blockchain technology, Robotics in business logistics, AI, Machine Learning, etc. do not operate separately but interdependently. They lead to a reduction in cost, reduce delivery time and improve quality of service, improvement in technology and offers a competitive advantage.

Keywords: logistics, innovation, competitive advantage, cloud computing, robotics, blockchain technology

Introduction

The business outlook has changed from the early 1990s because of globalization and competition has warranted the customers to get the right material, at the right time, at the right point and in the right condition at the lowest cost. No business with marketing, manufacturing or project execution can succeed without logistics support. Michael Porter posits that for the 21st century business to survive and succeed, it must be able to fulfil the challenges of the present demands regarding logistics since it has become a part and parcel for every business today (Neeraja et al., 2014).

The word logistic originates from the Greek word 'Logistikos' and the Latin word 'Logisticus' which means science of computing & calculating. As of today, the meaning has been broadened and is used in business to mean the transportation of raw material from suppliers to the manufacturer and finally the finished products to the consumers still as propounded by Neeraja et al. in their 2014 publication. In the domain of logistics, innovations have been judged to be the driving force of society but their importance is still underestimated since they have not been exhaustively analysed. Technology improvements also enable logistics processes to be created more efficiently. Worthy of note is the fact that due to the high reliance of business on logistics, companies with computer systems and intellectual capital tend to offer end-to-end logistics services on a global scale.

According to Flint et al (2005) Logistics innovation is any innovation brought in logistics related service from the basic to the complex, technological or administrative that is seen as new and helpful to a particular focal audience. The audience is referred to as internal where innovations improve operational efficiency or external where innovations render better services to customers.

The **research goal** is to examine the impact of successful innovations in business logistics and make recommendations to handle existing problems and how to improve existing services. The study lays emphasis on innovations in business logistic services and the data used for the research was gotten from review of journals and scholarly articles and in-depth interview. The report provides a summary of the research objectives as well as an analysis of the findings.

Research aim: to examine how innovation tools impact logistics and provide solutions to problems faced.

The following **objectives** have been set to achieve the aim:

1. To investigate the innovative tools in business logistics
6. 2.To examine the contributions of innovation in business logistics
7. 3.To make recommendations on sustainable innovations in business logistics

Research object and methods

The research object: Innovations in business logistics

The **methodology used** to carry out this research is the qualitative method of research. Qualitative research broadly refers to a category of research approaches that produce findings without reliance on quantitative measurement or statistical analysis (Corbin & Strauss, 2015). **The methods used** are the scientific literature analysis and expert evaluation (in-depth interview). In-depth expert interview is a form of collecting data through interviews with participants and it is a characteristic of a qualitative study. Interviews give the most direct and straightforward approach to gathering detailed and rich data regarding a particular phenomenon. Expert interview provides exclusive insights into expert

knowledge and into structural contexts as well as change processes of action systems. The statistic method of data analysis used in the study is the mean and the standard deviation statistics.

The study looked at both product innovation and service innovation. From the review of the journals and articles (Chieh-Yu & Yi-Hui (2007), Mena et al (2008), Moldabekov et al. (2020), Zhang (2020)) the research identified the following tools of innovation which impact product innovation in the logistic industry (which account for product innovation). The executives and experts interviewed were forty (40) in number and included: logistic managers, quality managers, supply chain managers, procurement managers and transportation managers.

From the articles and expert interviews, seven innovative tools in logistics alongside their functions were identified in different domains and presented on table 1 below.

Table 1. Innovative Tools in logistics (Source; created by author)

Tools of Innovation	Functions in Logistics
Cloud computing system	Cloud computing systems are a model of computer systems in which companies and individuals receive power and software applications over the Internet rather than buying hardware or software and installing it on their computers. Cloud computing enables companies to access and store data and applications over the internet, eliminating the need for on-premises infrastructure and it is currently the fastest-growing form of computing.
Big Data processing methods	Big data analytics for logistics offers cost reduction methods, an optimal pricing strategy, and a strategy to optimize logistics processes and greatly facilitates the decision-making process. There are three areas of logistics activity, the development of which is facilitated by Big Data technology (DHL 2017)
Internet of Things (IoT)	With the advent of IoT, Internet connections now extend to physical objects that are not computers in the classic sense and, in fact, serve a multiplicity of other purposes. The incorporation of controllers and actuators in such a way that an action taken in the *digital world*, such as a user clicking a link in an application, can result in a corresponding action in the *physical world* (e.g., an alarm sounds, a lever flips, an assembly line comes to a halt) (DHL & Cisco, 2015). IoT also includes more consumer-oriented devices, embedded technologies, and apps.
Analytical model of the logistic problem	Analytical models allow companies to quickly make effective decisions based on effective analysis of huge data sets. Instead of the traditional process of the chaotic collection of operational data and spontaneous reporting, it should be replaced by an advanced approach to collecting data from various data sources using analytical models aimed at specific functional areas.
Robotics in business logistics	Robotics is another innovation that is transforming business logistics. Robotics can be used to automate many of the manual tasks involved in logistics, such as picking and packing, loading and unloading, and inventory management. This can help companies reduce costs, increase efficiency, and improve accuracy.
Blockchain technology	Blockchain technology has the potential to revolutionise business logistics by improving transparency and accountability in the supply chain process. Blockchain is a decentralized digital ledger that allows for secure and transparent record-keeping. This technology can be used to create a permanent record of every transaction in the supply chain, from the manufacturer to the end consumer.

Table 1. Above, from the review of the journals and articles, innovative tools in logistics were identified and examined about the integration of technology, data analytics, and automation that has transformed the logistics industry, making it more efficient and cost-effective. Cloud computing has been discovered to be a vital innovation that has transformed business logistics, cloud computing enables businesses to access and store data and applications over the Internet, eliminating the need for on-premises infrastructure and helping companies reduce costs, and improving scalability with increased flexibility.

One of the main benefits of robotics in business logistics is increased speed. Robots can work faster than humans, allowing companies to increase the number of deliveries per day and reduce delivery times. Robotics can also help companies reduce the risk of injuries and accidents, as robots can perform tasks that are dangerous or physically demanding.

Blockchain technology in business logistics has increased transparency greatly by creating a permanent record of every transaction being carried out, blockchain provides complete visibility into the supply chain processes which can help companies identify and address issues such as theft, counterfeiting, and fraud.

Research results and discussion

From the in-depth interview of experts in the logistics sector, which was conducted online, the questions were posted through some social media handles and company accounts, and the following vital information was gotten concerning the innovative tools in logistics and their contribution to the logistics sector. The variables were outlined and examined on how they influenced service innovation in logistics include reduction in cost, reduced delivery time, improvement in technology, and offers competitive advantages. These tools in their specific nature contribute to the improvement in services rendered by business logistics. The significance and solutions to problems in business logistics with regards to the various innovative tools studies are presented in table 2.

Table 2. Attributes of various innovative tools (source: created by author)

Tools involved	Attributes	Significances and contributions
- Big Data Analytics - Cloud computing system	Reduction in cost	Logistics innovation improves a firm's market effectiveness and internal cost efficiency. Logistics innovations can also lead to increased revenues due to added services and improved customer satisfaction. Findings show a positive relationship between logistics innovation and strategic performance for large firms.
- Cyber Physical System (CPS) - Artificial Intelligence (AI) - Internet of Things (IoT)	Reduced delivery time / Improved quality of service	The cooperation between various services in the logistic sector like loading, unloading, warehousing, and delivering to the destination, etc., will assist in the realization of integration of the logistic chain and reduce the cost (Mingyong, 2014).
- Cyber Physical System (CPS) - Machine learning - Cloud computing system	Improvement in technology	Informatization and computerization of logistic processes give room for effective operation within various material flows. It also provides an opportunity to break down the supply chain process and to formulate tasks for participants of the logistics chain based on the order of the consumer of logistic services (Baheti & Gill, 2017).
- Big Data Analytics - Analytical model - Cloud computing system	Offers competitive advantage	Innovation is the source of competitive advantages, and such business executives increase investment in the direction of innovations in logistics. The use of innovative technologies enhances competitiveness among enterprises.

Table 2. above discusses various innovations and solutions in business logistics, including big data analytics, cloud computing systems, cyber-physical systems, artificial intelligence, and the internet of things. These technologies can help reduce costs, improve the quality of service, and offer a competitive advantage to companies in the logistics industry. It also highlights the positive relationship between logistics innovation and strategic performance for logistics businesses with the integration of various services in the logistics sector which can lead to the realisation of the integration of the logistics chain and reduce costs. Furthermore, the use of innovative technologies enhances competitiveness among enterprises, making logistics innovation an important investment for business executives.

Discussions

With respect to product innovation, the results showed that for the seven tools of innovation identified, the Internet of Things (IoT), Big Data Analysis, cloud computing system, and analytical model met the agreed level of average mean and average Standard Deviation (SD) while Machine Learning, Artificial Intelligence, and Cyber Physical System didn't meet the agreed level of average mean and average Standard Deviation (SD), which means individually they can't influence the performance of logistic services but can work interdependently impact it.

On the other hand, with regards to service innovation, the results showed that the mean and the standard deviation of the following variables: reduction in cost, reduced delivery time, improvement in technology, offers competitive advantages - all permit the logistic services to meet the agreed level of average mean and average standard deviation (SD). To corroborate the results gotten from our study, Dallasega et al. (2018), in their assessment of the widespread adoption of new information technologies and solutions (i.e., IoT, Big Data analytics, robotic systems, and additive manufacturing), showed how they affect the organization of activities within global value chains.

Where there is great progress, it is also imperative to note that there may be some concerns while trying to implement innovative tools or solutions in business logistics. For example, data privacy concerns is an obstacle that will limit the implementation of innovative tools in business logistics. Many of these technologies rely on the collection and analysis of large amounts of data, which may include personal information about customers and suppliers. Companies need to ensure that they are complying with data protection regulations, such as the EU's General Data Protection Regulation (GDPR), and that they are protecting the privacy of their stakeholders. Therefore Companies need to be transparent about how they collect, use, and store data, and ensure that they have appropriate safeguards in place to prevent unauthorized access or misuse of data. Failure to comply with data protection regulations can result in significant fines and damage to a company's reputation.

Blockchain can also help companies improve the efficiency of their supply chain processes. by automating many of the steps involved in the supply chain, such as payments and inventory management, blockchain can reduce costs and improve speed.

The implementation of information technology in supply chain management of the logistics industry has enabled it to achieve a competitive advantage by establishing connections between flexibility, coordination, and adaptation. Other considerable technology implementations including the use of data analytics for enhanced cold chain logistics decision-making, application of green and lean concepts, e-commerce, omnichannel logistics, cyber security, cloud computing, etc., have also led to significant improvement in Economic, organizational, and delivery performance. Rapid digitalization has amounted to massive pressure generation on the logistic sector, involving transportation, storage, information flow, customs, supply chain, etc. The sector has been prevented from reaching its full potential by an enormous fundamental infrastructure deficit, poor roads, insufficient railroads, corruption, customs, and government policies. As a result of the costly nature of some of the innovations, some companies benefit from them by partnering with other companies that

have more advanced technology or infrastructure to access those resources. This could involve partnering with logistics or IT companies, or with technology companies that can help to improve the efficiency of operations. ". This therefore implies that if logistics is not neglected or the logistics performance of the companies is adequately met, the digital transformation of the economy and society will be safeguarded.

Conclusions

1. Studies carried out identified various innovative tools in logistics which include Internet of Things (IoT), Blockchain technology, Robotics in business logistics, Cyber-Physical Systems (CPS), Big Data Analytics, cloud computing, Artificial Intelligence (AI), Machine Learning, and Analytical models. The study proved that Big Data Analytics, the Internet of Things, and cloud computing, have been very instrumental in banking, health services, custom clearance, and e-commerce.
2. Based on empirical evidence from studies carried out, innovation is a multi-perspective topic and the tools of innovation in logistics such as IoT, CPS, Big Data Analytics, Blockchain technology, Cloud computing, AI, Machine Learning, etc do not operate separately but interdependently provide solutions to the problems in logistics. Evidence also showed that innovative tools bring about a reduction in cost, reduced delivery time, and improvement in technology, offering competitive advantages.
3. Regulatory and legal issues can be an obstacle that will limit the implementation of innovative tools in business logistics as many of these technologies and solutions may be subject to regulatory or legal requirements, such as safety regulations or intellectual property laws of which companies will need to ensure that they are complying with these requirements, which may vary depending on the jurisdiction in which they operate
4. Blockchain can also help companies improve the efficiency of their supply chain processes. By automating many of the steps involved in the supply chain, such as payments and inventory management, blockchain can reduce costs and improve speed.
5. It can be concluded that cloud computing can also improve the accuracy of inventory management. by providing real-time data on inventory levels and demand, cloud-based logistics solutions can help businesses optimise their inventory levels, reducing the risk of stockouts or overstocks.
6. With regards to the recommendations, since evidence has shown that innovation is very vital for the improvement of business logistics and to improve the effectiveness and efficiency of their services, the above-mentioned innovative tools are highly recommended and organizational innovation is also encouraged. The use of ICT can drive innovation by enhancing communication, processing information, and improving cooperation. ICT is considered the key enabler in this process allowing new service design and implementation.

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