IMPACT OF DIGITAL TECHNOLOGIES AND TRANSPORT MANAGEMENT SYSTEMS ON OPERATIONAL EFFICIENCY IN BUSINESS LOGISTICS

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Abstract

In this global economy, the sector of logistics has been the one to experience a significant growth in efficiency and a transformation by the increasing integration of tech and digital competency at an operational level of processes. Especially the companies which work on the ground level of logistical operations and businesses- they are increasingly adapting to digital and technological solutions which are innovative and sustainable in ways. These solution help companies efficiently plan transportation, swift and simple order generation, dispatching and tracking, coordination between employees, customer management control, order management etc. This study aims to highlight and identify how digital tools and technological innovation has impacted operational efficiency and has cut down manual labour hours with zero to minimal scope of error in business logistics. Qualitative research methods are applied in this study including scientific article analysis and professional experience in the field of business logistics especially in the operational side of this business. Attention to transport management systems, order processing from dispatching to tracking, integrated platforms for seamless communication within operational processes and other systems which add value on the integration itself will be analyzed in this article. The research results and findings have come to show that digital and technological advancement and integration in logistical business processes have proved significant reduction in employee working hours, increased accuracy in transport planning for better results, better coordination between process holding managing within logistical processes and more efficient overall operations. The article concludes by suggesting the adaption and implementation of such solutions which are tech and digitally wired- they add in value and comprehend towards an improved operational efficiency with lesser risks of operational errors with better and flexible management between operational processes.

Keywords: operational efficiency, logistics, transport management systems, dispatching, digitalization, technological innovation, seamless communication

Introduction

The transformation logistics sector has experienced in the last few years, have been several just in the last decade as many companies have widely adopted digital and tech solutions for optimizing the quality of their service and operational efficiency with seamless communication. The global logistics and supply chain community has become even more complex with the increasing international trade and consumer expectations and consumption and with every growing need comes faster delivery and door-to-door services. This resulted in logistical services providers and companies to constantly be on top of current trends in tech and digital advancements in terms of improving their operational efficiency to stay competitive and in the business with other companies in the market.

Digitalization and technological advancement have been the key operator for increasing efficiency in logistical management roles and operations. Since most of logistical groundwork can be digital and optimized better with correct each, systems such as transport management systems also knows as TMS allows users to automate order delivery and processing- which has shown to significantly reduce manual working hours with less to minimal manual interventions. Rightly pointed out by Christopher (2016), with modern logistical management getting increasingly dependent on digital solution partners, it also allows companies to manage and coordinate activities within transportation processes which helps in dispatching, tracking, monitoring shipments with real time info and improving visibility within supply chain processes. In prospect to that, Rushton et al. (2017) also paid emphasis on digitalizing logistical solutions with the help of tech to improve coordination with different participants and processes of supply chain in order to reduce errors in operations.

From a practical point of view, the sector of logistics and supply chain has seen one the most advancements and major improvements withing the operational sector in the last decade itself. Logistical specialists and supply chain professionals have noticed ethical improvements in this time as well, that digitalizing processes and technological tools have simplified processes like order allocations, revision and distribution, seamless communication within internal operators, duplication of instructions, coordination with drivers, tracking and dispatching team and with delivery execution has played a very big role. Without digital tools and technological advancement in such tools, these processes would be time consuming and take over a lot of manuals working hours than now which can performed through integrated systems which accumulate more reliable and faster communication and improves accuracy in planning (Christopher, 2016; Ivanov et al., 2021).

This research draws light upon the relevance of improving and growing with the trends of digitalization and how important innovation withing the logistical sector is for technology and operational efficiency. Not only to coordinate operations but also to understand how digital tools and technological innovations can positively influence logistical business and their processes efficiency. Previously with more human error index, long and strenuous working hours are now being performed by integrated tools for better and efficient working and communication with almost zero to less error rate and accurate transportation planning (Hofmann, Rüsch, 2017).

Even though, with an increase of usage and adaptability of digitising and being equipped to technological innovations in logistics, there still falls a gap between better or clear understanding of how specifically these digital and technological tools (for example: Transport Management System or internal communication channels) can have a direct influence on operational coordination, efficiency and reduce manual hours and errors made in day-to-day logistical operations (Queiroz, 2021).

The research problem of this study is narrowed down to define the lack of understanding creating a gap between understanding how specific digital tools can help logistical performance and integrate them in everyday logistical operations to influence efficiency, reduce error margins, and improve coordination.

This **research aims** to highlight and identify how digital tools and technological innovation has impacted operational efficiency and has cut down manual labour hours with zero to minimal scope of error in business logistics.

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

1. To analyse the impact of technological innovation and digital tools that can change transport management systems in respect to operational efficiency in logistical process.
2. To comparatively analyse theoretical and practical insights on integrating digital tools in logistical processes and relying on digital solutions.
3. To disclose how technological innovation and digital tools can improve efficiency, coordination between logistical actors, communications and reduce errors in logistics.

Research object and methods

The research object and method are the application and usage of digital tools and innovative technological usage in business and logistical processes which comes to influence the transportation and its operations efficiency within the company.

To analyse and evaluate terms of this topic, qualitative research methods have been used. This study is solely based on analysis and evaluation of scientific literature on logistical efficiency and involvement of digital tools and technological innovations to strengthen such processes in logistical management systems. With the help of scientific literature analysis, it identifies perspectives that are based on theory and trends that have been followed in this sector that tends to influence operational efficiency and processes in companies.

Scientific research articles and publications which have sheer focus on logistical operations and management with digitalization in their supply chain processes were examined and to understand how technological advancements and innovations can contribute to the same and improves such operations with their integration. This study is based on scientific literature analysis, qualitative research methods and practical professional experience in logistical operations. The selection criteria of scientific literature were some pre- reviews articles and journals of digitising the logistical industry. Some literature and publications were also focussing on digitizing the whole industry mainly around the period between 2016-2023. Additionally, with literature and scientific publications analysis, this study also includes professional observations that have come with practical experience of working within logistical operations. Professional experience did not only add valuable inputs but could also correlate practical experience and understanding with scientific articles and their observations regarding technological innovations and its usage in everyday activities such as transport order management, transport planning, dispatching and coordination within logistical partners in the process until delivery execution. The scope of this study also extends towards supply chain management, transport management system (TMS) and digitalizing logistics platforms. The comparison procedure however comprised of recognizing and identifying major digital technologies and assessing their direct impact on logistical operations, coordination, and communication by minimizing operational errors. It was further compared with scientific and literature findings practical observation experience.

Research results and discussion

The research result and analysis of logistical innovations shows growth and developments in the digital and technological tools being used to improve the efficiency of logistical processes has significantly and rapidly observed. Only in the last decade, companies who are logistics service provider or in supply chain business models. They have increasingly integrated their work into using newer digital and technological tools in order to support their day- to- day activities within the sector such as order planning, order dispatching, order tracking route optimization and communication within operational teams. In Ivanov et al. (2021)’s work, the transformation in the supply chain industry has helped these organizations to be able to improve visibility across operations and respond to errors more effectively and more efficiently to avoid disruption in their service.

One such very noticeable improvement and ground-breaking integration was that of transport management systems (TMS) in everyday work of logistical operations. TMS allows coordinators in logistics to manage transportation activities and orders within a centralized digital tool where transport orders can be assigned, dispatched, and tracked in real time. In Rushton et al. (2017), the use of systems that allows such modification and real time tracking was highlighted to cut down manual working hours of employees significantly and improve transport planning accuracy and reliability.

In some studies (Ivanov et al., 2021; or Hofmann and Rusch, 2017) it has highlighted the direct impacts and befits of digitalizing logistical processes- but they generally look upon challenges that are faced practically such as integration of the tool with company systems, or a tool so complex it is hard for employee adaption. From professional experience in logistical operations, even though it noted that digital tools improve communication, and coordination within the process but its effectives in directly co-related on the competency of the user using it and its reliability on the company system. Contrasting to the opinion of almost zero error rates, in practical and real-world experience; the disruption caused by data imprecisions comes under system limitations. Thus, technological innovation and adaption of digital tools should not and cannot be viewed as a complete replacement of human involvement rather than just a support mechanism in day-to-day operations.

From a perspective that comes from practical experience, indeed technological systems have simplified a lot of different day-to-day tasks in logistical processes. From professionals, it can quickly catch on the ongoing trends and revise transport orders, which some step in the way change or needs modification or instructions need to be duplicated for others responsible until the delivery is executed. This function enables specialists to have a clear understanding of information regarding transport details, route optimization and other requirements regarding delivery.

One another such advantage of technological innovation in logistical processes is the improvement and seamless regard of communication within specialist of different operations in the process. Earlier, communication between different specialists in logistical operations such as sales, tracking, dispatchers, and drivers- usually depended on manual circle of communication. In today's digital tech world, these integrated tools allow communication within the operation team to be seamless with exchange of important information faster and to monitor such changes in real time tracking even easier. This is also mentioned by Hofmann and Rush (2017) in their study that digital platforms do significantly add value and improves the transparency in logistical operations and its communication which in return enables logistics professionals to have a quick reaction time to any operations disruption that might occur and make the margin of human error very low.

In totality, these observations and results suggest that digital tools and technological innovations has played a critical role in transforming modern logistical operations and improving their work efficiency and reducing the margin of human errors by enabling a way flexible transport management operation.

With a practical sense of view, the implementation of such digital systems has indeed made everyday day- to- day logistical task for specialists way easier and simple. Logistics specialists can revise, redo, mark and modify any ongoing transport order with much ease and communication about changes to other actors within the operation easily. These functions have reduced manual work hours and minimize the margin of human work error.

Moreover, technological innovations and digital systems have increasingly improved the visibility and transparency within transportation activities which allows actors on each step of the operations to be able to monitor and respond at a quicker time rate than before- which reduces or minimizes to the lowest of operational disruptions. This is a sort of capability that is foremost important in logistical operations where problems like route disruption, delays, changes, and operational adjustments should be addressed and reacted to promptly.

Model structure that shows integrations of technological innovation in a logistical process is given in Fig. 1.

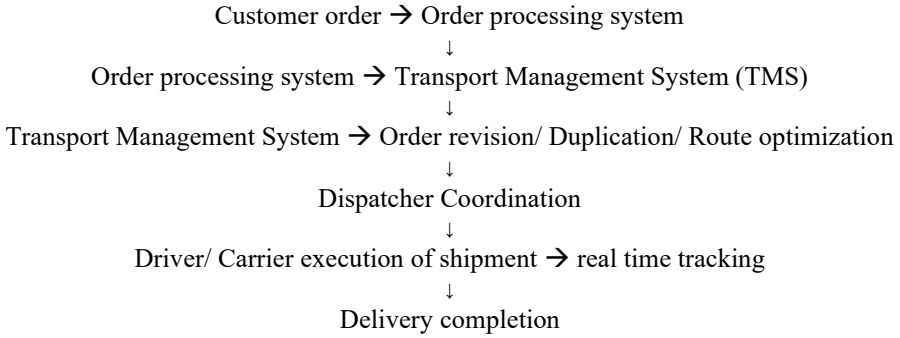

Fig. 1. Integration of technological innovation in logistics operational processes (created by the author based on Christopher, 2016; Ivanov et al., 2021).

The figure above explains a conceptual model that is structured in a way to represent how digital tools are applied and integrated in logistical operations. Contrasting to a lesser factual model, this model highlights how centrally systematic roles of digital tools such as transport management system can enable real- time communication between actors involved in the process, if any modifications are needed in an ongoing order, and improved coordinated amongst internal actors at each stage (Rushton et al., 2017). This model also adds a perspective towards demonstrating how the

integration of digital tools and technological innovations can change and transform the operational efficiency of logistical processes that are interconnected in a system.

This integrations of technological innovation and digital tools allow logistical operations to preform smoothly as logistical coordinators are enabled to now manage shipments and transport operations though a centralized digital platform. As in the figure above, its shows how a generic logistical process takes place. In modern logistics, the systems are enabled to fast revisions of transport orders, instructions that may need to be duplicated along with transparent and seamless instructions and communications that's needed within the actors of logistical operations that are responsible for a smooth delivery execution (Hofmann, Rüsch, 2017).

The results and findings of this report do not only suggest that technological innovations improve logistical processes and its operational efficiency, but also enhances the process of decision making and its capabilities within logistics managers involved in the process. The access to all of this in real- time operations uplift the managers to plan and coordinate logistical activities for effectively and respond faster under the ever-changing supply chain condition (Ivanov et al., 2021). In addition, results validate the fact of integrations of technological advancements, innovations and digital tools within logistical operations contribute to a better understanding and improved efficiency and transparent communications with a more reliable and better source of transportation processes.

Conclusions

The results and findings of this study concludes that the implementations of technological innovation and digital logistics tools have significantly improved coordination within logistical professionals and specialists involved in the process, such as dispatchers, trackers, sales, transport partners, customer, clients, and drivers. The study can be concluded as the following suggests:

1. This study confirms that application of digital and technological tools has significantly reduced manual workload and has minimized operation errors – but not eliminated them completely.
2. Digital and technological tools enhance communication and coordination by enabling real time flow of information and exchange which increases transparency and visibility in processes.
3. Finings of this study indicate that implementation of such tool in logistical operations reduces error margin; however, it depends directly on its correct usage and integration.
4. Practical insights can further strengthen and fixate on theoretical findings of this study and prove digitalization simplifies operations in logistics.

Additionally, through practical experience and consequent observation in the last six years in this field, such told demonstrate that it allows logistical actors to revise orders, chains and procedures more efficiently, and duplicates instructions or task for following up and when requires and also to transparently communicate through different actors within the chain of procedure until delivery execution.

References

1. Christopher, M. (2016). *Logistics and supply chain management* (5th ed.). Pearson Education.
2. Hofmann, E., & Rüsch, M. (2017). Industry 4.0 and the current status as well as future prospects on logistics. *Computers in Industry, 89*, 23–34.
3. Ivanov, D., Dolgui, A., & Sokolov, B. (2021). The impact of digital technology and Industry 4.0 on the ripple effect and supply chain risk analytics. *International Journal of Production Research, 59*(11), 3538–3553.
4. Rushton, A., Croucher, P., & Baker, P. (2017). *The handbook of logistics and distribution management* (6th ed.). Kogan Page.
5. Queiroz, M. M., Fosso Wamba, S., Machado, M. C., & Telles, R. (2021). *Smart production systems drivers for business process management improvement: An integrative framework.* Business Process Management Journal, 27(2), 1–20.