

# The Impacts of Digitisation on Freight Forwarders within the Shipping Industry

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## ABSTRACT

Freight forwarders within the shipping industry have been noted as being conservative in embracing and using digital tools and lag behind other industries in their quest for digital transformation. The study aims to examine the impacts of digitization by understanding and analysing employees' levels of agreement regarding their knowledge of technologies and the associated barriers/ challenges and drivers/ benefits of digitisation. An online survey was used to collect data from 120 participants from container freight forwarders and the survey consisted of four main sections, the results of which were analysed through statistical software to test their validity and reliability. Through this research, we were able to confirm the high level of support and knowledge that employees of container freight forwarders hold regarding digitisation. Areas of key focus were determined, such as strong management required and investment in training and skills to make the digital transformation and the company's efforts a success. To the best of our knowledge, this study is the first of its kind to examine specific container freight forwarders' opinions on the impacts of digitisation. The results will benefit freight forwarders and other stakeholders within the shipping industry who want to be aware of the challenges and the beneficial impacts.

**Keywords:** *barriers, digitisation, digital transformation, drivers, freight forwarders, knowledge*

## 1. INTRODUCTION

### 1.1 Background of the Study

For the past few years, working within the shipping industry has been a turbulent and rapidly evolving journey. Navigating the logistics of shipping containers around the world has felt like a continued voyage sailing on uncharted waters, with a lack of visibility regarding lead and transit times, port congestions, vessel capacity, and overall global schedule reliability. Containers dominate the transport market with 90% of world trade carried by the international shipping industry (Babica, Sceulovs, and Rustenova, 2020), demonstrating its immense importance in facilitating global trade. Ahmed and Rios described this as the glue connecting actors across global supply networks (Ahmed and Rios, 2022). Geopolitical conflicts and the lingering impacts of COVID-19 have alerted the industry to the need for resilience and adaptability in rapidly changing circumstances (Trade Finance Global, 2023). However, even amongst these

changing and challenging times, the industries that are thriving are those that are embracing the power of technology through digitisation. Despite the immense importance of digitization, the shipping industry is often characterized as conservative, making it challenging to identify and embrace innovative trends (Koukaki & Tei, 2020). As customer expectations continue to rise, there is an accelerated need for the shipping industry to change from its manual, time-laden processes to dynamic and automated platforms. Digitisation is the ability to adapt and improve digital capabilities, which enables organisations to overcome uncertainties and respond to business demands effectively. It is technology adoption coupled with fundamental "change" that occurs in organisational direction, strategy, and business processes (Alsufyani and Gill, 2022).

### 1.2 Statement of the Research Problem

The shipping industry is referred to as a conservative industry, slow to change by people both within and outside the industry (Marine Information Solutions, 2020). What are the reasons for this? The problem to be explored is evaluating if there is a lack of understanding and utilisation of digital technologies among freight forwarders within the shipping industry. The industry, despite keeping economies and businesses afloat, is not characterised as a forerunner in digitisation (Raza *et al.*, 2022). Discovering and evaluating the obstacles and challenges associated with digitisation is key to understanding how they can be overcome. Based on a day-to-day experience at a company that ships hundreds of containers globally monthly, there is a lack of digital understanding and maturity with new technologies available, which could improve and enhance the operations and strategies. How can freight forwarders who play a pivotal role in the shipping industry overcome barriers to enable a change in the way of delivering business by implementing digital technologies? Freight forwarders are the link between customers and shipping carriers, and they hold the most significant scope for influence. Are they the drivers for technological advancement, or are they being driven by other stakeholders?

The sheer spectrum and size of the shipping industry create complexities of dispersal and complicated supply chains, leading to a lack of collaboration and information sharing. The UK Parliament described the shipping industry as competitive and fragmented (UK Parliament, 2023). Most stakeholders work independently and are poorly connected to the end-to-end supply chain (Voorspuij and Becha, 2020). Can digitisation increase transparency in the shipping supply chain? To stay afloat and profitable, the shipping industry

calls for proactive measures and real-time reactionary action (Fieldbase Services Limited, 2023).

### 1.3 Research Questions

Technology is constantly and rapidly changing, so wider attention and understanding are needed to know how improvements can be made to the shipping industry. There is limited literature on freight forwarders' views, and most research focuses on only the shipping lines or end customers. This research considers a broader multi-dimensional approach to ensure feedback from those at the centre of the supply chain. This should add value and input required for complex supply chains and for the implementation of digitisation to be successful and benefit all stakeholders. Even with caution and slow progression to digitise, the shipping industry is starting to transition into a new operations paradigm, often termed as shipping in the 'era of digitisation' (Ichimura *et al.*, 2023). Wang and Sarks (2021) recommended in-depth studies examining specific digital advances in freight transport and logistics would enrich the digitalisation and digital transformation literature. Also, Heinbach *et al.* (2022) recommend further research related to analyze details on digital freight services to enable connected transport management to understand both barriers and opportunities for business applications. Furthermore, Herold and Fahimnia (2023) highlight that future studies can clarify how the emergence of digital freight forwarders affects existing business models in the logistics sector, and in what ways the new digital initiatives can affect the traditional freight forwarders. With this as a driver, we will explore the impacts of key digitisation technologies on freight forwarders in the shipping industry. Industry 4.0 has meant companies in the shipping industry must understand and appreciate the benefits of new technologies; otherwise, they are at risk of being left behind.

To explore the impact of digitisation on freight forwarders within the shipping industry, this research will examine several critical dimensions. First, it will assess the current state of technology adoption among freight forwarding companies. Second, it will evaluate the level of awareness and understanding that employees within these companies have regarding digital technologies. Finally, the research will investigate whether these employees recognize the potential advantages and challenges that digitisation may present. To achieve these objectives, the study will be guided by the following three key research questions:

RQ1: How much knowledge of digitisation and its associated technologies is there among freight forwarders in the shipping industry?

RQ2: What are the main drivers and associated benefits for digitisation?

RQ3: What are the challenges of digitisation and are there strategies for overcoming these to deliver digitisation?

Using these three research questions as an umbrella will enable a further series of questionnaire statements for the chosen methodology approach. The data received back will detail what level of knowledge employees would rate themselves at about digitisation and how digitally mature they consider their companies to be currently. Participants are asked to share their level of agreement or disagreement with whether digitisation can enhance efficiency and transparency and aid in better decision-making. Will digitisation help meet changing customer expectations and

provide automation, bringing better communication and visibility? Will employees share those challenges like cultural unwillingness to change processes and lack of expertise, provide obstacles to digitisation, or are the benefits and opportunities outweighing the barriers? This analysis will lead to understanding the drivers of digital transformation for the rapidly evolving needs of freight forwarders within the shipping industry, in the quest to increase cost and operational efficiencies (Raza *et al.*, 2022).

The structure of this research paper is as follows: Part 2 is the literature review of the subject area. This section includes previous research and articles relating to the key research questions. Part 3 is the methodology of this research, explaining how data will be collected and introducing the questionnaire statements, which come under the umbrella of the main research questions. This part also includes details of the survey administration and details of the chosen participants. Part 4 is the analysis and results of the survey, including the evaluation of the data in the visual format of the findings and statistical tables. Part 5 is the conclusions and recommendations to consider if the research questions can be answered and where further study and research may be required.

## 2. LITERATURE REVIEW

The focus and purpose of this literature review is to synthesise and interpret what already exists in research with regards to the impacts of digitisation on freight forwarders within the shipping industry supply chain. One of the largest shipping carriers, Maersk, has stated that 'Digitisation is shaking up the world of logistics, opening doors to greater visibility, connectivity, and agility' (Maersk, 2023). An understanding of how and why this is happening is crucial. With digitisation moving at an increasing pace, we have chosen to focus on the most recent literature to serve as the current basis for where the shipping industry currently lies in its digital transformation journey. The structure of the literature review is as follows: Section 2.2 covers the role freight forwarders play within the shipping industry supply chain. Section 2.3 looks at these freight forwarders' current knowledge of digitisation and considers current and emerging themes. Section 2.4 looks at digital technologies within Industry 4.0 that freight forwarders can utilise. Section 2.5 is the research framework, which visually displays how this review shows the direction of this methodology approach.

### 2.1 Shipping Industry Supply Chain

The shipping industry comprises key players, including shipowners, ship operators, freight forwarders, terminal operators, and port authorities (Scherrer, 2025). Digitalisation within these players is expected to provide competitive advantages and cut costs, may provide prevention of system failures, reduction of maintenance costs, a decrease of off-hire claims, the accuracy of the information, compliance with maritime regulations, control of security, and availability of data (Plomaritou & Jeropoulos, 2022). Ichimura *et al.* (2022) emphasized that it is intuitively difficult to consider that shipping companies are proceeding with digitalization without collaborating with forwarders. Container freight forwarders play an extensive role across the shipping industry supply chain. Their role is to facilitate the connections and services between the crucial

transportation stages of the supply chain. Their value is generated by taking on complexities such as document and customs generation, along with the physical movement of the goods. Freight forwarders act as a point of contact and service, so shippers do not have to facilitate coordination directly with shipping line carriers. Appreciating the scope of their involvement within the shipping supply chain highlights the significant influence they can have on other stakeholders when it comes to digitisation and the uptake and use of digital technologies. The efficiency and functionality of present-day supply chains are greatly impacted by digital information sharing and communication technologies (Nguyen *et al.*, 2023). The shipping industry has long been regarded as resistant to change, often embracing new technologies only when required to meet regulatory standards or when immediate financial gains are apparent (Janmethakulwat & Thanasopon, 2024). This cautious approach has shaped its development over time (Gkerekos, 2019). Within this literature review, is this concept now being challenged?

There is growing awareness of digitisation concepts that can influence a seamless supply chain by using digital freight platforms, which are positioned as a virtual market for enterprises that use transport services (Ilin *et al.*, 2021). With the goal of everyone in the supply chain to satisfy their customers, moving efforts to a digital supply chain can create simpler, faster, and more transparent processes (Homchant, 2019). In the face of a changing global supply chain, identifying the current role of freight forwarders in the shipping industry supply chain is vital. It is understood that they not only take an active role in the transport process but also encompass several comprehensive activities. In their intermediary role with logistics, they should aim to reduce wasteful operations and additional costs in everyday processes (Skiba and Karaś 2022). With this comes greater pressure to work innovatively to achieve it with the advancements of their service offerings. If freight forwarders lead the way towards digital supply chains with the integration of Industry 4.0 it will encourage multilevel collaboration for lean and agile supply chains within the shipping industry (McDermott *et al.*, 2023).

Freight forwarders manage and facilitate the transport of goods from one destination to another. On many occasions, they do not move the goods themselves; instead, they act as an agent for other transport companies to move them (Freight Filter, 2013). Freight forwarders have been subjected to three years of unprecedented supply chain disruptions (Maersk, 2022). COVID-19 brought about global displacement of containers and decreased vessel schedule reliability. This was followed by the Suez Canal obstruction (Wan *et al.*, 2023) and the war in Ukraine (Ngoc *et al.*, 2022). This has magnified the importance of flexible and resilient supply chains, all involved in being prepared when operations get repeatedly tested to respond effectively. Skiba and Karaś (2022) analysed the changing role of freight forwarders in the face of changing global supply chains. Currently, the freight forwarder is no longer a contractor of just one service but is involved in arranging transportation, managing documentation, handling customs clearance, and tracking shipments across a comprehensive supply chain in an industry that sees dynamic changes in how it brings together clients and suppliers. Freight forwarders are looking for technologies to streamline the entire transport process.

## 2.2 Digitisation within Freight Forwarders

The development of digital technologies has shifted the traditional way of doing business, and many companies might feel pressured to react to digitisation. It is understood that whilst the political, socio-economic and environmental landscapes have been changing, digitisation has enabled freight forwarders to find the sustainability balance between these economic, social, and environmental goals, offering many solutions to overcome technical challenges, improve productivity, accelerate processes, and become more sustainable (Okitasari, Kandpal and Korwatanasajul, 2022). There is a clear understanding that the industry must adapt to compete with cheaper alternatives and competitors. Digitisation is being accepted as the act of incorporating technological advancements to convert operational processes into automated ones, meaning tasks are quicker, more accurate, and often require little or no human intervention (Jin, 2023). Maersk stated that only digitisation that supports simplification and growth will continue to attract investment and inspire other freight forwarders to advance their digitisation (Maersk, 2022). With the global market increasing demand for products in shortened lead time, activities that generate value and efficiency through innovation are being recognised with the application of digital technologies.

Digitisation changes traditional logistics businesses, striving to make transport faster, cheaper, and more predictable (Gruchmann *et al.*, 2020). Sea freight forwarders are always wanting to gain a competitive advantage, and integrating digital technologies can better fulfil customer-specific requirements. Connectivity that comes through digital data sharing will advance significantly and continue to affect how the shipping industry manages information (Aiello, Giallanza and Mascarella, 2020). For freight forwarders, the motivation and objective of using and sharing digital information is that it should create value. Digital data can be generated by installing technologies, but action is needed, and changes in corporate culture translate into decision-making processes. Literature endeavours to explore the question of how prepared companies are. The current implementation level is fragmented and uneven (Aiello, Giallanza, and Mascarella, 2020). Knowledge and awareness of digitisation continue to grow, but there is a significant gap between the current state and the implementation of new digital technology in business models. To create a level playing field for freight forwarders to implement digitisation, a global set of standards and regulations could provide direction and push and support smaller companies into involvement. Policymakers and shipping international organisations can facilitate the interoperability of data-driven processes in shipping and trade through international standards (Marine Digital, 2023). Digital transformation can be defined as the process of reshaping the business model, enabling new possibilities, and creating value (Tijan, 2021).

Within this methodology analysis, we will be able to see if survey responses have changed over time compared to previous studies, highlighting the need for constant evaluation and the evolution of digitisation. Previous results within the shipping industry suggest that 15% saw that radical industry change would be unavoidable. 69% acknowledged significant changes might come from

digitisation, but no revolution would come within the industry. 16% of feedback saw the topic as overrated (Quitau *et al.*, 2018). A more recent report advised that 90% of supply chain leaders have been investing in digital supply chain management technology, with 80% expected to continue that investment into forthcoming years (Allied Market Research, 2021). PWC published data revealed that 60% of senior executives think digital transformation is critical for business growth in 2022. However, studies of digital transformation performance suggested that 87% of digital programs fail to meet expectations (Forbes, 2022). Identifying current trends in digital transformation can influence and impact business models. A crucial part of successful digital transformation is to turn data information into easy-to-adapt and develop building elements (Genzorova, Corejova, and Stalmasekova, 2019). An important factor to recognise is that digitisation is not solely about technology; it involves changes in employees' behaviours, their work roles, and organisational structures. For change within employees, they should feel as though their company is allowing them to have an active role and feedback in the process and formation of digitisation strategies. Employees are recognised as top contributors of value, and their experience and motivation will show in return for investments in technologies and be a driving force for growth. Our study explores digitalisation in freight forwarders from a panoramic view. First, understanding the level of knowledge of digitisation and its associated technologies among freight forwarders in the shipping industry to gauge readiness, acceptance, and potential resistance to implementation. Second, identify key drivers and motivations to embrace the digitization initiative and potential benefits and gains. Third, pinpoint key challenges that may hinder the successful implementation of digitalisation initiatives and ways to overcome them

## 2.4 Digital Technologies

Previous literature will argue that technology has not been widely adopted in shipping operations (Diordiiev, 2018) and may still be lagging behind other industries, but progress and knowledge are happening. By analyzing the literature review alongside the outlined methodology, one can identify and evaluate the technologies exerting the most significant influence on the shipping industry. Freight forwarders will agree on the importance of analysing data and that digital technologies can provide greater flexibility, agility, and visibility. The Internet of Things (IoT) can be integrated into containers to support the monitoring of freight services. Devices are fitted with sensors that can automatically collect and report information to freight forwarders (UK Parliament, 2023). DHL advocates embracing technologies within the Internet of Things (IoT). For them, data makes insights possible, and smart technology reveals patterns and highlights real-time changes to reliably predict trends in the future (DHL, 2023).

Big data analytics offers vast opportunities, delivering greater visibility and stability for decision-making to optimise key areas of freight forwarder supply chain functions. For freight forwarders, digital technology can help manage and provide platforms for oversight of their transport and delivery optimisation, along with customer management and collaborative tools they can use for tracking or automated electronic documentation. This is referred to as

the Digital Bill of Lading, and it is primarily a convenience for all sides of the supply chain (Duda and Korczak, 2021). Big data analytics techniques will soon be considered standard practice in freight forwarding supply chain operations and management and will be expected by customers. We know digital technologies are only one piece of a more complex process for implementing digitisation. A company such as a freight forwarder needs to have critical resources in place for digitisation success and to create a competitive advantage (Balci, 2021). These are factors such as organisational resources, which means support from management, knowledge, and experience, a company culture inviting to change, and openness to innovation. Then, closely tied to the digital technologies themselves is the technological resource required. Does the company have the right IT infrastructure to support? Marketing and collaboration resources are also necessary for the development of a strategy with partners and customers. It is seen as a strategic challenge and delicate balancing of priorities, investment, customer demand, and capacity for freight forwarders in applying digital technologies, but an opportunity to greatly simplify operations (Maersk, 2023). Industry 4.0 focuses on the importance of interconnectivity, machine learning, and real-time data access. Industry 4.0 is being embraced by the shipping industry to improve its value chain and its management effort to enhance profits and reduce overheads by improving efficiency (Barthwol and Agarwala, 2022).

Blockchain technology can address issues such as vast documentation and information imbalance in the shipping industry by improving how information is stored, shared, and verified. The instant, secure, and reliable data-sharing capability of blockchain can significantly transform decision-making processes (Gerakoudi-Ventouri, 2022). Operations within the shipping supply chain involve complex procedures and interactions, so effective communication is vital in the form of knowledge transfer and reducing errors and uncertainty. An advantage of blockchain is its utility for circulating reliable data to different parties, which can decrease operation costs and improve collaboration (Bai *et al.*, 2020). Blockchain technology can provide a decentralised, transparent, and secure environment (Alahmadi *et al.*, 2022). Blockchain simplifies decision-making, which often involves the processing of large amounts of data and information (Di Vaio, 2020). It provides freight forwarders and their supply chain network with instant tracking and accurate shipping predictions. Blockchain enables the possibility of exchanging information based on trust and transparency (Loklindt *et al.*, 2018). All involved have real-time transaction visibility (Casion, 2019), and data is tough to tamper with and alter. However, there is a lack of applicable standards, and initially, high operational costs and investments need to be started and established (Jovic *et al.*, 2019)

## 2.5 Research Framework

Based on the literature review and with the three research questions in mind, a conceptual research framework is outlined in the figure below. This serves as a guide to examine the impacts of digitisation, taking into consideration participant data on the areas in pink, to conclude if digital transformation is happening within the freight forwarding in the shipping industry.

The interpretation of the literature reviewed is that it is critical to understand the success factors of digitisation for freight forwarders (Yuen *et al.*, 2022). In the methodology, we will examine the impacts of digitisation on organisational

structure and competency, highlighting freight forwarders' expectations and employees' understandings and motivations for digital transformation.

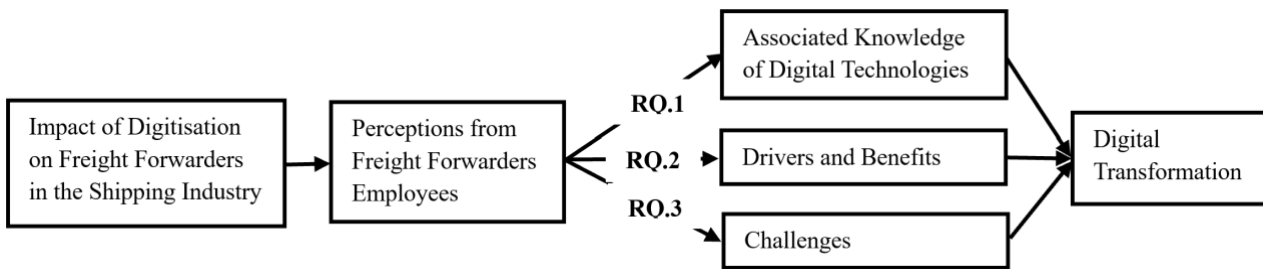


Figure 1 Research framework.

Also, drivers and expected benefits from digitisation and challenges and risks. To the best of our knowledge and literature review, research shows that there has been no previous container freight forwarder employee review of digitisation. This means that this study will be of significance in assessing how company employees perceive digitization.

### 3. METHODOLOGY

#### 3.1 Introduction

The purpose of this part is to introduce the research methodology used for this study regarding the visibility and understanding of digitisation for freight forwarders in the shipping industry. In choosing to carry out original data research, it collates the most current attitudes from employees working in the container freight forwarding industry. The results will help us understand where freight forwarders see their company on their digital transformation journey (Fraunhofer, 2023). This will enable us to identify the main factors of particular importance for the digital viability of freight forwarding companies. Today's freight forwarders' major challenge is how to retain their customers (Newage, 2023). Can digital technologies provide shipment visibility and transparent communication with real-time updates on each shipment milestone, which aids credibility and trust for customers? It has been stated that the key focus of digital transformation should be to create value by enabling employees to work more efficiently. Questions arise about whether automated tasks from digital technologies have opened more time for other strategic activities. (Butt, 2021).

It is important to understand the opinions and views of those directly involved in gauging if successful digital transformations involve successful employee integration. If there is resistance or apathy from employees about digital technologies, digitisation might be seen as more of an obstacle than an advantage. This research aims to highlight the perceived importance of digitisation in company freight forwarder leaders and the subsequent discussion and promotion across the wider shipping industry supply chain. The results would enrich the existing literature, motivated by suggestions for future research by scholars such as (Fruth & Teuteberg, 2017; Wang and Sarks, 2021; Heinbach *et al.*, 2022; Herold and Fahimnia, 2023).

#### 3.2 Research Approach

This section outlines the hypotheses related to the impact of BDA-AI technologies on SCSP, framed through the lens of DCT. This theory emphasizes an organization's ability to sense, seize, and transform opportunities in a rapidly changing environment. In the context of BDA-AI utilization, it provides a robust framework for understanding how organizations can leverage technological innovations to enhance SCSP, particularly SCRE, SOPER, and ENPER.

The research approach was based on designing an online survey form and distributing it to employees of global freight forwarders in the shipping industry. Invitations to participate were sent to get a reasonable response rate and confidence level. Responses will be anonymised to protect the views of individuals. Individual invitations will be emailed to the employees providing the background to the research, the purpose of their input, university reference support, authorisations, and return response times. The questionnaire statements are based on the three key research questions within this project and were formulated from the conducted literature review in this research. One of the most fundamental decisions when carrying out research is determining what methodologies will best enable you to address your research questions (Prendergast and O'Meara, 2022). Providing the participants with statements to mark their level of agreement serves as a technique that is easy to complete and then analyse.

The online survey was split into four sections. The first section asks for general information regarding the participant's age group and years of experience within their field of work. Then, on a scale of 1 to 7, questions regarding their knowledge of digitisation, the level of adoption within their company, and how digitally mature their company currently is. Section 2 asked the participants to share their level of agreement about statements regarding the purposes and perceived functions of digital technologies. Section 3, following the same format, asked for a level of agreement regarding the drivers and perceived benefits of digitisation. Section 4 asked about the level of agreement on the challenges companies face when trying to undertake successful digital transformation. The last question was an open box for participants to share any further thoughts or comments about the survey or their own experience.

#### 3.3 Primary Data Collection

Data collection and survey were administered via an online questionnaire platform (using Free online Surveys).

Invitations to participants were sent out during the first week of November 2023. The link to the survey will be included in an individual email sent out to 300 employees in the three identified freight forwarder companies chosen. The email describes the reasons for the research project and how the data will be handled and processed. The designed survey was short and simple and explained to the participants the expected time to complete. According to a recent article, 47% of those surveyed say their top reason for abandoning a survey is the time it takes to complete (HubSpot, 2023). The survey was designed to be completed within 2-3 minutes, preventing the barrier of time constraints or complexity for participants. The survey was also designed to have a consistent flow with scaled ratings, following the format of the three key research questions and being easy to complete for the participants. Consistency facilitated participants to quickly complete, due to the questions being less confusing and reducing bias. A Likert scale was used, which is a rating scale that quantitatively assesses opinions, attitudes, or practices (Scribbr, 2023). It asked for items that measured a single viewpoint when response scores were combined. A 5-point scale was used to evaluate the participants' level of agreement with statements regarding digitisation.

The survey comprises a series of Likert-type items representing similar questions combined into a single composite score. It has been used for visualisation analysis to produce quantitative estimates of subjective attributes (South *et al.*, 2022). Likert scale data can be analysed as interval data, i.e., the mean is the best measure of central tendency (St Andrews, 2023). The mean is important because it gives us an idea of where the centre value is in a dataset. The mean is also important because it carries a piece of information from every observation in a dataset (Statology, 2022). The standard deviation shows the average amount of variability in a data set. It measures how dispersed the data is about the mean score and how far each score is from it. Participants were asked to rate their level of agreement using a five-point Likert scale using Strongly Disagree (1), Disagree (2), Neither (3), Agree (4), and Strongly Agree (5). Likert scale measures are categorised as composite measures that combine to capture one construct by measuring the same thing in different ways, which is referred to as Internal Consistency (Grad Coach, 2021). This consistency is not a guarantee and therefore needs to be tested for reliability.

The employees of three freight forwarding companies were chosen because they are some of the largest freight forwarders within the shipping industry, that hold global connections, and advertise themselves as at the forefront of digitisation (Transport Topics, 2023). The first author of this paper works in the industry and has existing contacts and connections. This helped identify some initial survey recipients who were more likely to endorse the request within their wider company and encourage completion by their colleagues. In addition to strong personal connections, all these companies currently portray a very proactive and innovative approach to digitisation. The questionnaire data will show if this is the reality in practice from the views of those who work there. The initial survey invitation was sent to 300 participants from the three chosen companies. Employees selected were from mixed levels, from desk-level operators to branch managers, and across global locations. The online survey link was sent out to the participants by

email to their company addresses, and any participants who had LinkedIn profiles received a personal message with the link. Research suggests that sending questionnaires on a Monday receives the best response (SurveyMonkey, 2023). The invitations for this survey were sent on Monday and Tuesday to capture participants' attention early in their working week. The questionnaire has been designed using an online website in a simple and easy-to-complete format that minimises the use of comments and text. Recipients were given two weeks to submit their responses. As the survey is anonymised, it may be necessary to send a general reminder by email after a week if the level of responses is too low for statistical accuracy.

### 3.4 Data Analysis Plan

The questionnaire provider platform collated the data once the participant had submitted their online responses. As this was produced in real-time, the information was provided in an ongoing format. At the conclusion of the questionnaire, we were able to analyse the data through specialist support software. The chosen software was the IBM Statistical Package for the Social Sciences (SPSS) (Croasmun & Ostrom, 2011). This provided both visionary findings and data analysis to support textual outcomes. The Chi-square Test (Franke *et al.*, 2012) and mean analysis (Allen and Seaman, 2007) were calculated for each survey statement.

The Chi-square ( $\chi^2$ ) test assessed the research questions by comparing observed and expected responses to determine statistical significance. It helps evaluate whether data distributions differ from expectations, indicating associations or independence between variables. This test is most effective when data are randomly collected, responses are independent, and group sizes are adequate (minimum of 10 per group, with at least 50 total observations). A higher Chi-square value suggests a greater deviation between observed and expected responses, supporting or challenging the research hypotheses (Haddud & Khare, 2020; Turhan, 2020; The Classroom, 2018). The following subsections provide results about the three used constructs. Mean Values for each statement and standard deviations are displayed in each table. Below is the analysis of results relating to each Research question area and the five statements where respondents had to mark their level of agreement.

### 3.5 Reliability and Validity

Through the use of SPSS, the Construct Validity (Factor Analysis) and Scale Reliability (Cronbach's Alpha) were calculated to test the validity and reliability of the data collected from the survey. Reliance on using a predesigned survey to all employees will provide consistency of results. The questionnaire was sent out to 300 employees, which should give a better confidence level of statistical validity. In preparation, the survey link was trialed on colleagues to test that it works, and the results were collated on the online platform. The confidence level for a survey of 300 people indicates a confidence level of 95% (+/- 5%) if 169 responses are returned. (Check Market, 2023). As the higher the response rates, the more reliable the results, the survey has been made as simple as possible to complete to facilitate a high response rate.

Validity ensures an instrument measures what it intends to, while reliability reflects consistent interpretation across contexts (Field, 2013). Reliability underpins validity. Factor analysis is widely used to establish construct validity by

identifying underlying dimensions among variables, simplifying complex data, and supporting theoretical development (Kang, 2013; Tavakol & Wetzel, 2020; Williams, Onsmann & Brown, 2010). Cronbach’s Alpha tests internal consistency; values above 0.70 are generally acceptable (UCLA, 2021). It is essential when using Likert

scales to confirm item cohesion and scale reliability (Gliem & Gliem, 2003). The data tested for this survey all had an alpha score over 0.9, which indicates high reliability. Factor Analysis and Cronbach’s Alpha (if item deleted) values for the survey data are provided below in Table 1

**Table 1** Construct validity and scale reliability data for all survey statements.

Construct	No. of Items	Item mean ranges	Scale Reliability (Cronbach's Alpha)	Construct Validity (Factor Analysis)
Benefits of digitalisation	5	4.02 - 4.41	0.965 - 0.967	0.695 - 0.830
Challenges of implementing digitalisation	5	3.83 - 4.29	0.964 - 0.965	0.795 - 0.851
Drivers of digital transformation	5	3.56 - 4.26	0.963 - 0.964	0.838 - 0.902

#### 4. ANALYSIS AND DISCUSSIONS

This section provides a presentation of the statistical findings to demonstrate and analyse the results from the quantitative survey data collected. It is important that the results align and reflect the purpose of this study and research questions (Grad Coach, 2021). The profile of the participants is evaluated along with their level of knowledge and their companies in terms of digitisation. Validity and Reliability tests are displayed to show if the data is credible, rigorous, and authentic. Analysis of the Likert scale statements is also presented in the form of mean values and Chi-square ( $\chi^2$ )

tests to confirm the validity of the survey responses. In the discussion, a review of the correlations from the statistical analysis is considered. This is vital to bringing objectivity and consistency to the data, identifying trends, and strengthening the credibility of findings (Medium, 2023). A comparison is made to compare these findings to existing literature and other similar studies to see the positioning of this research. The analysis used IBM’s SPSS software (Statistical Packages for the Social Sciences) and utilised this to conduct research where findings can be supported by statistical analysis (LinkedIn, 2022). analyses. Statistical tests assess whether observed relationships between variables are statistically significant (Spire, 2023).

**Table 2** Profile of participants.

Question	Frequency (n=120)	Percentage
<b>Age Groups:</b>		
18-21	3	2.5
22-25	8	6.7
26-30	8	6.7
31-40	29	24.2
41-50	41	34.1
51-60	28	23.3
61+	3	2.5
<b>Years of experience</b>		
1-5	20	16.7
6-10	14	11.6
11-20	38	31.7
21+	48	40
<b>Choose your Level of knowledge about ‘Digitalisation’</b>		
Scale	0 1 2 3 4 5 6 7 8 9 10	
Responses	2 6 0 10 6 19 20 30 25 3 0	
Percent	2% 5% 0% 8% 4% 16% 17% 25% 21% 3% 0	
<b>What is the level of adoption and usability of digital technologies in your company?</b>		
Scale	0 1 2 3 4 5 6 7 8 9 10	
Responses	1 1 1 7 7 10 11 26 30 14 5	
Percent	1% 1% 1% 6% 6% 9% 10% 23% 27% 12% 4%	
<b>How digitally mature do you consider your company to be now?</b>		
Scale	0 1 2 3 4 5 6 7 8 9 10	
Responses	1 0 1 10 5 7 19 25 32 11 9	
Percent	1% 0% 1% 8% 4% 6% 16% 21% 27% 9% 8%	

#### 4.2 Profile of Participants

Data was collected from 120 respondents for this study. The respondents were from three global freight forwarding companies. Survey invitations were sent out to 100 employees of each of the companies. Out of 300 invitations to participate in the survey, 120 completed the survey, and

the overall response rate was 40%. Almost 60% of the respondents to the survey were over 41 years old. Less than 16% were under 30 years. This was slightly surprising as ResearchGate advised older adults may regard data collection practices differently than younger ones, leading to varying rates of participation and responses (Quinn, 2010).

The participants’ age correlates to the years of experience they hold in their field of profession within the shipping freight forwarding Industry. Around 72% of respondents held over 11 years of experience, with 40% having 21+ years. This length of experience suggests that participants will have extensive knowledge of their companies’ processes and procedures and how technology may have evolved. On the opposite side, employees who have worked at their companies for a longer period may be more resistant to change and development. Respondents’ work experience is a critical factor in getting the best quality data from surveys (Emi, 2021).

66% of respondents marked themselves as having knowledge at level 6 and above, indicating employees of container freight forwarders feel comfortable with their understanding of Digitisation. The highest category was level 7 at 25%. On the other end of the spectrum, 15% of respondents marked themselves below 3, suggesting that there are still some employees who do not feel they have a confident knowledge of digitisation. Knowledge is seen as a key to creating a sustainable competitive advantage (Matošková, 2016). Earlier literature describes knowledge as

experiences, understanding, and the comprehension of the context of a problem (McQueen, 1999). If respondents mark themselves as holding a high level of knowledge of digitization, it will support the quality of the data results in the likelihood of the strength of their level of agreement.

Along with asking participants about their individual knowledge, they were also asked about what level they would place their company in terms of adoption and use of digital technologies. It is worth noting that 7 respondents did not mark this question, but those who did believed their company had a high level of digitisation already happening, with the weighted average close to 7. 75 respondents marked their company level 7 and above (66%). Table 2 also displays the respondents’ results of how digitally mature they think their company is. This, whilst linking with the previous question, provides another opportunity to capture whether, even if their company is using digital tools, employees consider them familiar and embedded within the business. The weighted average was higher than the previous question, suggesting that most respondents see their company as being digitally mature and advanced in its use of digitisation. 77 respondents marked 7 and above (65%).

**Table 3** Chi square test data of analysis results towards statements relating to digitisation and associated technologies.

Level of agreement about the below areas of digitisation and associated technologies	Chi-square ( $\chi^2$ ) Test (Frequencies of residual values)									Item is Supported
	Mean	t-stat	p-value	Std. Deviation	SD* (1)	D* (2)	N* (3)	A* (4)	SA* (5)	
1. Digital technologies can enhance the efficiency and transparency of the shipping process.	4.41	21.91	< 0.001	0.728	- 23.0	- 22.0	- 19.0	27.0	37.0	Yes
2. Using data analytics can help to make better operational decisions.	4.35	18.52	< 0.001	0.729	-4.0	- 27.0	- 21.0	21.0	27.0	Yes
3. Digital technologies facilitate services to better understand and meet you customer expectations.	4.02	12.22	< 0.001	0.809	- 23.0	- 20.0	-4.0	38.0	9.0	Yes
4. Digitisation allows for automating of operational processes- which can improve supply chain visibility and communication.	4.24	17.77	< 0.001	0.745	- 23.0	- 23.0	- 11.0	34.0	23.0	Yes
5. Digital technologies allow your company to track and analyse customer data- which improves performance.	4.28	18.60	< 0.001	0.688	-8.0	- 29.0	- 17.0	27.0	19.0	Yes

\*Notes: 1= Strongly disagree; 2= Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly agree. SD= Strongly disagree; D= Disagree; N= Neutral; A= Agree; SA= Strongly agree

### 4.3 Results for the Three Main Research Questions

#### 4.3.1 Operationalization of Constructs

Table 3 above shows respondents’ results that relate to this research question of their level of agreement about statements about digitisation and its associated technologies. The highest ranked in terms of the mean score (4.41) and standard deviation (0.728) was the respondents’ level of agreement that “Digital technologies can enhance the efficiency and transparency of the shipping process”. This result is supported by research already known of

technologies such as blockchain, enabling many shipping stakeholders to increase operational efficiency by having real-time transparency of transactions (Alahmadi *et al.*, 2022). The highest residual value came under the strongly agreed option for this statement, as well as respondents’ view on “Data analytics helping to make better operational decisions” (Mean: 4.35) and a standard deviation (0.729). Big data analytics is advocated for strategic and operational decisions by companies, being able to extract value from data to make appropriate business choices to increase production and profitability (Jabir and Falih, 2022). Respondents could provide additional feedback comments, and one

anonymously stated, ‘Digital technology is paramount to create efficiencies and added value to a company and the service provided’.

Chi-square analysis indicated that all five items presented in Table 3 were classified as supported data, meaning their highest residual values were in the agree or strongly agree classification. The lowest mean statement was “Digital technologies facilitate services to better understand and meet your customer expectations” (Mean: 4.02) with a standard deviation of 0.809. Even though most respondents still agreed with this statement, the area out of the five received the highest amount of neither classification (20 respondents, 16.7%) and the lowest amount of people strongly agreeing. It suggests there is some ambiguity from container freight forwarders as to whether and how digital technologies meet their customer needs. In addition, a one-sample t-test for each statement was conducted, testing whether the mean response significantly differs from the neutral midpoint (3.0) on the 5-point Likert scale. All p-values are effectively zero, meaning the mean responses are significantly greater than neutral (3.0) for every item. This supports the conclusion that respondents agreed or strongly agreed with these positive statements about digital technologies and digitisation. The results support providing insights to answer the first research question, which is discussed in the discussion section. The data suggests that the participants confirm digitisation technologies as tools for analysing, tracking, and automating processes to facilitate improvements for their company and the wider shipping supply chain.

4.3.2 What Are the Challenges of Digitisation, And Are There Strategies for Overcoming These to Deliver Digitization?

Table 4 shows respondents’ results that relate to the second research question of identifying the challenges their companies might face when trying to digitise. It is first worth noting that the mean values for these statements were lower than the previously analysed set of items, with 3 holding a mean below 4. The highest ranked mean score (4.29) and standard deviation (was 0.760), and the only statement that most respondents marked as strongly agreed was “Without strong management and a clear digital transformation strategy, digitization efforts will be unsuccessful”. It is expected that employees would feel strongly about this; successful digital transformation depends on leaders’ vision, foresight, and how they decide to use digital technologies for the growth and productivity of their company (Sainger, 2018). Without management that conveys a clear strategy towards digitisation, employees will not have the support or direction to be engaged. The lowest mean value (3.83) and standard deviation (0.866) was for the statement “Cultural resistance from employees can provide a barrier towards change”. This was the area out of the 5 where the highest “Neither” category by respondents was marked (30 respondents, 25%). Resistance to change being a barrier to digital transformation is most frequently mentioned in the literature, highlighting difficulties with changing employees’ mindsets and beliefs, but it is not seen as the biggest challenge/barrier (Cichosz, Wallenburg, and Knemeyer, 2020).

**Table 4** Chi-square Test data of analysis results towards statements relating to challenges of implementing successful digital transformation.

Level of agreement about the below challenges in trying to undertake a successful Digital Transformation	Chi-square ( $\chi^2$ ) Test (Frequencies residual values)									
	Mean	t-stat	p-value	Std. Deviation	SD* (1)	D* (2)	N* (3)	A* (4)	SA* (5)	Item is Supported
1. Lack of expertise and right in house skills and training hinders digitisation.	3.88	10.55	< 0.001	0.791	- 22.0	- 23.0	6.0	39.0	.0	Yes
2. Cultural resistance from employees can provide a barrier towards change.	3.83	8.68	< 0.001	0.866	- 22.0	- 19.0	-6.0	34.0	1.0	Yes
3. Not having IT infrastructure and support along with cybersecurity concerns is a key challenge.	4.10	13.03	< 0.001	0.844	- 23.0	- 19.0	-8.0	33.0	17.0	Yes
4. Without strong management and a clear digital transformation strategy, digitisation efforts will be unsuccessful.	4.29	16.97	< 0.001	0.760	- 12.0	- 27.0	17.0	20.0	24.0	Yes
5. Limited funds/budget prevent necessary investment in digital technologies.	3.95	11.29	< 0.001	0.798	- 23.0	- 22.0	5.0	34.0	6.0	Yes

\*Notes: 1= Strongly disagree; 2= Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly agree. SD= Strongly disagree; D= Disagree; N= Neutral; A= Agree; SA= Strongly agree

“Lack of expertise and right in-house skills and training” (mean 3.88) was also a challenge, and 30 respondents neither agreed nor disagreed with the statement. One respondent in their anonymous feedback commented, ‘Training culture is basic for companies to keep up with the

fast development of digitisation. More experts and knowledge are needed in companies but linked to the logistics market expertise and knowledge. Despite the mean values being below 4, the highest residual values came under the agree option for four of the 5 statements and 1 for

strongly agree, meaning all items are categorised as being supported and valid. In addition, a one-sample t-test for each statement was conducted, testing whether the mean response significantly differs from the neutral midpoint (3.0) on the 5-point Likert scale. All p-values are effectively zero, meaning the mean responses are significantly greater than neutral (3.0) for every item. The results support recognizing the main challenges container freight forwarders’ employees feel their companies face in trying to undertake successful digital transformation. To counteract the challenges, the highest priority is for leadership to provide employees with strong direction, which then filters down to providing the funding needed for digital investments and the right IT structure, staff training/and skills to make sure all staff is engaged in moving forward in the company’s digitisation evolution.

4.3.3 What are the Main Drivers and Associated Benefits for Digitisation?

Table 5 below shows respondents’ results that relate to the third research question of their level of agreement about statements about drivers of digital transformation. Three of the statements, as with the previously mentioned analysis data table, have means below 4. The highest residual values came under the agree categorisation option for all five statements. The highest ranked mean score (4.26) and standard deviation (0.750) was “The main benefits of digitisation are real-time visibility, automated processes, and

faster communication”. 105 respondents (88%) were marked as strongly agreeing or agreeing to this item. As transportation supply chains such as the shipping industry are becoming more complex, real-time visibility is increasingly viewed as an essential criterion to bring about real-time control and long-term competitiveness (Wyciślak, 2021).

The lowest mean (3.56) and standard deviation (0.786) was for “Shipping lines are driving freight forward to implement digital technologies for supply chain collaboration”. 42 respondents (35%) rated themselves as neither agreeing nor disagreeing with this statement. This may suggest they are unaware if shipping carriers are utilising digitisation or if they are pushing for other stakeholders in the shipping line to invest in digital technologies. One respondent in their anonymous feedback advised, ‘Shipping lines are driving freight forwarders to implement digital technologies but not for supply chain collaboration, more to improve efficiency and speed and to reduce manual data entry errors’. Literature expresses the challenge it can be in creating a new integrated paradigm of a digital supply chain; however, companies are at the risk of being left behind if they don’t accept and turn to digital tools (Attaran, 2020). One respondent echoed a similar remark in their anonymous feedback, stating, ‘Digitisation is the present of our current logistics world, and if the companies aren’t prepared for that, these companies won’t have a future’.

Table 5 Chi-square Test data of analysis results towards statements relating to drivers of digital transformation.

Level of agreement about the below drivers of digital Transformation	Chi-square ( $\chi^2$ ) Test (Frequencies residual values)									
	Mean	t-stat	p-value	Std. Deviation	SD* (1)	D* (2)	N* (3)	A* (4)	SA* (5)	Item is Supported
1. Meeting customers changing expectations and requirements is a key driver for digitisation.	3.98	10.04	< 0.001	0.884	-23.0	-18.0	.0	29.0	12.0	Yes
2. Company management is actively driving the digital transformation in your company.	3.79	4.84	< 0.001	0.952		-17.0	.0	16.0	1.0	Yes
3. Using digital technologies enables your company to gain a competitive advantage over competitors.	4.04	11.67	< 0.001	0.864	-23.0	-18.0	-6.0	33.0	-14.0	Yes
4. Shipping lines are driving freight forwards to implement in digital technologies for supply chain collaboration.	3.56	7.27	< 0.001	0.786	-23.0	-15.0	18.0	34.0	-14.0	Yes
5. The main benefits of digitisation are real time visibility, automated processes, and faster communication.	4.26	17.94	< 0.001	0.750	-23.0	-23.0	11.0	32.0	25.0	Yes

\*Notes: 1= Strongly disagree; 2= Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly agree  
 SD= Strongly disagree; D= Disagree; N= Neutral; A= Agree; SA= Strongly agree

Employees of container freight forwards may feel that, with the scope and role they play in the shipping supply chain, they are the ones and not the shipping lines that hold the most influence and drive efforts for collaborative digitisation. No matter which stakeholder is showing the most advancements, it is seen that digital platforms can

facilitate communication between supply chain members with instant messaging, document sharing, and progress tracking, bringing everyone onto the same page to reduce misunderstanding and delays (Geodis, 2023). Again, as in the two previous Chi-square test data tables, all items are supported by the results obtained. In addition, a one-sample

t-test for each statement was conducted, testing whether the mean response significantly differs from the neutral midpoint (3.0) on the 5-point Likert scale. All p-values are effectively zero, meaning the mean responses are significantly greater than neutral (3.0) for every item. Approval from the respondents suggests that, again, management has a key role in driving forward digital transformation in their companies. Keeping customer needs in mind whilst trying to remain competitive is important, and digital tools can facilitate this through faster and better communication.

In summary, for these three data tables, out of all fifteen statements that were analysed, the item that held the strongest residual value was digital technologies can enhance the efficiency and transparency of the shipping process, with 51% of respondents strongly agreeing. The item that held the lowest residual value was that shipping lines are driving freight forwards to implement digital technologies for supply chain collaboration. This suggests that the container freight forwarding respondents in this survey did not feel comfortable with their level of agreement about a third party like they would show their level of agreement about a statement that referred to their own company.

#### 4.4 Discussion

By using statistical methodologies, we draw evidence-based conclusions and contribute to the advancement of knowledge relating to digitisation in the shipping industry. These findings correlate with similar existing literature studies. Management is seen as either a key driver or a barrier to digital transformation and is reaffirmed by a study detailing critical success factors to digitisation within the global shipping industry are leadership and strategic capability (Brrar, Lee, and Yip, 2023). Linked to leadership, literature also identified a crucial element of digital transformation is organisational competency (Yuen *et al*, 2022). In a study carried out in 2021 it was raised that in the container market, there was a struggle with the lack of awareness and people felt the idea of digitisation was overrated (Tijan *et.al*, 2021) The results of this study suggest that employees are embracing and classifying themselves as having awareness and knowledge of digitisation. Two years in the digital evolvement can make a big difference just as opinions may continue to change in the coming years. One respondent in this survey stated ‘Digitisation is the way forward for this and the next generation of freight forwarders. People are both the biggest challenge and main source of success in digital transformation (Cichosz, Wallenburg, and Knemeyer, 2020). On similar lines, anonymous feedback from one of the respondents advised, ‘Digitisation investment is essential to drive the business forward for success. The main drive for improvement and customer service is data-driven. However, not forgetting businesses still need human intervention to make logical choices, have sensible discussions, and have the market intelligence and experience to find alternative solutions.

Therefore, the results imply that digitalisation is an important first step for analytics/data-driven decision-making processes. Digitalisation involves implementing new technologies such as artificial intelligence (AI) to enhance the efficiency, sustainability, and resilience of key logistics and supply chain functions. While there are clear benefits freight forwarding companies can gain from embracing

digitalisation in their operations, there are associated challenges and risks that need to be addressed before, during, and after implementing digitalisation initiatives.

## 5. RECOMMENDATIONS

### 5.1 Recommendations

With reference to individual statements used within the analysis and displayed in Table 6, suggested recommendations could be used to counter the challenges and barriers and help to aid the benefits and progress of digitization. It is appreciated that the results were from established global freight forwarders, which are already established in their digital journeys, but continuous improvement is always required, as is guidance for smaller companies who are yet to develop their digital efforts. The recommendations should aid in the success factors.

Digital technologies can enhance the efficiency and transparency of the shipping process. For technologies to be effective, they need to be the right ones for certain objectives and purposes. Gaining insight from a specialist will help to tailor where blockchain might be of most benefit or how to advance a company’s current data analytics. Knowing where the current position is will help to build a roadmap to understand which processes need to be advanced; it involves looking at processes that are most time-laden and where cost savings could be made. Engagement and interaction with customers will help to understand what digital tools could provide them with faster communication, and their expectations will be met.

#### 5.1.1 Overcoming Barriers

This research highlighted four potential barriers to successfully implementing digitalization in freight forwarding businesses. This sub-section recommends how to overcome them. First, ‘‘Lack of expertise and right in-house skills and training hinders digitization.’’ Hiring specialised digitisation consultants will help to guide not only what technologies are the right fit, but also support in providing training to employees on how they are to be used. This might be an initial ‘invest to save’ cost to be accounted for, but is considered worth the investment instead of relying solely on the company’s own internal knowledge and IT teams. These actions are mainly required at operational levels. One respondent’s feedback stated, ‘Technology is a must, but in the right hands’. Digital technology is only as effective as those who use and understand it, so investment in their training and skills is vital for success. Second, ‘‘Cultural resistance from employees can provide a barrier towards change.’’ Employee engagement is essential to minimise concerns and resistance from employees. This could be done through company internal surveys, forum groups, and training sessions. Staff might feel that technologies threaten their job security, so concerns should be addressed for them to feel valued and to see the benefits digitisation can bring to their own jobs, along with companies’ success. Literature reaffirms this by advising that if companies want to digitalise their business, they should start to think about how to adjust employees for change (Genzorova, Corejova, and Stalmasekova, 2019). Tackling these challenges should be done at operational and strategic levels.

Third, ‘‘Not having IT infrastructure and support along with cyber security concerns is a key challenge along with limited funds/budget prevent necessary investment in digital

technologies.” These area needs financial investment and a designated budget. A respondent’s feedback shared ‘The biggest blocker is the funding required to develop and implement such technologies. Specialised consultants can direct and guide along with precautionary steps of trialing technologies before committing to long-term costs. Fourth, “Without strong management and a clear digital transformation strategy, digitisation efforts will be unsuccessful.” Just as investment in the right technologies and training is needed, first and foremost, management needs to lead the way in knowing what they want to achieve and then communicate it. They might deploy a specialist panel for digital transformation and advisory support. These efforts require strong support at the strategic level and strong commitment at the operational level to ensure effective adoption. Change management is a crucial component of successful digital transformation; it requires comprehensive transformation across all facets of a company, from its business model to its culture (Watfix, 2030).

### 5.1.2 *Building on Drivers and Benefits*

Results also showed the validity of understanding what drives freight forwarders to digitise and that this needs to be continually monitored and reviewed. It brings about a new outlook and should now include not only aspects related to transport but also information management (PierNext, 2021). First, “Meeting customers changing expectations and requirements is a key driver for digitisation.” Engagement and feedback from the customer base may also be required to understand what their needs and expectations are. It might be of benefit to communicate and promote the benefits seen that result in improvements and efficiencies for the customers, i.e., data analytics has enabled them to see where transit times are most impacted, and corrective action has been taken to use an alternative shipping line. Respondents’ feedback cautioned, however, ‘Internally we have a high adoption and usability of digital technologies, but we do not see a similar uptake from our customers, whom we make these tools available for.’ This leads to the need for customer engagement to improve their understanding of the uptake of digital tools. Customer satisfaction is the responsibility of the entire business, but more focus is needed at the operational levels.

Second, “Company management is actively driving the digital transformation in your company.” As mentioned in the section above, leadership plays a key role in driving efforts for a digitisation strategy and its implementation. Leaders need to champion their importance and research for themselves what is unique and required for their company’s business needs. The drive and investment for continuous improvement lead to digital technologies enabling your company to gain a competitive advantage over competitors. Assessment is constantly needed at strategic levels to evolve as the technologies develop and advance. Respondent feedback shared their opinion, ‘Digitisation is the way forward for this and the next generation of freight forwarders’. All stakeholders within the shipping industry should be involved in efforts to pursue digitisation. Each may choose to focus on different areas or processes, but each can be of benefit and use to others in the chain for real-time visibility, automation, and faster communication. The freight forwarders play a pivotal role due to the scope of their involvement in the shipping line supply chain; they can drive

others to implement efforts to digitize, which should address the simplification and automation of tasks and the transparency of expedition data between suppliers and clients (PierNext, 2021)

## 5.2 *Practical and Theoretical Contributions*

The contribution of this study lies in examining container freight forwarders' agreement with the impacts of digitisation. We know they play an essential role in the shipping industry supply chain, and results show that agreement is made that digital technology aids to increase company efficiency and flexibility and meet customer expectations. This analysis is a supportive piece and evidence to literature advising digital technology is here to stay and is likely to take an even greater place in the future and freight forwarders must join the evolution (Sinay, 2022). Literature on the impacts of digitisation of container freight forwarders shows conflicting opinions and results and few surveys on the opinions of actual employees. A gap this analysis has endeavored to fill with this analysis. We can conclude that employees advocate what their media publications present of their efforts and support for digitisation. This research has shown the progress that has been made in recent years in the shipping industry’s thinking and views; previous surveys showed many thought that digital insights might be overrated and not a key part of their business (Gkerekos, 2019). This work is evidence that digitisation is essential and a high level of agreement from employees of freight forwarding believing their companies are currently positioned strongly in their digitisation journeys. A new insight that arose from this process came from another shared experience of a respondent’s feedback ‘In the whole digitisation process, we should not forget that a computer cannot replace a person’s mind but should merely be a support’. Indeed, employees hold knowledge of digital tools, and they are in use and hold benefits, but results and recommendations strongly suggest that digital technologies are only as important as the employees understanding and acceptance of the value those technologies can bring.

## 5.3 *Limitations and Suggested Future Research*

To strengthen the results of this analysis, a wider data sample would have been of use. The request to participate in the survey could have gone to a wider number of people and monitored until an equal number of respondents from each company had completed the online survey. This could be coupled with asking employees from other freight forwarding companies for further reach and scope. It would also have been insightful to understand the employment position of the respondents of the survey to see if someone who worked in a managerial position had a strong agreement of statements to someone who worked at the desk operations level. To better understand the implications of these results, future studies could address possible cost-benefit analysis requirements for digital investment would be the next stage – having agreed on overall support and the need for digitization, what does this mean in terms of outlay v cost benefits of improvements? Surveys could be adapted and extended to other stakeholders in the shipping supply chain to gauge their efforts in digitisation. It would also be interesting to compare these results with the same survey in a year. We know Literature and surveys seem to be outdated in a short space of time as technology and communication keep evolving- would we see even stronger support, or

perhaps barriers and benefits to digitisation would be completely different?

In summary, this research identified key drivers, benefits, and challenges associated with digitalising freight forwarders' operations. This paper provides useful guidance to freight forwarders about correctly embracing digitalization within their operations. The paper can also help other logistics and supply chain organizations better understand the potential benefits and challenges of digitalisation. The paper contributes to the existing literature by adding new insights about supply chain digitalisation and how to make our supply networks more efficient, sustainable, and resilient. We expect the findings from this paper to help conduct similar research activities in other supply chain functions. Such endeavors align with themes of the Operations and Supply Chain Management: An International Journal (OSCM)

## 6. CONCLUSIONS

The analysis shown and discussed in the previous section strongly supports the view that employees of container freight forwarders view digitisation in a positive light and agree with the benefits it can bring to their company and the wider shipping supply chain. Employees' results also support that of the literature review reflecting the freight forwarders are making in their digital transformation processes. Respondents also showed that their companies are digitally mature and that the adoption and use of digital technologies are now occurring. This research project has addressed three important research questions: understanding the knowledge of digital technologies and the barriers and drivers of digitisation. The highest-ranked mean score was the strong agreement that digital technologies can enhance the efficiency and transparency of the shipping process. This finding is supported by the latest views of others in the shipping industry that having access to real-time data, tracking, and monitoring facilitates better communication and collaboration, making it easier to complete tasks and processes (Wakeo, 2023). Table 6 shows the combined ranking of all statements from the three tables (Benefits, Challenges, Drivers), based on their t-statistics from one-sample t-tests against the neutral midpoint (3.0 on the Likert scale). As the table shows, the two highest-ranking statements lead to the first research question of "How much knowledge of digitization and its associated technologies there is among freight forwarders in the shipping industry?". There is personal individual-level knowledge of how companies are engaging and using digitization. There is a knowledge of what data analytics is and the benefits it can provide to decision-making. One respondent shared their own experience advising that 'Supply chain management was one of the first business functions to undergo ERP systems upgrades with digital assistance, focused on improvements in three areas, end-to-end planning, supporting major operations, and last but not least sharpening the analysis on which decision is based.'

The least ranked statement in terms of their mean score was 'Shipping lines are driving freight forwarders to implement digital technologies for supply chain collaboration'. This received the most neither agreement nor disagreement in participant responses, suggesting it is unknown which stakeholder within the shipping supply

chain is pushing the most for digitisation. Freight forwarders might believe they are the driving force or are unaware of what shipping lines might be doing, or they might feel customers at the end of the supply chain are driving everyone upstream to use digital tools with the benefit of providing a better service for them.

**Table 6** Results of one-sample t-tests regarding statements ranking and significance.

Rank	Source	Statement	Mean	t-stat
1	Benefits	Efficiency & transparency of shipping process	4.41	21.91
2	Benefits	Tracking & analyzing customer data	4.28	18.60
3	Benefits	Data analytics for better decisions	4.35	18.52
4	Drivers	Benefits: visibility, automation, speed	4.26	17.94
5	Benefits	Automation & supply chain visibility	4.24	17.77
6	Challenges	Lack of strong management & strategy	4.29	16.97
7	Challenges	Lack of IT infrastructure & cybersecurity	4.10	13.03
8	Benefits	Understanding customer expectations	4.02	12.22
9	Drivers	Digital tech enables competitive advantage	4.04	11.67
10	Challenges	Limited funds/budget	3.95	11.29
11	Challenges	Lack of expertise and in-house skills	3.88	10.55
12	Drivers	Meeting changing customer expectations	3.98	10.04
13	Challenges	Cultural resistance from employees	3.83	8.68
14	Drivers	Shipping lines drive collaboration	3.56	7.27
15	Drivers	Management actively driving transformation	3.79	4.84

The second research question leads to the 3rd and the 14th-ranked mean statements that company management is actively driving the digital transformation in their company. This received the most disagreed responses, suggesting the biggest challenge to digitisation is management and leadership not pushing for digital tools to be used or effectively communicating this to employees. A strategy for overcoming this to deliver digitization is the importance of clear and defined business goals that are filtered down and advocated by management. Statements 12 and 13 need to be aligned with this for management to prevent a lack of expertise and skills from being a barrier to understanding if there is cultural resistance to change.

The third research question asked what the main drivers and associated benefits for digitisation are, which are captured from the results of most statements with means above 4. Those are the benefits of tracking and analysis, the transparency of working with and sharing real-time data and analysis. Automation brings about great efficiency, and digitization provides insights for better decision-making.

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## CONFLICT OF INTEREST

No conflicts of interest to report.

## DATA AVAILABILITY STATEMENTS

Data available on request.

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