Haaga-Helia
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Developing warehouse managing system and procurement at company X

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Abstract

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The thesis is conducted in cooperation with company X, a food importer in Finland. The company is growing, resulting in the storage is running out of space and the staff working ability is low. They adopt an Enterprise Resource Planning (ERP) system to improve productivity across departments, including warehouse operations. Plus, the procurement process is complicated because of the COVID-19 epidemic. They seek to find new vendors for new products. The research objectives are to outline their challenges in warehouse management and procurement procedures and suggest applicable solutions to them. Addi- tionally, the thesis aims to evaluate how well the ERP performs.

The thesis consists of the theory part describing the concepts used in the thesis and litera- ture review of previous researches, and the practical research part outlining the research objectives. The theoretical framework is based on definitions of the research objects, in- cluding warehouse management, inventory management, procurement, and the concepts used to suggest solutions.

The qualitative research method is used primarily in the thesis, accompanied by quantita- tive and desktop study methods. Firstly, primary data is collected via structural interviews with the manager to describe the business practices, the ERP implementation, the chal- lenges, and the impacts of the epidemic on the business. Secondly, a survey is conducted with the personnel who use the ERP system to collect their evaluations. Finally, secondary data is collected to suggest potential solutions and support their possibility and fitness.

The practices at the company are primarily manual, making errors are easy to occur. Plus, they have quite a lot of excess stocks clogging the warehouse flow. Firstly, liquidating stock is suggested by discounting and donating. Secondly, adopting advanced storage so- lutions, rearranging inventory are recommended as it helps to utilize more space and im- prove productivity. For the ERP system appraisal, most of the staff evaluate it as good, as they grade it 7.6 on average on a scale of 10 though it sometimes indicates inaccurate data. In addition, the epidemic causes difficulties in the sourcing process. Subsequently, the strategies to select vendors and mitigate risks are presented.

In a nutshell, the thesis suggests possible alternatives to the case company that may suit their needs based on the research findings. Companies should continue to develop to be more competitive in the market, and it can begin by enhancing operations within the com- pany and further activities. As the technology trend drives the modern world, it is considerable to adopt such applications to develop.

Keywords
Warehouse Management, Procurement, Enterprise Resource Planning (ERP) system, COVID-19 epidemic

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Abbreviations

(The) US	The United States
(The) UK	The United Kingdom
ERP	Enterprise Resource Planning
FTSE	(The) Financial Times Stock Exchange
GDP	Gross Domestic Products
IM	Inventory Management
IT	Information Technology
LM	Logistics Management
SCM	Supply Chain Management
SMEs	Small and Medium Enterprises
SRM	Supplier Relationship Management
SWOT	Strengths, Weaknesses, Opportunities and Threats
WHO	World Health Organization
WM	Warehouse Management

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1 Introduction

This research is a bachelor thesis of Degree Programme in International Business in the major specialization of Supply Chain Management (SCM) taught at Haaga-Helia University of Applied Sciences. This chapter presents the background of the research topic and its relevant sections such as research question, case company, key concepts, demarcation of the topic, as well as project objectives that the research aims to meet. The project tasks are presented in the overlay matrix.

We are living in a world that is constantly changing and developing. It is very easy to buy a product that is manufactured in Vietnam with raw materials from India and sold in Europe or America. Of course, in reality, like many other industries, supply chain management has its challenges. Thus it is not a surprise when one of the biggest giants in the technology industry, Apple, is led by Tim Cook, an expert in the supply chain. (Lehmacher 2017, xi). The global supply chain plays an essential role in shaping the modern world. Yet its role is not indicated easily, but with deeper scrutiny, we discover that the structure and management of a nation's supply chain system will define its economic strengths as well as its wealth. A thorough assessment of the supply chain system will demonstrate barriers to cross-national trade. We all play a role in the supply chain and the value chain process, either as individuals, institutions, or countries. We can be vendor, manufacturer, distributor, seller, consumer, or recycler. (L. 2017, xiii). Thus we shape its design and are responsible for its outcomes, both negative and positive. The global supply chain as a whole is like an orchestra. Every instrument plays an important role that cannot be replaced. An orchestra delights audiences only when all musicians play the perfect harmony. (L. 2017)

Dukic and Oluic (2007, 452) emphasize that logistics success does impact an organization considerably. They point out the in the Western economies, and logistics costs constitute approximately 10 to 15 percent of Gross Domestic Products (GDP). (G. & C 2007). In the logistics sector, the research pays attention to warehouse management and procurement and some relevant issues because most of the challenges of company X surface in the two areas. As a wholesaler like the commission company of this research, these areas are chosen because logistics is one of the most critical aspects of the supply chain process as the company has to deal with a vast amount of physical products in their warehouse, making them devote special attention to developing warehouse opera- tions as well as the procurement process associated. In addition, the pandemic of COVID-19 has been causing massive impacts on the world economy, especially on SCM. Subsequently, it leads to difficulties in the sourcing process of the company. In this research, the influences of the epidemic on the company are also

discussed.

1.1 Background

The thesis topic is provided by company X in Finland. They are an food importer in Finland. They supply foods and kitchen utensils for restaurants across Finland and also the retail business. They want to develop their warehouse operations and expand more warehouse space, as the warehouse capacity is predicted to be fulled in a short time.

Company X has several obstacles in Warehouse Management (WM) on which the research concentrates suggests potential solutions. They adopt a new managing system that integrates new advanced and efficient warehouse operations. They cooperate with an Information Technology (IT) company to design the new customized Enterprise Resource Planning (ERP) software. company x

They want to find more vendors for more products. They have some challenges regarding sourcing practices due to COVID 19, which will be presented more specifically in chapter 4. Company X is on its way to develop and grow. Therefore, they are facing many challenges to secure a strong foothold in the market. The research will present those challenges as well as suggest applicable solutions for them.

1.2 Research question

The research question of this thesis is:

"What are the challenges in warehouse management and procurement that company X faces, and what solutions can they use to improve?"

The two primary objectives of this research question are to recognize the challenges that a business is facing in its supply chain system and give suggestions to the case company to cope with these challenges. To better analyze the research question, 4 investigate questions or sub-questions are added as below:

IQ1: What are the current practices in the company X warehouse?
IQ2: What are the challenges that company X is facing in WM?
IQ3: How well does the ERP system work?
IQ4: What solutions can they use to tackle the challenges?

An overlay matrix is created to clarify the sub-questions better.

Table 1. Overlay matrix of the research question and investigate questions

Investigative Questions (IQs)	Theoretical Framework [1]	Methods	Data Analysis/ Results
IQ1: What are the current practices in the company X warehouse?	WM, IM, procurement, ABC analysis	Desktop studies, structured interview	Daily routines in warehouse operation.
IQ2: What are the challenges that company X is facing in WM and procurement?	WM, IM, procurement	Desktop studies, structured interviews.	Addressing the challenges in warehouse operations and procurement, partly caused by the epidemic.
IQ3: How well does the ERP system work?	ERP program, DeLone and Mclean model of IS	Desktop studies, structure interview, survey	Evaluating the effectiveness of the ERP system, especially on warehouse operations.
IQ3: What solutions can they use to tackle the challenges?	Technological advancements, Flow rack system, SRM, SWOT analysis, 5S method.	Desktop studies, empirical studies	Applicable solutions for the case company to tackle the problems.

1.3 Demarcation

The research will focus on the 2 phases of the supply chain process: WM and procurement. In the WM phase, the study will focus on warehouse optimization, order fulfilment, stock management are discussed. Nonetheless, the study on ERP impacts may broader than just the two areas mentioned above, as it is integrated for the whole business process.

In addition, the research concentrates on mitigating sourcing risks, selecting and managing relationships with the suppliers in the procurement part.

1.4 International aspects

Although company X only serves customers within the Finnish territory, many suppliers range from different continents. In Asia, they source from Korea, China, Vietnam, Indonesia, Japan, etc. In Europe, such as Holland and Spain. They also have some suppliers from Africa. Plus, the company's workforce is very diverse in terms of nationality and background.

Most of the products are sourced from overseas, which requires a professional delivery channel to ensure the integrity of goods and the shipping time. Company X also works with international logistics services. Thus this topic is an excellent opportunity to gain knowledge of trade between countries and continents and multicultural competence.

1.5 Benefits

This thesis can be beneficial to businesses operating in the wholesale and retail markets, especially ones having their products mostly origin from overseas. That is where the role of the supply chain process is essential.

As the world is changing and developing thanks to modern technology, company X wants to improve its business practices by adopting a new customized ERP software. ERP is crucial for millions of businesses globally, ranging from sizes and industries. (Oracle 2021). Companies that do not manage their business by ERP will have more insights when adopting new technology to their business through this thesis. The thesis also pro- vides case company discussion about the fitness of the system to the company. The re- search offers company X an evaluation of this improvement itself and possible recom- mendations for further development in the future. Furthermore, the thesis aims to provide company X with the applicable solutions to their problems. They can take them into con- sideration for development

The research gives a case study of a global wholesaler trade, which researchers can use as a reference.

1.6 Risk analysis

Although the company X manager has excellent English proficiency, it is not both my and his first language. Hence, it may result in a misunderstanding between us and cause barriers to the investigation.

One risk is probably the limited access to the process of adopting a new ERP system and the information included, which might benefit the research. Because an IT company provides the ERP system that company X uses, some confidential information cannot be informed to a third party. Besides the information about the ERP system, the company might not be very willing to share some other information if it is confidential in their opinion.

Another risk might be that the information that the case company provides is not sufficient to interpret. Although the company seems to be very eager about the topic, they sometimes do not have enough information. Reports on sales might be kept disclosed.

In addition, the system needs some time to be fully developed and installed, and it is still in process when the research starts. It will be a big concern if the system is not ready on time by the thesis's deadline. If that is the case, there will not be enough information and results to interpret, which leads to a high chance of failure of the research.

1.7 Key concepts

Warehouse Management (WM) Faber (2013, 1232) states that WM includes operating procedures starting from planning to control warehouse operations. The author presses that WM aims to ensure that every step of warehouse processes and activities is monitored effectively and adequately.

Inventory management (IM) In a study by Borisov and Plinere (2015, 91), IM determines the quantity of inventory to have in stock, how many to order, and where to order so that the amount is sufficient enough to satisfy customer demand. It includes various actions such as monitoring orders both from vendors and customers, stock management, managing the number of products available for sales, and order fulfillment. (Tradegecko)

Procurement is an orderly and systematic exchange of goods or services between a seller and a buyer. It is the process of acquiring goods and services, and it encompasses all of the activities related to deciding the types of items required, making orders, receiving and storing packages, and managing procurement contracts. (Feistein & Stefanelli 2012, 3).

Supplier relationship management (SRM) is a systematic approach to managing business relationships with the organizations that provide goods and services. (Mettle & Rohner 2009, 59). SRM objectives are to drive vendor behaviours and to manage the relationship between two entities. (Easton, Hales, Schuh, Strohmer & Triplat, 2014).

Enterprise Resource Planning (ERP) system According to Nestell and Olson (2017, 2), an ERP system is multi-module application software that integrates business functions such as product planning, parts purchasing, managing inventories, and managing supplier relationships customer service, and managing orders. Application modules for the finance and human resource functions are also included. Technically, an ERP system is run based on the relational database system. (N. & O. 2017).

DeLone and Mclean model of Information System (IS) measures the success of an information system which is taxonomy and interactive. (DeLone & Mclean 2003, 9). The model assesses an information system based on six aspects: system use, system quality, information quality service quality, net benefit, and user satisfaction. (D. & M. 2003).

SWOT analysis is used to evaluate a company's resource capabilities and market environment. It consists of four elements: Strengths, Weakness, Opportunities, and Threat, abbreviated as SWOT. (Sarsby 2016, 3). Strengths and Weaknesses are the company's resource capabilities that the company cannot control. The factors they can monitor are Opportunities and Threats, which are the market environment. (S 2016).

ABC analysis is a method that classifies warehouse inventory based on their sale volume and quantity or importance. (Myerson 2015, 61). It is based on the Pareto rule 80/20, in which 20 percent of resource generates 80 percent of outcomes. It categorizes the warehouse items into A, B, and C products. A product has the most significance, comprises 20 percent in units, and produces 80 percent of sales. B is the medium-important item, and C the least important inventory. (Richards 2014, 79).

5S method is a waste-production and organization productivity technique that includes sort, set-in-order, shine, standardize and sustain (McFadden 2021).

Pick-to-voice system is a technological system that uses voice prompts to guide warehouse staff on the pick location, types, and quantity. (Glynn, 30 April 2021). The system enables working without papers and eye and hand focus.

Pick-to-light system uses alphanumeric screens and buttons to lead the picker through light-assisted manual selecting, placing, and arranging. (Glynn, 13 April 2021). **Pick-to-pallet** is an advanced version of the pick-to-light application. It utilizes proven put-to-light technology within the pallet truck forks, integrating the picking truck with the existing WM software and voice equipment. (Raymond Corporation 2021).

Flow rack system utilizes the rack-supported arrangement of raised rails and dynamic parts such as conveyors or trollers. (MHI 2021).

Radio Frequency Identification (RFID) is a technical device that scans the barcode on magnified compatible RFID tags with a laze and contains an alphanumeric series to identify a product. (Kabachinski 2005, 131). A regular RFID system consists of readers, tags, and supporting applications (Rantasila, Hinkka, Sihvola & Permala 2014, 245).

2 Literature review

This chapter will indicate the theoretical underpinning of the research. A theoretical framework is built to explain and evaluate the theories and models used in the study. The other theories following are the WM, IM, LM, and SRM. The later part of this chapter presents the research gaps in previous academic researches.

2.1 Theoretical framework

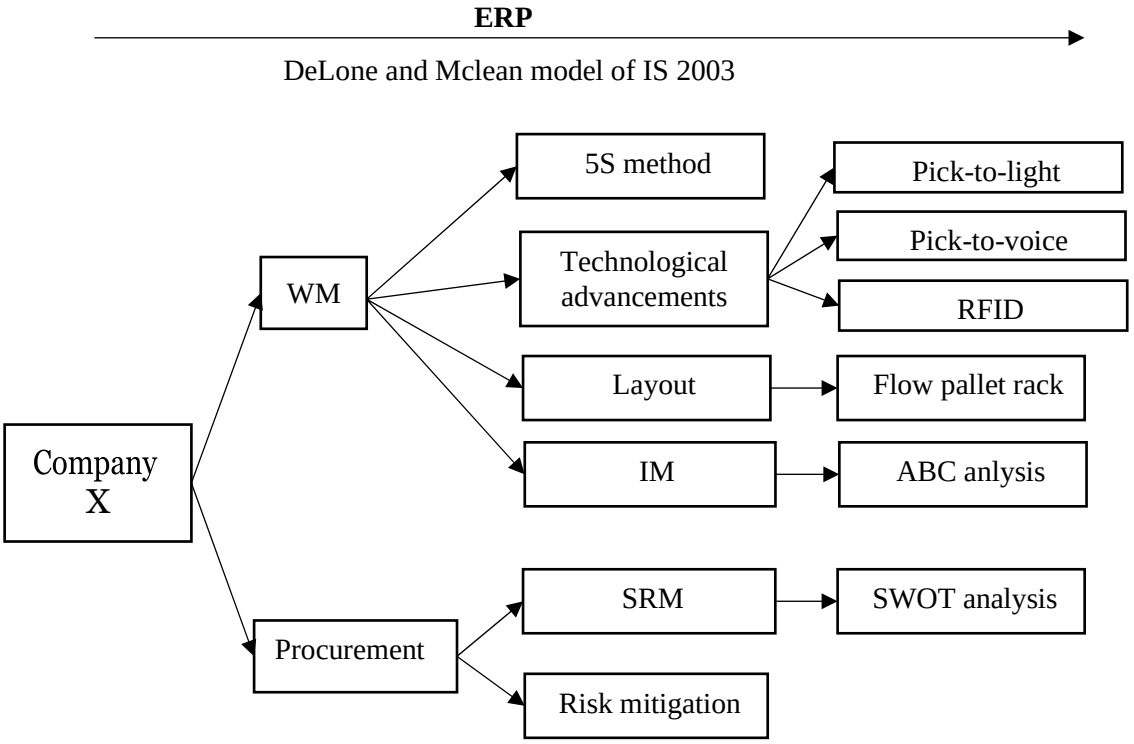

Figure 1. Theoretical framework

Figure 1 illustrates the study's theoretical framework, explaining the concepts supporting the thesis and showing the established fundamental ideas. WM and procurement processes are the critical concentrations. In chapter 1, it is explained why these areas are selected, making WM and procurement the key elements of the research. Under WM, IM is investigated because it is a challenge for company X since they offer a vast amount of products, meaning managing stock and relevant issues may be complicated and have high risks of errors. An ABC analysis is included to categorize the inventory demands. In procurement, the thesis focuses on the company's mitigating risks and the relationship with the suppliers. When assessing a vendor's capability, a SWOT analysis is included. The sourcing process and IM have a correlation relationship. Particularly, secured inventory practices have positive impacts on procurement. (Onchoke & Wanyoike 2016, 124). Warehouse managers decide on purchasing based on inventory situation. In this thesis,

the warehouse optimization is designed as a proposal to the case company, including concepts such as pick to voice or pick to light system, 5S method, and RFID application. The new customized ERP program is implemented throughout the company and across functions. That is why it does not belong to a specific department, as described in figure 1. The DeLone and Mclean model of IS is used to evaluate the success of the ERP system.

Faber (2013, 1232) states that WM includes operating procedures starting from planning to controlling warehouse operations. WM aims to ensure that every step of warehouse processes and activities is monitored properly and effectively. Hompel and Schmidt (2007, 7) highlight that WM mission is a similarly direct and straightforward way to manage and optimize the complex warehouse and distribution centres. Chan (10 May 2017) describes the WM as a broader field that encompasses IM.

Priniotakis and Argyropoulos (2018, 1) define IM as an approach to manage inventory and maintain sufficient replenishment to meet the demand. Borisov and Plinere (2015, 91) define IM by listing its objective and purpose: determining the quantity of inventory to have in stock, how many to order, and where to order so that the amount is sufficient enough to satisfy customer demand. The definition of Borisov and Plinere seems to focus more on the quantity of inventory level, whereas Priniotakis and Argyropoulos define it more generally. An article on Tradegecko (2021) lists the IM activities, such as managing orders and remaining inventory level, monitoring stock for sales and order fulfilment. While IM concentrates on stock and materials management, WM also includes staff management and delivery. (C. 10 May 2017).

ABC classification approach defines the highest proportion in sales or profits is contributed by a small number of products. (M. 2015). Richards (2014, 80) breaks down that the ABC analysis classifies stock into three categories A, B, and C. In which, A product is the most important stock, which accounts for 20 percent of the inventory and generates 80 percent of sales; B product has a medium significance which accounts for 35 percent of the inventory and generates 15 percent of revenues; C product is the least important, which constitutes 45 percent of the stock and produces 5 percent of sales. (R. 2014). On the other hand, Ravinder and Misra (2014, 257) describe it as "*a well-established categorization*" approach. The authors also highlight that ABC analysis seeks to prioritize inventory and helps warehouse managers to answer two primary questions: when and how many to order?. (R. & M. 2014). In this thesis, an ABC analysis is used to classify the inventory types, which helps design the warehouse layout.

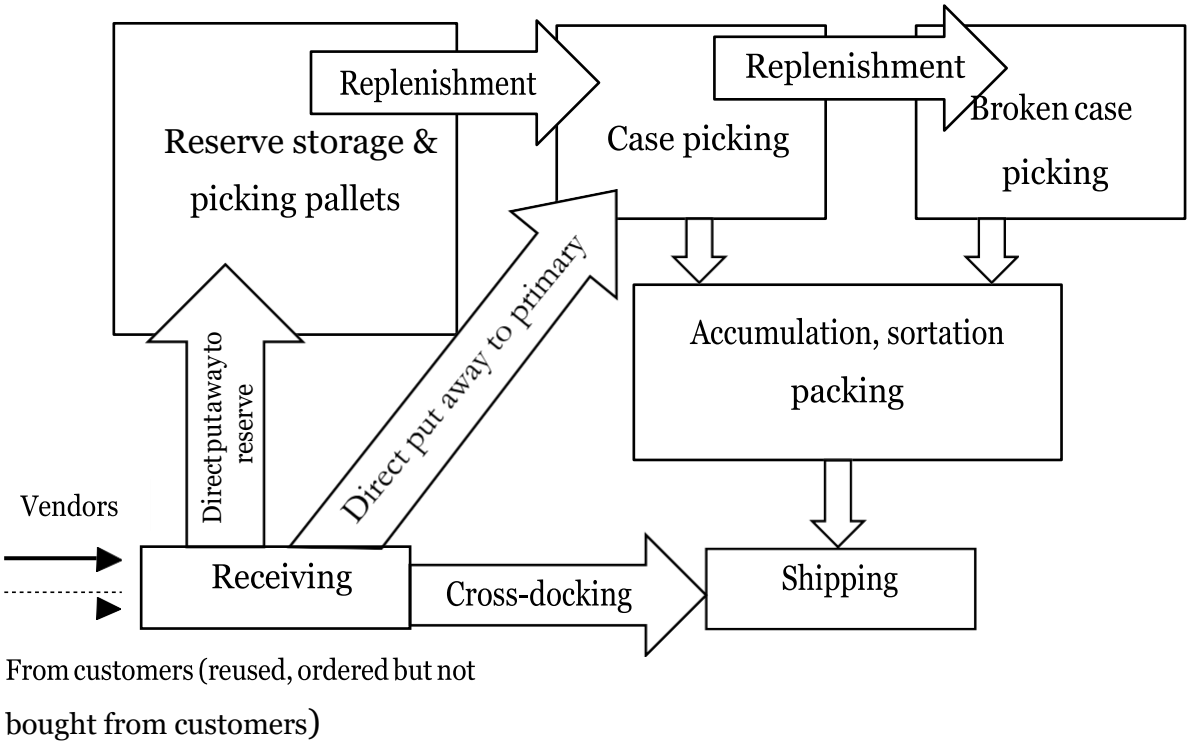

Figure 2. Typical warehouse operations (Tompkins, White, Bozer & Tanchoco 2010, 42)

The proposed solutions for the case company include the 5S method and technological applications such as pick-to-voice, pick-to-light, and RFID. In the 5S method, sorting concentrates on tidiness, requiring removing unused items in the warehouse. Set-in-order prioritizes orderliness, which seeks to design the facility. Shine means to check and clean the place frequently. Standardize aims to make the procedures of 5S is implemented follow set rules. Finally, sustain focuses on discipline, in which responsibilities are assigned to personnel and ensure it function promptly and durably. (McFadden 2021). Bartnicka (2018, 453) explains that the first step of the method concentrates on minimizing losses caused by the redundant flows of goods and tools, whereas the others help warehouse managers to develop and sustain effective working habits that benefit the business operations. A figure that illustrates the concepts is presented below.

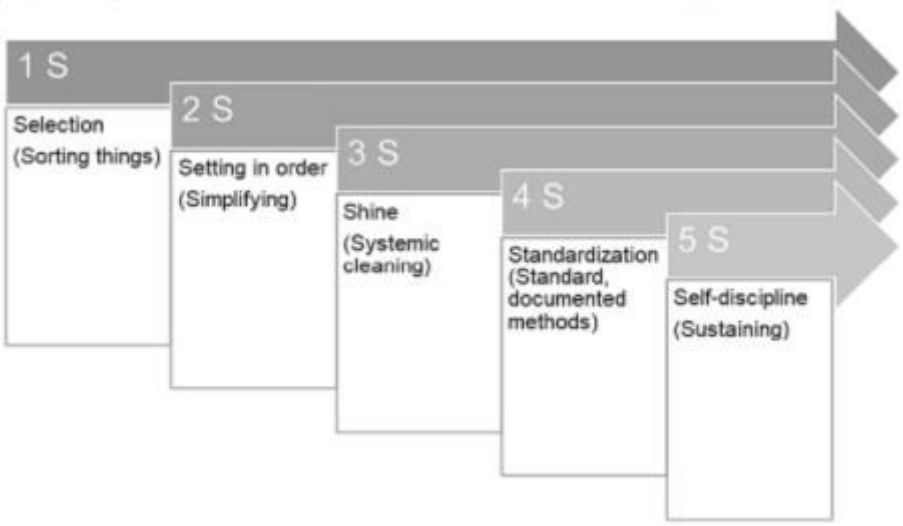

Figure 3. The idea of the 5S method (B. 2018).

In recent years, people have been taking advantage of Information Technology (IT) applications in the logistics process. (Adrialdo, Mauro, Silvio & Camargo 2016, 724). The pick-to-voice system carries out picking activities through voice instructions. The system allows free of hands and eyes as well as avoids paperwork. (Adrianldoo & al. 2016, 724). Glynn (30 April 2021) describes it as a technological system that uses voice prompts to guide warehouse staff on the pick location, types, and quantity. The system enables working without papers and eye and hand focus. (Glynn 30 April 2021). Pick-to-pallet is an advanced version of the pick-to-light application. It utilizes proven put-to-light technology within the pallet truck forks, integrating the picking truck with the existing WM software and voice equipment. (R.C.). The lights act as a beacon, instructing the right pallet to collect items. The system then sends instructions to staff, informing them of the locations, quantity, and which pallets to place them through the voice speak headset. The picker will confirm the task is done by saying "check digit," then the lights will turn on under the target pallet position. After that, the picker will speak out to confirm the quantity and customer's name and place it on the targeted pallet. (R.C).

Additionally, a flow rack system is included to improve warehouse capacity and efficiency. The system utilizes the rack-supported arrangement of raised rails and dynamic parts such as conveyors or trollers. (MHI 2021). Safronov and Nosko (2019, 80) describe the system as having two versatile and static elements. Static parts keep the system stand firm in both directions, whereas the versatile trollers or conveyors keep the pallets flow safely. Versatile components also include a brake system. (S. & N. 2019).

Kabachinski (2005, 131) describes an RFID device scans the bar code on magnified compatible RFID tags with a laze and contains an alphanumeric series to identify a product. A regular RFID system consists of readers, tags, and supporting applications (Rantasila, Hinkka, Sihvola & Permala 2014, 245). Want (2004, 41) characterizes RFID as an electronic application using electromagnetic technology to identify items, locations in the distance automatically. The RFID working principle is described as follows: the reader produces signals to supply power to the tag. The signal allows the tag to execute the operations ordered by the reader. Then, the tag is able to return a signal comprising digital identification of an item. (W. 2004).

The procurement practices are the prior steps before the warehouse operations. Under Feinstein, Stefanelli and Hancock's standpoint (2012, 3), procurement is an orderly and systematic exchange of goods or services between a seller and a buyer. It is the process of acquiring goods and services, and it encompasses all of the activities related to deciding the types of items required, making orders, receiving and storing packages, and managing procurement contracts. Van Weele (2018, 7) interprets in another lens: procurement is to manage the external sources to ensure the supplies of goods and service, as well as capabilities that are critical to the business, run smoothly and effectively, covering the materials, information, and money flows to consumption. The author also emphasizes that procurement does not encompass IM. Nonetheless, it should be closely connected and interrelated to IM and other material and quality management activities to improve productivity. (V.W. 2018). The two definitions describe the issue through different lenses, which can perfectly support the research. Because the case company is a wholesaler of physical products, it is a perfect chance to exploit the procurement aspects of these definitions.

An effective purchasing strategy should reduce the risks of shortages and interruptions in the inventory supply. (Bowersox, Closs & Cooper 2010, 75). On the other hand, IM does impact the performance of procurement departments, as purchasing decision is made based on the inventory cycles. (Mukopi & Iravo 2015, 5). Thus, these two functions within the SCM are closely linked to each other.

Supplier relationship management (SRM) is defined as a systematic approach to managing business relationships with the organizations that provide goods and services. (M. & R. 2009). SRM objectives are to drive vendor behaviours and to manage the relationship between two entities. (Easton & al. 2014). Biedron (10 December 2018) states that SRM helps businesses access suppliers' influences on a company, and it is applied in procurement, operations, and project management. Each definition expresses a different

aspect of the term. SRM is beneficial for the research because the case company sources products from different countries, meaning that managing the relationship with them is crucial for the long-term development of the business.

In this research, a SWOT analysis seeks to appraise the vendor's competency. SWOT stands for Strengths, Weakness, Opportunity, and Threats. It is used for planning strategy that evaluates an organization, a project, or a business activity. (Güller & Tat 2017, 994). It allows correlating the company's resources and capabilities with the market's situation. (G. & T 2017). Fine (2009, 5) argues that SWOT analysis organizes data sequentially, which builds a foundation to understand the organization and the proposal ideas. The two definitions describe in different lenses which serve the research process.

ERP software is a crucial database and application for many companies due to its preeminence in data processing and managing. It helps businesses automate and integrate their information and functions, and it operates as a database solution. (Puspitasari, Saputra & Utami 2020, 2). That is also why it is included in this research. The case company is adopting a new customized ERP system to improve practicalities, which subsequently enhances their business. The ERP's effectiveness is examined throughout phases in this study rather than in a single business function. Company X is adopting the expanded version of the ERP system, and personnel can use it across departments.

The research uses the DeLone and Mclean IS success model for appraising the ERP success. The model is developed by two professors William H. DeLone and Ephraim R. McLean. Researchers apply the model to evaluate information systems. It consists of six measurements that influence each other: system use (how long and how often the system is used and dependency, nature, and scope of use); system quality (usability, functionality, dependability, versability, convergence, significance, and data quality) (D. & M. 2003); information quality (precision, completeness, relevance, and ease to understand and security) (D. & M. 2003); service quality (responsiveness and guaran- tee); net benefits (time and cost efficiency, market expansion); user satisfaction (repeat usage and purchase, user survey) (D. & M. 2003). The impacts of the measurements on each other are presented in figure 4.

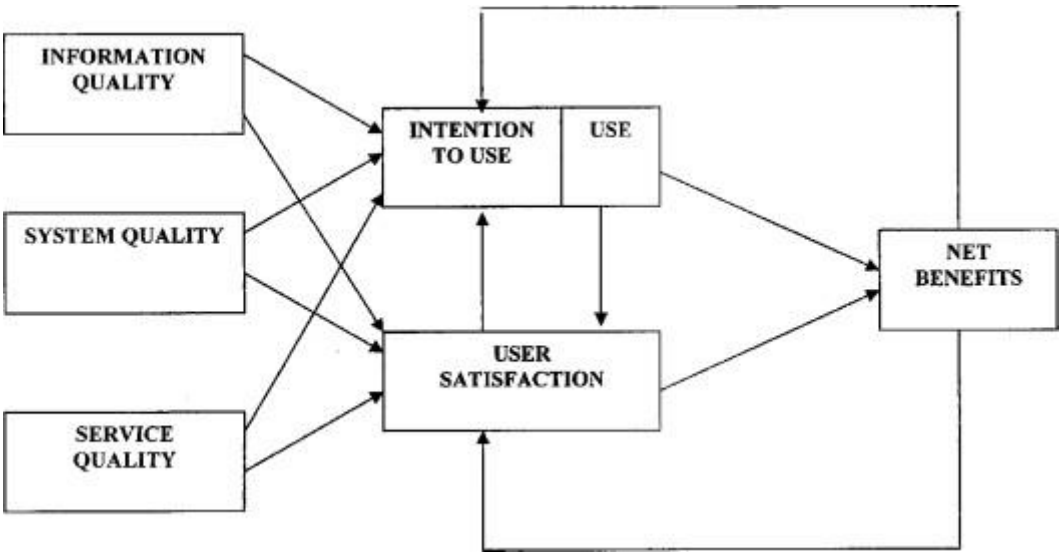

Figure 4. The updated DeLone and Mclean model of IS (D. & M. 2003).

The theoretical framework describes the theories, concepts, and models used in this research to define the problems and explain the research structure. The SCM scope is broad, but the thesis only draws attention to critical areas where the case company's issues lie. WM, IM, procurement, SRM, and ERP system are the primary concentrations of the study.

2.2 Relevant literature review

To demonstrate the gaps in a study before and after the initial discovery phase, insights and facts from existing researches are included as background knowledge. (Flick 2018, 49).

2.2.1 Warehouse management researches

This subsection presents previous studies on a similar topic. These researches focus on how ERP system is integrated into the warehouse operations specifically and how it changes the current practices. The section is outlined based on the scope of the research, from broader to narrower. Besides, some studies are presenting how different methods have developed procurement.

A study by Rizzi & Zamboni (1999, 367) emphasizes that traceability is the most crucial element to attain high-quality management. Wortmann, Hoffman & Davenport (R. & Z. 1999, 386) point out that the ERP system helps businesses to do that due to its features of integrating modules, analyzing functionalities, data storing and retrieving process and

management combined with other typical functionalities. The study highlights the traceability gained through the ERP system that helps to develop WM in general. Such parameters in WM being assessed are order shipping time, inventory accuracy, and space utilization rates. The study concentrates on three parameters in the logistics process of a manual warehouse: traceability rate to manage perishable goods effectively, warehouse fill rates, and lead times. The strategy of first in, first out in the picking process is important to manage perishable products. The system automatically issues a packaging order list according to the storage date and gives warehouse instructions on where to pick it. Thereby the authors state that traceability is very crucial to increase shelf life expiration date and subsequently improve the efficiency of WM. The second parameter, fill rates, are optimized by enhancing the storage units and piles. To do that, the warehouse operators should carefully consider pallet features, pile limits, spaces between pallets, etc. Finally, time is money. The shorter the lead time is, the more efficiency and profits the company gains. (R. & Z. 1999). The authors conclude that these issues are the primary levers for warehouse managers to improve performance parameters, and they are closely correlated to each other; it is important to have a mutual balance monitored between them. The design of the warehouse and the arrangement of the inventory are included. Specifically, the authors suggest that higher-demand items should be placed closer to the loading area. This strategy is called class-based storage. It is proved to decrease the lead time from 95 seconds retrieving to 78 seconds and subsequently reduce the required labor force. (R. & Z. 1999). To choose the most appropriate storage and retrieving strategy for a warehouse, firstly, a manager should clarify the require- ments for logistics movements and research advantages and disadvantages through a cross matrix method. The research includes those initial requirements combined with other management strategies in the module. The ERP system uses a data transmission system to update and manage inventory in the warehouse through an information database. After imputing a single storage unit's production information, the system then updates the IM and then WM. A transfer order is then issued and confirmed when the storage cycle is completed. The process is shown in the figure below.

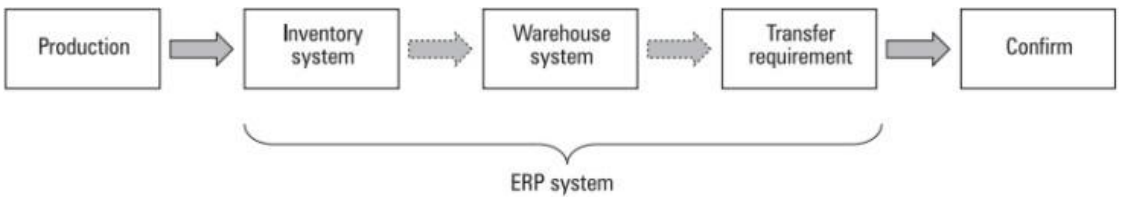

Figure 5. The logical warehouse stock charge process (R. & Z. 1999).

After a thorough analysis, the authors state again the advantages of the ERP for businesses to adopt. It helps build a strong backbone for operations throughout the company with parallel process view, process integration, data liability, and increased traceability. The study draws particular attention to a manual warehouse of perishable products and the changes when adopting the ERP modules. (R. & Z. 1999).

Dimitriadis, Koh, Misopoulos, Padmore and Simpson (2006) present research focusing on how effective businesses in Greece adopt the ERP system, which consists of two elements: ERP implementation and ERP integration and figure potential gaps in the system. Six enterprises of different business sizes from different industries adopting ERP systems are involved in the research as case companies. (Dimitriadis & al. 2006).
ERP implementation research highlights project management, system implementation, and change management, whereas ERP integration is about operational issues and integration and performance. (Dimitriadis & al. 2006). The authors point out the clear disparity favouring the literature review of ERP integration over ERP implementation. They also argue that the process of ERP adoption research in the US and UK is more mature than in developing countries such as Greece, which means that the US and UK cases can be a lesson for other countries. (Dimitriadis & al. 2006). After analyzing the six case companies, the authors list the key drivers for ERP adoption, on the basis of the crucial level, are: storing and processing the vast amount of information, production planning, and IM. Some of the advantages that the ERP system offers are increasing quality and quantity of information, higher speed and accuracy of the order process and cost, higher productivity. (Dimitriadis & al. 2006).The research also points out the challenges of the system. Limited integration leads to false and inconsistent information, resulting in more costly operations and wasting time. Skilled users of the ERP system are also taken into consideration. Most of the staff are unfamiliar with the system, which costs money and time to train them. An ERP company can provide the training. A case company has found a solution for this issue, it is to let their staff use games consoles to get familiar with the system, but it seems not effective as expected when they finally decided to hire a full-time staff to run the system. Another case company suggests training their staff at the beginning of the project and letting them integrate with ERP vendors' guidance. The key to effectively run this system and reduce errors is that staff perform their work properly and productively. (Dimitriadis & al. 2006). In general, these companies experience such risks: machinery errors, material, and skilled workforce shortages. All six companies adopt several systems parallelly, such as ERP, MRP, and WMS, and the study also says that the ERP system cannot be fully integrated. To sum up, the authors state that it is nearly impossible to use methods to deal with the problems simultaneously.

The businesses have failed to determine related uncertainties, leading to the fact that they can deal with them effectively as expected. (Dimitriadis & al. 2006). The ERP adoption in Greek companies is more fragmented than ones in the US and UK primarily due to the lack of systematic approach guidance. They prioritize the basic functions rather than advanced ones like companies in the US. In the end, it is a challenge for Greek companies to successfully adopt the ERP system like the ones in the US and UK. It necessitates comprehensive system customization and building the appropriate implementation process to the business's conditions. Managers can take advantage of this study's taxonomy to clarify what factors make the project successful or failed when adopting the system. (Dimitriadis & al. 2006).

A study by Himawan, Nurhakim, Putra & Rifni (2020) illustrates the implementation of an ERP system in the kalijapat warehouse of Pertamina Hulu Energy (Indonesia). The authors collect data by interviewing the kalijapat warehouse coordinator and use the Miles & Huberman approach to interpret. The research objective is to clarify how Pertamina Hulu Energy optimized the material flow to improve warehouse management. The method is described as follows: The first step is data decrease and isolating focused data so that it is able to illustrate patterns. Secondly, the data is displayed to interpret a specific event or information. Finally, the authors make conclusions based on themes and patterns and linked to data decrease and display. The authors also draw some flow charts indicating processes such as storage materials, material transfers, material expenditure, and stock calculation to explain their findings. (H. & al 2020, 3).

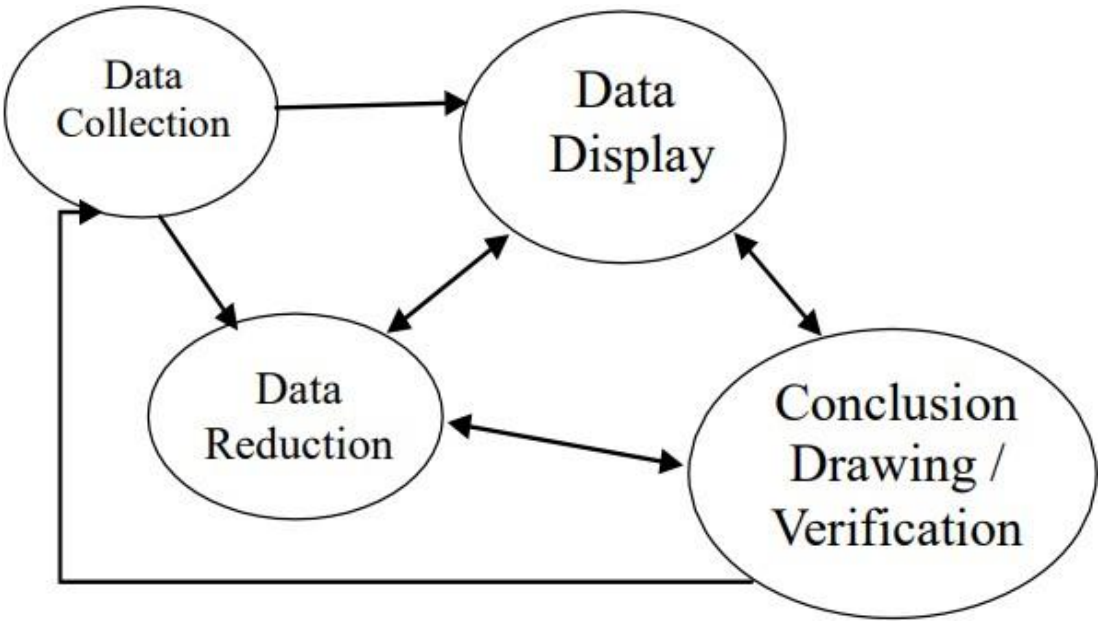

Figure 6. Data processing technique (H. & al 2020)

After carefully analyzing the data, the authors conclude that the ERP system has helped the kalijapat warehouse optimize its inventory calculation. The error is always kept at a lower than 2-percent level. They all agree that the ERP system has contributed significantly to material management development at the kalijapat warehouse. (H. & al 2020).

The researches mentioned above has similarities to the objectives of this thesis. They focus on warehousing practices that need to improve and particularly highlight the key points that the thesis aims to interpret, such as traceability and success of the ERP in other businesses. These studies can be used as references and comparisons with the thesis.

2.2.2 Procurement researches

Van Weele (2018, 9) defines procurement operations include purchasing function, traffic, store, and transportation. It is based on the idea of the total cost of ownership, meaning the cost company pays during the product's lifetime. Purchasing and procurement are compatible in business practice, so they are sometimes used interchangeably (V. W 2018). Strategic procurement is recognized as an activity that adds value and cuts costs for business. A description of the procurement development over the years is as below.

Table 2. The procurement development over the years (Bailey, Croker, Farmer, Jessop & Jones 2015, 32).

	In the 1980s	In the 2000s	Today	Future
Description	To buy from vendors offering the best prices	Companies also paid attention to other factors outside of prices, such as quality and delivery	Procurement is more strategic as it gives the organization strategic benefits	Leading-edge idea
Supplier involvement	Little	More than in the earlier stage	Closely involved, aware of true ownership costs	

Vision	Primarily clerical and reactive activities		Decentralization of simple purchasing practices closer to the point of use	• Value addition is the key element • Technology advancement • Total customer focus

Bailey & al. (2015) present a case of footwear company Clark when it won the Chartered Institute of Procurement & Supply SCM awards in 2003. The company's procurement department focuses on the goals of each department and holds regular meetings with department managers throughout the organization. They form six criteria for performance evaluation, including agreements, administration, sourcing, value tools, mindset, and supplier development. The company let its customers present their thought on how they evaluate the procurement's roles to the strategic development. Because of the strategic roles, the company is reaping the rewards of better purchasing performance. The main areas of expenditure are now managed more effectively, allowing Clark to gain more competitive edges as well as values from the supply base. (Bailey & al. 2015).

2.2.3 The ERP review

Fabi, Poba-Nzaou and Raymond (2008, 530) argue that companies can take advantage of information systems and information technologies to be more competitive in their market. Furthermore, the authors point out the factors failing to implement the ERP system, including organization, business-associated, technology, management, agreement, and finance. (Fabi & al. 2008). A table that specifies the risks associated with the ERP implementation is shown below.

Table 3. Risks causing the failure of ERP adoption (Fabi & al. 2008)

Organization	The environment in which the system is adopted, including workers and the company's structure
Business-associated	The models, artifacts, and procedures after deployment in terms of continuity both from outside and inside
Technology	The Information technology to run the ERP system
Management	The monitoring skills of the top manager

Agreement	The relationship with the ERP provider
Finance	The ability to pay for the implementing fee

Due to the saturation in the large corporation market, plus the cost reduction for implementing the system, there is an increasing number of small and medium enterprises (SMEs) adopting ERP (Gable & Stewart 1999, 779; Everdingen, Hillegersberg & Waarts 2000, 530). A reason for it is the shortages in resources, say the authors. It is worth noting that not every company succeeds in implementing an ERP system; some even lead to bankruptcy. As a result, companies should carefully search for and examine the information to choose an ERP system that best fits their organization. (Small & al. 2003). SMEs have a higher risk of failure and fewer chances to overcome the frustration of implementing an ERP system than large corporations, despite several studies say that they are more versatile when adapting to innovative approaches and more open to modern concepts and techniques than larger counterparts. (Small, Muscatello & Chen 2003, 831; Metaxiotis 2009, 53). If the software application's capabilities do not match the requirements appropriately, there are two alternative solutions to consider: adapt business processes to suit the system with limited customization or adjust the system to fit the operation. (Buonanno & al. 2005).

2.3 The COVID 19 pandemic review

The pandemic COVID 19 broken out in late 2019 has caused many dramatic negative impacts on the world economy.

The pneumonia pandemic is caused by a dangerous SARS-CoV-2 virus or coronavirus (also called COVID 19), easily spread from person to person, both directly and indirectly. Governments have to promulgate urgent social distancing, lockdown, and border closing strategies to stop the epidemic. Subsequently, world trade and economies have been destroyed dramatically. According to WHO, the world witnesses 129,215,179 confirm infection cases worldwide, leading to 2,820,098 deaths, as the report updated on 31 March 2021. (WHO, 31 March 2021). The epidemic is still wiped out in many countries at the time this research is conducting. Gallagher (13 January 2021) presses that there is not yet effective cure treatment and vaccinations. However, scientists are testing new drugs and several kinds of vaccines, and they show promising potentials. (G. 13 January

2021). A rising concern is that uncertainties in the market could worsen if authorities cannot fasten vaccination programs and lockdown strategies are continued (B. & al. 24 January 2021).

Some quick facts of the impacts of coronavirus on the world economies are listed below, according to BBC (Brown, Palumbo & Jones 24 January 2021) and other sources:

- The **FTSE 100 index*** had dropped 14.3 percent this year, its worst year since 2008 when it dropped to 31.3 percent.
- The unemployment rate in the US reaches 8.9 percent.
- Millions of hospitality employees lost their jobs, and numerous businesses go bankrupt, accompanied by millions of flights being canceled.
- The world economy was predicted to fall by 4.4 percent in 2020, which was the worst since the Great Depression of the 1930s.
- Billions of US dollars have been lost.
- The global GDP fell 3.4 per cent (Szmigiera 30 March 2021). According to United Kingdom (UK) Parliament, the national GDP dropped by 9.9 percent in 2020, making the UK is one of the most affected countries. (Brien, Keep & Harari 26 February 2021).

*__FTSE 100 index__ includes the 100 largest companies by Market Capitalisation on the London Stock Exchange, which account for approximately 80 percent of the LSE's capitalization. (Mase 2007, 462). The acronym term FTSE stands for Financial Times Stock Exchange. Investors view FTSE 100 index as a proxy for the success of the broader UK stock market. (The Share Center 2021).

3 Research method

The research method selected for the topic is qualitative and desktop study. This chapter presents how data is collected and analyzed as well as justifications for the selection. The chapter also gives a discussion on its reliability. The name of the case company is kept disclosed according to the manager's wish. In the thesis, they are called "Company X".

3.1 Research design

The subchapter outlines the design and approach of the thesis. It encompasses data sources, methods to collect and analyze data, and the relationship to each IQ in each thesis phase. The figure of the research design is shown below.

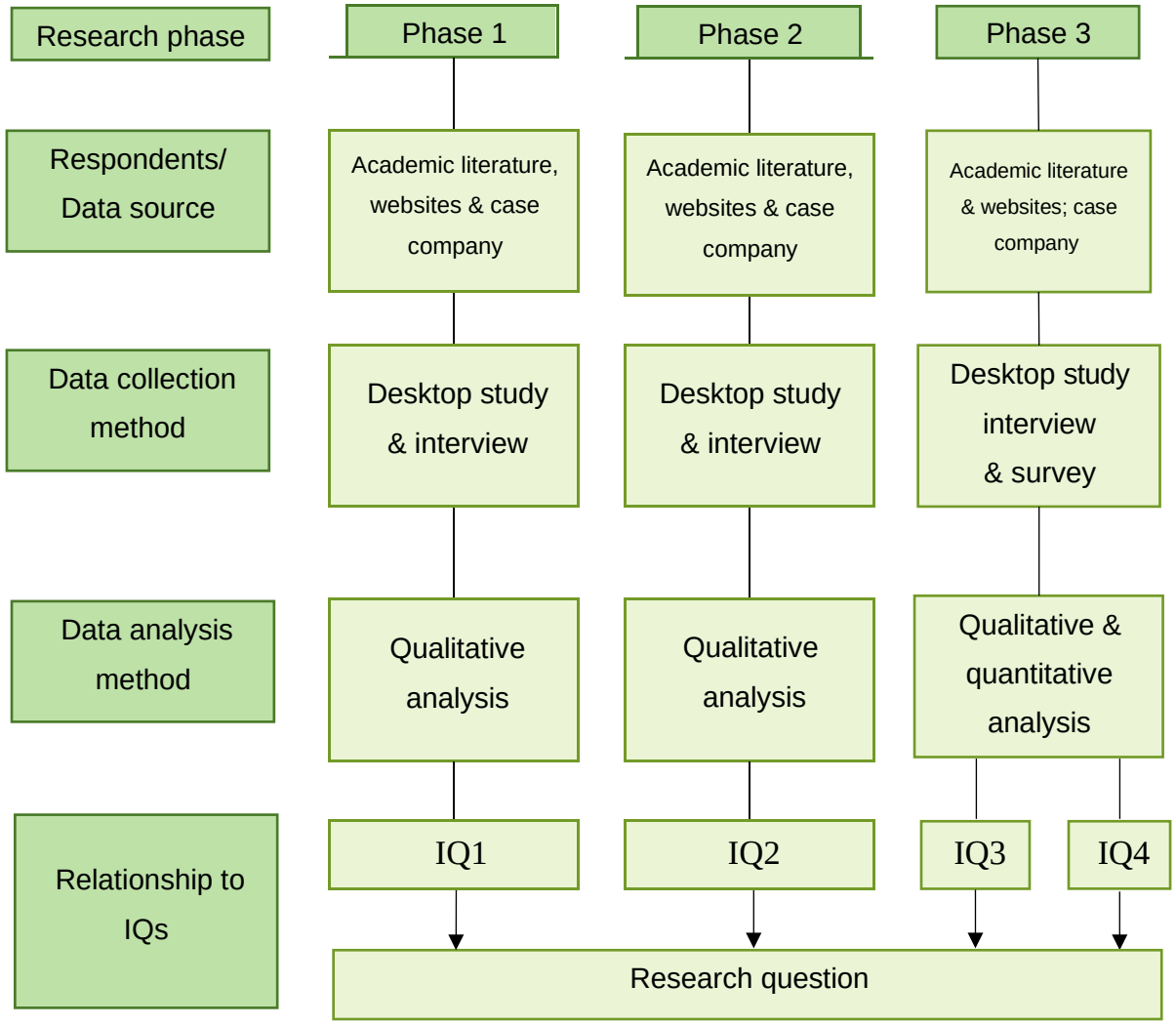

Figure 7. Research design

As the figure shown above, the study consists of three phases corresponding to three Investigate questions. Phase 1 is progressed with multiple interviews with the company's representative to gain knowledge and insights to answer IQ1: *What are the current practices in the company X warehouse?.* Company X is implementing a new customized ERP system to improve its business practice. Data of ERP adoption at Company X is described in this phase. A desktop study is also carried out in this phase to find researches supporting the points. The idea is to present daily routines at the company X warehouse so that readers can imagine and evaluate the warehouse managing system.

Phase 2 is also carried out with the representative and combined with a literature review to answer the IQ2: *What are the challenges that company X faces in WM and procurement?.* Besides the routines and challenges described by the representative, I also review the literature and present empirical knowledge to clarify and evaluate the situation. The data collected in these two phases are mainly primary data, as indicated in chapter 2. The objective of this phase is to outline the challenges before searching for solutions in phase three.

In the last phase, a survey with the staff is conducted to evaluate the ERP system. Afterward, I use the desktop study method to gather and analyze data used to form recommendations for each obstacle, combined with the opinions of the case company manager through interviews. The results of this phase can answer the IQ4*: What solutions can they use to tackle the challenges?.* In this phase, knowledge is gathered from a personal stand view and by empirical studies and desktop studies on previous researches to select strategies that enhance the warehouse and procurement practices, which is also the key objective of the thesis.

After all three phases are carried out, the final part discusses and concludes the research findings presented in chapter 5. The answer to the research question of this study is also discussed in this phase.

3.2 Research methods

The research methods chosen for the thesis topic are qualitative research, quantitative research, and desktop study. The subchapter presents justifications and explanations for each method selected.

3.2.1 Desktop research

As the case company is quite a young player in the market compared to their counterparts in the market, a desktop study is necessary to evaluate the business practices and

the challenges of the case company. This research method also helps me overview the preliminary ideas of the company's situation, technology adaption, and the search for possible solutions later on. Bouchrika (13 August 2020) defines the desktop study as summarizing information and literature created and published by other authors. Sometimes it is referred to as systematic review in academic researches. Researchers collect and interpret the data from primary sources when writing secondary studies. (B. 13 August 2020). In this thesis, secondary data is sourced from academic journals, published books and articles, and researches by educational institutions and online commercial knowledge. Advanced academic search engines such as Google Scholar and the HH finna library system allow accessing the sources easily.

The desktop studies method is selected for this thesis because it offers a copious amount of resources online and offline to assist in answering IQ1*,* IQ2, *and* IQ3. Although these IQs focus more on the company's experience itself, desktop research helps to break down the answers by comparing with other cases and underpinning relevant issues — for example, the risks associated with ERP implementation, which are clarified in chapter 3. In the later phase, desktop research is the primary research method to answer IQ4*: What solutions can they use to tackle the challenges?.* After outlining the current practices of company X and its challenges, previous studies will be reviewed and synopsized to suggest potential strategies for those challenges. Other methods are used to clarify IQ4, which is interpreted more distinctly in the following subchapter. In a nutshell, IQs are clarified using mixed research methods to support the findings.

3.2.2 Qualitative research

In qualitative research, investigators collect, analyze, and explain the data achieved from respondent's speech and actions. (Burns, Veeck & Bush 2016, 144). Cresswell and Poth (2018, 8) highlight that the qualitative research method uses observation and theoretical framework to form the research problems, aiming to highlight the context individuals or groups attribute to a social or human issue. Lowhorn (2007, 3) states that researchers use the qualitative method to interpret a phenomenon in its natural setting and describe it only to that focus group. Qualitative analysis's objective is to come up with a theory describing the observable behaviour. Specifically, when doing a qualitative study, the researcher asks the participants with a list of questions and records the answer for data analysis. (L. 2007). The author states that qualitative research may include a case study, observation, and structured interviews to clarify the problem. (L. 2007). Silver- man (2005, 9) argues that qualitative research includes people's understanding and interactivity because it follows the non-positivist model of reality. Saunders, Lewis and

Thornhill (2016, 168) emphasize that the researchers use the qualitative method to create reliability and engagement, access to meaningful and comprehensive knowledge. The outputs of qualitative research are text production, whereas quantitative inquiry tends to results in numerical outcomes. (Sanjari, Bahramneshard, Formani, Shoghi & Cheraghi 2014). The thesis describes the challenges of company X, meaning to research the situation, and it involves the company participation by the manager and staff. The study's implementation is to results in potential solutions for the problems. The study includes the participant's opinions in qualitative texts from the manager and staff. These justifications from the literature review above make the qualitative research is suitable for the thesis.

3.2.3 Quantitative research

After three interviews with the manager, a survey is conducted with the staff to indicate how they assess the system under the manager’s permission.

Quantitative research aims to produce numeric results and standardize results to the population. (L. 2007). The survey consists of variables that are nominal, ordinal, and interval scale. The survey seeks to explore how the respondents who use the ERP system evaluate it. The quantitative questions ask about the age of respondents, the number of experience years, frequency of use, and ratings. The qualitative questions require them to express their thoughts in their own words, such as what they would suggest to further improvements. Currently, there is 17 personnel using the ERP system.

In addition, quantitative figures are used in the proposal of the supplier evaluation process, which is described in chapter 4. Particularly, the proposal requires collecting vendors' information such as prices, key financial performance, and the number of shipping days and then analyzing them to rank the suppliers.

3.3 Data collection method

The subchapter presents methods to collect data for the study and the foundation each method. The thesis uses both primary and secondary data to support the research. The study also pays attention to the ethical aspects when doing research.

3.3.1 Ethical consideration

Mertens (2018, 33) suggests taking ethics into careful consideration when conducting researches, especially in the data collection practice. The author explains that during the

data collection process, ethical issues tend to appear conspicuously. In qualitative research, working with participants when collecting information carries nuances of societal norms, attitudes, ideals, and habits. (M. 2018).

Richard and Schwart (2002, 135) outline three core ethical aspects of qualitative research: *"consent and anonymity, privacy, and confidentiality."* The term confidentiality means no participation's personal information is revealed to the public. The researcher must ensure the autonomy of the participants. Shaw (2008, 404) supports the ethics of consent saying researches should be carried out with voluntary disclosure from participants, and they must bed well informed about what kind of data is needed and how it is collected and analyzed.

This ethical issue is guaranteed in this thesis with the commission agreement among three parties: the student, the thesis's supervisor, and the company. The personal information of the respondents who do the survey and the interviews is kept disclosed. All of the information collected serves for the thesis's research purposes only.

3.3.2 Secondary data collection

Saunders & al. (2009, 256) define secondary data as *"raw data and published summaries."* There are various sources of secondary data in both written and non-written materials and other sources, say the authors. Written data is notices, emails, academic literature, articles, websites, etc. Non-written materials could be information on media such as TV, videos, voice recordings. (Saunders & al. 2009). Secondary data allow investigators to access resources to answer research questions, make their goals met, and subsequently make a conclusion and evaluation for the research objectives. (Saunders & al. 2009). Since secondary data resources are vast, it is crucial to carefully assess the sources to ensure it precisely fits the study (Corti 2017, 168-169). The author highlights that searching for keywords and accessing the whole text quickly locate and extract relevant information.

In this study, academic literature such as books, journals, or articles is used to navigate applicable data because of its high credibility. Some other sources to extract valuable information are reliable theme websites, original newspaper websites, as mentioned in subchapter 3.2.1. Beneficial search engines are Google Scholar, HH Finna, or online libraries such as IEEExplore, a platform lending a vast amount of academic journals and articles. Nonetheless, it is sometimes hard or even impossible to access some data that may be considered beneficial for the study.

3.3.3 Primary data collection

Burns & al (2016, 116) define primary data as information collected and developed by the investigators themselves for the current inquiry projects. Primary data is mainly collected to answer the IQ1, IQ2, and IQ3. The respondents are the company manager and the staff. I conduct structured interviews with the manager while writing the thesis. In addition, to support the answer of IQ3, I survey the effectiveness of the new ERP system by collecting opinions of the company personnel.

Questionnaire design for the interview

The interviews are conducted multiple times during the thesis process in different methods, such as in-person or virtual meetings or emails. The respondent is the case company manager solely in this phase. He is one of the key founders and shareholders of the company. Hence he has comprehensive knowledge of how the business runs and other aspects. The interview process is described in the table below.

Table 4. Interview process

Interview	Method	Content(s) of the meeting
Interview 1	In-person	Preliminary introduction of the company and daily business practices.
Interview 2	Video calls	Describing the challenges of the company in general and problems in WM and procurement specifically.
Interview 3	In-person	The ERP implementation and its effectiveness.
Interview 4	Emails	Expressing the company's opinions and expectations. Further questions regarding remaining issues and sub-objectives.

The first meeting was on the beginning phase of the thesis when the manager helps to build the research objective based on the company’s situation and aspiration. Then, the later meetings are carried out after every approximately two weeks. The interview questionnaire is designed based upon four research themes, which correspond with the four IQs. The first theme is current business practices. In short, it explains the business routines of the company in WM and procurement, such as sourcing, receiving and fulfilling orders, managing purchases, delivery, selecting vendor process, etc. The second theme is the challenges that the company faces. The third theme is the

implementation of the ERP system and how it improves productivity, including on WM. The last theme is solutions for their obstacles. The company's opinions and expectations are presented towards the final theme. There are three types of questions in the interviews: firstly unstructured questions, for example, *"What are the challenges in your warehouse practice?";* secondly is semi-structured questions such as *"How do you evaluate the new ERP process?"*; and finally, structured questions such as "*Are you satisfied with the ERP program?".*

The language used in the interviews is English, which the manager speaks quite fluently, although he is not a native speaker. I list the questions and send them via email in advance so that he can have a preliminary preview of what information is needed. He is well aware of confidentiality, and he has all the right to refuse to answer questions that may be considered confidential, according to his or the company's opinions. How data is analyzed is informed to the case company. The investigator must ensure that informed consent is well achieved from respondents for any stage of data collection. (O'Hara & Neutel 2002, 76). Cooper & Mcnair (2015, 100) explain that confidentiality influences two ethical aspects of inquiry: "*respect for person and beneficence."* The authors press that respondents should be aware that the investigator respects the possibility of limiting access to data. (C. & M. 2015).

Questionnaire design for the survey

To better clarify the success of the ERP system, a survey is developed to ask about the experience using the new ERP system, which includes both quantitative and qualitative data. It consists of ten questions (see appendix 2), and the respondents are the company personnel. The survey is sent to them in the early stage of phase 3. The questionnaire is architected based upon the DeLone and Mclean model of IS, including time and frequency, evaluation of service and system quality, satisfaction, information accuracy, and overall feedback. Besides, the survey also encompasses the age and working experience factors. Quantitative survey data consists of scaled questions or have yes/no answers, which inform the scope of responses. (National Business Research Institute 2021). Müller (2009, 2) argues that the qualitative survey helps to build quick and accurate reports on investigating objectives such as the performance of an organization. Respondents are expected to contribute honest and neutral information and opinions. (M. 2009). The survey structure is designed based on the DeLone and Mclean model of IS and described in table 5.

Table 5. Survey structure

Focused topic	Number of question(s)
Age and working experience	2
Previous experience on ERP program	1
Time using the program per day (on an 8-hour working day basis)	1
Frequency of errors	1
Overall evaluation	4
Recommendations	1

The reason to include the age factor is that a person's cognitive ability declines when they get older. Over the lifespan, changes in the human brain may decrease the ability to perceive and analyze new information and recall what data has been stored in the memory. (Harvard Health Publishing, August 2017). The working experience is included in the questionnaire, as the longer time they work at the company, the better they know the business procedures, so it is easier to use the system. In addition, the longer time the employees use the program, the more experience they earn. It is considered as a training practice for them. That is why the survey asks about the time they use the program every day. These factors mentioned above may have an impact on their ability to use technology and indirectly influence the system’s effectiveness.

As the key objective of the survey is to evaluate the ERP effectiveness, I construct five questions asking the respondents to assess the quality of the service, the information, and the system. These questions are in both multiple-choice and free short answer forms. They include statistical needs such as evaluation scale, the improvement level in percent. Besides, the error frequency and a free text answer suggesting future enhancements from a personal standpoint are added. I do not want to limit the respondents' opinions by making them choose the options I make. Hence, I add free-answer questions so that they can diversely and freely express their thinking.

3.4 Data analysis method

There is not such a fixed procedure to analyze qualitative data. Saunders & al. (2016) suggest exploring the subjective and socially positive significance conveyed by the respondents when analyzing qualitative data. Kvale (Saunders & al. 2009) states that the analysis likely already begins at the collecting phase, and the immersive nature of data collection and analysis enables a recognition of key concepts, trends, and relationships while collecting data. The nature of qualitative data is unstructured, non-

numeric, non-qualified, and it could be ”*product of all research strategies*." (Saunders & al. 2009).

Secondary data may have already been collected and analyzed, and in some cases, it contains the answer for the research question that we are looking for. (O'Leary, 2017. 504). The process of analyzing secondary data follows the suggestion made by O'Leary (2017). After carefully defining the research question and accessing the relevant data, I appraise its applicability and credibility. Finally, I explore how it is used to support my points in the research.

When interviewing in person with the company representative, I make notes and transcript his answer into a Word file simultaneously because transcribing from voice recording after the meeting may be time-consuming. Plus, he can view and check what I write to ensure the information is correct in a confidential manner. When we meet on the Zoom platform, I share my screen with him so that he can see the notes as well. Since we both are not in a hurry when doing the interviews, so this approach is achievable. When using email to communicate, I sent the questionnaire, and he will reply a day after. The notes contain critical points of the interview, and they are sufficient enough because I often write the whole sentences in accordance with what he says. Then I adjust minor issues such as grammar and spell to generate a complete version and combine all the interview transcripts into one file (see appendix 1). The answers are not altered and are kept intact contextually to guarantee their validity. Each interview lasts approximately 40 minutes and a maximum o 60 minutes. For some questions, it is agreed that he provides relative numbers to ensure confidentiality for the company.

For the data collected from the survey, I use Google form, which also functions to create the statistics graphs for analysis (see appendix 2). It helps save a lot of time compared to other tools, as it combines collecting and analyzing functions. After receiving the answers and statistics analysis, I start to write my interpretations and comments.

A SWOT analysis that describes the vendor’s capabilities and resources is carried out based on empirical studies and web-based articles. Particularly, I design a proposal to appraise a vendor from Vietnam, where it is my home country. Hence, I have knowledge about the environment, business, trading, and so on. That knowledge serves to analyze the subject, accompanied by information collected from trustworthy news websites. On the other hand, the ABC analysis is implemented and discussed based on the quantitative data provided by the manager.

3.5 Validity and reliability

Reliability is defined by Flick (2009, 385) as the consistency of the findings using different approaches**.** Maintaining high-quality documenting data and recordings, standardizing notes, and make them checkable guarantee the reliability of the sources. (F. 2009). Silverman (2013, 285) describes validity as "*the credibility of the interpretations".* A research design that includes the ability for focus groups after analyzing the questionnaire can increase validity. (S. & al. 2009). Validity is further categorized as internal validity, which is the ability to exclude the possible hypothesis for the findings, and external validity, which is the study results' generalizability. (Loyal, 16 March 2016). Loyal (16 March 2016) suggests that validity and reliability should come together when doing research rather than independent criteria, and securing these two criteria makes the research findings trustworthy.

When doing the research, I do pay serious attention to reliability. Primary data is collected by myself. Two primary approaches are the interviews with the manager and the survey with the personnel. The survey is approved and sent by the manager. Then, after selecting and extracting secondary data from prestigious sources, it is analyzed carefully to formulate the questionnaires and the theoretical framework. Hence, selecting credible sources is very crucial for any research, in my opinion. All of the citation information is listed in the Reference section so that readers can re-check or verify themselves. The reference format follows the Haaga-Helia guidelines.

In addition, the survey is conducted via a digital platform, Google Form, to ensure data integrity for analysis. It also helps avoid inconsistency when using a traditional method, such as a paper survey, when inputting data from documents to the digital analysis tool.

During the study process, the thesis supervisor gives feedback and recommendations for adjustments. The manager sometimes acts as an advisor of this research.

The interview and survey questionnaires are designed with straightforward questions to answer the research issues. The manager also previews before the meetings to confirm its relevance and suitability to the research problems. In case he has some confusion regarding the questionnaire, I explain to him when we meet until we are both on the same page. He reviews my notes after every meeting to confirm the information he provides. Sometimes, he helps even me to interpret the data himself by drawing maps and figures. In structuring the survey questions, he acts as a consultant as he knows the

system and what aspects he wishes to explore. Noticeably, it is emphasized that the respondent to the interview is the Chief Executive Officer (CEO) of a growing company, having nine years of experience doing business in Finland, which makes him earn his credibility. The survey is conducted with his staff, who have knowledge about the business practices at the company and are the practical users of the ERP system. These factors contribute to increasing the validity of the research.

4 Results

The chapter presents the results of the research, which answer all the IQs by using research methods mentioned in chapter 3.

4.1 Current warehouse and procurement practices at company X

This subchapter should answer the IQ1: *What are the current practices in the company X warehouse?*. The practices are outlined in the flow: purchasing, receiving, storing, order fulfilment, and delivery. In this subchapter, the procurement process is described first as it is the prior step of WM. But in the later part, solutions to optimize warehouse operations come before procurement development as there are more problems to discuss in WM.

4.1.1 Procurement practices

Before COVID 19 pandemic occurs, a favourable channel to explore competent suppliers is via food exhibitions. There they have an opportunity to meet and discuss with various suppliers in their industry. The manager himself has attended many food exhibitions in different countries, especially Holland, France, or Belgium. They can discuss with suppliers and see or even test the samples of the products. Other trading terms such as delivery and discounts for large orders are also discussed.

The priority to choose a supplier is the quality of the product. The company always wants to deliver the best products to customers. Other criteria are prices, steady sources, and shipping time. After suppliers are selected, they make the purchases, what kinds of goods, and what quantity. Most of the suppliers are overseas, so the optimal communication channel is via emails. After orders are received, suppliers will prepare and deliver via a logistics provider. The most popular shipping mode is ocean freight due to the heaviness of the goods. The regular shipping time is approximately 40 days. Perishable and lightweight products such as vegetables or fruits are shipped by air freight. In this case, the shipping time is much faster.

When consignment arrives in Finland, they will do the customs procedures according to Finnish legislation and receive it. The declaration can be made online. The Brexit affects the customs period, not the taxation yet, as they also source some products from the UK. When it arrives at the warehouse, warehouse workers will record information such

as quality, quantity, descriptions, expiration date, and other information before load to the storage location.

4.1.2 Order fulfillment

The main sales channel is via phone call. Most of the customers have close contacts with the company. They will call the salesperson and place an order. Each salesperson is responsible for a different customer segment. Emails are the second popular communication channel with customers, especially those who order for the first time. The company is implementing an online store for retail customers on their website at the time this thesis is conducting, but it needs more time for the platform to be ready and runs properly.

Orders will be sent to warehouse staff to prepare products. They will print out the order lists and start picking the items. The warehouse is a regular warehouse of physical products with pieces of equipment such as forklifts, trolleys, pallet trucks. The order picking strategy used is cluster picking, meaning to pick several orders at the same time. Richards and Grinsted (2013, 17) describe the cluster picking process as collecting the orders individually and gathering them in a certain area to arrange dispatch and shipping. The process requires high accuracy in sorting from the operator (R.& G. 2013).

4.1.3 Delivery and inventory management

According to European Logistics Association, warehousing costs make up approximately 20 percent of the logistics expenditure, in which around 55 percent is spent on the order picking process. (Boenzi, Digiesi, Facchini, Mossa & Mummolo 2015, 263). The warehouse does not install many shelves, which limited their space resources. Many of the pallets are placed in free pallets slots.

Delivery

For customers whose location is within a radius of 20km, they have their own trucks to deliver to them. If they are in the Metropolitan area, orders will be shipped to them directly. For customers who are further away, such as the Lapland area, company X cooperates with a logistics provider to deliver. The delivery time is just approximately two working days. The tracking code is not necessary in this case. However, the shipping costs are considered expensive.

"The Truck Tour"

The company has a particular mode of transportation which they called "The Truck Tour." For customers whose locations are outside of the Metropolitan area but not too far away, for example, Tampere, Lahti, or Turku, they will collect the orders from all of their customers in that area in advance, particularly one day before the delivery, and ship them all in one ride. This is an excellent opportunity to meet far customers in person and communicate with them directly compared to using a logistics partner. In addition, it helps to reduce shipping costs. In this way, the customer service is better improved. Issues related to low-quality, spoiled products or incorrect quantities are discussed directly with the shipper. They plan a schedule on which day they go to which place(s).

ABC analysis

Sushi items are the best seller of the company, constituting around 50 percent of revenue. The company provides an A-to-Z range of materials to make various kinds of sushi and even packaging products. This may be attributed to the vast amount of sushi restaurants in Finland. Aku Vikström, CEO of NoHo Partners, says that even in the epidemic time, the sales of sushi hit a surprise increase ever (Foreigner, 22 April 2020). It means the demand for sushi items is continuously increasing, making them the most critical products. Besides that, the second and third best seller product lines are respectively Chinese and Thai foods. Hence, the company pays more concentration on these three categories. The relative quantitative figures are provided below.

Table 6. ABC analysis

Product	Proportion in sales %
Product A: Sushi items	50
Product B: Chinese foods	20
Product C: Thai foods	10
Others	20

4.2 The challenges at company X in WM and procurement process

This subchapter describes the challenges that company X encounters in WM and procurement, which answers the IQ2: *What are the challenges that company X faces in WM and procurement?.* COVID 19 is also one of the causes of these obstacles.

The warehouse is predicted to run out of space in a short time due to the growth of the business, leading to an increasing quantity of goods. Probably they need a more proper storing strategy to utilize the space. An article by enVista Thought Leadership (2020) points out that a cramped warehouse could lead to congestion in the warehouse, which results in extra work for the staff. For example, you need to remove a product to get another behind it. A reason for this issue could be the blooming in the quantity of inventory as the business of the company is growing. The net sales in 2019 increased 51.5 per cent compared to 2018. The business is growing very well, and subsequently, they need more space for more goods. Finally, obsolete inventory has always been a challenge to any company, resulting in the situation that there is not enough space for other goods that are more necessary. Clearing out the warehouse, extending space with a smart procurement strategy supports the business growth.

Managers always expect their staff to be well-versed and accurate when doing their job as much as possible. According to the manager, one of the most formidable challenges in WM for them is working ability. As mentioned above, warehouse staff makes mistakes in managing inventory and delivery very often. For example, they pick the newer items first and left the older ones occasionally, resulting in expired and obsolete inventory. The cost for dead and obsolete commodities is estimated at approximately 20,000€ annually. The manager says that they deliver wrong and low-quality products to customers very often. It causes harm for the business as they have to sell them at lower prices as well as the company’s credibility.

Another problem is in the picking and delivery process. The staff delivers the wrong orders to customers both in quantity and type, which happens almost every day. It has been an issue that the company is actively making an effort to improve. Because delivering incorrect orders impacts the business seriously negatively. It mitigates the company’s credibility in customers' stand view. They might feel upset when regularly receiving under-expected goods. All of the above causes results in time and money consuming for reverse delivery and compensations for customers, not to mention the labour work costs for extra tasks. However, this situation can be explained as they offer a variety of products and the company does not have advanced tools such as RFID for the picking and delivery processes combined with manual practices.

The impacts of the COVID-19 (coronavirus) epidemic on the case company

When the COVID-19 pandemic first blooms in Finland and Europe in early 2020, many public events are cancelled to prevent the spread of the coronavirus. The channel to communicate with suppliers and find new ones through food exhibitions becomes impossible, creating barriers to supplier relationship management. The company change to communicates with them via emails or video calls completely. As the company's priority is to deliver the best products to customers, they want to source the best from suppliers. The business now is primarily based on trust. According to the manager of company X, one low-quality or spoiled shipment will end the business immediately and for good. They will never source from them again.

Besides the difficulties in sourcing that the coronavirus pandemic causes to company X, it brings a new opportunity to expand the market. When restaurants are closed or restrict the opening time and sales strategy, they have found another demand. Numerous supermarkets open takeaway sushi bars, and they come to company X to source materials, tools, and utensils. When the restaurants open again after lockdown, the sales significantly increase as they have more customers, which are the sushi bars at supermarkets. Nonetheless, the fluctuations in demand create difficulties for the company to make purchasing decisions, especially when the complicated evolvement of the coronavirus affects the restaurants' opening. Sometimes they have too little, and sometimes they have too much. However, after almost a year, they seem to cover the problems. Even so, one of the purposes of this research is to mitigate sourcing risk in the future due to external factors such as the epidemic. Furthermore, the imbalance in shipping containers from and to China increases the shipping time and costs. Specifically, China exports commodities worldwide in containers, but there are very few empty containers coming back to China for the next shipment. (Tan, 24 January 2021). As a result, some of the commodities of the company sourced from China slightly increases, estimated at 8 - 10 percent.

Because most of the suppliers are overseas, so the shipping time is extended, it may take up to one to two months for a consignment to arrive in Finland. Hence, the purchasing decision needs to be made sooner compared to other types of commodities. There was a time the company can not fulfil all customers' orders due to a lack of stock, although now they have overcome that problem. In general, besides enhancing warehouse operations, the study also investigates how procurement performance can be improved in terms of future risk mitigation, supplier selection, and relationship management.

4.3 The ERP implementation and its effectiveness

This subchapter answers the IQ3 by presenting the ERP adoption at company X and evaluating its efficiency. The results in this subchapter are collected from the literature review and the survey. The success of the ERP system assessed using a qualitative method through interviews with the manager and a survey with staff using the software, and it receives nine responses from them (see appendix 3). The survey contains both quantitative and qualitative data.

The company wants to improve business practices, so they contract with an IT company to provide a new customized ERP solution. The previous ERP version encompasses only three main modules: sales, purchase management, and WM. With the additional functionalities, the company is able to manage order and purchase, WM, financial (taxation and banking), customer and supplier relationship management, and shop online in one integrated system.

The company has invested a considerable amount of money into the ERP project. Though the license fee is kept secret, the maintenance cost is revealed to be around 1000€ every month. According to the ERP pricing guide by Technology Evaluation Centers (TEC Team, 16 December 2019, 19), the four drivers that affect the ERP cost are human resources (number of users and training), ERP knowledge, software license, and additional expenses. The guideline assumes that for businesses that have less than 100 personnel, the total cost of ownership should be from 50,000$ to 250,000$. Though the company does not disclose the specific license expense for the ERP project, they estimate that it lies between the range mentioned above, making the system meet the financial demands within their budget. The assessment of the ERP system follows the DeLone and Mclean model of IS, which is described in subchapter 2.1. The survey receives nine answers from respondents (see appendix 3), which are described below.

- Six persons are from 25-35 years old. Two persons are from 18-25 years old, and one person is over 35 years old.
- Four of them have worked at company X less than a year, three have worked from 1-3 years, and three have worked for over three years.
- Four persons use the ERP system from 6-8 hours, four persons use it for the whole day (8 hours), and one person uses less than 4 hours a day.
- Six persons perceived the system at the intermediate level, and three persons think it is easy to use. None of them believes it is hard to use.

- Six persons over nine have used the system before.
- Seven people say the system rarely shows wrong information, whereas 2 of them say it sometimes does.
- Three persons say the system meets their expectations, whereas one thinks the opposite, and five people think it meets the expectations, but it could be better.
- Seven people agree that the system enhances productivity by 50-80 percent. Two of them think the scale is even over 80 percent.
- Four of the respondents mark the system as 8 on a scale of 10, whereas three give 7. The average scale is 7.6.
- One respondent suggests the program be available in other languages.

System quality The initial requirement of the company is that the system consists of more business modules such as manage order and purchase, WM, financial (taxation and banking). In the future, they are planning to adopt e-commerce by implementing an online shop platform on the website, both for retail and wholesale businesses. By the general feedback by the manager, the modules work pretty well and meet his initial requirements.

The ERP helps to save time on checking inventory by adding more information of an item such as expiration date, which always a concern of the company, says the manager. Particularly, staff can check whether the item from the previous purchase is still in stock and its storage location as well. If it is, they will pick it first to deliver to customers. It now can updates the Stock keeping units (SKUs) automatically and streamlines the item history. Like regular ERP software, the staff can view the quantity in stock, quantity to be in orders, and shortages or surplus. Compared to the old system, these features are not included, making staff spend more time doing such tasks. Hence, the system does help to enhance productivity and diminish the time-consuming of managing inventory.

System use According to the survey, 44.4 percent of the respondents use the ERP program for the whole working day, and 44.4 percent use the system from 6-8 hours every day. Very few personnel use it less than 4 hours a day (11.1 percent). The majority of the respondents (66.7 percent) assess the system's complexity at the intermediate level, whereas the rest claim it is very user-friendly. Besides the ease to use of the software, it can be attributed to their prior experience of using the ERP program before joining company X as two-third of them used to use the ERP program before. Plus, they are pretty young, so they can have the ability to learn more quickly.

Service quality: When the research is conducting, the system has been completed approximately 80 percent, and few minor things need to be customized according to what the company desires. The IT company provides training, guidelines, and assistance when problems occur. According to the manager, they assist with great responsiveness and knowledge. In general, he is satisfied with their service.

Information quality 77.8 percent of the respondents say the system rarely indicates wrong data, and the others say it does occasionally. The manager says that most of the errors are inaccurate and outdated information such as expiration date, quantity, and descriptions. The IT company explains that it might due to the improper and underprocessed cleaning of the old database before integrating the program.

User satisfaction The majority of the respondents (77.8 percent) agree that the system improves productivity by 50 to 80 percent. The others think it even improves by over 80 percent. With the new functionalities being expanded and integrated, it is easy to retrieve data such as customer orders and item history. However, half of them say that although it somehow meets their expectations, there is still something to improve. For example, a respondent says it is great if the system is available in other languages. Currently, it is only available in English. The manager says that the personnel using the ERP system are mostly non-native English speakers. They mark the application at 7 to 8 on a scale of 10, making the average grade is 7.6. Overall, the system performs quite well.

Net benefits In general, the system helps the company to function more smoothly and diminish time-consuming. According to the survey, the staff is quite pleased about the system. The company perceives it as the core instrument to managing most of the functionalities. It can also be a case study for reference or experience for the IT company. In addition, personnel will acquire further experience using technology, especially ERP associated.

Based on the manager's perspective and the survey results, it can be said that the system has fairly succeeded. It delivers what the company desires with the system and service quality, information quality, and benefits. Although there are minor things to develop further, they are satisfied with the system.

4.4 Improving warehouse managing system

This subchapter forms recommendations for the case company to improve their problems, which shall answer the IQ4: *What solutions can they use to tackle the challenges?*

4.4.1 Space utilization

Liquidating the excess and obsolete goods is crucial to getting more space as they harm the business. Besides the financial aspect, dead inventory clogs the warehouse flow and causes difficulties in the picking process. The manager says that every year obsolete commodities cost the business nearly 20,000€. They currently use a selling strategy with a big discount or even give it for free for some products that are even really close to the expiry date, and this also helps to decrease waste costs. Alternatively, they can consider offering the bundle packages. For example, if they has a few boxes of sesame expiring in a few weeks or days. These boxes are ordinarily worth 65€, and they offer 20€ now. Usually, a sushi restaurant usually will buy a set of sushi rice, toppings, seaweed sheets to make sushi with a certain quantity of each type. If they buy those products without the sesame, the price is 500€. On the other hand, they can offer a set of products: sushi rice, seaweed sheets, toppings, and sesame for just 520€. This option encourages customers to change their question from "*Do I need to buy?*" to *"Which one to buy?"* It engages customers to purchase the excess inventory. Subsequently, it boosts sales of surplus items before it becomes the dead stock. The prices should be attractive to them. Furthermore, selling the excess items to employees with big discounts may help clearing out space, which also engages their commitment. Donation to charities can be considered. Many companies practice corporate social responsibility by donating for charity purposes. (Kotler & Lee 2005, 14). A study by Jin and He (2018, 1086) indicates that consumers tend to purchase more likely from companies that donate to society and willing to pay higher prices. The authors also highlight that consumers will favor those companies when suggesting or referring to others. (J & H. 2018). It is even a case in the US when companies can get tax deductions by charitable contributions (Internal Revenue Service 2021). Though it does not benefit financially, it improves the com- pany's image, which they can take advantage of when planning marketing strategy. The tactical suggestions concentrate on promoting stock liquidation rather than the financial aspect.

In addition, to expand more space, they can consider *re-design the warehouse*. The first is to adopt a shelf system and using more racks to take advantage of the vertical space. Narrowing the width between shelves help to increase capacity. A case study by John

Monck (Supply Chain Secret, 13 December 2019), Manager Consulting at Logistics Bureau, Australia, finds out that his alternatives improve customer's warehouse capacity by 30 percent. He and his team come and evaluate the warehouse situation first. After agreeing on what strategy to use, they start the renovation by adding more racks to shelves and narrow the aisle width from 3.5 meters to 2.2 meters. Now the warehouse can store 600 extra pallets. On the other hand, Crown, a pioneer in the cargo lifting equipment industry, claims that their racking solutions can increase capacity up to 48 percent (Crown Equipment, 6 February 2018).

If the company adopts this strategy, the regular forklift they are using will not be suitable for such a narrow aisle. They may need to liquidate the old one and invest in a new articulated forklift that is more versatile and efficient. A reference can be seen as the link below: https://www.youtube.com/watch?v=Epc2qxI38K4.

Secondly, to maintain the business processes as normal, the reconstructing should be implemented during the evening and even night time.

Peterson and Aase (2016, 96) suggest *inventory placing* can significantly reduce the travel distance in picking. In the rack system in the warehouse, reserve storages are placed above, and items to pick are stored on the floor level. Newer pallets of the full-load products will be loaded upwards to the top racks and moved downward by the forklifts over the sales cycle. The pallets keep going down until they reach the floor position for staff to pick, and a new cycle begins when the new order comes. When it gets to the floor place, it will be unpacked to collect separate items inside. This solution will help to avoid older stock being left behind. A certain kind of items should be placed on shelves vertically. In the design, the shelves consist of four layers. When the stock in the floor place is sold out, they will use a forklift to move the pallets from the second rack downward to unload and continue the cycle to the third racks. When moving the pallets from the third racks, they simultaneously drive the pallets from the highest frames to the second ones. When the new purchases arrive, they can load them to the top shelves and begin a new process.

Obsolete inventory may be attributed to the working ability of staff, as they sometimes neglect the expiration days of products. They take the new one to deliver to customers instead of the old ones. It may be beneficial to adopt the "Pallet Flow Racks" system.

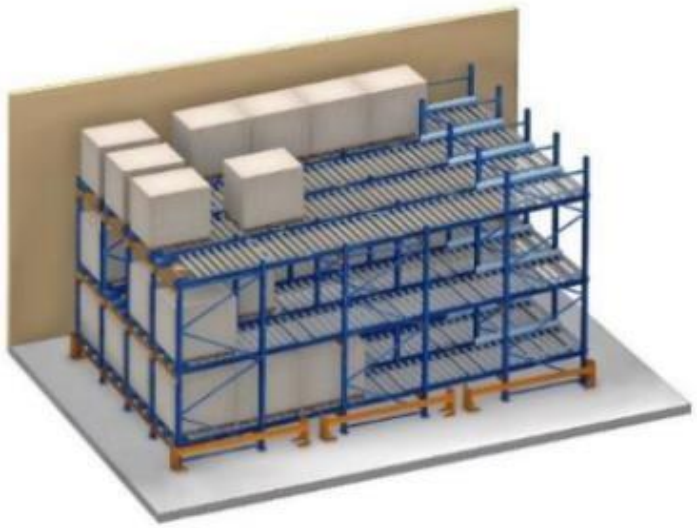

Figure 8. A pallet flow rack system (S. & N. 2019).

The system applies the first-in, first-out rule. The pallets are uploaded on the higher end and brought out from the lower end. It has a certain inclination with rollers to ensure the pallets slide safely and easily when taking out. Wu & al. (S. & N. 2019) find out the system can reduce the traveling distance by 22-25 percent. Staff can take off the pallets without going around the warehouse. Nevertheless, the system is best suitable for products having a quick cycle or high demand, large dimensions, and heavyweight, not all inventory. For example, vegetables, tock that has a high cycle should be stored in other storage media. The pallet racking system is suitable for other stock that does not highly require special storage media such as dry noodles, canned foods, or spices.

4.4.2 Inventory placement

From the ABC analysis, the company can make better predictions in demand and organize their warehouse. According to figure 9, the warehouse layout designed by Richards (2014, 90) following the U-shaped design and based on the ABC analysis. The A products that have high demand generate the most revenues are placed vertically along with the dispatch area so that it can cut picking time. B and C products are placed vertically towards the other side of the warehouse. There are some flow racks located in the front. Items to pick are placed on the floor level, and reserve storage is stored above. However, they can use the flow rack system to store items to pick, not just reserve ones. The pallets are stocks that have high demand and large quantities, dimensions or/and weights such as rice and soya bottles.

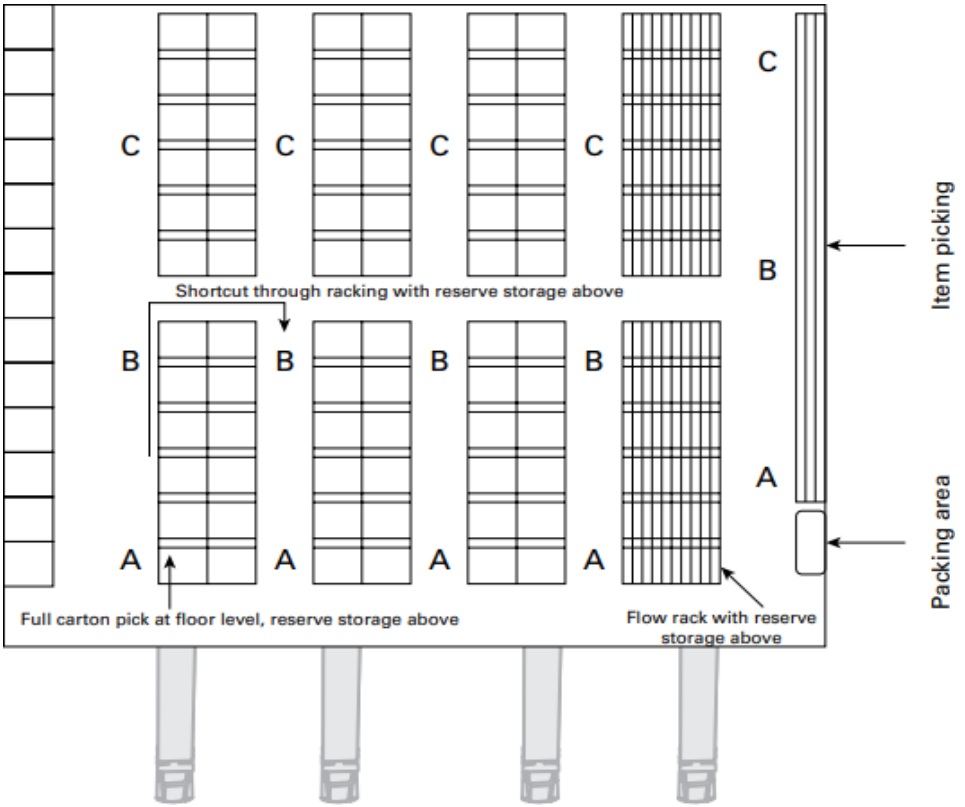

Figure 9. Basic warehouse layout based on ABC classification (R. 2014).

4.4.3 Efficiency in picking process and human error minimizing

The order picking process costs 55 percent of the warehouse cost. (Koster, Duc & Roodbergen 2007, 1). They are currently running the order picking process manually, resulting in occasional inaccurate delivery in quantity, quality, and product types. As errors in picking occur very often at the warehouse, it is considerable to apply new technology advancements in the process.

Aboelfotoh, Singh and Suer (2019, 1465) describe the picking process as traveling, searching, extracting, arranging, and documentation, in which traveling accounts for roughly half of the order picking time. For example, most of the errors such as wrong orders or taking new stock instead of older ones occur during the picking process. Paperless picking solutions have gained recognition in recent years. There are various alternatives in the market, such as pick-by-light or pick-by-voice, or pick-by-vision. Battini, Calzavara, Persona and Sgarbossa (2015, 483) evaluate the effectiveness of different picking models by comparing the costs associated and the number of errors that occurred during the process. They conclude that the handheld devices using both regular tags and RFID tags are suitable for warehouses having a medium or low rate of order picking per hour. On the other hand, warehouses having an intense level of picking per hour better adopt the RFID pick-to-light system. (Battini & al. 2015).

A study by Kondo & Abe (2020, 525) examines the success of the voice picking system by experimenting. They set up two experimental warehouses and let the participants do the picking tasks with assistance from the system. They will observe and collect data of the completion time and frequency and compare between two experimental rooms. The results show that the completion time reduces by roughly 11 and 14 percent, system usability increases by the rate of 1.92 and 2.3 for room one and room two, respectively. (K. & A. 528). The authors believe that speech localization and head tracking assist the voice picking system to enhance productivity and satisfaction. (K. & A.).

Dujmešić and Rožić (2018, 1128) assess the *pick-to-voice* program of a warehouse in Croatia by collecting and comparing the data before and after implementing the system. The data includes the number of pick assignments, number of errors, daily line rate, and time. After analyzing the data, the authors recognize an average enhancement of 20 percent in all criteria, such as productivity and cost, which show the greatest improvement, accuracy, workload, and time-consuming. (D. & R.). However, one of the withdraw of the program is the high cost. Besides, the program also brings other benefits, for in- stance, reduce training cost and time, allowing seasonal workers to work effectively. One of the withdraw the author discusses that is the high costs to install. (D. & R.).

An advanced version of the pick to voice is the *pick-to-pallets* system. It is claimed to reduce errors in picking by up to 35 percent and improve productivity by up to 20 percent. (R.C). Subsequently, it reduces the costs for reverse logistics and compensation if errors occur, not to mention the negative impacts on the company's credibility. From a personal stand view accompanied by the current requirements of the company, I think the pick to voice option seems to fit the business. This suggestion excludes the financial aspect, as the program provider can only offer the prices and specific solutions after discussing and comprehensively assessing the company's situation. Nonetheless, with the benefits of cost-saving for the company, it is worth considering.

An *RFID* scanner in warehouse operations avoids human errors by checking remaining quantities, expiration dates, and other information. Companies can use it to track revenue, quantity, store location, flow, transit time, temperature, theft precisely. The best RFID benefit is providing real-time data, enabling better inventory flow and data exchange, and new competitive opportunities. (Higgins & Cairney 2007, 32-36). The authors conclude that companies that neglect the benefits of RFID may lose competitive advantages (H. & C. 2007). A study by Chen & al. (2013) shows that the RFID

reduces the time to check on pallets and items by 82 percent. Plus, it improves the reading data from the tags process by 99 percent while transfer to the synchronized managing system. The operation time is decreased by 87 percent, and the combination of RFID and cross-docking operation can even diminish working time by 91 percent. (Chen & al. 2013).

A survey by the Ministry of Transport and Communications Finland in 2006 (Naula & al. 2006, 62) states that the use of RFID in Finland is limited and approximately half of large enterprises plan to use it by 2011. The survey also concludes that logistics can be revolutionized by using RFID technology. Many businesses in Finland have not realized the benefits of the RFID system, explaining the limited use in the country and even Europe. Furthermore, the technology providers in Finland do not yet have many opportunities to promote it. (Rantasila & al. 2014, 255).

Tsai and Huang (2012, 45) conduct quantitive research on evaluating the cost for investment in the RFID system of Port of Kaohsiung. The study assumes a net present value for 11 years. They find that the benefit-cost ratio is 2.5 in the general focused system and conclude that the RFID application is worth installing. (T. & H. 2012). Nonetheless, the implementation of RFID technology is complex and requires a professional partner in this field to assess the company situation, plan a proper strategy, and estimate the budget.

As mentioned earlier, another attribution of human error may be the *staff working ability*. Particularly, sometimes they lack carelessness and attention when picking products. Skerlic and Muha (2017, 88) advise warehouse managers to provide thorough training for employees and adopt the *5S method*. The 5S method consists of sort, set-in-order, shine, standardize and sustain, which is based on the disciplined guideline that managers use to train their staff. The authors describe the process as follows: removing surplus items, marking all products, and placing them in proper locations that are easy and safe to access. (S. & M., 2017). They conclude that warehouse procedures and measures are maintained by clarifying criteria in the beginning phase. Regular meetings to report on effectiveness and management help to sustain the system. Encouraging staff with awards is considerable as well. (S. & M. 2017).

4.5 Developing procurement process

4.5.1 Selecting suppliers

As mentioned in subchapter 4.1.1, the epidemic prevents the company from meeting and discussing in person with suppliers at the food exhibitions. Therefore, to select a vendor, they need another approach. As they have already created strong relationships with many suppliers, they sometimes seek other vendors for subcontracting or sourcing new products. According to the manager, the supply of some products is not stable, such as the frozen foods from Vietnam. The reason could be attributed to the fluctuations in the agriculture conditions in the origin countries. Although the supplies of most of the foods are currently stable, they want to find another vendor for a substitute in case the main vendors are not capable of providing according to what they desire. Additionally, they plan to widen the range of products to deliver customers the best value by seeking new supplies of new products. Supplier diversification reduces the company's dependence on them. Plus, reliable suppliers make the sources of supply are secured, and the IM becomes easier. Consequently, selecting a trustworthy supplier is very important for a smooth SCM process. The supplier selection process is illustrated in figure 10.

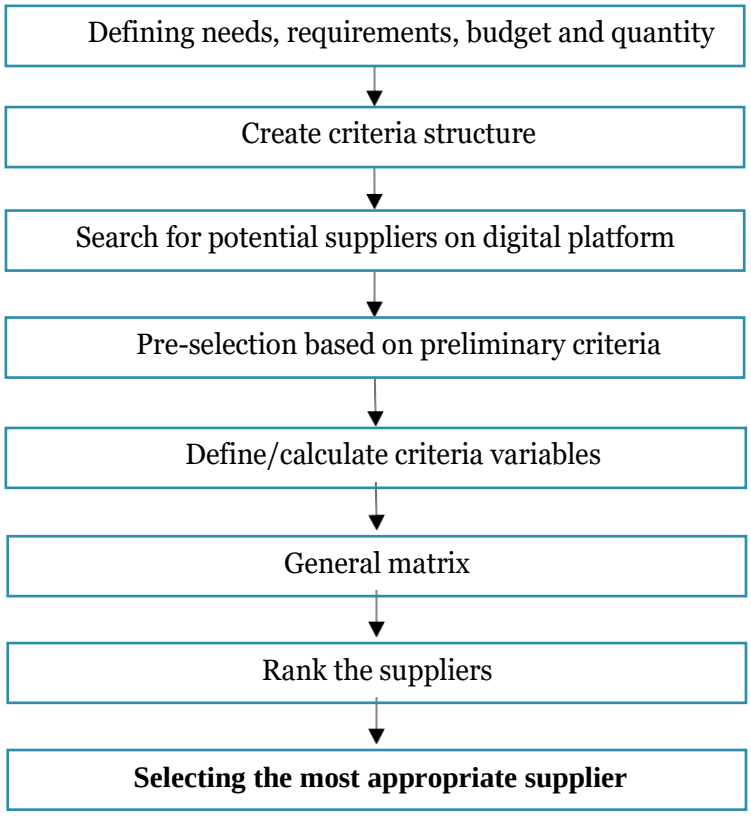

Figure 10. Supplier selection process

Before the epidemic occurs, the company can meet new suppliers in person at food exhibitions all over the world. They can easily discuss, negotiate trading terms after verifying supplier credibility and product quality. But now it seems impossible to communicate with them that way. Hence, it is crucial to analyze them more carefully to avoid risks for the business. The first step is to identify what they expect from a supplier and the budget for purchasing. Then they need to define the quantity they need. Based upon what the company desires, a structure of criteria to select a supplier is described as follows, listed according to their importance.

- Quality (Cr_1): the supplier provides high-quality products that meet specific requirements— the company values this criterion the most.
- Reliability and commitment (Cr_2): the supplier has the ability to supply commodities durably. It can be broken down to the production capacity. Production capacity history should be reviewed for a certain period of time.
  Production capacity = Actual output / Effective (maximum) capacity
- Financial performance (Cr_3): the supplier has sufficient cash flow and has a strong credit situation. It is also considered an approach to evaluate supplier's reliability. Because the company is a wholesaler, they usually purchase on large orders; it is too risky to choose a start-up or small company that is not capable of trading internationally, even though they have good products. In this approach, they communicate with suppliers online or on a digital platform. The ability to verify and evaluate suppliers is lower than meeting in person. Therefore, they need a supplier that is credible enough, which is partly proved by their financial performance. Evaluating supplier's financial performance can be done by viewing financial statements. A company having low leverage and high profitability has more opportunities to sustain. (Söhnke, Bartram & Dufey 2007, 444).
- Price (Cr_4): the supplier has a competitive price offer (exchange to Euros).
- Shipping (Cr_5): the supplier has excellent shipping media that has a short shipping time and good service.
- Vital customer service and responsiveness (A_6): the supplier can support the company in the purchasing process, such as errors occur with the consignment and flexibility in negotiating special terms, such as minor orders or special orders.

As it is impossible to attend a food exhibition in person due to the coronavirus situation, it is considerable to join a trustworthy digital or virtual food expos to find a supplier. There are several alternatives, such as the Online International Food Expo or Food Japan HYBRID ASEAN Exhibition of Oishii Japanese Food & Beverage (Japan External Trade Organization 2021). Visitors can find suppliers based on search criteria such as industry, product

categories, etc. Another unofficial way is to look for where competitors in Finland source their products. For example, if they want to import rice from another supplier, they might come to other food stores and look for the supplier's information on the packaging and contact them. When they find the potential suppliers that match their search criteria, such as industry and product portfolio, they can continue to the evaluation process to select the most appropriate one.

After reaching out to those suppliers, they need to assess their competencies. Below is a summary of how to calculate or define the variables. The constraints Cr_1 to Cr_5 correspond to the criteria above, respectively.

Table 7. Criterion measurements and ranking qualifiers

Criterion	**Measurement**	**Ranking qualifier**
Cr_1	Subjective measurement based on the product quality	Excellent/ satisfied/ not good
Cr_2	Numeric measurement	%
Cr_3	Subjective measurement based on financial reports	Stable/ acceptable/ risky
Cr_4	Numeric measurement	€
Cr_5	Numeric measurement	days
Cr_6	Subjective measurement based on how fast and effective supplier response	Excellent/ satisfied/ not good

After evaluating each supplier with the criteria above, then there is a matrix to fill in. When filling the evaluation matrix, the subjective measurements (Cr_1, Cr_3, and Cr_6) are transformed to numeric scale to analyze supplier capacity better and easier. Excellent/ Satisfied/ Not good equal to 3/2/1 respectively. For example, if a supplier has an excellent quality product, its quality scale is 3; if a supplier has a financial situation with risks and uncertainties, its financial performance scale is 1.

Table 8. Criterion matrix template

Suppliers	**Cr1**	**Cr2 (%)**	**Cr3**	**Cr4 (€)**	**Cr5 (days)**	**Cr6**
S_1						
S_2						
S_3						

S_4

S_5

S_6

When the evaluation matrix is filled out, the numeric results of criteria Cr1, Cr3, Cr6 can be combined together and compare parallelly with other criteria. Then they can select the most suitable supplier.

The method above can be used to evaluate existing vendors based on historical data during cooperation time. Effectively assessing suppliers helps companies classify them as, for example, the main source and subcontractors. When deciding to purchase, they know whom to ask first.

4.5.2 Risk mitigation

This subchapter highlights the vulnerabilities associated with the procurement process and presents some possible solutions to diminish their impacts.

A primary risk in procurement is an external dependency, which is the company's dependence on its suppliers' principles, feasibility, efficiency, and durability. (Russil 2010, 14). Those risks affect the supply of a company, such as production interruption or errors or damages occurring during delivery. They can use models such as Porter's five forces, PETLES, or SWOTS analysis to evaluate the supplier and the environment in which it operates to identify risks, especially when searching for new vendors. Identifying the risks of suppliers helps companies plan the sourcing strategy better.

The company sources many frozen agriculture products from Vietnam, such as fish, shrimp or squid, etc. Most of the large enterprises in this industry located in the south-west of Vietnam, where there are various rivers and natural resources for aquaculture. Below is a brief example of a SWOT analysis of vendor Y, who exports seafood.

Table 10. SWOT analysis of vendor Y

Strengths	- Located in the west-south of Vietnam, where aquaculture has strong development over the years. - Having plentiful supply from farmers in the local areas.
Weakness	- Marketing is not promoted much, leading to a limited approach to potential customers.

	- Does not have much experience in exporting, especially to Europe - High cost of production.
Opportunity	The EU-Vietnam Free Trade Agreement and an Investment Protection Agreement between Vietnam and European Union diminish exporting barriers and open new opportunities for both export and import sides. For example, tariffs are abolished 99 percent, decreasing legal barriers, protecting geographic indicators. (European Commission).
Threats	- Pressures from technology advancements and competitors from Thailand, Cambodia, etc. - Natural disasters affect sources of supply.

After analyzing suppliers' risks, they can have a proper strategy, whether they should source from them and plan the purchasing agreements. In addition, as mentioned in subchapter 4.5.1, vendor diversification decreases the company's dependence on them. In case on supplier has uncertainties, they will have a subcontractor for replacement.

Some importers in Finland collaborate with the supplier. I have seen products that have the seller's logo on the package in some of the rival stores. Distributed collaboration with suppliers creates synergy by interdependence with deliverables and decision-making on the production process. (Wang, Ming, Kong, Wang & Zhao 2008, 253). Suppliers and customers share risks, resources, and profits later on, as they take advantage of the capabilities and assets of each other and make them grow. (Hudnurkar & Rathod 2017, 213). Collaborating with vendors in terms of capital investment increases the company's control over the supply as they are involved in the production process. On the other hand, it engages suppliers to act more carefully and responsibly as their profits depend on it. Therefore, risks in production are less likely to happen. A survey by McKinsey & Company (Gutierrez, Kothari, Mazuera & Schoenherr, 7 July 2020) of 60 vendor and buyer executives reveals that production collaboration between a company and supplier decreases risks and costs while strengthens service and business growth. However, before deciding to collaborate with suppliers, further researches should be carried out to evaluate the project's possible because not all commodities can be produced that way.

A hedging approach is used to cover unsystematic risks such as demand uncertainty and price increase, or systematic risks such as disasters affecting the supply, etc. A financial hedge sets a forward contract, in which a fixed asset is sold at the fixed price p, with the fixed exchange rate r and at the time T. (Birge, 2012). It should be used for all

purchases as it saves companies from financial uncertainties due to exchange rate fluctuation. Most of the company suppliers are overseas and in other continents, where the currency is other than euros, meaning that is vital to consider a financial hedge.

5 Discussion

The chapter sums up the findings of the thesis as well as provides discussion and conclusion, which clarify the research question of the thesis: *What are the challenges that company x faces, and what solutions can they use to improve?*. Firstly, the key outcomes of the research are presented and discussed with relevant issues. Secondly, recommendations for further research are highlighted, which are based upon the limitations of the research and future developing strategy of the case company. Finally, the researcher's self-reflection on the knowledge that is acquired during the stud will be presented.

5.1 Key outcomes

As mentioned in the introduction chapter of the thesis, the primary objectives are to describe the challenges in WM and procurement procedures that the case company encounters and suggest solutions for them. Besides, the research also seeks to appraise the success of the new ERP system, especially in warehouse practices. The thesis uses mainly the qualitative research method through structural interviews and desktop studies to collect and analyze data. The quantitative survey is used to gather the ERP user's opinion about the system.

5.1.1 Structural interview findings

The interviews with the representative of the case company provide comprehensive knowledge and insights of the current business practices and the obstacles of the case company. The interviewee describes the business routines from purchasing from vendors, delivery process, warehouse operations, shipping, and other relevant issues. Additionally, he clarifies what the company wants to improve, especially in the WM and procurement processes. The knowledge acquired from the structural reviews is subject to answer IQ1, IQ2 and partly IQ3.

The case company is a wholesaler specializing in foods, kitchen utensils, and tools for restaurants across Finland. They have many suppliers, ranging from Asian countries such as China, Japan, Vietnam to Europe and Africa, as they offer a vast amount of products. They often communicate with suppliers and seek new vendors via food exhibitions worldwide, principally in Europe. When making purchase orders from suppliers, the communication channel is via emails.

The main channel to communicate with suppliers is via food exhibitions. There, they meet new potential vendors and discuss with some of the existing vendors. When the agreement is set, they will order via emails mainly. Most of the goods are shipped by ocean freight, and it takes around 40 days to arrive in Finland, depend on the location of the origin country. Lightweight or perishable commodities are shipped by air freight. When the consignment arrives in Finland, the customs procedures are processed to transfer to the warehouse. The criteria to select a supplier are quality, price, steady source, and shipping time, listed according to the importance.

When the epidemic occurs, they can only contact suppliers via emails or other virtual platforms such as Team or Zoom meetings. It causes difficulties as they want to find new sources of supply for certain products. It also leads to fluctuations in demand due to the lockdown period forcing restaurants to close and new sources of demand, which are the sushi bars in supermarkets. Sometimes, they have too much, but there are also some times they could not meet the demand.

The warehouse of the case company is a traditional facility, where most of the practices are done manually. Typically, they operate like many other warehouses in Finland. Customers order via phone calls with salespersons, and the lists of the order will be sent in paper forms to warehouse staff for preparing and delivering. The clustering picking method is used, meaning to combine multiple orders at the same time to pick. The company has its own trucks for customers located within a radius of 250km and operates with a logistics partner delivering to farther customers.

ABC analysis

The research includes an ABC analysis to categorize different types of stocks based on their demands. Sushi items are the best seller, which generates 50 percent in sales, followed by Chinses foods make up 20 percent, Thai foods with 10 percent, and other stocks with 20 percent in the total revenue. The results are used to plan the stock location in the warehouse.

The warehouse capacity is about to be fulled, as the business is growing, leading to the increase of inventory. Thus, they need to find solutions to expand more space or move

to a new spacious warehouse. Managing inventory is also a challenge to the case company, as they have a significant amount of excess and obsolete stocks, which cost them approximately 20,000€ annually. Furthermore, they have always concerned about the staff's working ability. They very often deliver wrong items to customers, both in quantity and types.

It is important to point out the limits so that they can implement improvement strategies for those problems. For example, the warehouse layout consists of free slot lines and very few racks. Hence, the solutions can be based upon it, such as adding more smart and modern racks and using a versatile forklift.

The company implements a new customized ERP system to improve the business practices in general and the warehouse operations specifically. The old ERP application only consists of sales, purchase management, and WM modules. The expansions will add the financial and online shop modules. The thesis also aims to assess how effective it is on the company operations, especially on WM.

5.1.2 Survey results

A survey is conducted to collect staff's perspectives towards the new ERP system. It consists of quantitative questions asking ages, seniority, experience, usability, rates, and qualitative questions asking respondents to rate and comment on the effectiveness and recommendations for further enhancements. Based on the survey results, the majority of them are satisfied with the system, although few of them say it does not meet their expectations. The manager also agrees with most of them, saying that it is worthwhile with the expenses. They marked the system as 7.6 on average on a scale of 10.

There is an error with the system when it occasionally indicates erroneous data. According to the manager, most of the errors are information on expiration days, quantity, and descriptions of products. The IT company who provides the application explains that the old database's cleaning process probably was improper. Furthermore, one respondent suggests making the system available in other languages, as currently, it is only available in English.

5.1.3 Desktop study findings

Based on the problems of the company and that the manager expects, several solutions have been suggested using the desktop study method and empirical studies which can answer the IQ4: *What solutions can they use to tackle the challenges?*

Warehouse optimization

Firstly, it is needed to clear the excess and obsolete stock. Several alternatives are selling at lower prices to customers or employees, offering bundle packages, or donating.

Secondly, to widen the warehouse space, installing the racks system is recommended to utilize the vertical space. Although they already have some shelves, there is plenty of spaces that can be installed more. Flow rack systems are suitable for stocks that have short cycle days, high demand, and large dimensions or/and weight. It reduces the risk of obsolete stock as it adopts the rule first-in, first-out. The other types of inventory can be stored on the normal pallet rack system. The aisles are narrowed down to around 2.2 meters to utilize more space. An articulated forklift is recommended to ensure it can operate within the narrower aisles. The inventory is placed according to the ABC analysis. The A products are placed vertically alongside the dispatch area so that they are picked more easily and quickly. B and C products are stored in the same rule toward the other side of the warehouse. The layout can refer to the warehouse designed by Richards (2014, 90), as illustrated in figure 9.

The company has always concerned about the working ability of their staff in the picking process. They usually deliver wrong orders and pick newer items, resulting in excess stocks. They can apply technological advancements. For example, an RFID scan system consisting of readers, tags, and supporting applications can quickly check data such as revenue, quantity, store location, flow, transit time, temperature, and theft precisely. Several studies indicate that the RFID system enhances accuracy, cuts time-consuming and traveling distances in the picking process, as well as improves productivity. Other technological applications are recommended to minimize errors and time-consuming. The pick-to-voice system that uses voice prompts to guide warehouse staff on the pick location, types, and quantity can be used to improve picking efficiency. Finally, the pick-to-light system is considerable, which uses alphanumeric screens and buttons to lead the picker through light-assisted manual selecting, placing, and arranging. Both systems allow the picking process to go smoothly without paper lists. In addition, pick-to-pallet is

recommended, which is an advanced version of the pick-to-light application. The two systems are proved to enhance accuracy in picking.

Plus, warehouse managers can adopt the 5S method to guide staff with discipline at the workplace. The method includes sort, set-in-order, shine, standardize and sustain.

Procurement development

As it is impossible to meet existing and potential vendors at food exhibitions, the research suggests joining virtual exhibitions. The evaluation process should be more careful. The procedures are described as follows: firstly, they need to define the company's needs, requirements, budget, and quantity to build a criteria structure based on that. Next, they can search for potential vendors on a virtual platform based on search criteria such as industry and country of origin. Then, data of vendors are collected and analyzed according to the criteria structure which includes quality, reliability, and commitment, financial performance, price, shipping and customer service, and responsiveness. Subsequently, those variables are filled in the matrix and ranked. Finally, the most suitable vendors are selected based on the matrix results. The proposal can be used to rank the performance of existing vendors when prioritizing a source of supply.

The research also suggests a proposal to mitigate uncertainties in sourcing. A highlight risk is an external dependency on vendors. Besides the evaluation process, a SWOT analysis is included to assess a vendor's capabilities and resources better.

Collaborating with a supplier in terms of capital investments is considerable as it offers higher control and shares risks for both parties. Several food importers in Finland have implemented this strategy. They can also use financial hedges to fix the prices at a certain exchange rate for a certain product at a certain time. The financial hedge prevents the risks caused by the volatility in the exchange rate.

In a nutshell, after the data collection and analysis process, the research outlines the case company’s current working procedures and challenges. Thereafter it offers them several alternatives to improve their warehouse operation and procurement procedures. The solutions are expected to be suitable for them based on previous research reviewing and analysis, as well as the company’s situations and requirements.

5.2 Research limitations and recommendations for further research

The subchapter describes the issues that can not be studied in the study due to several reasons. From those constraints, there are several recommendations for further inquiries.

As mentioned in subchapter 1.6, one of the research obstacles is the limited access to the company reports due to confidentiality. When doing the ABC analysis, it is not feasible to disclose the quantities in sales of each product. Therefore, it is not complete as expected. It is assumed to not significantly affect the proposal solution, which is the warehouse re-design. As the A products have high demands, it does not matter how many items they are, and the design still can remain as suggested. Nonetheless, if the sales quantities are included, a double ABC classification that combines frequency and volume can be analyzed. Researchers can take advantage of it and design a new warehouse layout and slotting strategy to utilize more labour costs and picking efficiency.

If the company considers adopting the re-design solutions, they probably need to do more researches. Particularly, the detailed design, physical measurements such as weight capacity, heights, widths, or lengths should be calculated and reported in quantitative figures by professional constructors. The same situation happens to other technological solutions such as RFID application or the pick-to-voice system. It provides exciting topics for investigators to study, especially in the design and technology professions. The thesis cannot provide that information because I am not an expert in that field. The solutions for warehouse optimization are mainly qualitative knowledge, and detailed quantitative results might be produced in other studies.

The research excludes the company's financial resources and expenses for development. The specific amount for renovating and implementing IT application is hard to predict. It needs consultancy from specialists. Besides, the company's budget can not be revealed. Several topics and aspects can be researched in further studies, for example, architecture design, expense, and sustainability.

Furthermore, the survey on the ERP effectiveness only receives nine responses from the company staff, whereas the manager says that there are 17 users at the moment. Some respondents do not answer all of the questions. The survey only receives one answer in sentence form in terms of the recommendation to further develop the system. If there

were more respondents, ideally 17, and all the questions were answered by all participants, the assessment could be more precise and objective. Besides, the system continues to develop in other sectors such as e-commerce. Hence, there are probably more investigating topics for later studies.

As the company is growing, the solutions in this study might not be appropriate in the future. Then, the case company will need to explore more potentials, which allows for more interesting research topics. To be continuously competitive in the market, companies should invest in research and development. They can start by enhancing the operational operations and other activities.

5.3 Self-reflection

The thesis has been conducted for approximately 2.5 months. It is pretty short in my opinion. While doing this research, I have acquired valuable knowledge of my specialization study and developed interpersonal skills such as independent work, communication, collecting and analyzing data.

With such a short time doing the thesis, I have practiced time management and task allocation skills, which will be beneficial in my future career. Though I only work mainly with the manager of the case company, through the interviews with him, I have improved my communication skills significantly and gained business insights from him as well. My computer skills are enhanced in terms of searching techniques and writing essay skills. Reading and browsing paper books also help me greatly improve my knowledge of the research methodologies, specialization knowledge, social knowledge, etc.

It was a little precarious in the beginning phase when choosing the right topic to investigate. But the manager and my supervisor help me a lot in building the study, from beginning to end. Prior to the thesis writing, I do not have much knowledge and experience in the business environment, both international and in Finland. The case company sources from many different parts of the world, which allow acquiring insights into doing business in Finland and international trading, which have great benefit for my specialization study and future career. With assistance from the case company, step by step is done. Plus, the guide from the supervisor has assisted me in structuring and finalizing the research.

In conclusion, with support from the case company and the supervisor, writing this thesis helps me strengthen and explore more knowledge and insights in my study field as well as enhance interpersonal skills.

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Appendices

Appendix 1. Summary of structural interviews

1. **Hi. It is an excellent chance to have an interview with you today. Could you please introduce yourself as well as your company?**

Hello. I am the manager of company X. We are specializing in food and kitchen utensils and tools for the restaurant business. Literally, we can provide all items required to operate a restaurant. The revenue tripled in 4 years from 2015-2019. The net sales increases by 51 percent from 2018-2019.

2. **How do you source from vendors?**

Mostly we contact them via emails. After an order is confirmed, they will ship the consignment via a logistics provider. For normal products they ship by ocean freight, and it takes around 40 days. For perishable food such as vegetables or fruit, they ship by air freight. When consignment arrives in Finland, we will do the customs procedures according to Finnish legislation and receive it. The declaration can be made online. The Brexit affects the customs period, not the taxation yet, as we also source some products from the UK. When it arrives at the warehouse, warehouse workers will record information such as quality, quantity, or expiration date before load to the storage location. Our priority is quality. If vendors sent low-quality products, we would not source from them anymore.

3. **What are your main channels to contact customers, and could you please the shipping process to near customers?**

Because most of the customers are close to us, we know each other and have been trading for a while, so the primary sales channel is via phone call. Very few customers contact us via emails. They know our salesperson contacts and make orders with them. Then we will prepare the order and deliver it. Some customers contact via email.
We have a specific schedule for our " truck tour " for customers in nearby cities to Metropolitan area such as Tampere, Porvoo, Lahti, and we have a particular schedule for our "truck tour." It means that we pack products on our trucks and travel to customers' places. Usually, we have several business customers and the same city, and we also retail. We will contact them in advance or vice versa to ask what items they need and load packages to trucks. The day after we travel to deliver them and for retail purpose also. It helps customers save shipping cost and allow us to reach out new

customers. Old customers introduce us to new customers. For example, they might come to the restaurants, see something interesting, and ask where the owner purchases stuff.

4. How the epidemic affects the business?

Firstly, it affects the communicating channel with suppliers. We usually communicate with suppliers via food exhibitions around the world. For example, some exhibitions take place in Belgium, Holland, France. There, the suppliers present the samples to test. We can meet new suppliers to discuss product quality, shipping, prices, discounts, and so on. We also meet some existing vendors there to discuss more such. But now, because of the epidemic, I can not come anymore. We contact them via emails and video calls.

Besides, restaurants close because of the lockdown restrictions, so we lose a lot in sales. However, then we found another source of demand. Many supermarkets open sushi bars, and they came to us to source materials and tools. Then when restaurants open again after lockdown, there are fluctuations in demand. Sometimes we hold too much inventory, and sometimes we do not have enough to meet demand. Besides, the pandemic makes the shipping days from vendors longer, about 2-3 months. The shipping costs also increase. Therefore, our purchase prices slightly increase about 8-10 percent.

5. Could you please introduce practices to fulfill an order?

The order list is printed out and deliver to warehouse staff for preparing and delivering. When we receive orders from customers, we will prepare the products and deliver them. For customers who are within a radius of 250km, we will use our own trucks. For customers who are far, we cooperate with a logistics company. They are very professional, and the shipping is very fast, about two working days, so there is no need for a tracking system.

In the warehouse, we use cluster picking to pick items. It means combining multiple orders to pick at the same time. We use some types of equipment such as forklifts, trolleys, and pallet trucks as a typical warehouse.

6. Which countries do you source products from?

We source from many different countries. In Asia, we have vendors from Korea, China, Vietnam, Indonesia, Japan and so on. In Europe, we have vendors from Holland, Spain,

Belgium and so on. The supply of some of the products is not stable, such as frozen food from Vietnam vendors.

7. Do you hire foreigners to work in your company?

Yes, we do. The background of our working labour is diversified. We come from many different countries such as China, Vietnam, Nigeria, Estonia, or Russia and so on. But there is some staff both in warehouse and office are not very good at English because they are not English native speakers. So sometimes they cannot communicate with them very well and even make some misunderstandings.

8. What are the challenges that you are facing in general?

Since we are wholesalers and our products are physical, some products are even heavy and cumbrous. We handle a vast amount of inventory every day. That is one of our challenges. It is to develop warehouse management and then the operations across the company. I would not say that our WM is bad, but I want it to be better than it is now. For example, managing expired products are problematic because most practicalities are manually, so sometimes warehouse staff might not notice it. They pick the newer products first, which increasing the obsolete stock. It leads to a decrease in profit because we have to sell them at lower prices or sometimes treat them like trash, leading to increased disposal costs. Obsolete stock costs the business around 20,000€ per year. Besides, they very often deliver wrong orders to customers, both in quantity and types. We have to compensate them. So I think it is one of the toughest challenges for us.

Another problem is that the warehouse is not big enough. Because we are developing and it means the amount of inventory is increasing. So we are planning to move to a more extensive warehouse. Besides, we have not installed many rack systems yet.

9. What is the scale of product proportion?

The sushi items are the best seller, constituting around 50 percent of revenue. Thai food sales are around 10 percent, Chinese food sales are around 20 percent, and the rest of the sales are other products.

10. Do you have any plan or strategy to solve those problems?

Actually, yes, we do. We are implementing a new customized ERP system. It is 80% completed so far. We just need to adjust a few things. In general, I appreciate the new

system, and it improves our business a lot in my opinion. There are 17 users at the moment.

11. Could you please describe more about the new ERP system?

The old ERP system only integrates purchase, sales, and warehouse functions. The new one is developed with adding features: order and purchase management, inventory, and financial. We have spent a lot of money on this project, and we are happy with the results, although some issues need to be adjusted more according to our requirements.

The new ERP system will allow customers to order on our website. It is convenient for new customers who purchase for the first time, for example, if they don't know how to contact us. But the module needs some time to be ready.

12. How much do you spend on the project, and are you satisfied with how the system performs?

I cannot disclose the license fee, but every month we pay about €1000 for maintenance. And yes, I'm pretty satisfied with the system.

13. What do you think about the ERP system and the customer service of the IT company?

In general, I think it performs quite well and worth the expense. The ERP adds more information about an item, such as the expiration date. Mainly, staff can check whether the item from the previous purchase is still in stock and its location as well. It now can updates the Stock keeping units (SKUs) automatically and streamlines the item history. We can view the quantity in stock, amount to be in orders, and shortages or surplus. The IT company provides training pretty well I think. Because most of our staff have used the ERP system before, so it is not difficult for them to adapt.

14. How does the IP company that provides the ERP system acts when there are errors?

They act pretty responsively. They have experience in this field. So when something wrong happens, they will come to check and improve within few working days. I am pleased with their service.

15. Does the system ever show incorrect data?

Yes, sometimes it indicates old expiration dates, quantities, or descriptions. The IT company explains that probably the clearing process of the old database is not carried out properly. Then they will fix it.

Thank you so much for spending time to have the interviews with me!

Note: The data collected from the interviews and the survey serve the thesis purposes only.

Appendix 2. Survey form

ERP SURVEY

1. How old are you?

- ◯ 18 - 25 years old
- ◯ 25 - 35 years old
- ◯ > 35 years old

2. Have you used the ERP system before?

- ◯ Yes
- ◯ No

3. How long have you worked here?

- ◯ < 1 year
- ◯ 1-3 years
- ◯ > 3 years

4. How many hours a day do you use the ERP system (on a 8-hour working day basis)?

- ◯ 4-6 hours
- ◯ 6-8 hours
- ◯ 8 hours

5. Is the system hard or easy to use?

- ◯ Easy
- ◯ Intermediate
- ◯ Hard

6. Does the system ever indicate wrong data?

Chỉ đánh dấu một hình ôvan.

- ◯ Never
- ◯ Sometimes
- ◯ Rarely

7. How does the system improve productivity?

Chỉ đánh dấu một hình ôvan.

- ◯ < 50%
- ◯ 50-80%
- ◯ > 80%

8. Does the system meet your expectations?

Chỉ đánh dấu một hình ôvan.

- ◯ Yes
- ◯ Yes but not completely
- ◯ No

9. On the scale of 1-10, how would you evaluate the system

_____

10. Do you think there is something to improve?

_____

_____

_____

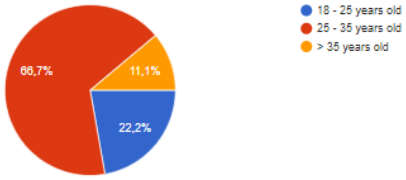
_____

_____

Appendix 3. Survey results

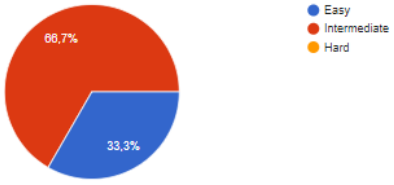
How old are you?

9 câu trả lời



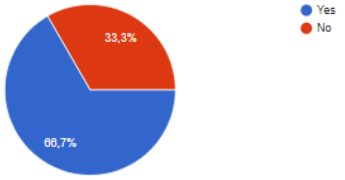
Is the system hard or easy to use?

9 câu trả lời



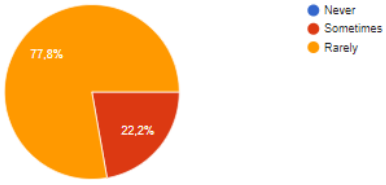
Have you used the ERP system before?

9 câu trả lời



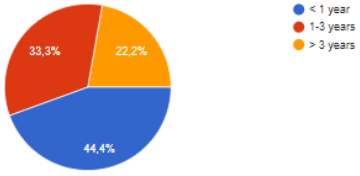
Does the system ever indicate wrong data?

9 câu trả lời



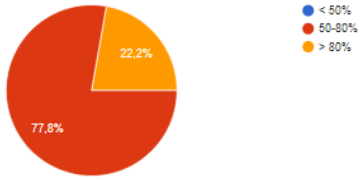
How long have you worked here?

9 câu trả lời



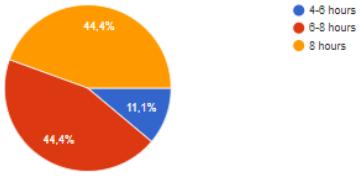
How does the system improve productivity?

9 câu trả lời



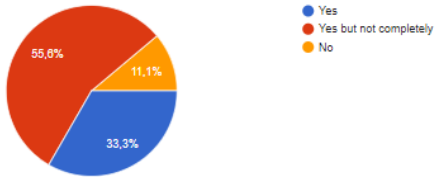
How many hours a day do you use the ERP system (on a 8-hour working day basis)?

9 câu trả lời



Does the system meet your expectations?

9 câu trả lời



On the scale of 1-10, how would you evaluate the system

7 câu trả lời

Do you think there is something to improve?

1 câu trả lời

more languages will be better