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INTEGRATION OF INFORMATION TECHNOLOGY IN LOGISTICS: CASE OF DEVELOPING ECONOMIES

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Summary

Due to the consistency in technological evolution, business sectors are gradually embracing the digital spheres by integrating software systems into their business operations. This is also due to the effective presence of more customers online, necessitating the integration of automated systems to match their current needs. It is however sad that this technological evolution is not evenly distributed, as some developing nations still operate manually. This research paper therefore focuses on examining the need for full technological integration into the logistics systems of developing economies, assessing the challenges of introducing such innovations and suggesting ways for effective implementation.

Keywords: logistics, technological integration, technology, supply chain management, developing countries.

Introduction

Information technology encompasses the gathering, processing, storage, retrieval, display and communication of information or data, normally by means of a processing equipment (Willcocks, Fitzgerald, 1993). Over time, it has undergone several changes, geared towards perfecting its status in solving societal and global issues. The 21st century has equally witnessed a tremendous evolution in technology across the globe and this can be seen from the gradual movements from manual to automated processes across different activities. Business sectors have equally embraced the technological advancement by integrating some automated aspects into their activities, some of which includes e-learning which permits one to study from any part of the world, e-banking to carry out banking transactions from the comfort of wherever you are, use of credit cards to effect purchases wherever the cards are accepted, tracking of goods being transported to your location without physically displacing oneself, electronic bus card for paying for bus fees, electronic insurance policies and so forth. These few are just some excerpts to demonstrate how effective the integration process of technology has simplified business operations in different sectors. It is however unfortunate that the examples cited above are more predominant in some countries while others still languish in the slow-paced manual operations. Throwing a glimpse at the logistic sector, for example, one can easily spot huge gaps in terms of the level of automation instituted in this sector in countries like South Korea and Cameroon.

Recently, technology has led to an increase in the availability of information on product movement within the supply chain (Prasad, Tata, 2000), creating a necessity for technological integration in logistics. But while developed nations basks in Intelligent Transport Systems like Bus Information Systems (BIS), Automatic Fare Collection (AFC), Parking Information System (PIS), etc., other nations are merely struggling with manual routines like physical counting of goods, manual paperwork, no systems to monitor deliveries on transit, inadequacy in route tracking for effective transportation. It should equally be stressed that the logistic sector permits one country to enjoy the facilities of other countries and vice versa through international trade. The African continent for example is globally known as a major supplier of raw materials and cash crops like timber, cocoa, coffee, tea, rubber, etc., and likewise, they also import goods like cars, motorbikes, yachts, bicycles, etc. from the West. Thus, it is imperative to enhance the logistic process, especially in developing nations in order to increase the effectiveness of the activities. This paper is therefore focused on examining the need to fully integrate and implement technology into the logistic sector of developing economies, examine the challenges that may be encountered in the implementation process and proposing solutions to overcome such challenges.

Research aim: To determine the effects of technological integration in logistics.

The following **objectives** were derived from the aim:

- To examine the benefits of integrating technology into logistics.
- To assess the challenges of technological integration on the efficiency of logistics operations.
- To propose ways forward in ensuring a smooth integration process.

Research objects and methods

This research article follows a qualitative methodology, which is based on a structured research strategy that provides the means to explore similar areas of interest and creates an environment for further studies and analysis. The focus is on an explicit form of secondary analysis of rich, deep and flexible information from similar sources. These

sources were thoroughly analyzed in line with the research problem, leading to the derivation of propositions for the stated problem.

The term logistics has witnessed varied definitions, stretching from the ones given by Doug Lambert (1998), CSCMP (1998), Phillip Kotler, etc. However, these different definitions tend to have a unique idea, focused on planning, implementing, and controlling the physical flows of materials and finished goods from point of origin to point of use to meet the customer's need at a profit. From that standpoint, one could easily identify that every logistics process involves elements of planning and control, transportation and exchange, consumption and finally satisfaction and profitability at the level of the customer and company respectively. This equally indicates a flow of processes, with different agents working at different angles to ensure that the ultimate goal is attained. Therefore, a problem or challenge at any stage can lead to a complete breakdown of the entire process, causing a deviation from the ultimate objective, customer satisfaction. It is an integral part of trade that connects countries through the processes of importation and exportation. That said, countries have been able to consume goods and services which they cannot produce because of the exchange process that takes place through international trade, an element of international logistics. The concept of production can equally not be ignored when discussing logistics. Production has been explained as the act of creating goods and services to satisfy wants. This act follows a process of extracting raw materials from nature, converting them to semi-finished or finished goods and finally moving them to the market where change of ownership will take place to mark the end of the production process. Logistics acts in the production process by ensuring the transportation of raw materials to the factory, warehousing and then to the market. It could make sense to say that logistics assist in completing the production process. However, the world today has been completely overtaken by a serious technological wave, causing every sector to embrace the digital sphere for purpose of survival. We have schools embracing digital learning that permits students from any part of the world to study from the comfort of their home with any institution of their choice, businesses creating websites of different categories to facilitate dealings with their customers, etc. As revealed by the Digital 2021 Global Statshot report, more than 60% of the world's population is always online, thus creating the need for businesses to be established at the digital level. The logistics and transportation sector is equally impacted in this technological revolution, with some logistics companies embracing software systems that permits them to automate their operations.

Fig.1: E-logistics digital information system chart
Source: According to Deliforce software, (2021).

This technological integration has made it possible for tracking of items ordered by customers, Bus Information Systems in public transport that facilitates time tracking of bus arrivals, departure and duration of specific journeys, use of drones for delivery, use of warehouse management systems to ensure effective storage of goods, etc. It is however unfortunate that such innovations exist but are not evenly available. Most logistics firms in developing economies are still far-fetched as far as technological logistics is concerned. The logistic activities in that part of the world are governed by manual processes, involving loading and unloading, lack of tracking devices to detect the transportation process of goods in transit, absence of software systems to detect the temperature of special consignments in transit, limited cooling houses for effective storage of perishables, etc.

Fig. 2: Manual workers unload planks of wood off a ship
Source: According to REUTERS/Alamy photo, (2005).

The pictorial display above is a typical representation of the manual norm that is governing the logistics processes of most firms in developing countries. This case depicts manual workers unloading heavy loads of planks off a ship at an

Indonesian port. This is a very tedious task that actually requires the intervention of some machinery of technological initiation to facilitate the unloading process. This and more contributes in degrading the performance and efficiency level of logistics in developing economies. One could be tempted to agree with the manual way of doing things based on the idea of minimizing cost of operations as spelt out by (Kuteyi, Winkler, 2022), who believed that there are only two reasons for such low trade performance - firstly, a predominant focus on international export of a few commodities (fuel, agricultural produce and mining products); secondly, supply chain and logistics difficulties across the region. A number of multinational firms that have been expanding into other emerging markets have found it difficult to penetrate some parts of Sub Saharan Africa as the supply chain and logistics costs are too high. Thus, it is a strategic and competitive priority for organizations that do, or wish to do business in Africa, to understand the present condition of logistics and Supply Chain Management practices in Africa and identify the challenges and opportunities to succeed. Another contributor, Caroline Freund (2016), Director of the Macroeconomics, Trade & Investment (MTI) Global Practice at the World Bank Group also weighed in to throw more lights on the aspect of Good Logistics. According to her, Good Logistics reduce trade costs, but supply chains are only as strong as their weakest link. For developing countries, getting logistics right means improving their infrastructure, customs, skills and regulations. Her view was supported by Christina Wiederer (2018), Economist with the World Bank Group's Macroeconomics, Trade & Investment Global Practice who chipped in more on the concept of Good Logistics. To her, Good Logistics is becoming more important due to the high dispersion of international trade through global value chains. Though these assertions show a great deal of contributions in upgrading the face of logistics in the developing world to an extent, the process will still encounter great limitations without any technological integration to cement the entirety of the process. The revolution of logistics in developing economies will come to limelight only after initiating outstanding technological innovations in the operations.

Research results and discussions

From oral, written and to practically demonstrated proofs of increased efficiency after technological integration in different business operations, it is thus no news that technology is the way forward for logistics in developing economies. Speed and innovation are important components of any business operations in today's competitive corporate environment. Any firm that ignores the relevance of current information technology will find it difficult to compete in today's marketplaces because its business operations will be inefficient and unproductive. The transfer of resources, information, and commodities from one site to another is controlled by integrated logistics operations, a business management technique. In integrated logistics operations, smart technologies such as the Internet of Things (IoT), wearable technology, robots, and automation enable accurate, faster, and high-quality items to be delivered to customers safely. Inventory monitoring, improved transparency, resolving disputes, and invoicing and payments are all aided by using Block chain technology in integrated logistics (Alan Muralidharan, 2021). Where several industries are still struggling to overcome the post-pandemic effects, there are a few industries that took the opportunity to adopt these modern technologies at a large scale. One of them is the logistics and supply chain industry. Data from Statista shows that AI solutions in the supply chain market have resulted in better inventory management, smart manufacturing, dynamic logistic systems, and real-time delivery controls.

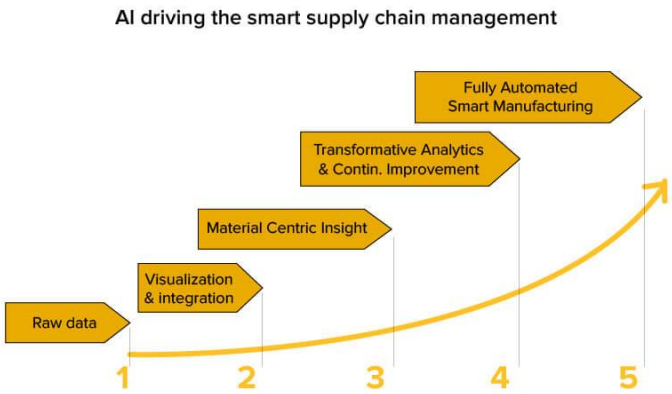

Fig. 3: Optimizing artificial intelligence on supply chain
Source: AppInventiv, (2015).

The above chart displays an upward trend movement of the supply chain, based on the impact of AI integration. Thus, technological integration is important and crucial for improved performance in the logistics sector in developing economies. A number of enlisted points below supports this assertion:

- One of the main benefits of integrating information technology into logistics is increased efficiency. With the use of technology, logistics companies are able to automate many processes such as order processing times, reduced errors and improved accuracy.

- Also, it can be used to track shipments and to provide real time updates to customers, thus enhancing positive customer experience.
- Another major benefit of integrating technology into logistics is reduction of cost. The automation of many processes leads to reduced costs, ranging from labour, paper and printing and other material costs.
- Technology can also be used as a means of route optimization, which reduces transportation costs and improves delivery process.
- The use of technology in logistics operations can possibly lead to increased inventory visibility, thus helping to improve inventory management and also reduce the need for safety stock

Despite the numerous benefits that can arise as a result of technological integration in the logistics process of developing economies, there may be some challenges which may accrue. It should be stressed here that most logistics firms in these areas are almost becoming comfortable with the manual modes of operations, and switching to automated systems may pose some challenges to them. Some of these challenges may include:

- The obvious lack of expertise is the major challenge. Many logistics firms in developing economies lack the expertise needed to effectively implement and use technology in their operations. This can lead to issued related to implementation, maintenance and support in the long run.
- Another challenge could be the low level of investment and poor infrastructural facilities needed to support the use of technology in logistics. Some of these facilities include access to reliable electricity, poor internet connection, the necessary hardware and software systems to enable full functionality of technologies integrated.
- The will to switch and adapt to the new systems is also contributing factor. There could be possibilities of conservatism, where some key players may be too comfortable with the manual way of things and will not see any need of switching to automated systems. Such reluctance may arise as a result of outright rejection, comparing costs involved or trying to cover certain malpractices which may be uncovered if automated systems are integrated.
- Another challenge could be the aspect of standardization. According to the Oxford dictionary, it refers to the process of adjusting things to conform to established standards. It is obvious that most logistics firms in developing economies are not standardized due to their fragmented nature, making it difficult to effectively implement technology in their operations. Compatibility issues may arise, limiting the ability of the company to collaborate.

To unravel these challenges, the following possibilities are suggested:

- Key players in this sector should undergo training in software management and application, in order to better understand the management and maintenance of the software system put in place. This training will provide them with the knowledge and skills necessary to manage the software effectively.
- To unravel the challenge of low investment and poor infrastructure, the firms could borrow from banks and invest in their business. With knowledge acquired from training, sufficient funds will be required to support the required infrastructure needed to withstand the software system to be implemented.
- Serious sensitization will be needed to unravel the conservative idea in which some of the key players may be imbibed into. They should be made to understand the massive opportunities they are already missing because of their modes of operations, demonstrating how others who have gone automated are doing better off. Such sensitization should be accompanied with video and pictorial displays for demonstration purposes.
- The key players should be shown on how to properly structure their businesses so as to enable smooth integration of software systems. There should be conformity between the system and organizational structure.

Conclusion

The integration of information technology into logistics has numerous benefits, ranging from increased efficiency, lowered costs, etc. However, developing countries face significant challenges in implementing these technologies, such as poor infrastructure, lack of expertise, etc. But despite these shortcomings, strategies are gradually being put in place to ensure that the integration process should be smooth and void of altercations. There are a growing number of training institutions who have been developing training programs on information technology and other computer technology related programs, geared towards the training of personnel concerned and its application in business logistics and also the sensitization on the importance of technological integration in logistics operations. Also, most of the developing economies are gradually making significant investments in information technology in order to enhance their competitiveness and to meet the growing demands of their customers in the logistics domain. As technology continues to evolve, it is likely that these investments will continue to payoff and this will also create the need to invest further on training in technology in order to keep the pace of what technological evolution will bring in terms of automation and its benefits in logistics in the nearest future.

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