



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

The Benefits and Challenges of Digital Transformation of Logistics Systems

By
Carys Wooldridge

Abstract

The purpose of the literature review is to provide context of digitalisation within the global market of logistics. It will look at scholarly articles, conference presentations and published books within the supply chain to provide evidence of the benefits and challenges faced, using a case study as a real time example.

The concept of digital transformation has gathered much attention in recent literature, exploring the benefits and challenges faced alongside the implications for the global supply chain.

The review will look at the definition of digital transformation of logistic systems, the benefits and challenges faced during the transformation.

Table of Contents

Abstract

1.0 Introduction

2.0 Benefits of Digital Transformation in Logistics Systems

2.1 Enhanced Efficiency and Visibility

2.2 Reduction of Costs

2.3 Improved Customer Service

2.4 Environmental Sustainability

2.5 Real-time Problem solving

3.0 Challenges of Digital Transformation in Logistics Systems

3.1 Cyber security

3.2 Requirements of skilled workforce

3.3 Investment

3.4 Company Morale

4.0 DHL Case Study

4.1 Company Overview

4.2 Digital Transformation Initiatives

4.3 Challenges Faced

5.0 Conclusion

6.0 References

1.0 Introduction

- In an era defined by rapid technological advancements and interconnected systems, the logistics industry is undergoing a significant transformation. Digital transformation of logistic systems refers to the comprehensive and strategic integration of digital technologies and data driven solutions, with the goal of enhancing efficiency, effectiveness, and visibility. This transformation involves the integration of innovative digital technologies and data driven processes, promising to reshape the way goods are transported, monitored, and managed. (Mangan et al.,2020)
- Technology has always played a significant role in business operations ever since humankind established a stable society, and one area of research that has stimulated the interests of scholars has been the role played by digitalisation on supply chain management (Umar.,2023)
- Branded as the fourth industrial revolution digitalisation is precited to holistically transform logistics and supply chain management with sensors placed in everything, networks created everywhere, anything becoming automated and everything getting analysed. (Sullivan & Kern, 2021)
- This literature review will explore the benefits and challenges of digitalisation transformation in logistic systems. Readers will have a comprehensive understanding of the dynamics involved and will be able to make an informed decision regarding the integration of digital technologies.

2.0 Benefits of Digital Transformation in Logistics Systems

2.1 Enhanced Efficiency and Visibility

Several studies emphasised the role of real-time tracking and monitoring systems enhancing the current operational systems within logistics. The ability to enhance operational excellence by integrating technologies allows a proactive, transformative approach. (Mangan,et al. 2020). Real-time tracking has transformed the logistical experience throughout the supply chain process right to the end customer. (Christopher & Peck.,2004).

2.2 Reduction in Costs

Automation of processes within logistic systems appears as a cost-reduction strategy. Automation of tasks such as order processing and inventory management can significantly reduce labour costs. (Mangan et al., 2020) As well as real-time costs of shipping and inventory allow companies to reduce freight costs using real-time data and supply a competitive edge and this saving can then be passed on to end customer. By reducing the costs of operations it can boost profitability and increase revenue after first investment. (Sullivan & Kern 2021)

Higher-maturity companies reported industry-leading revenue growth and profit margins

Percentage of respondents reporting metrics significantly above industry average, by level of digital maturity



Note: Comparisons to industry averages were self-reported by the respondents.

Source: Deloitte analysis.

Figure 1: Uncovering the connection between digital maturity and financial performance. Appinventiv (2023)

2.3 Improved Customer Service

Streamlining processes provides customers with real-time data that they can use to manage inventory and manufacturing processes. By supplying accurate delivery estimates and real-time tracking, customer service will be improved, leading to higher levels of trust and retention of customers in both e-commerce and business to business. (Appian ,2023).

2.4 Environmental Sustainability

Digitalisation allows companies to contribute to environmental sustainability. By optimising freight routes, reducing empty miles and managing inventory efficiently and effectively, companies can minimise their carbon footprint (Richnak, 2022). Automation of processes can increase environmental safety. (Mangan, Et al 2020)

2.5 Real-time problem solving

Trackable processes allow companies to be proactive when it comes to foreseeing issues and combating them in real time. An example of this is digitalising the verification documentation for customs, this gives a head start to foresee any issues and shipments are not held while documentation is provided.(Alesksandr,2021)

3.0 Challenges of Digital Transformation within logistics

3.1 Cyber security

With the integration of digital systems within logistics, companies are exposed and at risk to cybersecurity threats. The storage and transmission of supply chain data holds sensitive information that is vulnerable to cyber-attacks. When implementing any form of digitalisation, cyber security will be one of the biggest ongoing costs for the company and is a crucial aspect of the digitilisation process. (Sullivan & Kern 2021)

3.2 Requirements of Skilled Workforce

Digital transformation of any process within supply chain requires a skilled workforce to not only manage but support the technology. This will either require training costs for the existing workforce or employing a workforce with digital expertise. There is a shortage of skilled workers in digital areas such as data analytics, artificial intelligence, and cybersecurity. This is a key factor when looking at timescales and feasibility of any process change driven by technological advancement. (Patrik,2022)

3.3 Investment

Spending on digital transformation technologies and services
worldwide from 2021 to 2026 (in trillion U.S. dollars)

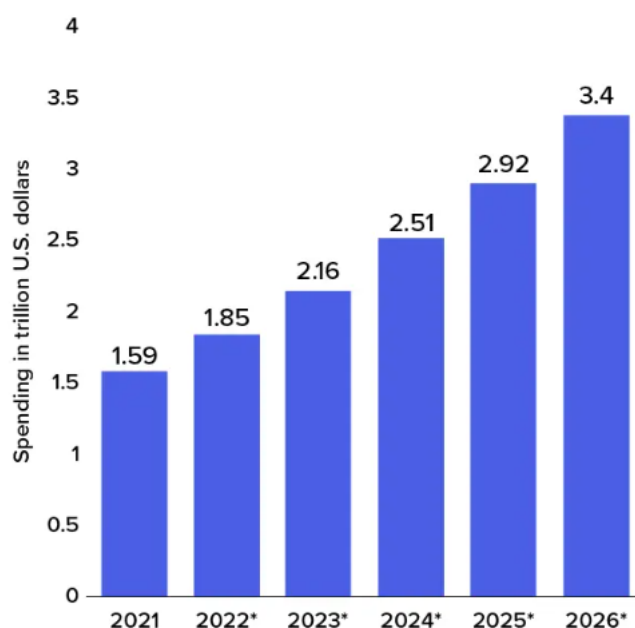


Figure 2: How Digital Transformation Can Reduce our Business Costs (Kabashkin,2019)

Adopting digital technologies involves a significant financial investment. This includes the cost of buying technology, integrating new systems, training workforce and cybersecurity measures. Financial commitment is a critical consideration for companies considering digitilising their processes. The global spend for digitilisation is predicted to reach 3.4 trillion US dollars by 2026. (Appian,2023)

3.4 Company Morale

With any new implementation it can have a knock-on effect on employees' morale. Employees and management may be reluctant to adapt and integrate new processes and systems into their current roles. It is crucial that planning, execution, and resources are in place to ensure a smooth transition of a complex nature. (Farivar., et al, 2020)

4.0 DHL Case Study

4.1 Company Overview

DHL is one of the world's largest logistic companies and has undergone a significant digital overhaul to enhance their operations and compete in a fast-paced ever-changing industry.

4.2 DHL Digitalised Indicatives

1. **Smart Warehousing:** DHL integrated automation and smart technologies for repetitive and physical tasks to free up their workforce for more complex, value-adding duties. It allows optimisation of inventory management and accuracy of picking and packing orders. This in turn reduces time finding packages and reduces the risk of losing shipments.
2. **Route Optimisation:** DHL used data analytics and machine learning algorithms to optimise delivery routes. This increased the speed of deliveries, lowered fuel consumption and decreased the company's carbon footprint.
3. **Customer Facing Digital Solutions:** DHL introduced user-friendly digital platforms and mobile apps that allow customers to easily book shipments, track packages and manage their logistics online. These implementations were put in place to enhance customer experience and supply real-time visibility of shipments.
4. **Investment:** Deutsche Post DHL group- in line with their 2025 global strategy is investing €2 billion on digital transformation projects to improve the experience of customers, employees.
5. **E-commerce Solutions:** DHL recognised the growth of e-commerce and developed specialised e-commerce logistic solutions for their customers. They streamlined the handling of online orders, provided an efficient last minute delivery service along with a seamless returns process for their e-commerce customers.
6. **Data Analytics:** DHL harnessed the power of big data analytics to gain insights into operational performance. (DHL,2023)

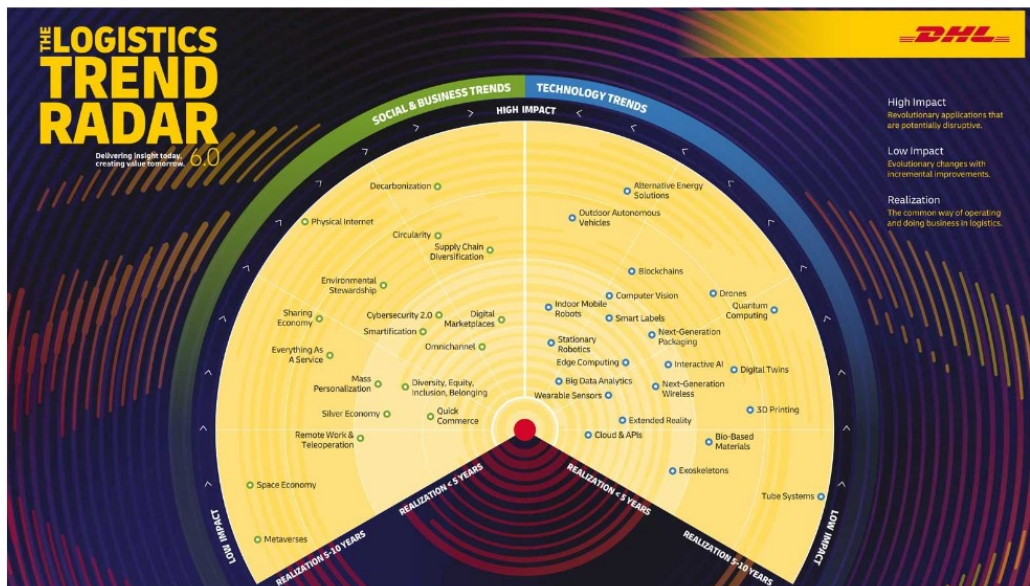


Figure 3: DHL Innovation Centres Logistical Trends (DHL,2023)

4.3 Challenges faced

1. **Automation:** comes with its own challenges. With highly specialised material, parts and ability are extremely difficult to come by. Finding skilled workforce to run the machinery and help integrate the automation into existing systems was extremely difficult for DHL. By taking the risks to fully automate warehouses it put an elevated risk of down time if the machinery broke, and new parts required.
2. **AI technology:** By moving customer service to an online chat system, customers can experience less satisfactory outcomes than when dealing with a skilled employee. When they first introduced the online portals, it caused many issues for customers being unable to log in to their accounts, track shipments and caused major disruptions throughout the network. Even though these challenges have been overcome. It did cause some customers to move away from DHL who are one of the most expensive freight carriers and with this comes a high standard expected from customers.
3. **Training:** When DHL started the innovation transformation, it required vast training and recruitment. Not only for current employees but also existing customers. This delayed progress in certain geographical areas of the business.
4. **Geographical Location:** As with all data trends and reviews, location plays an important part. For example, in a more advanced tech driven country such as Germany, DHL's initiatives were successfully rolled out and the predicted effectiveness and benefits from the digitalisation were seen by customers and stakeholders alike. However, in countries less digitally rich, progress has been slower and unforeseen challenges have occurred. For example, in Poland local areas differ vastly throughout the country. So, a one process fits all cannot be used and individual processes must be put in place to allow for the digitalised initiatives to have a positive effect.

5.0 Conclusion

For logistic systems to respond flexibly to dynamic changes in the globalised international environment, it is essential they become an agile, flexible, and secure entity. This can be achieved by implementing digital technologies within logistics. (Patrik,2022)

Digitalisation of logistics systems has appeared as a transformative force within the industry, offering substantial benefits to companies willing to embrace the change. In this literature review, we explored the benefits and challenges of digital transformation, including a case study of leading logistics company DHL and how they have implemented digital transformation in their processes and the benefits that they have provided.

Implementing digitalisation can yield many positive outcomes and advantages for companies. Through real-time tracking, robotics, sensors and advanced data analytics, logistic companies can optimise routes, reduce costs, and improve inventory management. This will translate to streamlined operations and processes with enhanced quality of customer service.

However, with any transformation or new process it is vital to acknowledge the challenges that go with them. Cyber security, data protection, skilled workforce, financial investment, and resistance to change are all significant hurdles that companies will face and must address. These challenges require a strategic and comprehensive approach, encompassing robust cyber security measures, investment in workforce and a robust management change system.

As the logistics industry evolves, companies who have capitalised on digital transformation have a competitive edge in the industry.

In conclusion this literature review highlights the multifaceted nature of digital transformation in logistic systems. While the benefits are extensive and attractive a lot of the literature material available were using examples ascertaining to larger companies. It would be beneficial to look at the impact of the highlighted benefits and challenges within the review and apply these to the size and geographical location of companies. This will allow a full review on the benefits and challenges of digitalisation.

References

- Aleksandr,K., Smirnova,A., Zaychenko,I., Yevheni,S., Kalkowska,J. (2021) *Logistics digital transformation model based on a platform solution*, 2(258). Available online: <https://www.proquest.com/docview/2577545701?accountid=130472&parentSessionId=EeHMRmZZjR3eTzSA2ZCS%2Fb8yw7hUXMSws4JtC1UK3W4%3D&pq-origsite=primo> (Accessed on the 8th of November 2023)
- Appian, (2023) *Supply Chain Outlook:Expert Advice on Thriving in Times of Change*. Availableonline :https://www.appian.com/uploads/e-book-supply-chain-outlook_EN.pdf. (Accessed on the 28th of October 2023)
- Appinventiv,(2023) *Benefits of Digital Transformation that contribute to cost reduction*. Availableonline: <https://appinventiv.com/blog/digital-transformation-to-reduce-business-cost/> (Accessedn on 28th October 2023)
- Christopher,M.,& Peck,H.(2004) *Building the resilient supply chain*. *The international Journal of Logistics Management*, 15(2)
- DHL (2023). *How Digitalization has transformed DHL Express' operations*. Available at :www.dhl.com/discover/en-global/about-dhl/reports-and-press-releases/digitilization-has-transformed-operations. (Accessed on the 28th of October 2023)
- Farivar,F., & Richardson,R.(2020) *Workplace digitalisation and work-nonwork satisfaction: the role of spillover social media*. Available at: www.tandfonline.com. (Accessed 8th of November 2023)
- Mangan., Lalwani., & Butcher,T.(2020). *Global Logistics and Supply Chain Management*. 4(4)
- Kabashkin,I., Yatskive,I., Petrovskis, (2019). *Reliability and Statistics in Transportation and Communication*. Available online: <https://link.springer.com/book/10.1007/978-3-030-44610-9>. (Accessed 11th of November 2023)
- Patrik,R., (2022) *Current Trend of Industry 4.0 in Logistics and Transformation of Logistics Processes Using Digital Technologies: An empirical Study in the Slovak Republic*. 3(6). Available online: <https://www.proquest.com>(Accessed on the 8th November2023)
- Richnak,, P. (2022) *Current Trend of industry 4.0 in Logistics and Transformation of Logistic Processes Using Digital Technologies: An Empirical Study in the Slovak Republic*.2(12)
- Sullivan.M,& Kern,J.(2021) *The Digital Transformation of Logistics demystifying impacts of the fourth industrial revolution*, 24(10)