

Digitalization impact on company inbound logistics: Etelä-Karjalan Osuuskauppa

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Abstract <p>The purpose of this thesis was to study and analyse how digitalization is impacting domestically on retail company inbound logistics. The co-operation company of this research was domestic operating retail company Etelä-Karjalan Osuuskauppa.</p> <p>Topic was chosen due its importance to all the industries, and it is highly current.</p> <p>Theoretical part considers theories about digitalization, inbound logistics and other related to mentioned terms. It also introduces for the reader the key concepts of thesis.</p> <p>This thesis research part was done as qualitative research as the data that was collected is non-numerical data. Empirical part data collection is executed as survey that was presented to employee respondents from retail stores of Etelä-Karjalan Osuuskauppa. The research questions that do digitalization make logistical procedures more time and cost efficient? Does employees of studied field feel threatened by digitalization and do digital technological innovations impact to sustainability in positively.</p> <p>The research carried out great information of wanted research question and it also pointed out some information about digitalization impact to loss management. Based on the results received from the survey co-operation company inbound logistics it seems that digitalization is making tasks more efficient than doing it manually. Some issues were pointed out that could be developed so current digital technologies could maximize their value. The main problem that currently occurred in inbound logistics lays in incoming goods quality.</p>		
Keywords Digitalization, Logistics, Inbound logistics, IoT, RFID		

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Appendix 1. Research interview frame and questions

1 Introduction

1.1 Background

Despite the industry, product, or service logistical procedures, people who are working with any kind of logistical task face the same challenges and difficulties. Digitalization has improved and optimized business operations (Scrive 2021).

Logistics is an industry that is highly prone to changes which makes understanding digitalization's pros and cons valuable, for development possibilities. Today logistical procedures such as transportation, material handling, and storage are facing more and more digitalization impacts. Of course, digital breakthroughs have been made throughout decades but in the past couple of years, it has shown radically. New more improved digital technologies are developed constantly, which will help to increase efficiency and accuracy in every part of the supply chain. (PWC 2016.)

The purpose of this thesis is to study how digitalization is impacting cooperation company's inbound logistics in retail stores. The co-operation company is Etelä-Karjalan Osuuskauppa which operates in several industries and belongs to the S Group. The company is widely introduced in subsection 5.1. The common abbreviation for the Etelä-Karjalan Osuuskauppa is Eekoo, so that abbreviation has been used in the rest of this thesis research.

The thesis study contains a theoretical framework where the data is gathered from books, website sources, and articles which are discovered to be reliable. It also contains the empirical research part and analysis of the topic and research findings. Based on the information received from the survey, the aim is to find solutions to the research problems, point out development targets and make improvement suggestions and create an outlook for the future.

The studied topic is important and current for several reasons, and it concerns today almost all the business industries despite is it in public or private. This is because businesses need to remain competitive and have their fair share in the markets and without adapting new innovative technology and processes the risk of falling behind increases. (Rolson Infotech Solutions 2022).

As the thesis is conducted in cooperation with a company that highlights green values in their strategy, led research also to inspect and make a brief review of how digitalization and its smart logistical innovations have impacted green logistics growth. There are studies, about how digitalization is positively impacting sustainability. The goal of green logistics is to decrease carbon footprint and another environmental burden that businesses make is

creating. Digitalization in logistics means improvements that will support environmental sustainability, mainly because digital technologies remove human errors, saves time, and makes material and product control more advanced. With digital technology products and raw materials that need special transport like thermo transport can be monitored in real-time which helps to supervise that the cold chain does not break and cause losses. (EEA 2022a.)

Digitalization is very much showing in the S Group cooperatives, for example, digital technology and automation in warehouses and transportation. On the consumer side, digitalization is also strongly visible, various applications enable faster transactions, such as mobile refueling, which was introduced in 2016, and is part of consumers' digital customer ship. (Eekoo 2022a.)

The latest news about digital technology adaptation in the S Group was an article about transportation/food delivery robots. About a week ago HOK-Elanto cooperative which is also part of the S Group started food deliveries that are delivered by robots that can learn from their environment with AI. These deliveries are operating now only from Alepa stores, but it is plausible that over time these kinds of delivery robots are expanded to operate from other stores also. (HOK-Elanto 2022.) Transport robots are a greener alternative to fuel vehicle transport since they use electricity to move.

Digitization enables a wider range of tools to promote the well-being of the planet, but also helps an organization achieve results. According to Elsevier's issue "Digitalization to achieve sustainable development goals: Steps towards a Smart Green Planet" digitalization guides us in a better direction in caring for the environment. It highlights the benefits of IoT and how it plays a major role in sustainable food production and for the whole planet's health, IoT is broadly introduced in section 5.1. (Elsevier B.V 2021.)

1.2 Research delimitation and objectives

The main objective of this thesis is to study how digitalization has impacted and is visible in cooperation company's inbound logistics. Also, to map out how the inbound logistics and its functionality could be developed to function even better if possible. The research purpose is also to provide information if new digital technology innovations that could increase inbound logistics processes efficiency.

Along with comprehensive research, the goal is to solve research problems and gain new procedure ideas for the targeted logistic area. Delimitation is an important part of the thesis process and like objectives, it narrows the research area so that the data amount doesn't get too big (Cactus Communication 2002-2022).

Despite the co-operations company retail stores is performed several logistical operations, this thesis research part is delimited to study only company inbound logistics, this provides a more detailed picture. Because Eekoo operates only in the South Karelia area it also creates geographical delimitation only to that region. The figure 1. Below shows the distribution of municipalities in South Karelia, it comprises nine (9) municipalities.



Figure 1. Municipalities of South Karelia (Etelä-Karjalan Liitto)

2 Digitalization

2.1 Digitalization meaning

This first section is focusing the key concept of digitalization. Digitalization is a phenomenon, a subject that cannot be bypassed. We are living in an era where almost everything is connected to the network, usage of machines and technological devices is in growth and cyber-physical systems are taking place even more especially in manufacturing. (Sphere Partners, LLC 2005-2022.)

We are using digital technology daily because almost every technology has begun to be digital technology and we use those without even thinking that it is part of digitalization. TurboFuture website lists 20 good and basic daily digital technology examples that people are using almost every day which gives a better understanding of digital technology. These are for example banking, mobile and online banking has become more common, smartphones and cameras, and social media. (The Arena Media Brands 2022.)

Digitalization has broad meaning, and it can have different definitions depending on which aspect it is viewed. Robotics and automation are part of digitalization, and so on these are concrete expressions of digitalization. (Marttinen J. 2018a 141.)

Difference between digitization and digitalization

Even though people tend to perfunctory know what digitalization is, but the specific definition might be harder to find. So, is there a difference between digitization and digitalization? The answer is yes, these two terms have a major disparity between them. People tend to mix up these terms, so naturally, it is important to clarify the difference. Basically, digitization means that when data is converted into digital format from its original form, like scanning paper into a computer. Digitalization is when business processes are transformed into digital form, to optimize the process. Word to word it is transformation and that is a major difference. Where digitization converts analog data to digital form digitalization is beyond that and it shapes industries and entire processes. Digitalization gives more value to the business and not only boosts up existing but changes it to a new level. (TruQC 2022; Gartner Inc 2022.)

2.2 Industry 4.0

The First Industrial Revolution happened at the turn of the 1700s and 1800s and it was about the transition to steam power and mechanization. The Second Industrial Revolution term is considered to be the most important and it is for the mass production era that started

at the end of the 1800s. This industrial revolution also meant the time of the introduction of electronic energy and adapting of assembly lines into production. (Institute of Entrepreneurship Development 2022.)

Industry 4.0 is the term used for the fourth industrial revolution which is happening right now. Industry 4.0 has its basis in the previous industrial revolutions due to the Third Industrial Revolution is an era of transformation to automated processes, computers, and electronics. Industry 4.0 connects physical to the network and the aspiration is to increase the automation and digitalization of industrial processes. Industry 4.0 comprises non-tangible innovations such as IoT, big data, cloud services, and AI. This revolution allows broader opportunities for companies to develop and monitor processes with direct data. (Marttinen, J. 2018b, 142; Simio 2022a.) Below presented Figure 2. visualizes and gives a brief explanation of what all the industrial revolutions comprise (Simio 2022a).

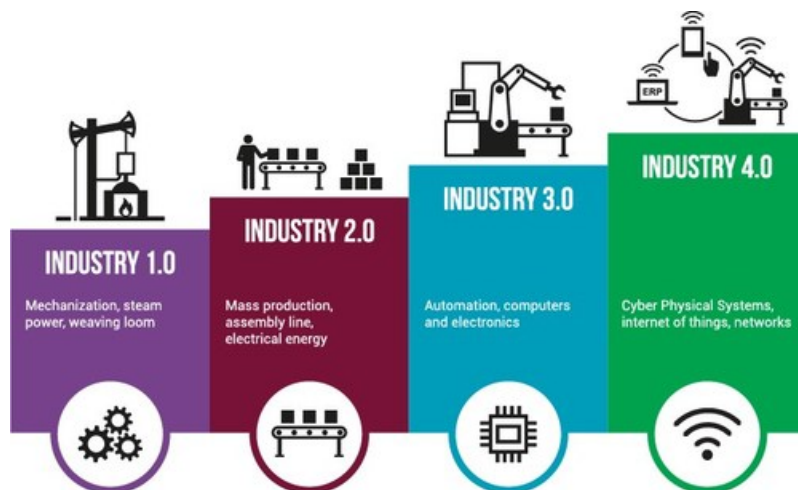


Figure 2. Industrial revolutions explanations (Simio 2022a)

2.3 The benefits and challenges of digitalization

Benefits

The value that digitalization is giving to businesses is unreplaceable if it is utilized correctly, it boosts the process of making sales, optimizes operations, increases profit-making and same time decreases carbon footprint. The impact that digitalization is making not only affects the business itself, but it supports sustainability and so many companies' core values. (TechTarget 2007-2022a.)

Digitalization gives agility to processes and makes them faster and more transparent, which also contributes to maintenance and security and enables products throughput to market

faster. Digitalization also makes customer contact quicker such as reacting and answering complaints cases. (CustomerThink Corp 1998-2022.)

The technology brought by digitalization makes it possible to collect data and make forecasts and thus better prepare for future goals and challenges. However, this does not accurately reflect future events, as variables can be expressed outside the existing data, in which case it cannot rely on 100 percent, but it steers the business in a better direction and prepares for the future. (TechTarget 2007-2022a.)

In 2018 Statistic Finland commissioned a survey that studied Finnish working conditions and the results received from that survey tells that about 90 percent of wage earners are using digital technology in their work. Approximately one-third felt that digitality has increased workload but mutually every sixth also said that load has decreased. The study also found that part of the answerer experienced that digitalization had increased the efficiency and transparency of the work. (Statistic Finland 2022a.) The figures presented below show a more specific picture of the studied situation.

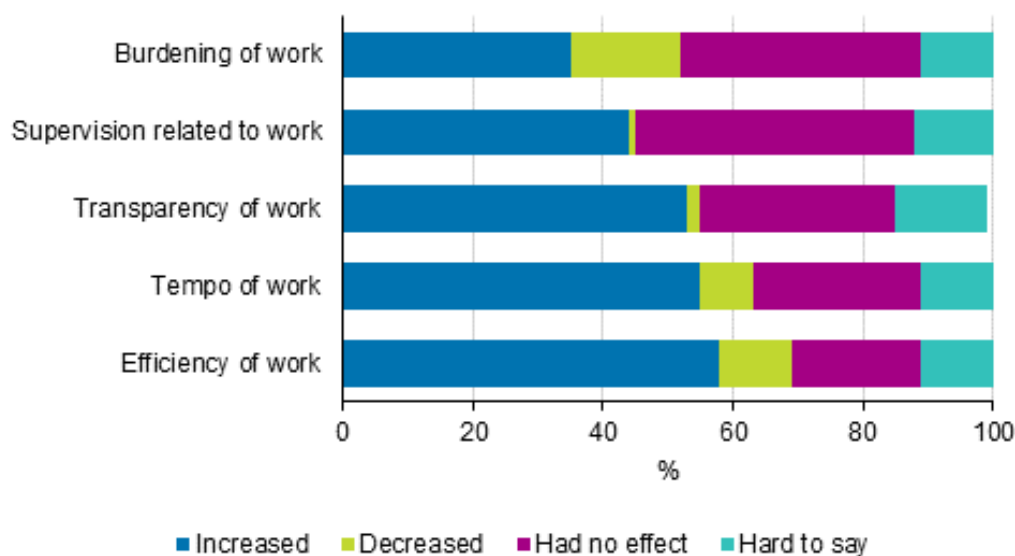


Figure 3. Effect of the use of digital applications and devices on work, share of wage and salary earners using digital applications. (Statistic Finland 2022a)

By analyzing results referred from Statistic Finland figure 3 it is possible to state that vast of the representatives' experiences that digitalization is lowering the workload pressure. However, there was a difference between women and men workers. Women felt that digitalization has increased workload whereas men experienced that work had become more efficient and using creativity at work had increased. (Statistic Finland 2022a).

Some of the respondents are dealing with robots in their work and they felt that the robots made the work easier and smoother (Statistic Finland 2022a).

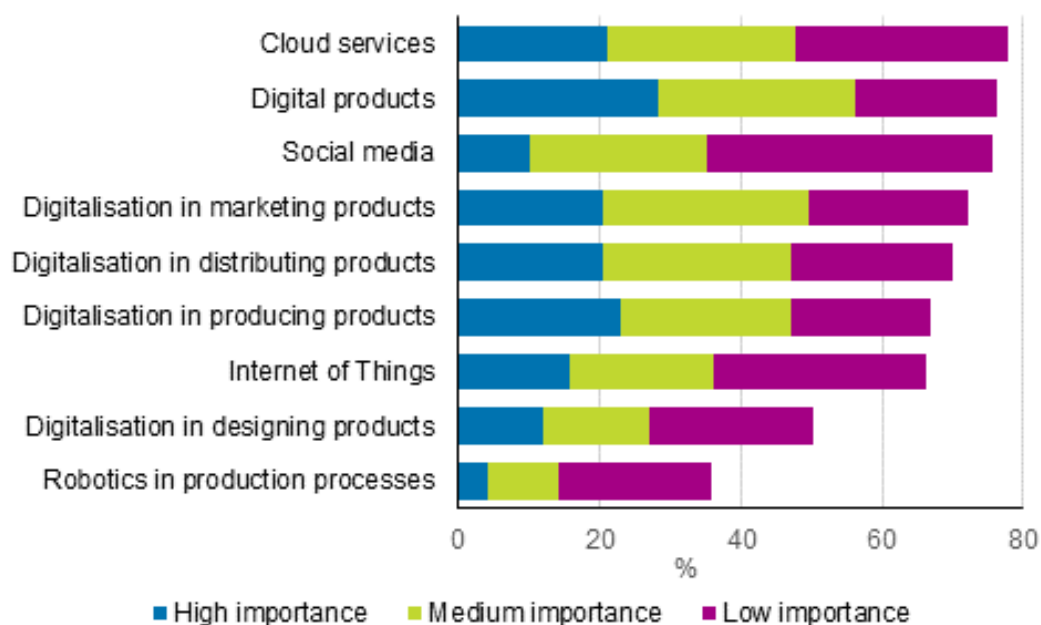


Figure 4. Importance of digitalization in enterprises' business activities in services in 2014 to 2016, the share of enterprises (Statistic Finland 2022a)

Figure 4 shows the distribution of service industry opinions on the impact of digitalization on business. The points presented in the survey appear to be significant factors, the only exception being robotics, which respondents clearly did not perceive as significant as other factors. Digital services, cloud services, digitalization in product production, and digital product marketing were considered the most significant for the company's business activities. (Statistic Finland 2022a.)

Challenges and disadvantages

Digitalization has so many benefits that it brings along, but also major challenges can occur. The manufacture of electronic devices is not always the most environmentally friendly, as their inclusion in the procurement, production, and processing of various metals and other components is not particularly ecological (Start Smarter LTD 2019a).

A very current and high risk that has risen especially with digitalization is cyber security risks. The integration of machines, devices, and functions into the network also raises the question of whether the company's privacy issues are in place. Even the smallest use of digital devices can expose the entire operation of a company if basic data protection issues are not up to date. Therefore, it is very important to ensure the security of the network and

to continuously improve its functionality. Hackers are constantly wreaking havoc in the corporate world and can cause the entire supply chain to come to a standstill, and blackmail with important company information is also something they try to achieve. (Start Smarter LTD 2019a.)

The safe use of digital applications and devices also requires thorough guidance, which in turn increases the number of hours and costs required. When digital devices are taken out of service, it would be important from an environmental and cost point of view to find potential re-use opportunities for them. However, the difficulty of reusing discarded digital devices and applications remains an existing problem and no revolutionary solution has been found. (Start Smarter LTD 2019a.)

With digitalization, the issue has also emerged that automation and robotics will almost completely replace human labor, and job losses are a concern. The survey on working conditions conducted by Statistic Finland in 2018, figure 5 also included an assessment of how automation and the increase in robotics have affected jobs. About five percent of respondents feel that the number of jobs in their workplace has decreased over the past three years due to the increase in robotics. (Statistic Finland 2022b.)

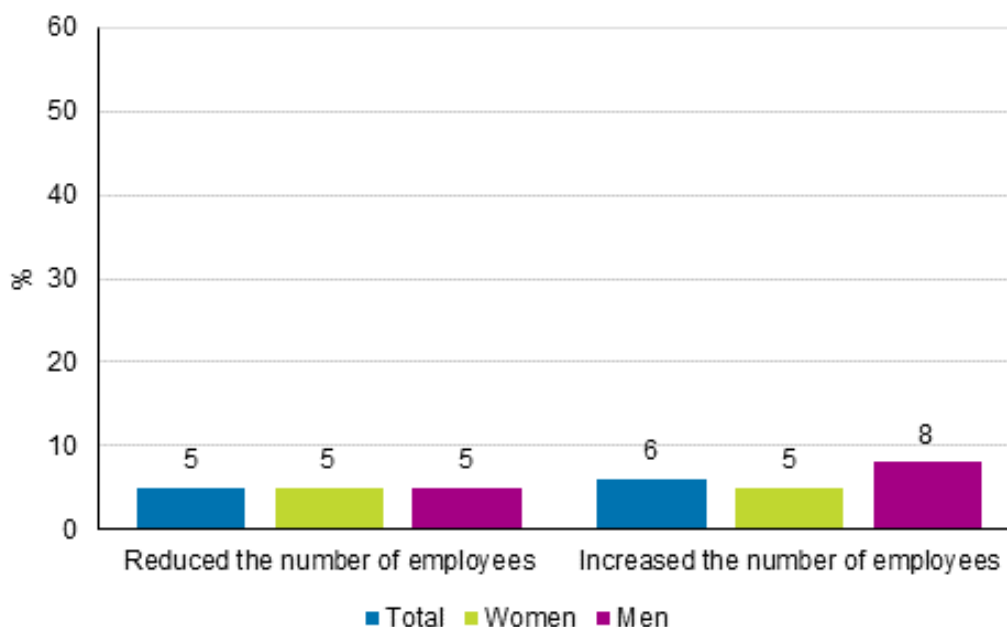


Figure 5. Effect of digitalization or robotization on the number of employees at the workplace over the past three years, share of wage and salary earners (Statistic Finland 2022b)

3 Inbound logistics

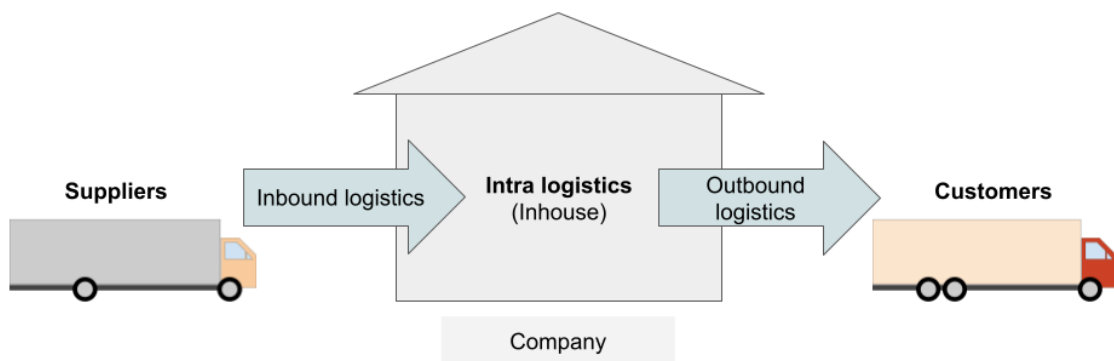
3.1 Logistic

Logistics is the part that makes services and products move in the right way to the right customer and right quantity, in other words, it controls and supervises material and information flow. Another way to describe it is that it is the process of planning, implementing, and controlling. These procedures mainly are focused on goods transportation and storage. The logistics concept also includes services and information related to transport and warehousing, which tells examples from where the products have left (*“point of origin”*) and customer requirements. (Mangan. J., Lalwani. C 2013a, 8-9.)

Logistics is not only a single function, but it is divided into sections that consist series of separately performed work tasks that all need resources, time, space, and expertise (Sakki. J. 2014a 6). Figure 6 which is retrieved from Finnish current and liable online material The World of Logistics, including information on key functions in the logistic sector shows the main areas in the supply chain. These areas are inbound-, in-house, and outbound logistics processes, and all these logistical processes are involved with the products through their entire life cycle (The World of Logistics 2022a).



Inbound, intra (internal) and outbound logistics



The material flow through the company is divided into inbound, intra and outbound logistics

Figure 6. Inbound-, in-house, and outbound logistics (The World of Logistics 2022a)

One of the logistics goals is to deliver raw materials, components, finished goods, and others in the most fluent way from point A to point B. Well-designed and efficient logistics enable efficient but also carbon footprint reduction.

Storage and transport methods have evolved over the years, the last decade has seen major leaps thanks to digitalization. Digitalization forwards this process by connecting different logistical parts to each other and linking physical objects to the network. (The World of Logistics 2022a.)

3.2 What is inbound logistic?

In this section, the theoretical part is focusing on the inbound logistics and work tasks related to that. Figure 6 explains where inbound logistics places in the supply chain, chronologically thinking it is the first stage in the company's logistical procedures. As the name tells inbound logistics handles incoming material flow efficiency and task-related that. It is actions between the company and the supplier, receiving goods, product handling, and storage in the company. It can also be inbound logistics in the supplier end when the complaint products are sent back to them and handled there. Practically inbound logistics and outbound logistics comprise the same actions but outbound is when products are exported or moved to the customer end. (Trade Financial Global 2022a.)

Inbound logistics encompasses several different actions in a company. Those are purchase, good reception, inspection and unloading, and finally warehouse placement. Stock accounting that is also known as inventory is counted as part of inbound logistics actions. When these inbound logistic tasks are handled well and accurately the better and more time and cost-efficient the whole process is. Inbound logistics actions also might have an impact on distribution partners' functionality. If the inbound logistic tasks are not anticipated well, it can create waiting time for transportation. (Trade Financial Global 2022a.)

Accurate and careful planning for the execution of processes ensures efficient operation of time and money. Inbound logistics tasks are an important area that rarely receives enough attention. Anticipation guarantees smooth work from the point of view of both the employees and the company. When the delivery dates of the incoming goods and the quality of the load are known, the necessary time and number of employees can be reserved to work on that day. (Richards G. 2014a. 66.)

For example, in retail stores deliveries usually contain products that do not last a long period of time outside the preservation temperature. That is why it is not efficient to have deliveries throughout the day when the goods might need to wait before unloading and storage, but rather schedule them to arrive in the morning or in the evening. (ESLogC 2022a.)

3.3 Goods reception process, inspection, and unloading

Procurement is the first task in inbound logistics, after that comes the goods reception process. The goods reception process starts when the products are arriving with the transport vehicle, checked that transported goods have arrived at the right destination, unloaded to the company premises, and briefly check in case of transportation damages occur. This is an important task to do in case there are possible damages that need to prove that happened before the goods reception. A more thorough quality and quantity inspection is performed later. (Mangan J. Lalwani C. 2013b, 196-197.) The next step is identifying the incoming goods and quality and quantity inspection

Documents related to the reception process

Among goods reception process there are documents related to arriving goods, which support tracking and identification. The bill of lading is the detailed agreement document that must contain information about the agreed transportation method and driver, product quality, quantity and weight, departure, and arrival information, and addresses as well as terms of delivery. (ESLogC 2022b.)

Incoming goods come usually in a trolley or pallets and an attached shipping list which is simpler than a bill of lading but includes information about shipped/sold products, quantity, and the total price also some cases a unit price. Quality control is one the important part of inbound logistic tasks because it is most visible on the customer end. These details need to be checked and confirm that the products and amount match what is informed in the shipping list and not only the assumed/ordered amount. (ESLogC 2022b.)

3.4 Stock accounting

After the reception, inspection and unloading have been done, goods are transferred to a warehouse. The purpose of warehousing is to store the products to wait for later use such as relocation or sale and the logging of the incoming goods is done during the goods reception or storage process. (Richards G. 2014b, 68.)

As the inbound logistical task are all crucially important to the company for money saving, it is necessary to recognize those sectors. To have a flawlessly functioning warehouse that has a good inventory cycle it needs stock accounting. Information about the amount of incoming goods and exported goods are necessary to have in real-time form. Up-to-date information ensures that the right amount of goods is logged in and the information is based on the true amount. The goods are moved in the warehouse with a pump cart or truck. (The World of Logistic 2020b.)

Companies have their own storage procedures and warehouse management, and the placement of the goods is based on the company's own storage system. There are various ways to store products and goods, but there are a few particular ways to make inventory management more efficient. Warehouse management related FIFO which means First In, First Out, method is one the most used, it is simple to execute and easy to follow. FIFO method ensures that products do not stay too long at the warehouse because products are leaving from the warehouse in that order that they arrive at the warehouse. FIFO prevents outdated products to build up at the warehouse which ends up to a loss. This for its part reduces costs and recognizes products as expenses which helps to see a more truthful image of inventory costs. FIFO is highly suitable for retail stores where products can be fresh products or have short expiration days. (Investopedia 2021.)

Multiple digital technologies are available for better and more accurate stock accounting one of these is RFID which is broadly explained in section 5.6.

4 Digitalization in inbound logistics

4.1 Digitalization impact to logistic processes

Over the years logistic actions have changed, thus basic elements are the same, and goods and materials are moving. Drastic change is the digital technology adaption to the processes which without navigation today's business world would be challenging. The amount of data is in growing fast and it is an important asset. Various technology and software are developed to help and improve data storage and data handling. (Intelligent CIO 2022.)

4.2 IoT and IIoT

IoT is a common abbreviation of the Internet of Things, so that is used in the remain of this thesis. On a daily level, IoT is familiar for example when people connect for example their smartphones, home appliances, or cars to the internet. IoT is a system that enables to take all the benefits from real-world assets because it connects tangible items into an information network which makes them active parts of the business process. The data from IoT can be read anywhere and in real-time. (VTT 2013, 11.)

Oxford English Dictionary defines IoT as:

***internet of things** n.* a proposed development of the internet in which many everyday objects are embedded with microchips giving them network connectivity, allowing them to send and receive data (Oxford University Press 2022).

When viewing from a logistical point of view it is more accurate to discuss IIoT – Industrial Internet of Things. IIoT focuses more on the industry environment such as manufacturing, management, and logistics. IIoT plays a major role in digitalization and has its part in shaping industries' productivity optimization. IIoT requires more sensitive sensors in devices to receive the most accurate data and information. (J. Collin, A. Saarelainen 2016a, 18-19.) IIoT produces large amounts of raw data, which is why it must be ensured that the existing infrastructure can handle them. IIoT enables automated machines used in logistical procedures can communicate among themselves and handle tasks without the human presence. In a retail store, IIoT tools are helping to improve customer experience and track customer behavior. It also improves the efficiency of inventory turnover and recognizes sales and demand which in turn also affects brand image. (J. Collin, A. Saarelainen 2016a, 92-93.)

stores. The best examples where the bar codes are used are the bar codes on the side of the products. These bar codes in the product contain basic information for example about the product like price, weight, production date, and expiration. (Nordic ID Oyj 2021.)

The most used technology that has been in usage for a long time is bar code technology. However, it is very limited, and it cannot be used in every situation due to its vulnerability and usage limitations. Bar codes are vulnerable because the bar code can be damaged in that way it is unreadable. Also, the bar code readability can be unsure in some cases, so it does not apply in every situation. The limitations show that the information can only be read because the communication is one-way, and the information received from the bar code stays the same. (Sakki. J. 2014b,14-17.)

QR code means a quick response code and it is related to the material control process. This technology helps stores and especially retail stores to track their sales amount data. This data is transferred to the supplier. (Sakki. J. 2014b, 15.)

Beacon sensor is another innovative technology that is designed to track and communicate. Beacon sensors work with a Bluetooth connection which means even greater reading distances than with RFID technology. Of course, this means that the target device needs to be Bluetooth activated. The technology is packed inside a small box that is attached to the surface of the wanted object. (Pandasuite blog 2021.)

4.4 RFID - Radio Frequency Identification Data

RFID is radio frequency identification data, which means that the technology can be read remotely from short to medium distances and it uses radio frequencies to transfer data. This technology is mostly used in different business operations. (Perret E. 2014, 3-5.) Daily, we are using RFID without thinking, for example when paying with a credit card remotely, access control, car keys, and when using a bus or metro card. (Trayvax Enterprises 2022).

The technology is based on tags that are attached to the objects and these tags contain the information RFID is read with a reader and unlike bar code with RFID, there is a possibility to read and edit the information. Radio frequencies can travel through objects, so since the connection does not need straight sight, it creates a broader reading distance. RFID tags are more expensive than bar code but having so many great qualities it makes processes operate faster. RFID tags can also contain sensors that are used to monitor example temperature during product transportation, these are active RFID tags. (Pamela J. Zelbst, Victor E. Sower 2016a, 13.)

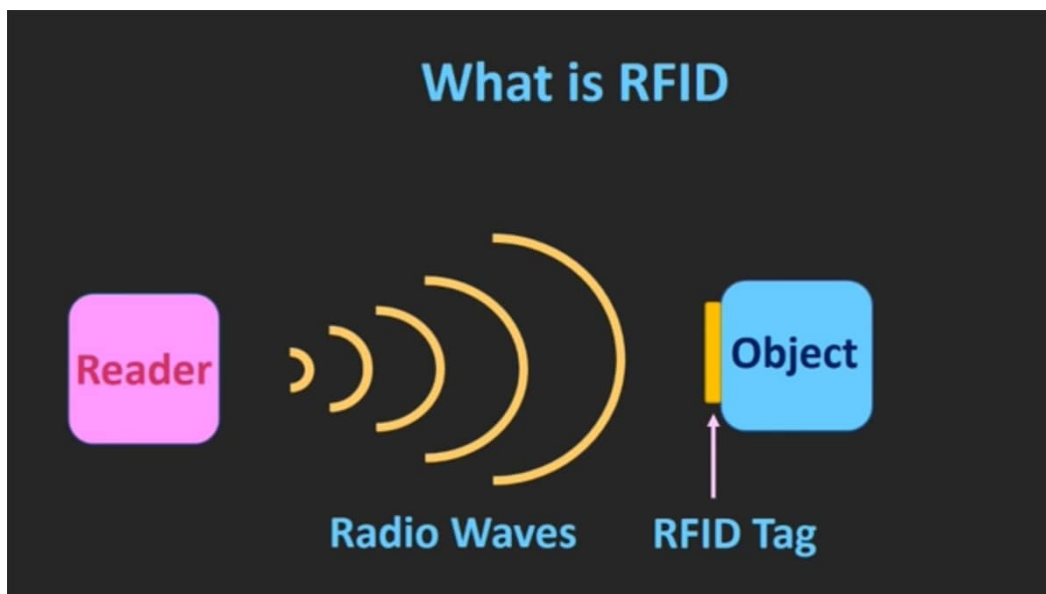


Figure 9. How RFID works (EPCI 2021)

The con of RFID is that it has minor error marginal when reading masses. Even though RFID can travel through objects when the tag is placed so that metal is surrounding it, radio frequencies cannot go through. Also placing them too tightly together may cause disturbance in the reading process. (ELAIInnovation 2022a.)

RFID tags can be divided into three categories: passive, semi-passive, and active tags. The passive RFID tag is usually the cheapest version of RFID tags but also the most durable since it does not contain its own power supply or any other extra parts that need more maintenance. A passive RFID tag takes the power from the reader device, so it works only when it is near the reader at a reading distance. Semi-active RFID differs from passive one as it has a small power supply which creates the possibility to read the tag from a greater distance. (ELAIInnovation 2022a; Pamela J. Zelbst, Victor E. Sower 2016a, 16.)

Like a semi-active RFID tag, an active RFID tag has its own power supply but also its own memory and transmitter. Active RFID tags are also bigger than others, so it is not possible to attach this tag to any object. Because active RFID tags have various features it is a lot more expensive. The advantage of the active RFID tag is that it does not need to be within the reading distance even when the information is to be read or edited. (ELAIInnovation 2022a.)

4.5 Automation and robotics

Automation and robotics are becoming more common in industries but especially adaption to logistics is highly beneficial. Automation means that technology has adapted to operations and those work without or with minor human input. Automation can be divided into

different automation types. (IBM 2022.) Automated machines and devices are limited to operating without AI. Automated machines operate on the principle that a person has set a certain mode of operation for them, and if the task requires actions that are not set in the automation machine, it will not be able to work. If an automated machine is equipped with artificial intelligence, it will be able to learn from its environment and create a path independently to the desired result. (Marketing Artificial Intelligent Institute2022a.)

Automated machines are highly helpful in warehouse and inventory tasks. Automation can repeatedly do the same task with the same time consumed or faster if needed. Automation ensures uniform work, and it minimizes human-affected errors which of course impact the product's journey to the customer. Adding automation to warehousing and inbound logistics operations speeds up product delivery to the customer, as it reduces unnecessary wastage such as product retrieval and waiting. It can also make quality and quantity control more efficient. (Marketing Artificial Intelligent Institute2022a.)

Electronic Shelf Labelling is an innovation that can despite its simplicity create huge benefits. Electronic Shelf Labelling the technology is based on the fact that product prices can be updated in real-time, or they can be scheduled to change according to different campaigns or even when the product expires. Many manufacturers of digital price displays guarantee compatibility with various shelf edges and easy implementation. ELS is suitable for many different industries and especially for grocery and consumer goods stores. The other benefits of Electronic Shelf Labelling are that it reduces cost versus traditional paper price tags, and it has better visual effects that also improves brand image because it creates a more modern look. (MINEW 2021a.)

Weight-based pallets/bins are also one good tool for sustainable and efficient inventory management and ordering. Weight-based pallet/bin is an IoT solution that tracks weight changes in stored products where it is not possible to identify individual pieces and thus facilitates material management and speeds up the ordering system. This solution also helps reduce manual work on inventory. (Forciot 2022.)

Like automation, robotics has also become more familiar to companies and their operations. Retail stores are adapting robotics to support better flow examples in order and supply chain.

4.6 Inbound logistics operations assistance with digital technology

Digital technologies not only accelerate logistical productivity and minimize errors, but it has a part in environmental protection. Not only well-managed loss management has environmental benefits, but it makes cost savings. RFID technology is highly used in logistics and especially in inbound logistics tasks it is valuable too especially in identifying, quantity inspection, and storage. (Sakki. J. 2014c, 15-16.)

When receiving mixed products pallet, the identification process can be time-consuming but with RFID the process can be more time efficient. For example, it can reduce the time from 30 seconds to three (3) seconds. (The World of Logistic 2022c.)

Other advantages of RFID also lie in the fact that it speeds up inventory as it is sufficient to pass through the warehouse without having to read each product that is read separately. Some companies also use a built-in RFID reader, through which the goods are transported as they arrive so that the goods are recorded immediately at the entry stage, for example in the company property gates or loading dock. RFID tags require a compatible system and own RFID reader. (Trayvax Enterprises 2021.)

Digital technologies and linked operations offer improvement to warehouse management and material flow. Like an automatic ordering system that is based on sales, this means linking inbound and outbound information. (Marketing Artificial Intelligent Institute2022b.)

5 Implementation of research

5.1 Company introduction

This thesis is done in cooperation with Etelä-Karjalan Osuuskauppa which is a responsible and large domestic cooperative. Etelä-Karjalan Osuuskauppa operates in various industries; retail-, utility goods-, traffic store-, car shop and hotel, and restaurant industries. Etelä-Karjalan Osuuskauppa employs approximately 950 people, and it belongs to the nationwide S Group chain. (Eekoo 2022b.)

The history of the Etelä-Karjalan Osuuskauppa goes back more than 100 years, to 1907. The name of the cooperative was not originally the Etelä-Karjalan Osuuskauppa, but the name has become established over the years, more precisely in 1984. (Eekoo 2022b.)

Etelä-Karjalan Osuuskauppa is a major player in the trade sector in South Karelia and its financial position is stable. Etelä-Karjalan Osuuskauppa uses the entire result of its business to develop South Karelia's services (Eekoo 2022d.)

The commonly accepted abbreviation for the Etelä-Karjalan Osuuskauppa is Eekoo, so that abbreviation has been used in the rest of this thesis research. Eekoo has a new strategy to work on and the environment's friendliness and green values are highlighted for the year 2022. That is why this thesis also studies what impact digital technology adaptation has on loss management and sustainability. (Eekoo 2022b.)



Figure 10. Company logo (Eekoo 2022b)

This thesis research also contains information that is related to the co-operating company distribution partner. The distribution company INEX Partner OY is owned by S Group, it distributes and produces other logistical services to S Groups retail and utility stores. In the summer of 2016 new automated warehouse was opened, it handles retail products that are distributed to the stores. The functions in the warehouse are highly automated and the

sections that are in retail store use are temperature controlled. This warehouse is one of the most modern warehouses in Finland. (INEX 2022.)

Eekoo is part of the S Group, which has already started automating stores, which includes a shelf robot with a machine vision and cameras attached to the roof that monitors product availability, as well as self-service checkouts (S Group 2022a). These are just a few existing technologies that S Group is using on the store side. It can be assumed that S Group and along with it Eekoo are using also other digital technology for example in the company's logistical procedures.

Below presented figure 11 shows the machine vision robots that inspect the shelves and report the product availability status. This innovation has been introduced so the customer's needs can be better served and "no we don't have that" can be avoided. The machine vision robots are currently operating only in a few of the S Group chain stores (S Group 2022a.)



Figure 11. Machine vision robot in S Group store (S Group 2022a)

5.2 Research method

This thesis research method was selected to be a qualitative research method. The research problem couldn't be solved with the quantitative method because the main data that is collected for the research is non-numerical data. This research empirical data will be acquired by a semi-structured interview in which questions are in survey form.

The qualitative research method focuses on subjective preferences and targets audits based on their own values. This method reveals target audits emotions, experiences, and perspectives towards the research topic. It is possible to demonstrate the functionality of the operations performed in numerical measures. However, in this case, desired data is wanted to be based on experiences and perspectives. This is because employees of the company are using digital technology in their logistical tasks, and they know how those work in practice. (Oppariapu 2015a.)

A semi-structured interview is also known as a theme interview, but that term is not usually known or used in English. A semi-structured interview is where the research interviewer gets acquainted with the studied subjects' theories and literature and decides what are the key themes. (Hirsijärvi S., Hurme H. 2001, 47-48.) Despite the semi-structured interview gives freer answering opportunities when structuring the questions, it is important to remember to avoid only yes or no questions. Yes or no answers do not give the interviewer much information. If research has yes or no answers that require more information, it is important to include an open-comment section to these questions where respondents can explain why they have answered yes or no. (Oppariapu 2015a.)

Research questions

The main goal of this research is to clarify the current situation in the co-operation company inbound logistic practices This thesis research study is based on to following research questions.

How is digitalization currently showing in the cooperation company inbound logistics tasks?

This is the research's main question, and its main aim is to provide an overall picture of digitalization's impact on cooperation company inbound logistics. It will map out what kind of digital technology the company is currently using and how they benefit from using the technology.

Problems that digitalization has brought to inbound logistics.

Where the main question focused to present the overall picture of the current situation this research question delves into problems in the system. The aim is to get information about occurring problems with the digital technology used in the inbound logistical tasks in the co-operation company. The theoretical part of the thesis introduced that inbound logistics is about handling arriving goods which means that its functionality is connected to the actions of a distribution company. This will open the co-operation company perspective about how digitalization in the distribution company impacts their company inbound logistic efficiency. The distribution company is known to be automated.

How current inbound logistics process can be developed with new technological items?

This research question's purpose is to provide information on the development needs and can digital technology be the improvement. Mapping out the future view is part of this research, and this question helps to identify what kind of changes are needed to do to make inbound logistics function more efficient.

5.3 Research process

The research process of this thesis was interesting and pleasant to execute. In the beginning, it was clear what the research is going to contain and what research method is going to be used. The method selection was easy due to the nature of the thesis objectives. It was known that the received information from the research was going to be emotion and opinion-based

Survey questions are attached at the end of this document and the survey is presented in Finnish due that it is ensured that all the respondents understand the questions and can fully answer what they want to say. Also, the presented result charts are in Finnish because the software that was used to produce the survey, produced Finnish results and it was not possible to change the language. Question answer translations are explained in the appendices section in appendix 2 where the original survey is translated to English. All the result figures include information about how many people have answered the question and the dispersion.

- Kaikki vastaajat = All the respondents
- Hajonta = Dispersion
- Vastauksia = The number of answerers

The results that were received from the survey contained valuable information for the thesis research and the cooperation company. A survey carried out answers from six (6) respondents, this amount does not allow full and deep analysis, still, it is possible to make a comprehensive analysis of the current state. Respondents were offered to answer the interview questions in three optional ways, these were face-to-face interviews, interviews via Teams, or a survey behind the sent link. In the beginning, one respondent was interested to answer the questions via any option but after all, all the respondents answered the questions through the survey link. The first email concerning the that the survey is now open was sent to respondents on the 28th of February. Due to the answer rate being rather small after two weeks; one reminder email was sent.

Thus, six answers are a good amount considering that the survey link was sent to eight (8) email addresses which indicates a 62,5% answer rate, this numerical data is presented below in a chart form. Correction to the statistical figure is that despite the figure shows, five (5) answerers, six is the right number. due that some respondents did not answer all the questions. That is why the software recognizes only five ready answers. Respondents to the survey were the store managers of the target company's stores.

Sähköpostivastaustilastot



Figure 12. Email response statistics from the research survey

The survey was open for approximately four (4) weeks between 28.2.2022 and 28.3.2022. After the research was closed and results were downloaded from the software and the analysis process started. Translation to figure 12 is presented below.

- Sähköpostivastaustilasto = Email response statistic
- Kutsuja lähetetty = Emails sent
- Vastaus valmis = Answer ready
- Ei vastannu = Did not answer
- Vastausprosentti = The answer rate percent

6 Conclusions

6.1 Results

Solutions proposals for the research problems are conducted based on the results received from the survey. The research survey included questions that steer the researcher in the right way and helps to find an answer to the presented research questions. However, due the research survey produced more like an overview of the current situation it does not contain a deeper analysis. A deeper analysis would require more thorough research and survey questions.

6.2 The current state of study targets in cooperation company inbound logistics

The survey produced good information about the cooperation company's current situation of inbound logistics and how digitalization is showing in that part of the supply chain process. In general, the company's situation with digital technology adaption is good but there is room for improvements. Some new digital technology should be introduced to maintain green values, have better functioning inbound logistics and warehouse management, and stay competitive.

2. Has the technology of the logistics side of your store been renewed in the last five years?

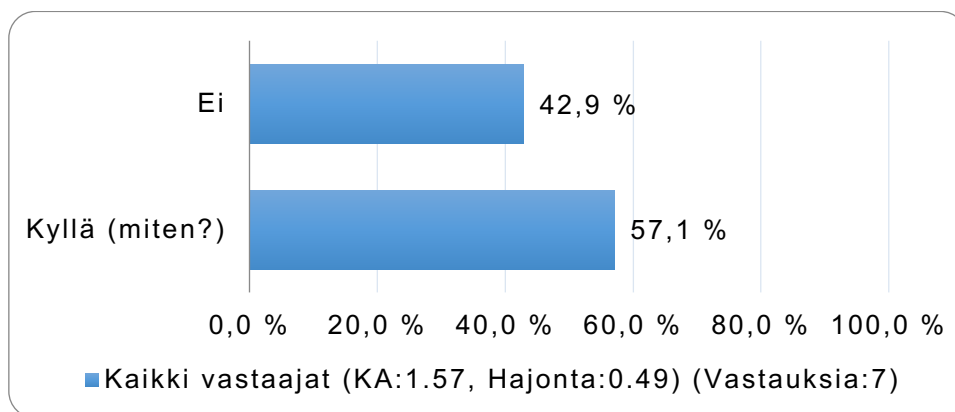


Figure 13. Survey results for question about the technology updates of the logistics side in store?

The above-presented figure 13 shows the distribution between respondents in the question about, is the technology renewed in the respondents' company in the past five years. Thus, the research did not produce information about what those renewed technologies were. The results were almost evenly distributed, No answer 42,9% and Yes 57,1%. This tells that some of the cooperation company's stores should invest more in technology updates, at least in the stores where the technology has not been renewed. This is because the

technology is constantly evolving, and it would be much more cost-efficient for the entire cooperative and its partners if the technology used is up-to-date and compatible. Question enabled respondents to specify what those renewed technologies are, but the open comment section was empty and did not produce further information.

6. Do you feel that digitalization in your inbound logistics has increased accuracy and efficiency?

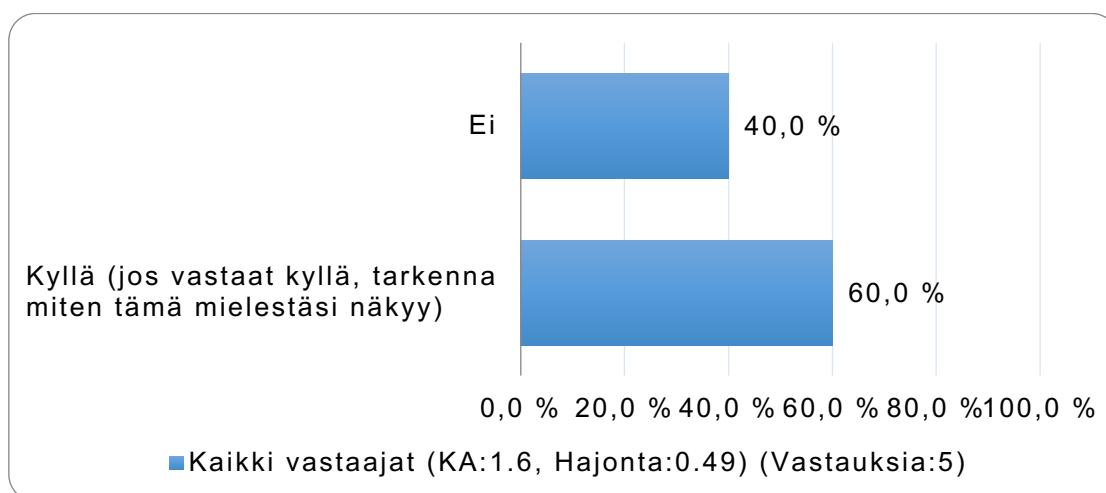


Figure 14. Surveys results for questions about digitalization's impact on work efficiency and accuracy

Based on the survey result received from question number six (6) it is valid to say that major of the respondents experience that digitalization has impacted positively their departments' inbound logistics. At the forefront of the respondents' responses was an improvement in efficiency and accuracy, as the forecast-based ordering system can order just the right number of products, leaving no unnecessary quantities of products in stock to wait. This has also a direct effect on shelving work and much better inventory turnover and equal opinion to aforementioned came up from the survey results. The inspection of incoming goods felt that there was a little more time left for a more thorough inspection with digital technology. Attention was also paid to the more sensible packaging of the trolleys; the trolleys have been packed in a way that correct product groups are in the same trolley which serves operational efficiency. This is more of the distribution company's task as they pack and transport the trolleys.

The overall impression of a studied topic shows that digital technology's adaption to processes has had a positive impact. However, answers that expressed that digitalization has not impacted positively to work efficiency and accuracy need to be considered. A broader survey question would have been in place to open why the part of the respondents felt that way.

3. What technology do you use when receiving goods and placing them in a warehouse

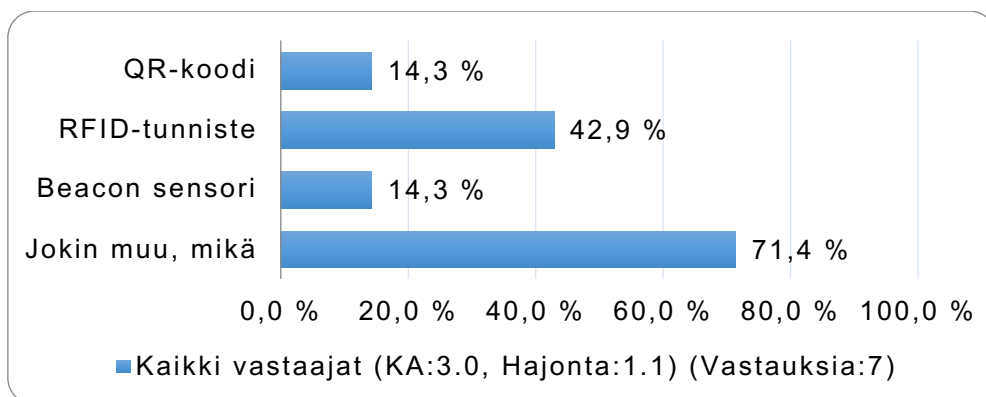


Figure 15. Surveys results for questions about what kind of technology company is using in inbound logistic tasks.

The question number three (3), figure 15 reveals that the cooperation company is mainly using RFID technology in inbound logistic tasks which is a considerably good and common choice. Also, 14,3% answered that they are using either QR-code or Beacon sensor in their inbound logistical tasks. These identification technologies have their own benefits but have their cons as well which why they do not fit so well in retail stores. The cons are mentioned in the theoretical part of the thesis. 71,4 % answered that they are using something else, this was explained in open comment section. Answers where about own internal product and ordering management system that the company is using.

It would be interesting to know what kind of stores of the company are using QR-code and Beacon sensor and how do they feel to operate with them and what kind of benefits those technologies bring.

However, the survey question should have been formatted to an open-ended question because now it only narrowed the used identification technology, because the question was formatted in a way that led representatives to focus on identification technology. It would be valuable to know is there any other kind of digital technology/automation in use when receiving, inspecting, and storing the goods.

This question also raised answers that mentioned that some of the cooperation company's stores are doing manual inspections for incoming daily consumer goods and that some shipments come with a paper shipping list. These could need some improvements and the ideas are presented in Conclusion part section 7.

6.3 Problems with the digital technology in inbound logistics

There was a clear consensus among the respondents on the condition of the incoming goods. After analyzing the survey results, a few problems stood out significantly. Like the figure 16 shows that 83,3% of respondents answered that the biggest complaint reason is that received products can be damaged or spoiled when arriving. Remain 16,7% tapped something else, what? answer, and opened their answer choice for an open comment section saying that products can be completely missing from ordered and received goods.

5. What are the main reasons for complaints about incoming goods?

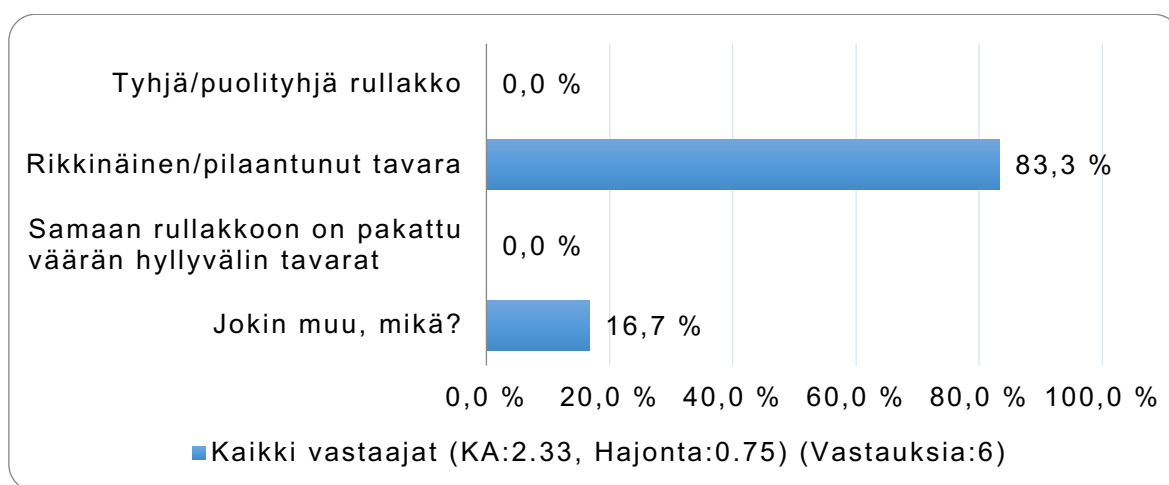


Figure 16. Survey results for question about what are the main reasons for complaints about incoming goods?

The answers showed that the robotic collection of an automated warehouse on the distribution partners' end is reflected in incoming goods when discussing the above-mentioned problems which were broken products / missing products.

Another concern was about half-empty transport units that drivers might combine, which will lead to time waste in stores when inspecting received goods amount. Also, there are issues with mixed trolleys or pallets that are including different shelf-spacing products which are highly time-consuming to sort out.

All in all, despite some problems with the incoming goods, respondents answered that the complaint process is easy to do with the integrated company software. Also, development ideas for this are hard to find due to the issues coming from the distribution partners' end.

6.4 Outlook

Respondents of the survey also considered the prospects between digitalization and the company. Vast felt that digitalization would not be a threat but more of an opportunity, although one respondent felt that the digital future was both, a threat, and an opportunity. Answers included also an unbiased neutral response.

Another quite similar question to the previous one was how the respondents see the future with automation and robotics, do they feel that these are going to replace human workers in the future. The answers were roughly evenly distributed, some felt that automation and robotics would not replace human labor, and some believed that human tasks would be partially replaced.

If we compare these answers with the survey of Statistic Finland presented in the theoretical part, in which it was examined whether the respondents will feel that robotics will replace jobs, the dispersion is not similar but there was little concern in either research. So, it is plausible that the outlook corresponds to the opinion of those who responded to the thesis where robotics is seen as an opportunity. Automation and robotics almost always need some human work done, at least in terms of manufacturing. Often, the control, maintenance, and other things of machines also create new job opportunities instead of lost jobs

Eekoo is a cooperative that is part of a modern chain that has taken a modern approach to digital applications and devices. The prospects for the company are very bright, as the company has already adopted innovations created by digitalization that improve profitability and efficiency. It is possible to say that in the future, Eekoo will increase digital technology both on the store side and in terms of warehousing and logistics. Especially when the already mentioned green value comes to the fore in the company's values, it is even desirable that digital technology and automation be added in order to reduce the environmental burden created by the company.

6.5 Areas for development

This section discusses conclusions based on the research theoretical framework and the result on the study and proposes a solution to the research question about how digital technologies can improve the current inbound logistic process. It is important to develop inbound logistics, especially in those companies where material flow is big, and the control and monitoring need more labor time. This situation can be for example in large retail and utility stores where the amount of incoming goods is larger in volume. When making a strategic plan it is important to recognize own company's resources and needs wanted to achieve.

Company has their own procedures for operations, and it is not obvious that implementing all the latest technology innovations helps towards productive and efficient operations

In this case, Eekoo is a large company that has an integrated system from which procurement, sales, and other issues are handled. Also, because it is part of a bigger company the implementation of new technology is not that simple. As proof of the existing ordering systems, the results of the survey guarantee that the company has the chain's own ordering systems and automatic balance management systems. Some respondents also felt that these improve inventory turnover.

An earlier brief discussion about paper shipping lists and manual inspection work raised thoughts about how these could be improved. Simply solution for the paper shipping list is to change it into digital form. When removing possible human-made errors and unnecessary paperwork, the goods inspection process becomes faster and more accurate. It is not known why some goods inspection process is made manually, RFID technology in this case could improve inspection efficiency when inspecting quantities.

During the theoretical part research, it was noticeable that some websites of technology solutions companies explained solutions also how automation and digital technology could improve goods quality control process. However, these theories are not included in this thesis so a wider analysis of them is not made. It is still reasonable to recognize that these kinds of solutions are existing.

The survey resulted in good developing targets for co-operations company markets and pointed out some technology innovation desires for better flow in inbound logistics. Development targets are mainly associated with the goods receiving part but contain also other areas that are in relation to inbound logistics.

The outlook part of the survey had also a question about what kind of digital innovations the respondents would like for their own work in the future. The answers varied between different digital technologies and automated options.

- The (ELS) digital price tags,
- A technology to support inventory so that the value of inventory would not have to be calculated separately,
- Automation and robotics for receiving, storing, and shelving goods.

Based on the answers, it would be important to do a more thorough study of exactly what kind of technology and automation would be suitable for the premises of the target company and existing management system.

Weight-based pallet/bin to improve noncountable product inventory

The theory section briefly mentioned weight-based pallet/bin system is more focused on industries where more non-quantifiable products and raw materials are stored but could also be suitable for some areas of the target company. For example, Eekoo's larger stores, such as Prisma, also sell a lot of hardware and construction goods, for which a weight-based monitoring solution could work to facilitate storage and replenishment orders.

Electronic Shelf Labeling for better customer satisfaction and correct prices

Exempting employees from the time-consuming exchange of price tags would save their working time for other important tasks such as revenue and internal logistics tasks and thus affect efficiency costs.

Conclusion about how a cooperation company could benefit ELS are, work time saving, real-time prices and matching prices with the online store, better and clearer visibility of customer owners' campaigns in the store, and their timing, and operating within the company's strategic values when removing paper tags. When prices are correct it guarantees better customer satisfaction. Also, as mentioned in the theoretical part about ELS, it could improve brand image.

Ideas for loss management

Loss management is an important area for companies because it greatly affects the company's revenue. Large amounts of losses are always out of the revenue generated and although companies generally calculate the expected cost of losses, the actual amount can be difficult to estimate and, especially during the high season, the amounts of losses increase. (EEA 2022b.)

7. Do you feel that digitalization has affected store loss management?

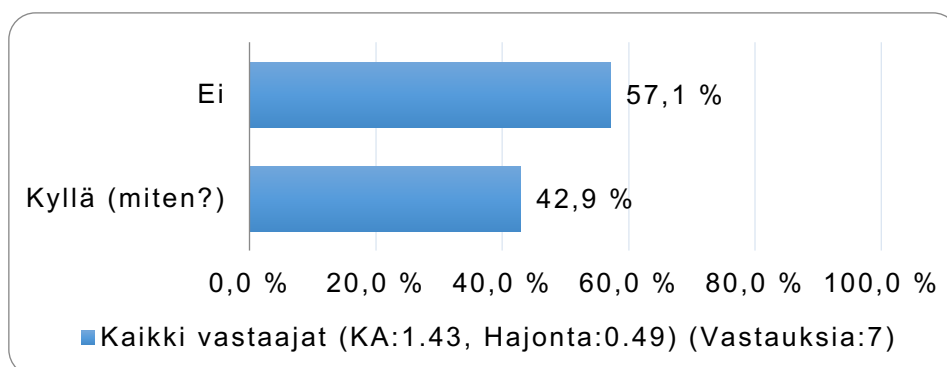


Figure 17. Survey results about question concerning how digitalization is impacting loss management

The results received from question number seven (7) which is presented in Figure 17 was an actual surprise. This, of course, can be company-specific but still, it is interesting that a vast of respondents 57,1% do not feel that digitalization has affected loss management. The common image of digitalization's impact on loss management is that it affects positively. Usually, digital technology helps with loss management.

As Eekoo focuses on green values, the introduction of digital price displays would be a potential tool in loss management and in sales promotion assistance, and the removal of millions of paper price tags would be more environmentally friendly. ELS: digital price displays can also influence the amount of loss. The effect of digital displays on losses is based on the fact that product prices can be timed to change to a cheaper price as the product's expiration date approaches, so obsolete products are not "forgotten".

According to Kauppalehti article published in 2018 about how Electronic Shelf Labelling - ELS is superseding traditional paper labels, says that S Group has noted that they do not gain any benefits from ELS due they have a daily "low price" pricing system (Alma Media Oyj 2022). The S Group cooperatives are using a "low price" pricing and "evening sale", thanks to which the chain's stores have been able to reduce losses considerably, as obsolete products move better for consumers due to twice the cheap price (S Group 2022).

Field research was made, and it is possible to state that at least Eekoo has not yet today adopted an ELS in their retail and utility stores. So, in the case of the S Group, the introduction of digital price displays would have a little direct effect on this, as the company's pricing criteria differ from those of competing companies. However, the possibility of loss management lies in the ELS but is not ready to be adapted to S Group cooperatives.

Outlook on the impact of digitalization in inbound logistics commonly

The outlook for logistics and its parts is bright and open. Digitalization has already played its part in shaping business processes over the years, but major changes are still taking place. As the majority of companies begin to understand even more about the benefits of digital technology, adaptation will happen even more. It is assumable that there is large amount beneficial digital technology that a vast of the businesses and industries are still not using. Highly important inbound logistics is an area that hopefully obtains more attention and digital technology adaption as much as in-house logistics already has. Of course, major of the in-house operations are directly linked to inbound logistic procedures and so on they use shared technology. Specific technology to speed up inbound logistic tasks, especially quality identification.

Moreover, cloud services are going to take more and more place in business making and customer satisfaction and experience achieving.

6.6 Reliability and validity of the research

To determine the quality of the research conducted, concepts of reliability and validity are used. Reliability means that when it is wanted to know how reliably used method or tool is capable to measure the desired phenomenon and its repeatability of it. When a method or tool can produce consistent results every time it can be said that it is reliable. According to the author Anders Orn (2018) on Research Collective website, a very simple explanation of how measuring the distance between points on a flat surface repeatedly gives the same result every time. Validity indicates how the measurement method or tool measures the right measured phenomenon that is claimed to measure. Wheatear the results are generalizable to other contexts validity helps to answer that, so it refers to credibility. If the valuables and conditions of the research are the same as they were in the first research, reliable and same outcomes can be achieved (Research Collective 2022.)

The aim of this research was to find an answer to a research problem that was explained earlier in section 6.2; *“How is digitalization currently showing in the cooperation company inbound logistics tasks?”*, *“Problems that digitalization has brought to inbound logistics”* and *“How current inbound logistics process can be developed with new technological items?”*. The result for research questions was reached and the primary aim was reached. Also, the research complements parts of the outlook gained wanted pondering. In the initial stage of the thesis, in the theoretical part, the most important aspects of the key topics related to the research of the thesis are explained. They support the conclusions and development proposals based on the results of the study. The research-focused part initially introduces the target company, its values, and history briefly which as well supports the development suggestions. After the presentation of the company, the study moves on to examine the results of the study in more detail. The exact desired result was not achieved, as the study remained very superficial and, in the end, only surveyed the current situation in a few stores of the target company. Primary data was collected through a survey that was constructed in a way that included both multiple-choice questions as well as yes or no questions with an open comment possibility. Secondary data is from variant books, articles in web sources, blogs, and journals.

The produced research can be stated to be valid and reliable due to the implementation of the research matches with the presented reliability and validity explanations.

6.7 Suggestions for further research

For the cooperation company would be highly beneficial to make more comprehensive research in the studied research field to address the issues identified in this thesis research. Further research might also point out other occurring problems that this research did not point out that need attention to improve functionality. Since the generated research is a very directional, perfunctory overview of the current situation and the technology in use. Broader research that includes distribution partner view and experience would give a better understanding of the studied current situation as the distribution partners' end outbound logistic actions affect very much cooperation company inbound logistic actions.

As well as expanding the research field for other cooperation companies' stores that this research did not study. As the study only contained six answers indicates that there is a large number of cooperation company stores that were not included in this research. This would also give broader and more comprehensive research results that could be compared to a larger sample.

7 Summary

To make a summary of the studied thesis topic, this was personally interesting even though in the beginning the topic faced some major changes. Co-operation company was included in the study and digitalization and inbound logistics rose to the main research targets when first the topic also included green logistics. Green logistics would have been highly motivating and interesting since those topics are important for me.

The thesis achieved some results and a few suggestions for development. Also, after the theoretical part study and research study, it is fair to say that digitalization opens new opportunities and enhances the productivity and efficiency of the whole organization and especially has a major role in logistic processes and procedures development.

With a view to future research, this study identified points that should be better addressed when constructing the survey framework. The research survey still left many things unexamined, and the formulation of the questions requires better formulation.

Since the research was overview more detailed and comprehensive research questions and fieldwork would have been in place, which would have allowed for more in-depth analysis and more thorough elucidation of the answers to the problem areas.

Respondents were nicely active. The number of desired respondents was not reached due to the email invitation list being rather small, however, the survey again produced good data for the development and review of operations.

- The survey contained an open pondering about the future with digital technologies and automated innovations. – A common view and emotions about how respondents feel about future work with digital technology. Also, some technological improvement suggestions were made.

Respondents of the cooperation company's retail stores were mostly satisfied with the used technology and have positive image of digitalization. The focus of attention was concerning incoming goods' condition. It is hard to say the real benefit that the company is gaining from this research due to these solutions for research problems are just improvement ideas and not actual implementations.

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Appendix 1. Research interview frame and questions in Finnish

Digitalisoitumisen vaikutus yrityksen tulologistiikassa

1. Työnkuva yrityksessä ja kuinka usein olet työssäsi tekemisissä tulologistiikan toimissa (tavarankäyttö, tarkastus ja varastoon sijoitus)

2. Onko myymälänne logistisen puolen teknologiaa uusittu viimeisen viiden vuoden aikana?

Ei

Kyllä (miten?)

3. Millaista teknologiaa käytätte saapuvan tavarankäytössä ja varastoon/myymälään sijoittamisessa

Valitse yksi tai useampi vaihtoehto.

- a) QR-koodi
- b) RFID-tunniste
- c) Beacon sensori
- d) Jokin muu, mikä?

4. Onko käytössäne automatisoitu varastokirjanpito/varastohallintajärjestelmä, joka mahdollistaa reaaliaikaisen varastohallinnan. (jokin ohjelma/palvelu)

En tiedä

Ei

Kyllä (tarkenna alle mikä ohjelma ja koetko, että käytössäne oleva varastokirjanpito parantaa varastonkiertoa)

5. Mitkä ovat saapuvan tavarankäytön suurimmat reklamaatioiden syyt?

Valitse yksi tai useampi vaihtoehto.

- a) Tyhjä/puolityhjä rullakko
- b) Rikkinäinen/pilaantunut tavara
- c) Samaan rullakkoon on pakattu väärän hyllyvälin tavarat
- d) Jokin muu, mikä?

6. Koetko että digitalisoituminen tulologistiikassanne on lisännyt tarkkuutta ja tehokkuutta?

Ei

Kyllä (jos vastaat kyllä, tarkenna miten tämä mielestäsi näkyy)

7. Koetko että digitalisoituminen on vaikuttanut kaupan hävikkihallintaan?

Ei

Kyllä (miten?)

8. Miten koet asioiden toimivan automatisoidun INEX jakeluvaraston kanssa, hyvin/huonosti? Mikä on hyvin tai mikä on huonosti

Tulevaisuuden pohdintaa

- Uskotko että digitalisoitumisen myötä, tulevaisuudessa automaatio ja robotiikka korvaa ihmisen työtehtävät kaupan logistissa toimissa?
- Millaisia teknologian innovaatioita itse toivoisit työpaikkallesi logistiikkapuolelle?
- Koetko digitalisoitumisen uhkana vai mahdollisuutena?

Kiitos että osallistuitte opinnäytetyöni tutkimusosuuteen. Halutessanne teidän on mahdollista saada opinnäytetyön lopullinen versio luettavaksenne, jossa näkyy tutkimuksen tulokset ja analysointi. Aurinkoista kevättä

Appendix 2. Research interview frame and questions in English

Digitalization impact on company inbound logistics

Job description in the company and how often you are involved in the logistics of work (unloading, inspection and warehousing)

2. Has the technology of the logistics side of your store been renewed in the last five years?

No

Yes (how?)

3. What technology do you use to receive incoming goods and place them in the warehouse/store

Select one or more options.

- a) QR-code
- b) RFID tag
- c) Beacon sensor
- d) Something else, what?

4. Do you have an automated inventory accounting/inventory management system that allows real-time inventory management. (any program / service)

I don't know

No

Yes, (specify below which program and do you feel that the inventory accounting you use improves inventory turnover)

5. What are the main reasons for complaints about incoming goods?

Select one or more options.

- a) Empty/Half-empty trolley
- b) Damaged/spoiled products
- c) A trolley contains products that belong to different shelf spaces
- d) Something else, what?

6. Do you feel that digitalization in your inbound logistics has increased accuracy and efficiency?

No

Yes (If yes, please specify how you think this appears)

7. Do you feel that digitalization has affected store loss management?

No

Yes (how?)

8. How do you feel about working with an automated INEX distribution warehouse, good / bad, what is good or what is bad

Reflection on the future

- Do you believe that with digitalization, in the future, automation and robotics will replace human work in retail store logistics tasks?
- What kind of technological innovations would you like for the logistics side of your workplace?
- Do you see digitalization as a threat or an opportunity?

Thank you for participating in the research part of my thesis. If you wish, you will have the opportunity to read the final version of the thesis, which will show the results and analysis of the research. Have a sunny spring