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DIGITALIZATION AND
DIGITAL LITERACY IN LOGISTICS

—preparedness of the employees for a digital transformation

Master's thesis in Governance of Digitalization

Master's Programme

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Åbo Akademi University

Åbo 2023

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to all those who have contributed to the completion of my Master Thesis. First and foremost, I would like to thank my thesis supervisors José Apolinário Teixeira and Gunilla Widén for invaluable feedback, guidance, and patience during the research process.

I would also like to extend my appreciation to all the staff and teachers at the Åbo Akademi, University and my employer for the opportunities given to me.

This thesis would not be possible without support of my beloved parents, friends and co-workers who contributed greatly to this work.

ABSTRACT

In the current market it is hardly possible to stay competitive without incorporating technology into business processes and operations. Enterprises are constantly improving the digital tools they use. Plenty of research tackles the topic of digitalization from the commercial and business perspectives. However, this thesis aims to approach technological changes from peoples' perspective, who experience changes first, are the primary users and must learn to adjust to them.

In the logistics field many new technologies such as Big Data, Automation, Internet of Things find wide application. Consequently, knowledge workers are facing constraints to adjust their digital literacy skills in accordance with the given organisation's new systems, stay relevant on the job market, which is becoming more automated daily. This paper addresses the importance of users and aims to fill a research gap on how employees feel about themselves, their skills, their company, and the company's place in the market. During the research process, employees of the case company were asked to assess their digital literacy and were interviewed regarding the overall digitalization state of the transportation industry. Additional data is gathered by laddering questions in order to establish the best possible change management practices and paths for efficient implementation. This thesis' contribution is not limited to one industry only, as it has revealed that attitude, satisfaction, and trust in new systems affects greatly whether employees adopt new tools or not. Additionally, clearly understanding the purposes behind, how exactly technology can ease their everyday work and smooth transition from old systems to the new ones encourages the users, who are open-minded to learn and improve their knowledge and digital literacy.

CONTENTS

ACKNOWLEDGEMENTS	1
ABSTRACT	2
CONTENTS	3
1 INTRODUCTION	5
1.1 BACKGROUND AND MOTIVATION	6
1.2 AREA OF RESEARCH	6
1.3 AIMS AND OBJECTIVES OF THE THESIS.....	7
1.4 LIMITATIONS OF THE RESEARCH.....	7
1.5 STRUCTURE OF THE THESIS	8
2 LITERATURE REVIEW	9
2.1 LOGISTICS INDUSTRY	9
2.2 SMART LOGISTICS	10
2.3 IOT AND BIG DATA.....	12
2.4 BLOCKCHAIN	14
2.5 FREIGHTTECH PLATFORMS	15
2.6 DIGITAL LITERACY	17
3 CONCEPTUAL FRAMEWORKS	20
3.1 EMPLOYEE PERSPECTIVE	20
3.2 DIGITAL LITERACY ASSESSMENT.....	22
4 RESEARCH METHODOLOGY	24
4.1 RESEARCH IN LOGISTICS	25
4.2 DATA COLLECTION.....	26
4.3 IMPLICATIONS	26
4.4 PHASE ONE	26
4.5 PHASE TWO	27
5 ANALYSIS AND INTERPRETATION OF RESULTS	29
5.1 PHASE ONE	29
5.1.1. <i>Background</i>	29
5.1.2 <i>Tools in use</i>	30
5.1.3 <i>Self-evaluation</i>	34
5.1.4 <i>Company updates and training programme</i>	35

5.2 PHASE TWO	36
5.3 OBSERVATIONS AND DEVELOPMENT POSSIBILITIES	37
6 DISCUSSION AND LIMITATIONS	39
<i>6.1 Results reflection</i>	39
6.2 ADDRESSING RQS	40
6.3 CONTRIBUTIONS AND LIMITATIONS	41
7 CONCLUSIONS	43
8 FUTURE RESEARCH	44
9 BIBLIOGRAPHY	46
10 APPENDICES	52
QUESTIONNAIRE	52
INTERVIEW QUESTIONS AND ANSWERS.....	55

1 INTRODUCTION

The transportation industry contributes greatly to the Gross Domestic Product (GDP) of any given country, and the logistics sector has a significant share in the global economy. The term “logistics” not only includes transportation of goods and raw materials, but also implies significant amounts of data exchange, which makes the industry one of the top three substantial industries (Sezer & Abasiz, 2017).

The current share of the logistics industry on the global market is estimated to be six billion euros and the predictions for the logistics sector’s share are expected to reach seven billion euros by 2024 (Statista Research Department, 2022).

As the competitive edge of all industries is shifting towards outsourcing and crowd-funded directions, one of the measures to stay relevant in this highly competitive market is to have a cutting-edge technological advantage over peer businesses (Gulamov & Shermukhamedov, 2018). To stay competitive in these markets, a business should strive to incorporate technology in its business model and do so in an effective, cost-efficient way (Matt et al., 2015).

RQ1 - How do employees feel about the digital transformation of their industry?

RQ2 - What are employees’ attitudes towards digital literacy and new technology?

RQ3 - What is the employer’s role in technology adoption for the daily operations?

Reviewing the existing research dating back to the 1990s regarding digitalisation of freight forwarding allows us to observe the exponential growth of complexity of the logistics area. In addition, as Information and Communication Technology (ICT) continues to be more sophisticated and embroidered into all aspects of everyday life, this thesis aims to research the tendencies of Information Technology (IT) development in the transportation industry, the direction of its evolution in the logistics sector and workers’ perception of the changes.

Moreover, this thesis discusses the digital literacy of employees, their preparedness to adjust to changes associated with digitalization and to implement those changes in their daily operational activities.

1.1 Background and motivation

Many of the existing research and literature focus on the digital transformation from the business perspective; they aim to seek optimal managerial and infrastructural strategies to implement new digital tools successfully. However, in this thesis the goal is to understand how prepared employees of different age groups are to start incorporating IT solutions into their everyday operations.

Transportation companies vastly diversify depending on a business model, assets, fleet and offered services. Typically, logistics businesses specialise on one or more modes of transportation such as sea, air, railway, or road. Supply chain managers refer to freight forwarders, brokers, third party logistics providers and other carriers for transportation solutions.

1.2 Area of research

Technology has influenced and forced many markets to transform, and transportation is no exception. In recent decades, there has been a noticeable change in the tendencies of the operating structure of logistics service providers. Improved customer experience and flexibility have shifted the competitive edge away from standardisation. Identifying which innovations to incorporate into their existing and well-established business models and daily operations is rather challenging for service providers.

The logistics industry is promptly implementing tools and technologies for their process optimisation and value creation. These technological changes have a direct effect on the current job market. Competency demands are different from the ones a couple decades ago and the requirements not only for businesses but also for the employees' progress to digitalise in a swiftly manner. It is important to focus on the digital literacy of the employees as when looking at digital transformation, as they drive the said transformation.

The “digital literacy” term covers both occupation-specific competences and general familiarity with the digital environment for every knowledge worker. Thus, the scope of the necessary skills and questions about their evaluation process need to be discussed.

1.3 Aims and objectives of the thesis

The purpose of this study is to review the current state of the logistics industry, discover tendencies and trends of the future development vector of technology's functions in freight forwarding, as well as reflect on the preparedness of the employees (of the case company) to adjust to digital changes and accept them into their operational routines.

This thesis aims to investigate whether employees are prepared for all the technological innovations.

Consequently, this thesis strives to address the following questions:

RQ1 - How do employees feel about the digital transformation of their industry?

RQ2 - What are employees' attitudes towards digital literacy and new technology?

RQ3 - What is the employer's role in technology adoption for the daily operations?

Firstly, to answer the above-mentioned questions, the relevant literature is studied and used as a foundation for the theoretical background. Consecutively, primary data is collected from the employees. The information acquiring process contains two steps: a survey and individual interviews of the workers. All the data is then analysed and used to address the research questions.

1.4 Limitations of the research

This thesis focuses on the freight forwarding subcategory of logistics, meaning the case company operates as a mediator between customers and carriers. The business model of the case company is Business-to-Business, where all the employees are knowledge workers, whose everyday activities directly involve digital tools and operating with technology. The case company showcases how small and medium businesses operate as a part of a larger enterprise, meaning the case company may contribute to the decision-making processes regarding digitalization, but majority of the guidelines are made centrally and introduced to the case company as a directive.

1.5 Structure of the thesis

Firstly, the introduction chapter reveals the main outline of the research, its motivation, limitations, and goals.

Secondly, the literature review chapter follows with the explanation of the relevant concepts of the industry, as well as review of current and future trends in logistics.

Thirdly, a theoretical framework describes the theory and methods that act as a basis for forming the questionnaire. The following chapter defines the process of carrying out qualitative research in two parts, a questionnaire followed by selective individual interviews.

Chapter five interprets the results and findings, accompanied by analysis and the final part is a synthesis of the whole project and reflection on the work carried out.

2 LITERATURE REVIEW

This chapter describes the key terms of the thesis, their meaning and development over time. Additionally, it presents such concepts as digital literacy, current tendencies of development in logistics and technology trends. Understanding these terms from different angles and various perspectives, decreases the chances for biased judgement.

The aspects described in this chapter are currently relevant in terms of the industry digitalization. Some tools and technologies have rather theoretical implementations as of currently. However, reviewing the tendencies and directions of their development can help navigate necessary actions from the digital transformation perspective.

Technologies, which are defined in this section of the thesis, are part of “Industry 4.0”, breakthrough mechanisms that are considered digitalization drivers (Schmidt & Wagner, 2019).

2.1 Logistics Industry

As the logistics field of study continues to develop and advance, researchers have witnessed that the term becomes enriched with other fields’ accompaniments, and more studies focusing on information exchange among involved individuals and the effect of these interactions on performance (Keller et al., 2002).

Countries expand their investments in the transportation industry as it facilitates the development of their economy in the current global, international trade playground. Researchers have found a direct correlation between logistics industry development and a country’s economic growth (Sezer & Abasiz, 2017).

Even though logistics is a rather applied discipline, researchers have found that, as the industry continues to develop, their articulation with the theoretical researchers will rise in significance. Nowadays, the term logistics has expanded vastly towards data and information exchange (Craighead et al., 2007).

Undoubtedly, technology is a great support for transportation businesses and adds great value to cut the competitive edge. To stay relevant, freight forwarders need to be able to

offer high process performance and devote their efforts to eliminate antiquated and inefficient operational practices (Auinger & Riedl, 2018).

Those digital transformation trends and tools include, but are not limited to, cloud computing, Internet of Things (IoT), Automation, Big Data and Blockchain. These digital tools carry great advantages. However, studying the complications associated with their implementation and application is crucial. Some of these advantages include the possibility for safer transportation, optimised routing, and lower environmental impact, reducing CO2 emissions.

Top players of the industry are encountering extensive adversity from all the stakeholders to follow the digital transformation (Cichosz et al., 2020). As only the large enterprises in the industry can afford cutting-edge technology, Kawa (2012) proposes a SMART model to promote collaboration between all the service providers on the market.

2.2 SMART logistics

SMART logistics is a relatively new term, referring to the model, which deploys information management systems to provide customers and other involved parties with information and allow continuous data flow.

Different types of Logistics Service Providers (LSPs) are distinguished on the market, depending on the services and resources they provide. These vary from companies providing transportation from point A to point B, to those companies offering to outsource the whole supply chain process, including planning, warehousing, and fleet. Depending on the business model, researchers differentiate 1 PL up to 10 PL (Majid et al., 2019).

A company, which is responsible for production, storage, and transportation of its own goods, is classified as 1 PL (first party logistics), if the company is only providing transportation, it is categorised as 2 PL (second party logistics). A company is referred to as 3 PL (third party logistics) when their portfolio has a greater scope, e.g., TMS (transportation management systems), packing and conveying the goods. 4 PL (fourth party logistics) orchestrates the whole supply chain of the firm, adapting to the client's

needs. The 5 PL (fifth party logistics) model has extended services, such as providing process optimization advice, lowering costs, and increasing performance.

Professionals in the industry have suggested future developments of the business models, which are not yet being widely applied, 6 PL, 7 PL, 8 PL, 9 PL (sixth, seventh, eighth, ninth party logistics) implies use of AI, automation, simulation and crowdsourcing respectively. The final concept, 10 PL (tenth party logistics) entails a self-aware system, which no longer needs human interference (Majid et al., 2019).

All these diverse business models and global companies on the market result in complications with metadata, since each one of them operates with a different information management system (Tang, 2020).

Logistics companies, apart from other services such as inventory care, at their core focus on providing transportation management. This includes the transport infrastructure and operational activities, executed by the employees. During the operational processes significant amounts of data is being created and exchanged, such as freight details, loading / unloading times and place, data about the goods and many more.

Businesses utilise IT in order to effortlessly communicate the information flow, automate the processes and develop their performance.

The scheme below presents the core concept behind the SMART model (*Figure 1*) which implies a mediating piece of automated software, acting as a point of contact between all the logistics service providers and the clients.

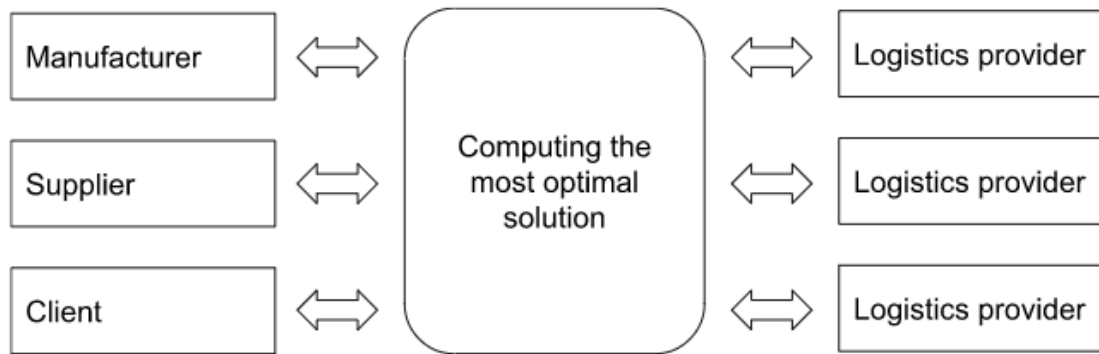


Figure 1. SMART model basic structure (Kawa, 2012).

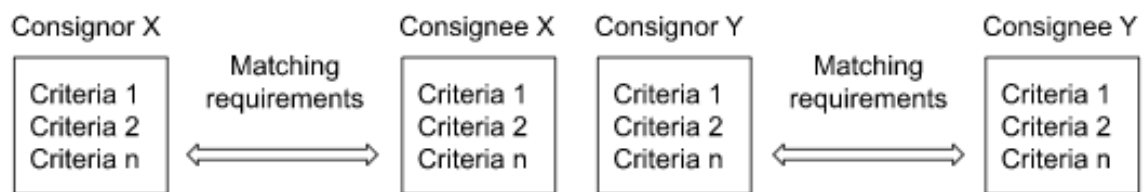


Figure 2. Computing Processes (Wang et al., 2020).

The model above (Figure 2) provides a possibility for various parties to exchange data in the same format and collaborate without the necessity to install additional software. Such data as load weight, vehicle measurements, mode of transport, etc. are matched for the client and the carrier.

Essentially, it is a safe cloud-based platform, where the network of service providers is available for the client, enabling competitive and equalised pricing for the whole market, and a possibility for improved capacity.

2.3 IOT and Big Data

Supply chain, transportation and freight forwarding are among the leading industries to adopt Internet of Things extensively (PWC, 2019). This internet-based hardware communication is one of the technologies which has been widely utilised in the supply chain industry, especially in the smart logistics approach. The IoT technology allows increasing efficiency, tracking, and updating relevant users as well as helping with the decision-making process by analysing received live, updated, and real-time data to navigate via the most optimal routing. Additionally, gathered Big Data helps in the

production processes, as analysing and predicting demand can give a better understanding of the production needs.

The complications associated with this technology are a wide variety of connected “things”; they operate on diverse frequencies, and different networks, along with the possibility of a cyberattack, can significantly sabotage the implementation process. In return, improved security and connectivity of IoT technology offer added value throughout the whole supply chain. Timely tracking of goods in the warehouse, following fleet location, process automation, and availability of all the operational data are all advantages of this technology (Ivankova et al., 2020).

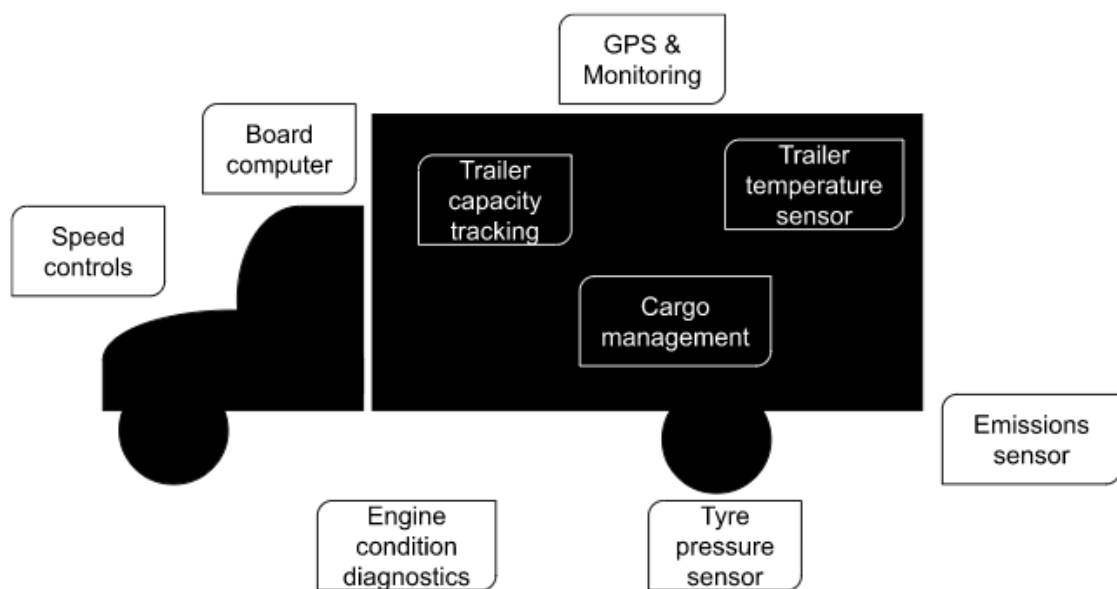


Figure 3. Possible application of IoT

The most widely applied technology for IoT is the Radio Frequency Identification system (RFID), which tracks and traces goods’ current location. This technology is commonly utilised for stock monitoring, as well as trailer space planning to optimise capacity use. Another popular technology is Wireless Sensor Network (WSN), which increases security, by alarming about possible theft or intruding.

Delivery process gains improved accuracy by utilising IoT and Big Data. Global Positioning System (GPS) allows tracking real-life location of the goods, estimated delivery timeline, whereas temperature sensors aid in keeping easily spoiled products within the recommended storage temperature (see *Figure 3*).

However, environment conditions may influence sensors and received data are sensitive to overcrowding, while requiring large amounts of electricity (Ding et al., 2021).

In order to acquire all the benefits of IoT and Big Data, the processes need to be standardised and methods to retrieve accurate and useful information have to be developed. Consequently, all the data and statistics provided by these technologies will facilitate the structure of the SMART logistics approach.

2.4 Blockchain

Blockchain technology has been rapidly gaining recognition amongst numerous different industries. Despite a rather slow integration pace due to uncertainty about implementation processes, this technology is “high risk - high reward” as it eradicates the need of a third party involved in a business deal, buyer and seller mutually reach the general agreement between each other, which makes transactions more transparent. Blockchain transcripts all the transactional history and enables its precise tracking as the data history is troublesome to sabotage (Pilkington, 2016). Since this technology is relatively new, businesses are sceptical to integrate it into their daily operations.

Nonetheless, the offered benefits of correctly incorporating Blockchain are outstanding, including lowered costs of each transaction, elimination of otherwise necessary processes, such as background credit check to assure the client/supplier's credibility. Ensuring simplified contract enactments and guarantee that all the parties fulfil the contractual agreements, documenting every transaction in the account books (Schmidt & Wagner, 2019).

Blockchain technology aids to solve such challenges of the supply chain industry as traceability of the compliance with the ethical standards and tracing back the origin of the goods, ensuring product legitimacy (Hackius & Petersen, 2017).

Apart from tracking the origin of goods, Blockchain provides the information on whether the goods were produced in an ethical manner, e.g., meeting minimum wage standards for the employees and following sustainability practices.

To have a chance at succeeding in implementation of this technology, companies must meet the competence requirements, which include not only IT capabilities, but also skilled employees and organisational scalability. As this technology operates on a network basis, another vital aspect is participation of all the partners, along with other parties in the industry, which might be challenging, considering top players might perceive change as a risk to their advantageous state (Hastig & Sodhi, 2020).

It has been estimated that up to a half of transportation costs can be matched by the necessary paperwork generated throughout the whole supply chain process (Difrancesco et al., 2017). However, real-world application of the technology did not eliminate the need to generate paperwork, but it backed-up the physical documentation onto Blockchain, only offering extended visibility to all the parties involved (Hackius & Petersen, 2017).

Security issues, associated with IoT implementation, discussed in the previous section, can also be addressed via Blockchain, to a certain extent. Overall, the advantage of transparency Blockchain is projecting might not be in favour of all the parties, as it requires sharing personal and corporate data equally from both carrier and shipper (Schmidt & Wagner, 2019).

Although companies acknowledge the added benefits of incorporating Blockchain into their business models, their investment strategies are rather doubtful, considering implementation and additional governance associated costs.

The research has shown that c-suite leaders are more enthusiastic, whereas mid-level management, who is more involved in the internal operation process, is rather cautious about Blockchain implementation (Hackius & Petersen, 2017).

However, it appears the market conditions are somewhat forceful upon the companies to stay relevant to the digital change.

2.5 FreightTech Platforms

Logistics is a data-controlled industry, and freight platforms are in great use for information gathering and sharing (Heinbach et al., 2022). Manually assigning and

matching loads is laborious and time consuming, email communications cannot keep up with the fast-paced demands of the market. It is a tedious process to find and match single loads when there are platforms available for these purposes. These platforms operate based on the crowdsourcing principle, meaning the service is seized from the users of the service (Buecheler et al., 2010).

Traditional freight forwarding is highly challenged by all the digital platforms available on the market. These platforms offer highly responsive on-demand distribution services, which help to reduce “empty” driving kilometres, resulting in achieving their environmental goals ahead of schedule. Additionally, e-commerce companies are switching from being a freight forwarders partner into developing their own transportation platforms (Hofmann & Osterwalder, 2017).

Most of these platforms are cloud-based solutions for the customers, which utilises AI to match cargo efficiently and logistics providers as road transport alone is highly challenging due to different equipment requirements, not to mention airfreight and container shipments via sea. Development of these platforms is the acceleration of digitalization of the logistics industry (Gulamov & Shermukhamedov, 2018).

In addition to digitalization, FreightTech platforms contribute greatly to the environmental aspects, such as reduced emissions and less negative impact on nature due to more efficient route and load planning.

Platform economy is considered as a sustainable substitute for the tedious process of traditionally manual labour for searching information to match carriers and loads for the transaction to happen (Poniatowska-Jaksch & Nowicka, 2021). Furthermore, Bierwirth (et al., 2002) describes the current freight platform situation of the road transport as a “marketplace” to find and/or exchange loads.

However, this model has evolved into tender platforms, fleet tracking system providers finding truck manufacturers, alongside with simple ad hoc bookings to match available capacity. Development of the current market has resulted in a new business model, where “digital” freight forwarders do not possess any fleet, but rely on data, user experience, standardised communication, and act as a mediator between the consignor

and consignee, providing possible additional services such as invoicing, monitoring of the load, shipment-related information, and documents (Heinbach et al, 2022).

All the technology mentioned in this chapter contribute to freight resource sharing platform (FRSP) facilitation and the concept model of SMART logistics can be observed from the image below (*Figure 4*):

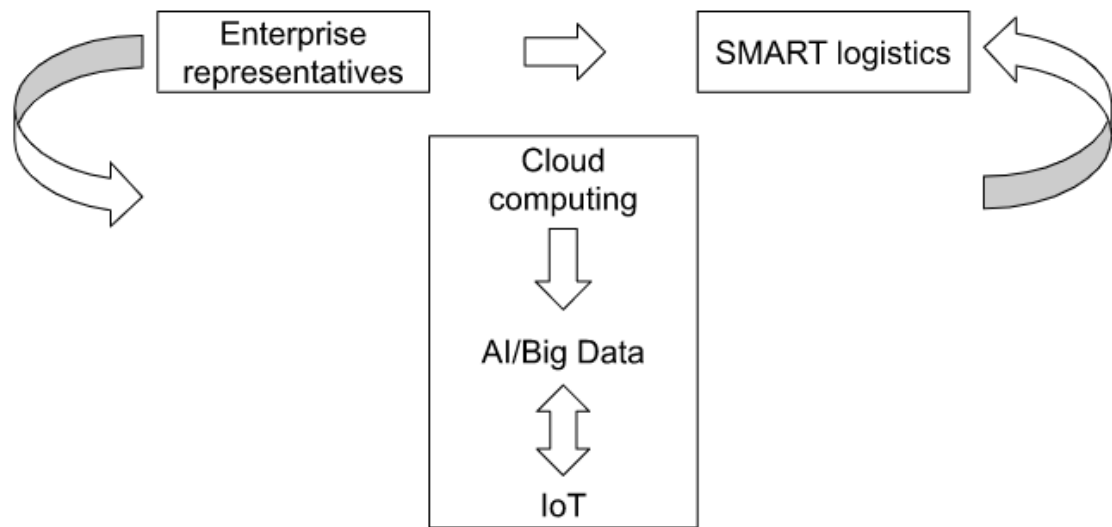


Figure 4. Concept Scheme of SMART logistics (Ding et al., 2021).

2.6 Digital Literacy

For the scope of this thesis, an aggregated term digital literacy is used to describe one's ability to work with technology (Lankshear & Knobel, 2015). This phenomenon is of interest in this thesis as it characterises a set of different skills, which are applied in order to operate with acquisition, retrieval and sharing of information to perform certain tasks via digital tools. The term was first coined by Paul Gilster (1997), and during over twenty-five years of its existence it has been ambiguous and expanded dramatically, resulting in communication challenges during the development of the learning solutions and training materials (Eshet-Alkalai, 2004).

According to Belshaw (2012), digital skills are the first layer of digital literacy and serve as a basis for the further application and development of it, starting with everyday

utilisation in the professional setting, then progressing onto producing knowledge with the digital tools (see *Figure 5*).

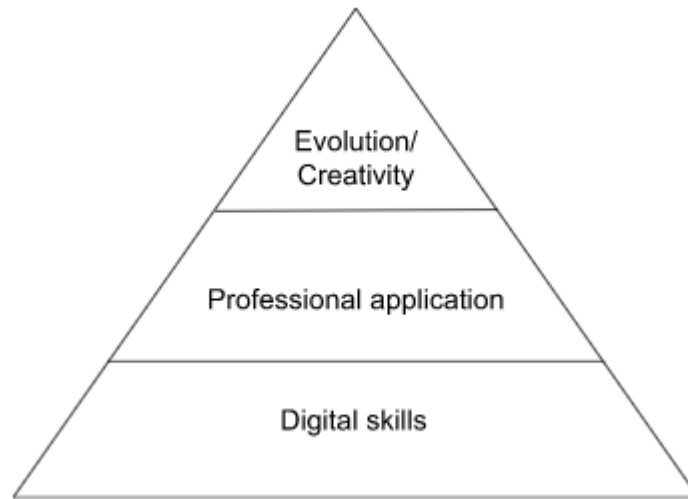


Figure 5. Layers of Digital Literacy (Belshaw, 2012).

His research states that from the governmental approach, digital literacy is a tool to facilitate equality as it enables access to socio-economic services for all. The authorities view ICT and digital literacies, alongside reading and writing, as making a person literate. A comparison of worldwide attitudes towards the incorporation of digital competences into daily operations has revealed the term's shift towards critical thinking, and the ability to analyse and create information.

However, some countries more than others perceive digital competence as a driver of the digital economy, including equating the employment market.

Unlike terms such as “digital natives” (generations who have been exposed to technology from an early age) and “digital immigrants” (generations who had to learn how to operate technology in their adolescence), which are, by definition, limited to a certain timeframe, “digital literacy” is ever evolving and vague. Additionally, circumstances and users of the term majorly influence the meaning of it. As interpretation of digital literacy may vary from one's ability to filter information using analytical skills to one's ICT competence, resulting in the necessity to view the term in context.

Moreover, according to Eshet-Alkalai (2004), there is no distinct definition of one's competence, as it is rather a spectrum, with the following defined components:

- Comprehension of information
- Creating new information
- Retrieving non-obvious knowledge
- Analysing the legitimacy of information

The fourth component “analysing the legitimacy of information” implies being familiar and following the rules of cyberspace. Whereas Belshaw (2012) argues that it is important not to only recognise the rules, but it is users' responsibility to be responsive and act promptly in accordance with their liabilities. The totality of all of these factors helps in withstanding the barriers of the current world and prospering in a professional setting (Eshet-Alakalai, 2004).

According to Huvila (2012), digital literacy and information services partially have common grounds and are comparable in their ambiguity. His statement includes a belief both phenomena address the same issue from different perspectives, and digital literacy is one's proficiency, which helps them to adapt to a digitalising environment (*Figure 6*). Additionally, he expresses an observation of greater complexity of technology hindering regular user's ability to acquire knowledge with ease.

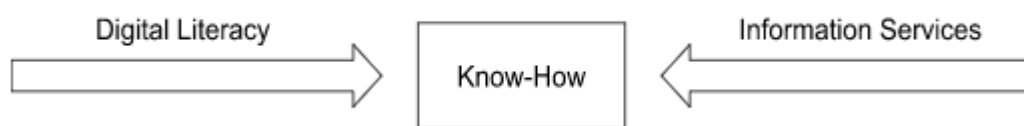


Figure 6. Approaches to know-how (Huvila, 2012).

3 CONCEPTUAL FRAMEWORKS

This section of the thesis describes and reviews research and practice which are further used as a basis for formulating the research methodology and questionnaire design.

3.1 Employee Perspective

As the digitization process in companies progresses, the firms' business strategies are being developed to accommodate the procedural developments. However, the action plans tend to be heavily focused on fundamental business operations, functions, and business processes. Despite digitalization being one of the top interests for businesses, the successful integration rate is less than one in three. External stakeholders and IT infrastructure received extensive attention from academic scholars and market research firms, whereas employees might get neglected. In recent years, the challenge associated with the digitalization process slowly shifts from technical capabilities to adapting company mentality, employee perception and expertise to integrate the new normal (Boutetière, et al., 2018).

The personnel need to adjust and evolve their hard skills to fit the digital transformation of the business and daily operations and be able to sustain it further, which is a challenging but fundamental concern. Existing employees' set of skills and attitudes might not match the new digital agenda of the enterprise resulting in the need to administer an evaluation of the current processes and capabilities in order to construct an optimal training programme (Matt et al., 2015).

Majority of the current research in the field of logistics transformation emphasises the consequences of digitalization on the business performance, rather than on the digital literacy and capabilities of the employees who facilitate that transformation. Although it is the knowledge workers who face these systematic changes in their daily operations, it appears that discussions gravitate towards focusing on technology and economic performance (Wang and Haggerty, 2011).

Since digital competence is a crucial skill in the current job market, numerous of job positions are susceptible to drastic changes forced by technology. There is a higher level of job insecurity for employees exposed to technology changes that replace their skills. This may not come as a surprise, considering the frequently made public statements, which tend to focus on job destruction as a result of innovation. As a result, even

employees who have benefited from technological innovations in the past may still be uncertain about the future (McGuinness et al., 2021).

As has been discussed earlier, logistics, like any other field, heavily relies on big data, and scholars have been rather focusing on a single skill (like data analytics), whereas extensive research on digital competencies in regard to certain industries is rather limited (Murawski & Bick, 2017).

In accordance with the affordance theory, employees interpret their interaction with the digital tools in the context of the (company's) social norms and interaction with other employees, which results in "collective digital literacy" (Wang et al., 2018).

Consequently, it can be concluded that an enterprise's digital transformation effectiveness is compelled by employees' ability to understand when, how and why to apply digital tools. Thus, digital literacy of the users assists in reaching the full potential of digitalisation as it implies not only the knowledge of the tools but also the understanding of the possibilities unravelled by technology (Kozanoglu & Abedin, 2020).

In addition, and based on technology adoption, acceptance, and decision-making models (Liao et al., 2009) and their peers have proposed the Technology Continuance Theory (TCT, *Figure 7*). The theory is based on models, which aim to explain users' perception of technology.

In the earlier stages of information systems adoption, satisfaction directly affects one's perceived usefulness of that technology and initial attitude of the users has less of an impact on the further technology adoption. However, in the long-term application of the information systems attitude dictates the successfulness of the technology adoption.

Nonetheless, both attitude and satisfaction have a great impact on the technology adoption process. Attitude is one's assessment of the system and is based on the user's prior experiences whereas satisfaction is based on the degree of fulfilment of the pre-existing expectations. Satisfaction and attitude are influenced by distinct aspects, all of which should be considered during the digitalization process planning.

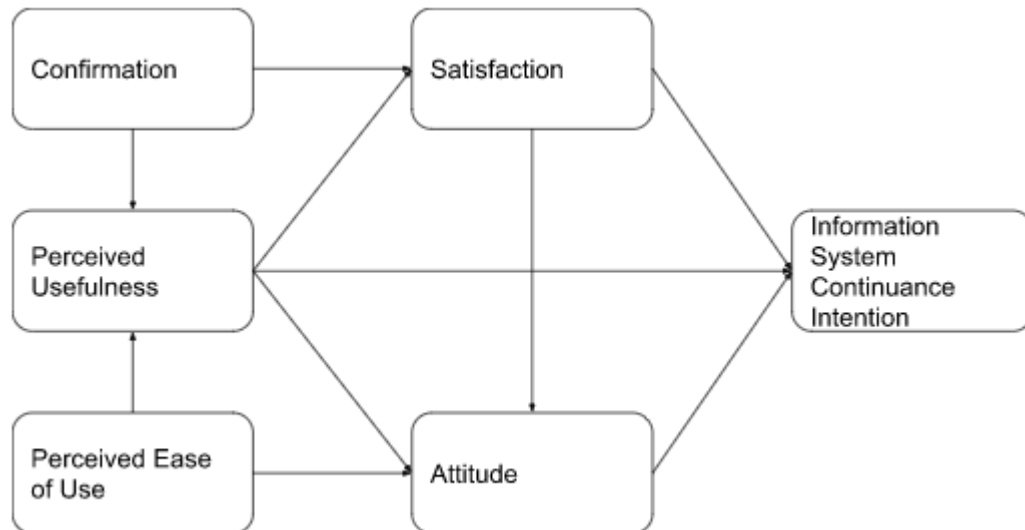


Figure 7. The Technology Continuance Theory (TCT) (C. Liao et al., 2009).

3.2 Digital literacy assessment

Employees and digital workers utilise and obtain a broad range of digital skills and practices daily. While the importance of employees in the digital transformation process is well supported by research, the importance of the employees' digital literacy and related concepts are yet to be studied. Hence, many organisations opt for online learning management programs to keep the workforce knowledgeable and upkeep the office productivity.

It is crucial to assess the knowledge and learning capabilities of the workers to deploy correct techniques and learning (Kozanoglu & Abedin, 2020).

Research carried out by Lee et al. (2011) and peers, has found that perceived ease of innovation has a positive impact on perceived usefulness. Furthermore, researchers have described digital literacy apart from one's proficiency and competence, but also as the user's perspective of technology (Holtkamp et al., 2015; Winterton, 2009).

Employees' digital literacy is challenging to indicate with one common principle as it varies throughout different business sectors. There is no one description for the term digital readiness as it applies to a variety of business aspects. However, Nasution (et al. 2018) characterises the term as preparedness of corporations, its employees, and other involved parties to endorse and employ digital technology in the most advantageous ways. Moreover, Horrigan (2016) emphasised employees' skills to adopt the technology.

Self-assessment (or peer-assessment) is one of the most common methods of distinguishing one's digital skills, literacy, and knowledge levels in the organisations. Previous research distinguishes areas of expertise within the digital literacy concept such as safety in the digital environment, ability to retrieve information, perception of the characteristics, etc. Throughout literature, approaches vary from more applied to more pragmatic evaluation criteria. Nonetheless, most of the researchers agree that the ability to critically evaluate how digital tools can be applied to improve work processes and the employees are able to evaluate the best approach for their tasks. Workers' digital literacy also includes critical assessment of the information's origin, its trustworthiness and authenticity. Consequently, cognitive abilities concerning technology and digital tools may be seen as more substantial than one's ICT proficiency (Gilster, 1997). Additionally, the ability to communicate is often mentioned as a part of digital literacy assessment, employees not only obtain information, their expertise in transmitting information into knowledge is crucial. Intake of information and creation of knowledge is an essential aspect of digital literacy (Hall et al., 2014).

4 RESEARCH METHODOLOGY

This chapter describes the research methodology, the scope of work and the process of data collection to address the thesis' research questions:

RQ1 - How do employees feel about the digital transformation of their industry?

RQ2 - What are employees' attitudes towards digital literacy and new technology?

RQ3 - What is the employer's role in technology adoption for the daily operations?

As the research questions imply self-awareness of the employees, as well as their opinion on topics related to the industry and their company.

Due to the research questions being based on the opinion and feelings of the employees, the descriptive research was chosen. This method was found to be the most suitable for the study and the data gathering process presented by a two-phased approach is found to be the most suitable. Both rounds are presented as an online survey among all the employees and are voluntary to answer. According to Greener (2008), qualitative research aids to create knowledge and have various subjective viewpoints as opposed to trying to discover them within the existing theories.

For the purpose of this research, a skill audit framework was used as an inspiration, in order to identify the current situation of the company (European Commission, 2019). Employees are given an assessment survey, to distinguish where the participants see their digital skills to be, as well as their approach in relation to technology and digitalization for themselves, the industry, and the company. This will pinpoint the starting skill set for the research and then further anticipate the attitude to innovation and digitalization for the employees. It is a common practice to offer a skill audit possibility to people looking to transition between different industries. and in the case of this study, point A is the current situation and point B is the digitalized future of the transportation industry.

Primary data represents a self-assessment of one's digital literacy and overall self-identification with correlation to a daily use of ICT.

An anonymous survey is sent out to all the employees for self-assessment and among the first-round participants, a few individuals are selected for gathering secondary data

and investigate further their preparedness for the logistics industry IT related developments.

The first round of the data collection is a survey sent out to all the full-time employees and the respondents will be assigned numbers such as *employee 1*, *employee 2*, *employee 3*, etc. when presenting the results of the research.

After the first round of surveying, a few respondents will be randomly chosen for the second round of laddering questions to elaborate on their answers and get more comprehensive information.

4.1 Research in Logistics

Researchers in the logistics field continue to extend their coverage area to other aspects of the industry such as management, marketing, technology, and strategy (Mentzer et al., 2001).

A publication by Craighead (et al., 2007) aimed to investigate the tendencies of the research approaches in the logistics field over the past few decades. In the late 90-s only under five percent of the content of scientific articles in the logistics field were case studies. Since then, academic journals in the industry have become more open and accommodating towards qualitative research, and case studies are gaining popularity among the research community.

The authors analysed 157 publications within a decade from highly ranked peer-reviewed journals from 1993, 1998 and 2003. Results showed that within the given timeframe the amount of survey-based research articles has grown by eleven percent, whereas scoping reviews, concept publications, Scope Quantitative Literature Review (SQLP), and analogous research decreased by twenty two percent. The authors observed the "domino effect" as qualitative case-studies notably gained more interest within the peer community and high-quality publications of this type have been "approved" by the researchers in the field.

Overall multi-methodology research can aid to capture all the aspects of the industry development, the authors suggest using the triangulation method, which implies several approaches and datasets are combined to capture a greater scope of opportunities (Craighead et al., 2007).

4.2 Data collection

As the research is carried in two phases, the data for the first phase was collected during April 2022 by sending a link with a self-assessment questionnaire to all the employees. There is a disclaimer in the beginning stating all the answers are anonymous and only variables contributing to the research are required to be answered.

The first survey was shared via work email addresses and had a week to be answered. The reason for such a relatively short deadline is the number of recipients, as the link was sent to about twenty receivers. This survey can be viewed in the appendices section, it was meant to familiarise the participants with the term digital literacy, observe how familiar they are with the current trends in the industry and get a preliminary overview of their opinions. For both phases of the study, a qualitative approach was chosen as sample size is small and more detailed answers are favoured.

4.3 Implications

Due to the COVID-19 pandemic and the employees working remotely or in a hybrid manner, the interviews were conducted virtually, which limits the impersonal connection. This could result in, for example, then the respondent is unsure or needs a leading question, the author cannot provide additional in-person information and many respondents prefer to leave the question unanswered rather than seek for help.

Another possible implication associated with gathering the data is the subjectiveness of judgement of the respondents. The survey includes their self-assessment, which is a subjective evaluation. However, one of the objectives of this thesis is to provide feedback for the systems and employees, who operate with them daily are trusted to have the most precise perception.

4.4 Phase one

The first questionnaire contains twelve mixed questions, starting with the background information, including gender, age, and education to give an idea of the sample group without compromising anonymity. The questionnaire offered participants a variety of question structures, such as open-end questions, multichoice and linear scale evaluation. The following questions were in the questionnaire (*Table 1*):

Table 1. First questionnaire

1	Evaluate the importance of digital literacy in your daily tasks. Where digital literacy, is one's ability to find, evaluate, and communicate information through communication technologies.
2	How do you feel about the state of digitalization of the freight-forwarding industry?
3	How do you feel about the state of digitalization in your company?
4	Please describe in one word (shortly) how you feel about your company's digital tools, e.g., how easy, or hard it is to find and retrieve information.
5	Select which statement about you is true <ul style="list-style-type: none"> • I need assistance with certain ICT-related issues • I deal with daily ICT tasks with ease • I feel confident in my digital literacy • I could perform better with increased digital literacy
6	Please evaluate this statement: My digital literacy is proficient enough to keep up with the possible ICT updates in the company.
7	Please evaluate this statement: My digital literacy is proficient enough to keep up with the possible ICT updates in the company.
8	How effective is your company's current training for your digital competence?
9	Are you a proactive user of new technologies implemented into your everyday work?
10	Please evaluate how familiar and adequate do you feel about the following topics: Artificial Intelligence (AI), Internet of Things (IoT), Transportation Management Systems (TMS), Blockchain, Automation

4.5 Phase two

Phase two is designed as individual interviews to compensate for potential lack of data from phase one due to the limited sample size. Five employees were chosen on a voluntary basis to answer the following interview questions (*Table 2*):

Table 2. Second questionnaire

1	Such technology as Blockchain and Big Data, store all the transaction
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	information, allowing more transparent transactions and helping to avoid monetary fraud. What is your opinion about it?
2	Has technology simplified your daily tasks, for example has Electronic Data Interchange (EDI) simplified the booking process in your daily operations?
3	How do you feel about the company's current approach to digitalization?
4	How do you feel about starting to use new platforms that are/will be implemented?
5	Please describe your opinion on self-driving vehicles (this might solve driver shortage).
6	Do you feel like all your digital competence is applied to your everyday tasks?

5 ANALYSIS AND INTERPRETATION OF RESULTS

This chapter includes analysis and interpretation of the acquired answers from both surveys for phase one and phase two. The results are first analysed separately, then the general perspective is discussed in the following chapter.

5.1 Phase one

5.1.1. Background

The first round of questions was sent to all the employees of the company, resulting in 21 emails delivered in total. The response rate was 86%, which is an equivalent of 18 participants. The respondents included experienced employees, working in the case company (and with its systems) for over 15 years and trainees who were still on their probation period (newly introduced to the company's systems).

The core structure of the organisation includes customer service team, operational personnel, and sales. Each team has digital tools and software which is specific to it, nevertheless, there are many shared systems which are in use by all the teams.

Within the organisation 41% of the participants are between the ages of 30 and 40, which is just 6% less than the majority, who are under 30 years old (*Figure 8*). Consequently, nearly 90% of all the respondents are “digital natives” (Prensky, 2012).

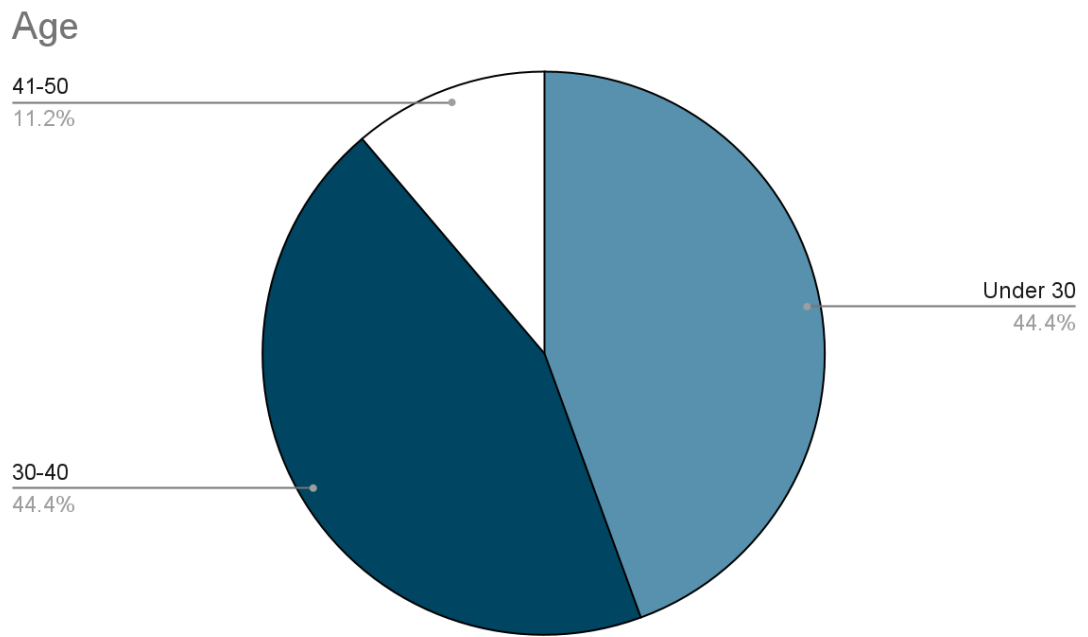


Figure 8. Age of the respondents

5.1.2 Tools in use

Apart from the Office Suite, employees utilise communication, performance, and operational planning-related software (*Figure 9*).

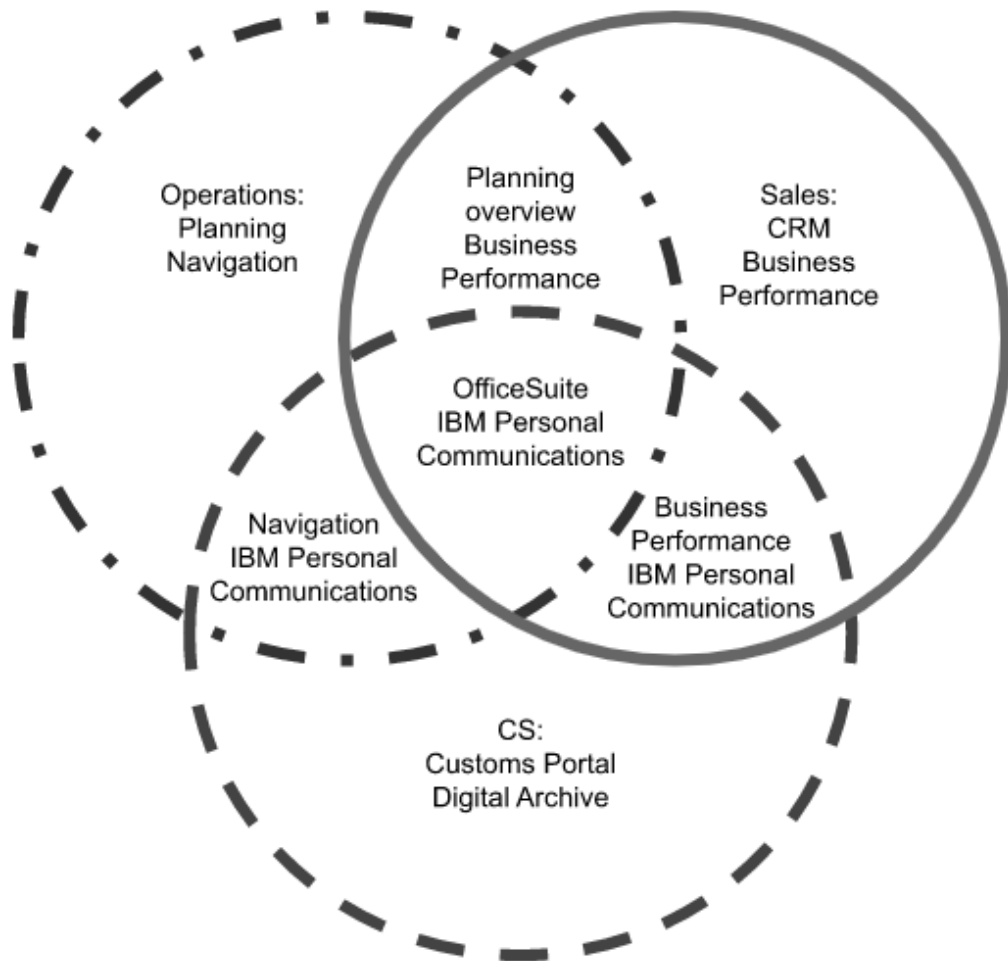


Figure 9. Digital tools used by each department.

As can be observed from *Figure 9* every employee receives, handles, and shares the information within different platforms and operating various digital tools. Despite employees being “digital workers”, implying digital tools is a basis for the everyday job, a trivial number of employees stated the importance of digital literacy as being

slightly important or neither important nor unimportant (*Figure 10*)

Evaluate the importance of digital literacy in your daily tasks. Digital literacy, is one's ability to find, evaluate, and communicate information through communication technologies (ALA, 2017)

18 responses

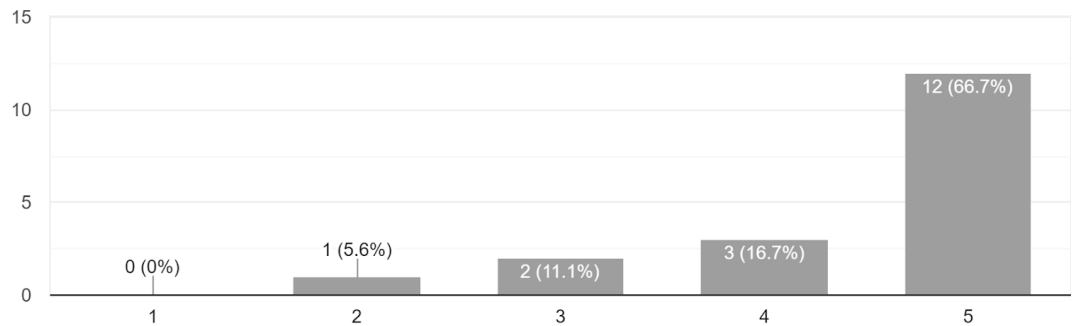


Figure 10. The importance of digital literacy.

It is interesting to note, however, that both questions on the state of digitalization of the logistics industry and on the state of digitalization of the case company received “adequate” as the most voted choice by far from the employees (*Figure 11 & Figure 12*).

How do you feel about the state of digitalization of the freight forwarding industry?

18 responses

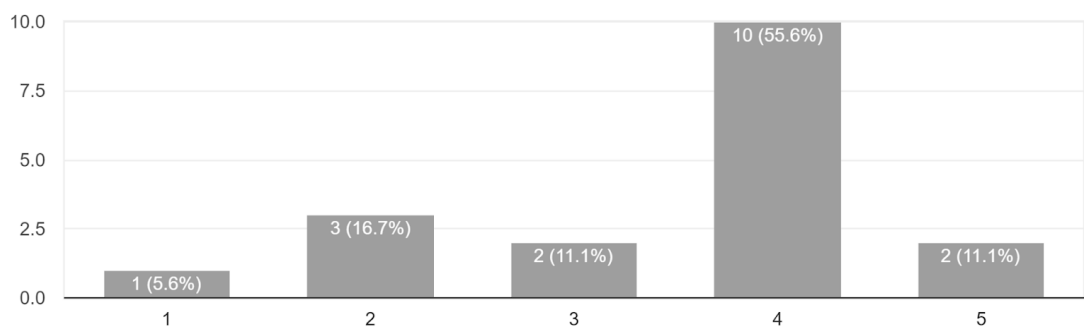


Figure 11. State of digitalization of the logistics industry.

How do you feel about the state of digitalization in your company?

18 responses

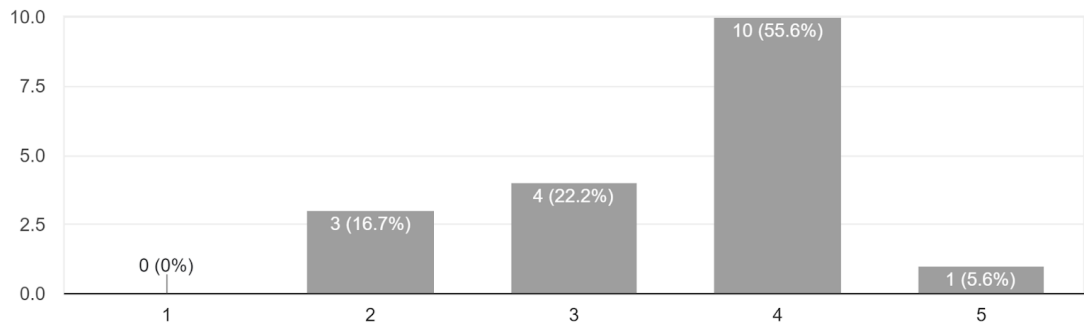


Figure 12. State of digitalization of the case company.

For the open-end question on how the workers feel about the current tools available for them the following answers were received:

Table 3. Short open-end answers

1	Relatively easy
2	Could improve
3	Needs to be upgraded
4	Underwhelming
5	Several
6	Okay
7	It takes time to learn, but after good training it is ok. It takes time to understand all things.
8	Frustrating
9	Hard
10	Hard
11	I think it is ok but it could be better. There are ways to do things more efficiently.
12	They are usually easy to find however, sometimes complicated to retrieve information.
13	Slowly improving
14	Good

15	There are many different tools, and they are not necessarily cooperating with each other.
16	Developing

These answers have been grouped into four categories (Positive, Room for improvement, Negative, Complexity of the systems), and an answer does not necessarily belong to one group only, the graph below shows the division (*Figure 13*):

Answer classifications

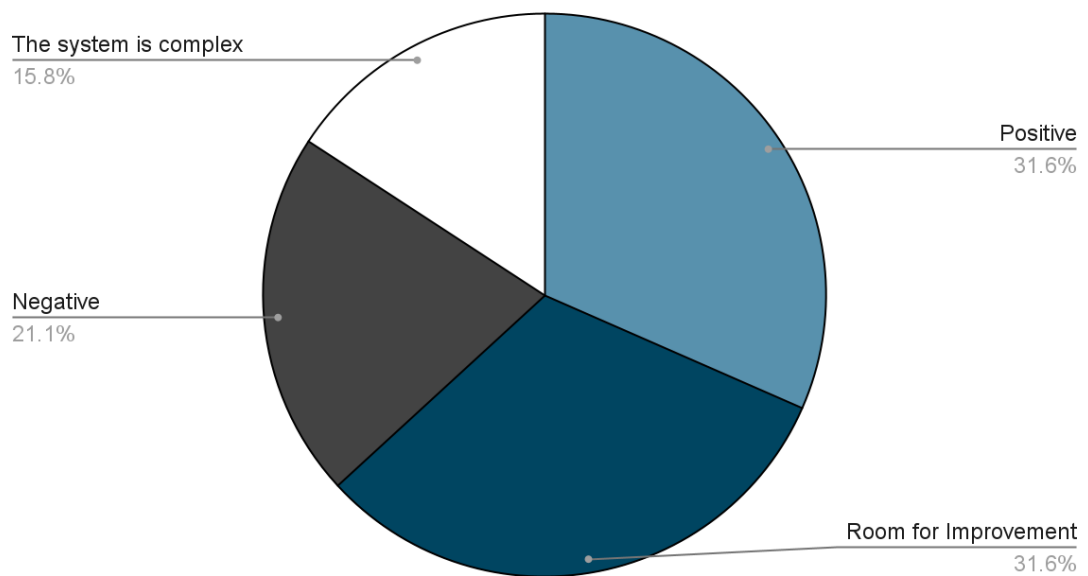


Figure 13. Feedback on the current available tools.

5.1.3 Self-evaluation

The participants were asked to self-assess their relationship with ICT and evaluate their digital literacy. Slightly over 33% of the respondents have stated they deal with daily ICT tasks with ease. However, twice as many employees said their performance could improve with increased digital literacy. By comparison, more workers feel confident in their ICT skills than people who need assistance with certain ICT-related issues. One fourth of the respondents stated they are not at all confident their digital literacy is sufficient to sustain possible updates in the company's systems, contrary, six employees felt strongly confident in their proficiency (*Figure 14*).

Please evaluate this statement: My digital literacy is proficient enough to upkeep with the possible ICT updates in the company.

18 responses

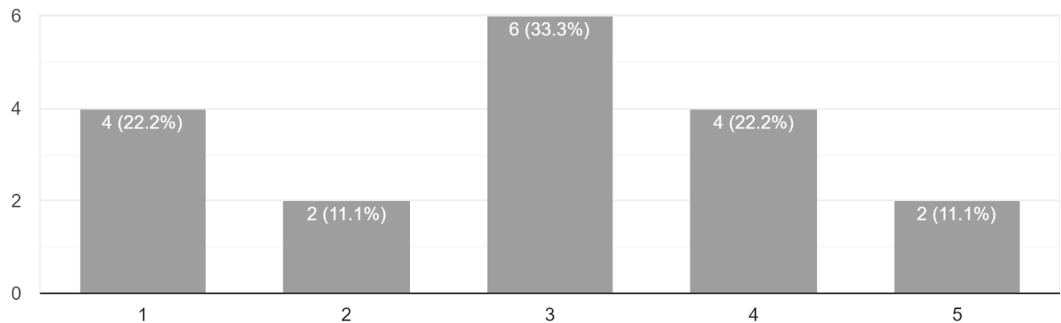


Figure 14. Digital literacy proficiency self-assessment.

In section two of this thesis new technology trends in the logistics industry were discussed, the respondents have been asked to evaluate to which extent they are acquainted with the terms such as AI, blockchain, automation, IoT and TMS. The most familiar and the least familiar phenomenon for the employees is TMS. Despite using it daily for planning, navigating and other operational tasks. Two of the most foreign technologies are blockchain and AI (see Figure 15).

Please evaluate how familiar and adequate do you feel about the following topics

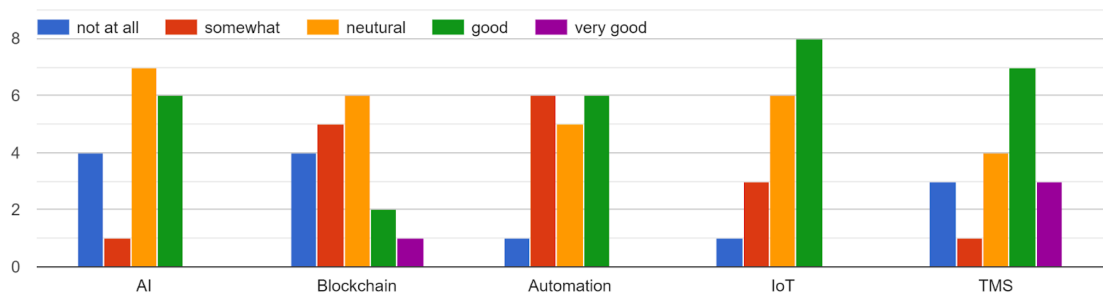


Figure 15. Familiarity with different technologies.

5.1.4 Company updates and training programme

As has been discussed in the previous chapters, training is an essential tool for keeping employees updated regarding a company's updates. Thus, employees were asked if the company's current training is effective for their digital competence and most of the

workers were neutral, while strongly agree and strongly disagree had an equal number of votes.

Recently, the case company has introduced a new approach with monthly topical training modules and generally, more people are satisfied with the current available training programmes. A reminder email is sent together with the new modules to suggest the workers of the missing courses.

Despite the implementation of new tools, employees do not always strive to use them. Several reasons such as fear, and uncertainty might be the cause.

The respondents of this thesis were asked if they are proactive users of new technologies implemented into your everyday work. And the results show that employees of the case company are rather open-minded and eager to accommodate the changes in the systems provided by their employer (see *Figure 16*).

Are you a proactive user of new technologies implemented into your everyday work?
18 responses

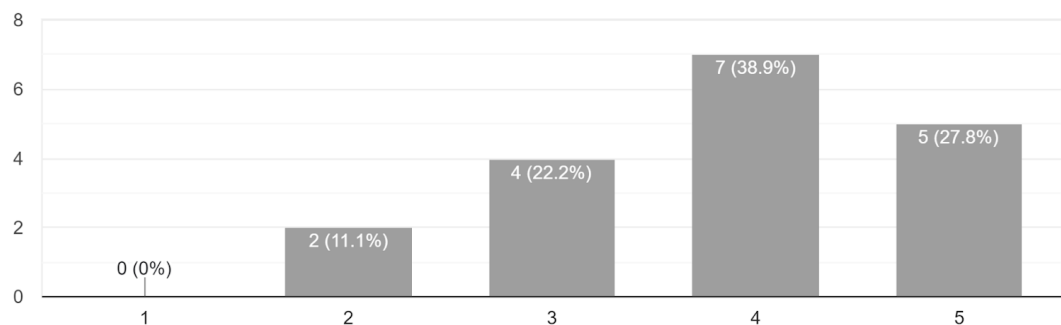


Figure 16. Proactivity in new technology use.

5.2 Phase two

The tables below in the appendix section present each of the six randomly selected / volunteered employees' responses to the laddering questions of the phase of the survey. The respondents were dominantly female and "digital natives".

Worthy to note, the respondents experience with the case company's systems varies between two months and six years. Some of the workers were employed recently and only had a short period to familiarise themselves with the tools, whereas others had routine work with the software for years.

The basis of the analysis method is chosen to be the thematic content analysis (Vaismoradi et al., 2016).

The interview answers went through the following segmentation phases, also known as thematic content analysis and four phases are distinguished as following:

1. Familiarisation with the answers – reflecting
2. Labelling data and creating categories - comparing
3. Making sense of the segments - defining
4. Searching for patterns - finalising

Overall, the respondents had found positive correlation between technology and transparency offered by it:

“My opinion is that blockchain creates a trust-inspiring technology. The possibility to make transactions without compromising privacy and the technology combines transparency and security.”, - Interviewee one.

However, it is interesting to note that most of the respondents only showed positive attitude towards transparency, without necessarily linking technology into the equation:

“I think everything that makes things more transparent & helps to avoid monetary fraud, are necessary.”, - Interviewee five.

“I support transparency in business, production processes and operations and I believe it should be encouraged.”, - Interviewee four.

5.3 Observations and development possibilities

Based on the responses above it can be concluded that despite some users being satisfied with the systems, improvement of the systems is certainly demanded by the majority. The most mentioned concern from all the respondents was complexity of the systems. Consequently, simplification of the existing platforms and training of the personnel is a development possibility. Additionally, encouragement to participate in the training programmes and start applying new methods of operating is seen to address current issues.

Overall, the employees are in favour of utilising technology for industry advancement, transparency, which shows they are open to learn and change.

The workers seem to perceive technology as a tool to ease their everyday workload due to process automation as well as a tool to improve the market situation of the transportation industry rather than a threat.

However, some respondents had an opposite opinion with scepticism towards technologies, which result in drastic changes in the labour market:

“... of course it's a little scary, and it also means it's less work for the people. So I am against it”, - Interviewee three.

Some sectors of the transportation industry are rather established and rigid to change:

“ I believe that especially the trailer transportation industry is fairly traditional and maybe not as keen to be innovative”, - Interviewee two.

It is important to note that the respondents also mentioned the transition process from the old to the new systems is rather lengthy and requires parallel work on both platforms:

“The problem is, often implementation of new software/platforms/systems is very time consuming and can take even years before being fully running and available for the whole organization. Due to this, people often need to work alongside the old and the new systems and this can be frustrating.”, - Interviewee six.

Some of the respondents stated their digital skills were not applied to their full potential in their daily tasks, which means operating systems could be developed more advanced. Moreover, as was reported by the employees their workload is quite high and the routine tasks consume considerable amounts of time. Automation of these patterned procedures can ease their routine responsibilities, which gives them more time to focus on more complex duties.

6 DISCUSSION AND LIMITATIONS

This chapter of the thesis examines the subjectiveness of the research results and reflects the findings in accordance with the literature review and theoretical framework analysed in the prior chapters.

Additionally, this chapter addresses the research questions with regards to the research data gathered via the questionnaires and the interviews. Evaluation of the performed work such as success, limitations and alternative routes for research are also presented in this chapter.

6.1 Results reflection

All the industries are affected by digitalization and transportation is no exception. It is safe to say automation has drastically altered traditional processes and approaches, replacing monotone manual tasks with procedure computerisation, creating new business model possibilities. Business models are moving towards abandoning human involvement and process automation. Consequently, many publications focus on the value creation and the business-oriented perspective for the enterprises, neglecting the human aspect: “*Digitalization is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities [...]*” (Gartner glossary, 2015).

Digital literacy is a complex term, and the components described in chapter two, such as comprehension, analysis and obtaining of underlying information have been addressed in this paper. Additionally, the literature review chapter raised the topic of complex systems hampering information retrieval, and this study has confirmed that employees feel overwhelmed by complicatedness. The research has revealed that system implementation and acceptance depend majorly on employees' attitude, and in this case company employees were rather eager and enthusiastic about digitalization. However, as satisfaction is another factor for successful technology adoption, paying attention to introductory training, which gives employees a state of comfort is crucial.

Knowledge workers possess numerous digital skills, and it is yet to determine which ones need to be paid special attention to on a case-to-case basis.

Although complex systems can make it difficult for employees to obtain information, there are many reasons for optimism on this topic. First, technological advances have made it easier than ever to access and manage large amounts of information. As

machine learning and artificial intelligence continue to evolve, we can expect these tools to become even more powerful and effective at organising and retrieving information. Additionally, organisations can take steps to improve information retrieval by implementing easy-to-use interfaces, training, and supporting employees, and fostering a culture of knowledge sharing and collaboration. These strategies empower employees to navigate complex systems and access the information they need to do their jobs successfully. Ultimately, by prioritising effective information retrieval, organisations can improve employee productivity, job satisfaction, and overall success.

6.2 Addressing RQs

The initial research questions are addressed in this chapter to identify if the carried research has answered all the appointed objectives.

RQ1 - How do employees feel about the digital transformation of their industry?

The knowledge workers in the logistics and freight-forwarding industry see the possibilities of automation being advantageous to avoid the routine tasks, ease their workload as well as the digital tools being an aid to both the transparency and the ethicality of the supply chain. However, some automation-affected tasks such as autonomous vehicles were met with rather sceptical reactions.

RQ2 - What are employees' attitudes towards digital literacy and new technology?

According to the results of this research, the employees of the case company are open-minded and receptive to the digitalization processes in the logistics and transportation industry. Majority of the workers try to incorporate new digital tools.

RQ3 - What is the employer's role in technology adoption for the daily operations?

The employer's role in technology adoption is crucial. Naturally, people are resilient to change and altering the usual processes, operating in the ways they are accustomed to. Thus, it is in the businesses best interest to promote alternative approaches to increase productivity.

The results have mainly supported existing literature and studies on similar topics, unveiling additional aspects such as improvement areas for the case company from their employees' perspective.

The previous research by Matt et al. (2015) suggested that IT implementation strategies were primarily concerned with the technical aspects of implementing digital tools, such as infrastructure execution and system management, rather than focusing on the business value they could offer. However, current research contradicts this notion by arguing that the implementation of digital tools must be aligned with business goals to achieve desired results. In today's digital age, businesses cannot view technology as just an infrastructure issue, but must consider the role of technology in creating value for their customers and stakeholders. Therefore, it is essential that organisations take a business-centric approach to IT implementation, considering the potential impact on operations, customers, and overall business strategy.

6.3 Contributions and Limitations

This paper has made theoretical contributions to the existing studies in the fields of digital literacy and logistics digitalization. The first aspect is a theoretical input to the gap of the existing publications. The second aspect is unveiling the current processes for the case organisation and suggestions of improvement points by evaluating the strengths and weaknesses from the employees' perspective. Additionally, providing a practical application for the case company if they shall implement the suggested changes.

The research can be utilised by the companies with the similar business model regardless of the industry.

This research is limited by the current state of digitalization and technology adoption by the case company and might vary in relevance as the progress evolves. Additionally, the business model of the case company limits relevance of application. As has been discussed earlier the transportation industry has many different operating aspects and varies from more progressive business models to more traditional structures.

As previously noted by Huvila's (2012) research on digital literacy emphasises the importance of considering emotions when conducting future studies on this topic.

Feelings, attitude, and scepticism play a crucial role in shaping individuals' engagement with and understanding of digital technologies. For example, individuals may feel anxious or intimidated by technology, or they may hold negative attitudes towards its

use due to past experiences or cultural beliefs. Scepticism is also a barrier to digital literacy, as individuals question the trustworthiness of information they find online and are reluctant to trust technology in general. Future research on digital literacy should therefore seek to recognize and address these emotional and psychological factors, in addition to focusing on technical skills and knowledge.

7 CONCLUSIONS

This chapter of the master thesis concludes the work performed, describes, and discusses key findings that have been discussed previously. This study has revealed that employees are eager to obtain new knowledge and tools. However, the transition process needs to be studied further and such questions as change management and training personnel can be elaborated in a separate study. Additional expansion of the sample size and business model types could be of interest and importance. As this paper excluded special modes of transportation: refrigeration requiring goods and airfreight, milkruns, etc.

During the research process, it was found that a certain degree of scepticism in technology is present within the knowledge workers. A possible reason for that could be unfamiliarity with the technology principles and a rather new concept that has not been proven safe and reliable on a broad scale. Consequently, familiarising employees through training and workshops might be a possible solution to improve ease of perception. The following conclusions can be drawn based on the research results: enterprises need to approach their digitalization processes while considering their employees as the end-users for the tools.

8 FUTURE RESEARCH

This paper has discussed current and future digitalization tendencies and trends in the logistics and transportation industries as well as preparedness of the employees to adjust and implement technical and structural business changes, adopt new tools and technologies. Methods and findings similar to this research can be applied to other knowledge workers involved in different industries, also undergoing digitalization processes. This thesis has revealed additional topics such as optimising change management when shifting from old systems to the new systems, which can be a further research topic.

In order to access a deeper and broader understanding of the subject, further research in the field with diverse samples is advised. Sampling may include other business models and organisations with contrasting age groups as most of this case study respondents were rather similarly acquainted with digital tools.

Future research on digitalization trends in the logistics and transportation industry should focus on employees' willingness to adapt and implement technological and structural business changes and adopt new tools and technologies. The digitization of these industries has already begun and is likely to accelerate in the coming years. As a result, employees must have the necessary skills and knowledge to effectively manage these changes. This includes not only technical skills, but also soft skills such as adaptability, collaboration, and communication.

Research helps identify the specific competencies that are most important to success in this context and effective strategies for developing these competencies in employees. In addition, future research should also examine the impact of digitization on the broader social and economic landscape.

As the logistics and transportation industry becomes increasingly automated and digitised, this could have significant implications for employment, income inequality, and other aspects of the labour market.

Researchers can play a key role in assessing these effects and identifying potential solutions to address their adverse effects. Ultimately, the readiness of people to adapt to and implement digital change, as well as a better understanding of the far-reaching social and economic impacts of digitalization in these industries, will help these changes be implemented in a way that benefits everyone.

While this study was limited to the logistics and transportation industry, more comprehensive results can be achieved by investigating digitalization across different industrial sectors.

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10 APPENDICES

Questionnaire

Digitalization in Logistics (self-assessment)

By participating this survey you are contributing to the research work on employees readiness for digital transformation of the logistics industry. All answers are anonymous and thank you for your contribution.

Gender *

Male

Female

Prefer not to disclose / None of the above

Age *

Under 30

30-40

40-50

Over 50

How do you feel about the state of digitalization in your company? *

	1	2	3	4	5	
Very inadequate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very adequate

Please describe in one word (shortly) how do you feel about your company's digital tools, e.g. how easy or hard it is to find and retrieve information.

Your answer _____

Select which statement about you is true *

- I need assistance with certain ICT-related issues
- I deal with daily ICT tasks with ease
- I feel confident in my digital literacy
- I could perform better with increased digital literacy

Please evaluate this statement: My digital literacy is proficient enough to upkeep with the possible ICT updates in the company. *

	1	2	3	4	5	
Strongly agree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly disagree

How effective your company's current trainings are for your digital competence?

*

	1	2	3	4	5	
Not helpful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very helpful

Are you a proactive user of new technologies implemented into your everyday work? *

	1	2	3	4	5	
Not at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very much

Please evaluate how familiar and adequate do you feel about the following topics

*

AI (Artificial Intelligence) IoT (Internet of Things) TMS (transportation Management Systems)

	not at all	somewhat	neutral	good	very good
AI	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Blockchain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Automation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IoT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Interview questions and answers

Table 4. Interviewee one

<p>1. Such technology as Blockchain and Big Data, store all the transaction information, allowing more transparency and helping to avoid monetary fraud. What is your opinion on making transactions in transportation more transparent with the use of technology?</p>	<p>My opinion is that blockchain creates a trust-inspiring technology. The possibility to make transactions without compromising privacy and the technology combines transparency and security.</p>
<p>2. Has simplified your daily tasks, for example has EDI simplified the booking process in your daily operations?</p>	<p>Yes a lot.</p>
<p>3. How do you feel about the company's current approach to digitalization? How do you feel about starting to use new platforms that are/will be implemented?</p>	<p>The company can become even better with more knowledge. Always open to try new opportunities that make daily work easier.</p>
<p>4. Please describe your opinion on self-driving vehicles (this might solve driver shortage).</p>	<p>My opinion, in addition to improved operational efficiencies, autonomous trucks and vehicles can help lower freight costs, improve truck utilisation, reduce logistics costs, improve fuel efficiency — and, of course, reduce delivery times.</p>
<p>5. Do you feel like all of your digital competence is applied to your everyday tasks?</p>	<p>It can always get better with more knowledge and modern systems.</p>

Table 5. Interviewee two

<p>1. What is your opinion about technology assisting in making transactions in transportation</p>	<p>-</p>
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more transparent?	
2. Has simplified your daily tasks, for example has EDI simplified the booking process in your daily operations?	I feel that technology almost always eases the daily routine tasks. The more routine the task, the more technology can help in automating and streamlining the process
3. How do you feel about the company's current approach to digitalization? How do you feel about starting to use new platforms that are/will be implemented?	Currently I think technology may not be utilised to its full potential and I think we are maybe a bit too careful there. Of course human contact should not and cannot be underestimated or eliminated but if tasks can be simplified by technology and digitalization it should be implemented. I believe that especially the trailer transportation industry is fairly traditional and maybe not as keen to be innovative as companies dealing with express- and or air-freight.
4. Please describe your opinion on self-driving vehicles (this might solve driver shortage).	If this can be implemented safely I think it would have a very large impact on capacity
5. Do you feel like all of your digital competence is applied to your everyday tasks?	Maybe not to their full extent but hoping for a better tomorrow

Table 6. Interviewee three

1. What is your opinion about technology assisting in making transactions in transportation more transparent?	Blockchain is very diverse and useful in its application
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2. Has simplified your daily tasks, for example has EDI simplified the booking process in your daily operations?	Yes
3. How do you feel about the company's current approach to digitalization? How do you feel about starting to use new platforms that are/will be implemented?	I am always open to learn new skills
4. Please describe your opinion on self-driving vehicles (this might solve driver shortage).	Well, of course it's a little scary, and it also means it's less work for the people. So I am against it
5. Do you feel like all of your digital competence is applied to your everyday tasks?	No not at all

Table 7. Interviewee four

1. What is your opinion on making transactions in transportation more transparent with the use of technology?	I support transparency
2. Has simplified your daily tasks, for example has EDI simplified the booking process in your daily operations?	Not applicable to my daily tasks
3. How do you feel about the company's current approach to digitalization? How do you feel about starting to use new platforms that are/will be implemented?	I support the digitalization process
4. Please describe your opinion on self-driving vehicles (this might solve driver shortage).	Yes, I agree that this might solve driver shortage
5. Do you feel like all of your digital competence is applied to your everyday tasks?	Yes

Table 8. Interviewee five

<p>1. What is your opinion about technology assisting in making transactions in transportation more transparent?</p>	<p>I think everything that makes things more transparent & helps to avoid monetary fraud, are necessary.</p>
<p>2. Has simplified your daily tasks, for example has EDI simplified the booking process in your daily operations?</p>	<p>I cannot say anything yet about my current work, but in my previous workplace technology has made the daily tasks easier – for example we had a lot of files we should have sent to customers monthly, but the process was changed so that the files went automatically, as well as customer orders came via edi & the unnecessary emails were avoided</p>
<p>3. How do you feel about the company's current approach to digitalization? How do you feel about starting to use new platforms that are/will be implemented?</p>	<p>I cannot yet say about the current approach, but everything new that comes to platforms is more than welcomed.</p>
<p>4. Please describe your opinion on self-driving vehicles (this might solve driver shortage).</p>	<p>In the beginning there would be probably a lot of threats/risks, but after all the challenges in the beginning I think this could lower the costs as well as help with the driver shortages</p>
<p>5. Do you feel like all of your digital competence is applied to your everyday tasks?</p>	<p>Cannot say yet, but so far yes</p>

Table 9. Interviewee six

<p>1. What is your opinion about technology assisting in making transactions in transportation more transparent?</p>	<p>I believe transparency is always good. It is not only a customer's benefit but also for ourselves, everybody can follow-up the movement of goods and the type of goods we are carrying. Downside is, we can't claim so much money anymore from the clients, as they can see the</p>
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	<p>true cost structure, but maybe this data could be used internally to cut “waste” from the process and to make it more lean.</p>
<p>2. Has simplified your daily tasks, for example has EDI simplified the booking process in your daily operations?</p>	<p>For me personally not, as I have no clients working with EDI-system, but of course it would cut out some of the manual work, such as booking creation. I find different kinds of databases very useful, as those give you access to information quickly.</p>
<p>3. How do you feel about the company's current approach to digitalization? How do you feel about starting to use new platforms that are/will be implemented?</p>	<p>Adapting to the new of course always takes time, but mostly I look forward to using new platforms and systems, as they normally provide upgrades on some level and have been made more user friendly. The problem is, often implementation of new software/platforms/systems is very time consuming and can take even years before being fully running and available for the whole organization. Due to this, people often need to work alongside the old and the new systems and this can be frustrating. But generally I only have positive feelings towards the change.</p>
<p>4. Please describe your opinion on self-driving vehicles (this might solve driver shortage).</p>	<p>The thought feels intimidating. Maybe this is good in “closed areas” such as harbours/warehouses/airports for example, but having self-driving trucks on the roads is very futuristic and weird. How is it going to work? Is it safe? Should they have dedicated driving lanes? It will solve issues like driver shortage, but who is going to secure the loads and help in case there is an issue at the loading/unloading place. This could be seen as part of the intermodal solutions (i.e. trains, ferries), but I believe human presence is still required when operating with customers and full truck loads. I believe these</p>

	unmanned deliveries work fine with small packages, e.g. Amazon delivering packages with drones.
5. Do you feel like all of your digital competence is applied to your everyday tasks?	No it's not. I believe my skills are sufficient, but of course there are multiple ways to speed up your own work. The problem is, this environment is constantly developing and changing, and you have to develop yourself all the time to keep up with the always changing environment.