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ANALYZING AND IMPROVING THE ORDER FLOW PROCESS

Case: A company X

Thesis

Profitable supply chain management

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ABSTRACT

The constantly changing business environment is a classic problem in supply chain management, and rapid changes seriously affect companies' supply chain performance. An agile supply chain is fast becoming a key instrument in supply chain management, enabling companies to adapt and respond to market requirements. Supply chain management and integration play a significant role in the maintenance of an agile, flexible, and resilient supply chain. In recent years there has been an increasing interest in ensuring that companies can coordinate the supply chain functions as one since global logistics challenges started.

The company in question is an international manufacturing company that produces orders made-to-order using the just-in-time method. The order quantities in this business area are relatively high, while order sizes are poorly standardized. The major objective of this study was to investigate the company's order flow process and find improvement areas from order inquiry to getting orders produced just in time -a method to catch the planned vessel. In this thesis, the mentioned process steps are called an end-to-end process. The aim of this project has been to attempt to establish the current process steps, identify the improvement areas, and offer tools to improve the process. This study sought to address the questions of what needs to be improved in the order flow process and how to achieve better collaboration and integration levels between sales, vessel booking, and production planning departments. This thesis sought to remedy these problems by analyzing the literature on supply chain management and supply chain integration.

The result of this investigation indicates that the company has implemented all the supply chain management tools, processes, and targets into practice, but internal supply chain integration is not yet achieved. The company must provide a more transparent and straightforward process through system support. This would offer clearer targets, roles, and responsibilities to support communication and information sharing. Sharing the knowledge of the overall process would improve decision-making and offer needed information to implement the continuous improvement part of daily tasks. All these actions would improve collaboration between the supply chain departments by creating trust, which would have a positive influence on the working culture.

Keywords: case study, manufacturing company, JIT, make-to-order, supply chain management, integration.

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TIIVISTELMÄ

Jatkuvasti muuttuva liiketoimintaympäristö haastaa toimitusketjun hallinnan ja suorituskyvyn. Ketterän toimitusketjun merkitys on kasvanut entisestään, jotta yritys pystyy vastaamaan markkinoiden tarpeisiin. Toimitusketjun hallinta ja integraatio ovat tärkeitä työkaluja luomaan ketterä, joustava ja mukautuva toimitusketju. Viime vuosina ilmenneet maailmanlaajuiset logistiikan haasteet ovat lisänneet yritysten tarvetta koordinoida toimitusketjua yhtenä kokonaisuutena.

Tapaustutkimuksen yritys on kansainvälinen prosessiteollisuuden yritys, joka tuottaa tilaukset pääasiallisesti suoraan tilauksia vasten JIT-menetelmää käyttäen. Kyseisessä liiketoiminnassa tilauskoot ovat verrattain suuria ja tuotteet heikosti standardisoituja. Tämän tutkimuksen tavoite oli tutkia kohdeyrityksen tilaustoimitusprosessia ja tunnistaa prosessin kehityskohteita. Prosessiksi on määritelty vaiheet asiakkaan kyselystä tuottamaan tilaukset oikea-aikaisesti suunniteltuun laivaan. Nämä prosessin vaiheet muodostavat kokonaisprosessin tässä työssä. Työn tarkoitus oli luoda prosessikuvaus prosessin eri vaiheista, tunnistaa prosessin kehityskohteet sekä tarjota niihin ratkaisuja. Tutkimus pyrki vastaamaan tutkimuskysymykseen: mitä pitää kehittää ja miten, jotta saavutetaan parempi yhteistyö ja integraatio taso myynnin, laiva- ja tuotannon suunnittelu osastojen välillä. Tutkimuksessa etsittiin vastauksia tutkimuskysymykseen syventymällä toimitusketjun hallinnan ja toimitusketjun integraation teoriaan.

Tulosten mukaan yritys on onnistunut jalkauttamaan toimitusketjun hallinnan elementit käytäntöön, kuten prosessin vaiheet sekä tavoitteet, mutta toimitusketjun sisäistä integraatiota ei ole vielä saavutettu. Yrityksen tulee kehittää toimitusketjua niin, että prosessin vaiheet ovat läpinäkyvämmät ja selkeämmät. Tämä selkeyttäisi tavoitteita, rooleja ja vastuualueita tukemaan kommunikointia ja tiedonvaihtoa. Lisäksi kokonaisprosessin tuntemusta täytyy parantaa tukemaan päätöksen tekoa sekä saamaan jatkuva kehitys osaksi päivittäisiä työtehtäviä. Kaikki edellä mainitut toimet parantavat yhteistyötä toimitusketjun eri osastojen välillä, joka luo luottamusta ja vaikuttaa positiivisesti yrityksen kulttuuriin.

Asiasanat: tapaustutkimus, teollisuuden yritys, JIT, valmistus tilaukselle, toimitusketjun hallinta, toimitusketjun integrointi.

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1 INTRODUCTION

The constantly changing business environment has become a central issue in supply chain management, and varying and poorly forecasted demand makes it even more complicated. The recent developments in forecasted demand have heightened the need for an agile supply chain because companies need to adapt and respond to quickly changing demand. An agile and cost-effective supply chain offers competitive benefits for the company, so companies need to support it with an integrated supply chain to optimize the information and material flow. (Iloranta & Pajunen-Muhonen 2012, 340–346; Straka 2019, 2–3.)

Supply chain functions are often spread throughout different departments in companies. Therefore, an overall picture of the process might not be clear and, consequently, departments may have different interests. However, departments should consider the end-to-end process in decision-making. For that reason, supply chain management needs to provide guidelines and targets to support considering the process as one instead of focusing too much on everyone's core area. To do this, supply chain management needs to look at the overall picture to find balance for departments' different requirements, avoid conflicts in the targets and optimize the end-to-end process. Supply chain management aims to create a straightforward process to be able to coordinate information and material flow between supply chain partners. An effective supply chain process also creates value for customers by reducing costs and supporting customer service. (Iloranta & Pajunen-Muhonen 2012, 340–346; Moon 2018, 1–13; Hugos 2018, 4–5.)

1.1 Background

The challenges in supply chain management discussed above are familiar to every company, and the commissioner company is not an exception. The company works in an international environment, and even though the supply chain activities are spread to several organizations in different countries, the process needs to be managed as one. Collaboration and integration between departments need to be achieved despite the physical distance.

The company is an international process manufacturing company and has mills in various countries. However, this study focuses on the order flow process in its Finland mill. The recommendations from this survey can be utilized at other mills, too.

The company's order type is mostly "made to order." This order type is selected because product sizes are poorly standardized in the current industry, and order quantities are relatively large. Just in time -method is used in the company because it decreases the stock levels, thus speeding up inventory turnover and releasing the working capital.

From the logistics point of view, Finland is like an island. For that reason, most international markets are easiest to reach via vessels, so waterways are crucial for Finland's export. Finland's isolated location decreases the company's competitiveness due to more expensive logistics costs. (Hokkanen et al. 2011, 22–25.)

The COVID-19 pandemic triggered massive challenges in global logistics, causing shortages in containers, operators, and carriers' availability which significantly increased freight costs. At the same time, global demand increased, causing carriers not to provide needed vessel allocations for the companies. (Huolintaliitto 2022.)

The company had recognized improvement areas in the order flow process before the crisis, but the shortages escalated when the global logistics challenges started. The global logistics crisis proved the importance of a transparent, straightforward process and deeper collaboration in the supply chain. The company's order flow process is different for each distribution channel. The Company delivers significant volumes via Helsinki port by ocean vessels in containers to the customers. So, it was reasonable to investigate this part of the order flow process to get a deeper understanding of it.

1.2 Research objectives, research question, and demarcations

The aim of this study was to clarify several aspects of the current process and investigate and identify improvement areas to improve the order flow of the process for the container market, from order inquiry/confirmation to producing orders just-in-time to catch planned vessels. The current study has only examined the container market's order flow process for orders delivered via Helsinki port to the customer. The process is quite complex because several issues influence it, and therefore the thesis does not engage with detailed S&OP planning, reference cycle setup, production limitations, customs, and contract negotiation.

The primary purpose of this study is to develop an understanding of the current process, identify improvement areas, and offer tools to improve the process, collaboration, and integration level between supply chain departments. The approach is cross-functional because it is vital to understand each department's point of view better, and therefore sales, logistics, and production planning departments participate in this study. The company uses a third partner at the port to take care of the terminal activities; thus, the port is also part of the study to get an external opinion of the company's order flow process performance.

This study aimed to address the following research question:

Q: What needs to be improved in the order flow process, and how to achieve better collaboration and integration levels between sales, vessel booking, and production planning departments?

1.3 Research methods

This dissertation follows a case-study design with an in-depth analysis of the company's order flow process. Qualitative methods offer an effective method of understanding a selected topic through experiences (Puusa et al. 2020, Chapter Introduction). Experiences offer an effective approach to understanding selected issues in a specific time and context (Merriam & Grenier 2019, 3–

5). A case study is a good approach when it is essential to understand a particular case in a specific environment and find answers to questions like; what, how, or why (Eriksson 2014, 4–5,7).

Data for this study were collected using semi-structured interviews. The researcher interviewed three to five individuals from each above-mentioned internal departments and four from the port. According to Puusa et al. (2020, Chapter 6), an interview is an excellent approach for the case study because the researcher can lead the conversation in the correct direction based on the topics that come up during the interview. Interviewing is also a more open-minded method to collect information. Questions should be set neutrally because too exact questions might limit the answers and negatively affect the results. An interview allows a researcher to ask additional questions to avoid wrong conclusions.

The semi-structured approach was chosen because it was essential to give the possibility to bring up own topics which respondent is experiencing vital (Vilkka 2021, chapter 5). In a semi-structured interview, the researcher needs to keep the conversation on the selected themes, but the respondent decides which topics are valuable. With this method, researchers cannot lead the discussion in the "wrong" direction according to prejudices. An open conversation might bring up topics the researcher could not consider beforehand. Researchers need to understand the study's topic to adapt interviewees' replies, lead the discussion to topics that are important to respondents, and keep the conversation in selected themes. (Puusa et al. 2020, Chapter 6.)

The themes for the interviews were collected from theory. The aim of this dissertation is to provide a conceptual, theoretical framework based on supply chain management and supply chain integration.

2 SUPPLY CHAIN MANAGEMENT

The supply chain must provide high-quality services cost-effectively because a significant part of the company expenditure forms from the supply chain functions. Companies need to improve the process and minimize waste to enable

savings constantly. However, cost-effectiveness cannot lead to a decrease in customer service levels. (Inkiläinen 2009, 109.) The supply chain must sustain the same service level and flexibility throughout the process. Otherwise, it would be challenging to respond to the customer's requirements. Transparency, visibility, and fluent flow of information are mandatory to achieve effectiveness and high quality in the supply chain. (Iloranta & Pajunen-Muhonen 2012, 352.)

According to Morana and Morana (2018), a world-class logistics model in supply chain management may be divided into four principal areas which influence overall performance and competitiveness. The principles are strategy, integration, agility, and performance. The supply chain supports the company's strategy with networks and employees. Therefore, the supply chain process needs to be managed as one to ensure a transparent process, visibility, information sharing, and continuous improvements within supply chain functions. Employees are essential to a successful process, and collaboration is needed. All mentioned actions enable an agile supply chain to respond to customers' requirements. It is vital to measure the process to gain knowledge of performance levels, identify improvement areas and enable benchmarking. (Morana & Morana 2018, Chapter: Introduction xxiii.)

Lambert (1998) divided supply chain management into five main categories. The first step is to identify the supply chain partners, and the second is to create vertical and horizontal lines between partners to ensure an effective supply chain process. The third step integrates the supply chain functions as one process. The fourth step is to support the process with educated employees, transparent organizations, and proper systems. The organization's structure should support collaboration, with targets and information sharing. Leaders can affect employees' workplace behavior, which is significantly influencing working culture and further integration. The fifth step is to measure the supply chain process functionality within the eight principal areas in the supply chain: customer relationship and service management, demand and forecasting, order fulfillment, workflow process, supplier management, development, marketing, and return process. These eight areas are linked and should be managed

as one. (Lambert 1998 cited in Morana & Morana 2018, chapter: Introduction xxiii.)

Mentzer (2001) has proposed two perspectives to build and manage a supply chain. First, there is a need to define supply chain orientation because the supply chain must be dependable, responsible, share risk and rewards, committed, followed, and aligned with the company's strategy. Top managers must support the process to create a value-adding process. (Mentzer 2001 cited in Morana & Morana 2018, chapter: Introduction xxiii.)

The second step (Mentzer 2001) is to define tools for supply chain management. Supply chain departments must have common targets and visions that can be achieved with transparent processes and clear roles and responsibilities. Information sharing is crucial in supply chain management and must be supported by systems. Sharing the forecast demand is helping supply chain functionals to plan their actions and increase performance, although risk management is also needed. Collaborations and integrated processes are vital for the supply chain, which can be supported with long-term relationships and leadership. (Mentzer 2001 cited in Morana & Morana 2018, chapter: Introduction xxiii.)

Mentzer (2004) complemented the theory with a third perspective, performance. Supply chain processes must be developed using the following five principles: "availability, the offer of products and services, just-in-time delivery, profitability, and growth." (Mentzer 2001 cited in Morana & Morana 2018, chapter: Introduction xxiii.)

Chick (2014) concluded that the best-in-class supply chains had one or more of the following approaches included part of the supply chain:

- 1) Suppliers are an integrated part of the supply chain.
- 2) Customer value is created through the entire supply chain.
- 3) Supply chain uses supplier collaboration to improve the production processes.

- 4) Supply chain understands the customer needs and offers tailored products.

(Chick 2004 cited in Morana & Morana 2018, 89.)

2.1 Processes, information sharing & system functionality

Straka (2019) has concluded that the leading supply chain processes are “purchase – production – sales” or “supply – production – distribution.” All other supply chain departments support the main functions. (Straka 2019, 26.)

The supply chain should support the company’s business strategy and create value for the customer. The company should make three different level plans for the supply chain. The strategic level guide what needs to be done, the tactical level specifies how it happens, and the operational level how to implement the plan into practice. (Sadler 2007, Chapter 5.6; Hugos 2018, 181; Stanton 2020, 11–15; Blanchart 2021, 16; Robertson 2022, 42-47.) Supply chain management enables the information flow within the supply chain functions so that everyone knows what needs to be delivered, where, and when. Once information and material flows are created, the process must be managed and led. (Sadler 2007, Chapter 1.1.)

The S&OP process aims to offer an accurate forecast for demand. Forecasted demand combines the company’s plans and actions into one. It combines business strategy, marketing, sales, customers, development, sourcing, production, and distribution into a single instruction to follow, which all functions can lean on when planning their field. (Blanchard 2021, 52.)

Accurate forecasting offers a basis for success in the supply chain. However, 100-% correct forecasted demand is impossible to maintain in a constantly changing business environment, and deviations are expected. The more accurate the forecast is, the less exceptional handling is required from the supply chain. On the other hand, the more inaccurate forecast is, the more agile supply chain is needed. It is important to notice that exceptional handling is always causing extra costs. As mentioned above, it is commonly known how vital accurate forecasted demand is for the company, but it is challenging to es-

establish. However, it is like the best guess made by existing tools and information. The company needs to balance the entire process from supplier to customers and adapt the forecast if any changes appear in demand. (Stanton 2020, 11–15; Blanchard 2021, 47–49, 82.)

There are many reasons why providing an accurate forecast for the demand is challenging, and one of the reasons is the bullwhip effect. For example, bullwhip is caused if the customer has a spot-order and orders more than usual. If the company does not know its customer's order behavior, unexpected variations in the order booking might be considered a "new normal." Suppliers assume demand will increase eventually and adapt their demand to secure availability. This continues for other mills and suppliers. When customers return to the regular order level, others in the supply chain are still prepared for higher demand, which leads to increased stock levels and forces the company to decrease or cancel future orders and productions. To minimize the bullwhip effect, companies need to reduce the lead time as much as possible. Lead time is measured from order creation to customer delivery date. If the lead time is extended, customers are forced to place the orders in advance without knowing the actual need. Everyone is trying to secure their businesses, and if the lead time is extended, they need to avoid risks and book the orders in advance to ensure availability. Another method to decrease speculative demand is to request customers to place smaller orders more often instead of significant orders more seldom. (Andersson et al. 2021, 242–245.)

Speculative orders are also creating the bullwhip effect. If the customers cannot rely on the availability, they are forced to place the same order with several suppliers to secure their business which distorts suppliers' visibility for demand. The supply chain should aim for transparency and share information to avoid the bullwhip effect. Therefore, end customers' demands and orders in the pipeline must be visible to all partners in the supply chain. (Andersson et al. 2021, 246–247; Robertson 2022, 42–47.) The supply chain should be able to rely on decisions based on forecasted demand, and even if the demand could be better forecasted, it still needs to be shared with all supply chain de-

partments. If the demand changes, the forecast must adapt and update the information to guide the supply chain to plan activities and secure a high service level. (Hugos 2018, 190.)

Supply chain leaders need to ensure the service level with appropriate contracts and service level agreements. Therefore, leaders must negotiate long-term contracts with suppliers and subcontractors based on the forecasted demand and build visibility and tools to react to short-term changes. Companies must estimate distribution channels continuously and constantly search for alternative routes to secure order flow and cost-effectiveness. (Robertson 2022, 42–47.)

The supply chain usually includes many organizations spread all over the company, with multiple employees and departments participating in supply chain management and planning. To manage the process as one is essential to create and maintain valuable relationships between the different departments. To succeed, departments need to share information and knowledge and be willing to learn from each other. (Hugos 2018, 4–5, 224–227; Moon 2018, 1–13; Stanton 2020, 11–15; Robertson 2022, 3–5.)

Understanding what happens in various supply chain organizations helps operatives make better decisions by considering the results in the overall picture. Visibility and transparency are needed to reduce the variation in the supply chain. When the latest information is available, it is possible to make quicker decisions and take necessary actions to ensure a high customer service level in the “first time right” -method. However, to make this happen, all departments must be willing to share the information and know how to use it. ERP system should be planned to respond to the business needs because modern technologies enable moving information and data faster in the supply chain and offer more accurate information for all departments. Nowadays, agility is mandatory, and technology needs to support that. (Sadler 2007, Chapter 5.6; Hugos 2018, 84, 89–90; Khan & Yu 2019, 13–14; Stanton 2020, 11–15; Blanchard 2021, 82.)

ERP system provides transparency in information sharing within the supply chain and supports planning by providing needed data. ERP should combine information from different organizations and enable tracking of the orders from the beginning until customer delivery. Companies should invest in ERP systems and training to provide an overall view of the situation and needed data for decision-making for everyone. (Hugos. 2018, 122–125.; Morana & Morana 2018, 115–116; Blanchard 2021, 54.)

“First time right” should be the main rule on order management. The company should create a process to confirm most orders like the customer requested “first time right.” Or even better if customers could order directly via the system, for example, using EDI. Order handling should be as automated as much possible so that employees only need to re-plan and touch the orders separately in exceptional cases. (Hugos 2018, 90– 91; Khan & Yu 2019, 13–14 Stanton 2020, 11–15.)

One part of supply chain management is to recognize potential bottlenecks. (Blanchard 2021, 8.) ERP offers information but usually cannot analyze the data. However, analyzed data would help the supply chain to optimize the process and provide information for decision-making to support strategy. Information sharing is the first step to start supply chain integration. Once the needed information and knowledge of how to use it is available, it is easier to recognize improvement areas and implement solutions quicker. (Hugos 2018, 122–125; Blanchard 2021, 29.)

Supply chain management aims to create and maintain an agile, resilient, on-wards-looking process. Risk management enables continual strategy and profitability and secures the business from interruptions. Unexpected events happen occasionally, such as the vessel stuck to the Suez Canal or the consequences of Covid19. Supply chains need to learn from crises, adapt the process, and try to develop the strategy even more resilient. Potential risks should attempt to be identified and create plans to avoid harm if any risks happen. Threats can occur in any area of the supply chain and come from inside or outside the company. Identifying and analyzing the risks is the first object of risk management. Once the potential risks are recognized, a plan for lowering

or eliminating the risk to a tolerable level should be created. (Cagnin et al. 2015; Robertson 2022, Chapter Preface, 42–47.)

Researchers have indicated that the Lean philosophy is an excellent supply chain management tool because it helps improve the process and modify the structure to ensure effective operations (Fotiadis 2022, 35–36). The process is never complete because the environment changes all the time. Therefore, lean, and continuous improvement needs to be part of the daily tasks in the supply chain at each organizational level. Implementing lean helps break silos because, in lean organizations, the employees are trained to look at the overall processes and learn to understand how their actions affect others and why. Lean culture can only be implemented with knowledge of techniques and training to examine the overall process. (Anderson et al. 2021, 171; Blanchard 2021, 75.)

The performance of the process should be measured and followed. Carefully built measurements and KPIs work like a compass to identify potential challenges and problems. To do this, collaboration and transparency in the supply chain need to be prominent to achieve agile actions and create a better understanding of what needs to be measured while keeping customer focus in mind. (Hugos 2018, 168–169; Blanchard 2021, 31, 36.) Customers can be either internal or external, and supply chain employees need to listen to and understand the customer's needs to maintain high-quality service. Moreover, employees need to understand the customer's perspective to understand the customer. (Robertson 2022, 111–112.) Targets and follow-ups help employees focus on the correct issues and offer visibility if deviations happen, which decreases the reaction time for changes and potential problems (Hugo 2018, 185).

Measurement combined with benchmarking offers an excellent tool for understanding the strength and weaknesses in the process. The supply chain should be managed as a global end-to-end process because each process step influences other steps. If some areas are optimized without considering the effect, changes might create problems elsewhere. (Hugos 2018, 168–169; Straka 2019, 26; Blanchard 2021, 16, 82.)

Producing JIT (Just in Time) is one method to reduce stock levels, and the idea is to produce the goods as late as possible to minimize storage time but still early enough to deliver in time to the customer. Therefore, orders should be confirmed to the latest possible makings. Calculated throughput time estimates how long it will take to produce the order and get it ready for loading once the production has started. Throughput time should be realistic because buffers increase storage time for the goods, and JIT aims ideally near zero stock times. However, this leaves less time to react to unexpected problems, so the process needs to be in good condition, and employees need to know the process to share correct information in the supply chain. Due to less time to react, information needs to be available fast, at the right place and time, and for the right persons to support decision-making and risk management. (Hokkanen et al. 2011, 213–2014; Iloranta & Pajunen-Muhonen 2012, 340; Khan & Yu 2019, 13–14.)

JIT's purpose is to make actions that create value. The aim is constantly to search for the process's weaknesses and improve or eliminate them. The benefits of JIT are decreased waste on process and stocks and improved process, collaboration, service level, and people's motivation. (Fotiadis et al. 2022, 35; Robertson 2022, 42–47.) Make-to-order challenges the supply chain even more, and processes and contracts with carriers must be in decent shape to manage. (Andersson et al. 2021, 240–242.)

2.2 Targets, leadership & culture

Supply chain management aims for low expenses, fluent processes, and high-quality customer service while ensuring a good sales margin. The supply chain process should be managed as one end-to-end process to gain the best value out of it. In the past, the supply chain's only target was to work with the lowest possible price, but today, there are many other targets. The focus should be on doing actions the customers are willing to pay and finding the most effective method to deliver the goods for the customer as requested with the lowest possible costs to maximize the company's profit after the ex-

penses—supply chain management balance between operational costs, efficient processes, inventory, and high-quality customer service. (Hokkanen et al. 2011, 209–210; Hugos 2018, 7, 173–174; Moon 2018, 32; Straka 2019, 2–3; Stanton 2020, 7; Blanchart 2021, 5, 11, 82; Robertson 2022, 42–47.)

The supply chain should focus on decreasing the total costs. Expenses can be reduced in distinct functions in the supply chain, but only total costs matter in the end. Inventory will tie up working capital and increase variable costs, so the stocks should keep at a reasonable level. Stock expenses might be even 25 % of the total stock value. It is vital to control the stock level effectively. By doing this, the company decreases the storage costs, increases the cash flow, and allows savings in the supply chain process, which releases working capital for better use. Lower stock levels have a positive impact on the company's financial performance. (Khan & Yu 2019, 111–113; Robertson 2022, 42–47.)

Transparent processes and communication are vital in supply chain management because they enable collaboration between organizations. Cooperation and combined knowledge enable everyone to succeed in their role and supply chain to achieve high-level performance, clear roles, and responsibilities that commit people to their tasks. Effective communication is a skill that everyone needs to learn. Employees might come from diverse cultures and have a foreign native language, which challenges communication even more and increases the possibility of misunderstandings. To support communication, supply chain processes need to build a method where everyone knows the targets, who is responsible, and for what. Transparency enables open conversations and willingness to share information (Hugos 2018, 111–112; Andersson et al. 2021, 240; Robertson 2022, 53–55.)

“You are only as strong as your weakest link.” This is a common saying, and it is valid for the supply chain and the company's performance. (Andersson et al. 2021,237). Carvalho et al. (2016) have noticed that collaboration is nowadays mandatory in supply chain management. Collaboration is the key to success and creates an environment where best practices and knowledge are shared. This environment enables a company to find the best improvement ideas; the company should support this. However, more is needed. Implementing the

supply chain practices might be difficult without supporting working culture, links between the departments, and convergent supply chain organizations. (Sadler 2007, Chapter 1.1; Sarrico & Rosa 2015.)

Employees are a vital part of aiming for supply chain excellence. Employees are the key to higher performance levels. Supply chains need to use all employees' talent to get the best out of it. Employees must be able to do their duty and need the correct qualifications to succeed. Diversity offers a multitalented supply chain, although the quality of the relationships affects the working environment. (Blanchard 2021, 8, 16, 42–47, 82.)

Relationships, communication, and the culture within the supply chain need to be open-minded, fair, respectful, truthful, safe, and positive and create trust between one another. Trust creates a positive environment and encourages employees to work together. Attitudes affect the working culture. Therefore, employees need to respect, help, and listen to each other and be honest to let everyone feel valued because a positive and supportive working environment encourages everyone to do the job as well as possible. The safe ambiance offers a good workplace, motivating people and encouraging them to take personal responsibility. Positive culture also allows people to enjoy their work, grow professionally, and feel successful. When people think they are treated well, they are more productive and willing to put extra effort into work. Employees need to trust that everyone is trying to find a solution instead of blaming others if something goes wrong. Negative culture reduces supply chain performance, so leaders must focus on supporting a positive working culture. (Hugos 2018, 111–112; 121–122; Blanchard 2021, 82; Robertson 2022, 3–5, 41, 53–55.)

3 SUPPLY CHAIN INTEGRATION

SC integration aims to reduce costs and waste over the supply chain, which does not add value for the chain or the customer. Without integration, SC might move costs from one place to another instead of reducing the total costs. Customers appreciate effective supply chains due to excellent performance levels and low prices. Companies that have implemented integration

for the supply chain have a competitive advantage due to decreased lead times, operative costs, and inventory levels. Collaboration is needed to implement an integration because the processes are usually cross-functional. (Sadler 2007, Chapter 7.1; Hugos 2018, 223–223.)

According to Khanuja and Jain (2021), integration aims to manage internal and external processes to achieve adequate, cost-effective, agile, and quick order flow. The supply chain must share all the information and accurate data with all supply chain partners to reach the goal. The company's internal integration decreases the distance between different departments, offering more precise information for everyone reducing process waste, and creating value for the customer. A fair amount of research has proved that internal integration positively impacts supply chain performance, and several other benefits have been established.

External integration, which includes suppliers and customers, benefits are that it provides more information and different perspectives to identify and react to risks in advance. In addition, external integration offers more accurate demand and decreases the bullwhip effect. (Ngoc Hon & Ha 2021.) However, companies must still be willing to share information with the supply chain partners and improve the business relationship to achieve external integration (Khanuja & Jain 2021).

External integration can be supported with Integrated IT platforms between supplier and customer to offer more specific supply chain data, enable more accurate forecasting, and give the supplier an advantage. The benefits of the system integration are fast information sharing, decreased manual work and mistakes, and increased customer service and productivity. It also improves visibility to track and trace orders and billing. However, this is expensive and should be considered only for the supplier and customers where it is possible to achieve a clear advantage. (Sadler 2007, Chapter 7.6; Khanuja & Jain 2021).

3.1 Research of supply chain integration in different contexts and perspectives

Quang et al. (2015) have researched SC integration from a supply chain quality management point of view. A considerable amount of literature has been published on supply chain integration. A selected approach is from a theoretical perspective, using the best practices from previous research. It concluded how companies need to support a supply chain integration from the SCQM point of view and which areas affect the company's financial performance. Figure 1 presents their findings on the need for supply chain integration and targets of its positive impact.

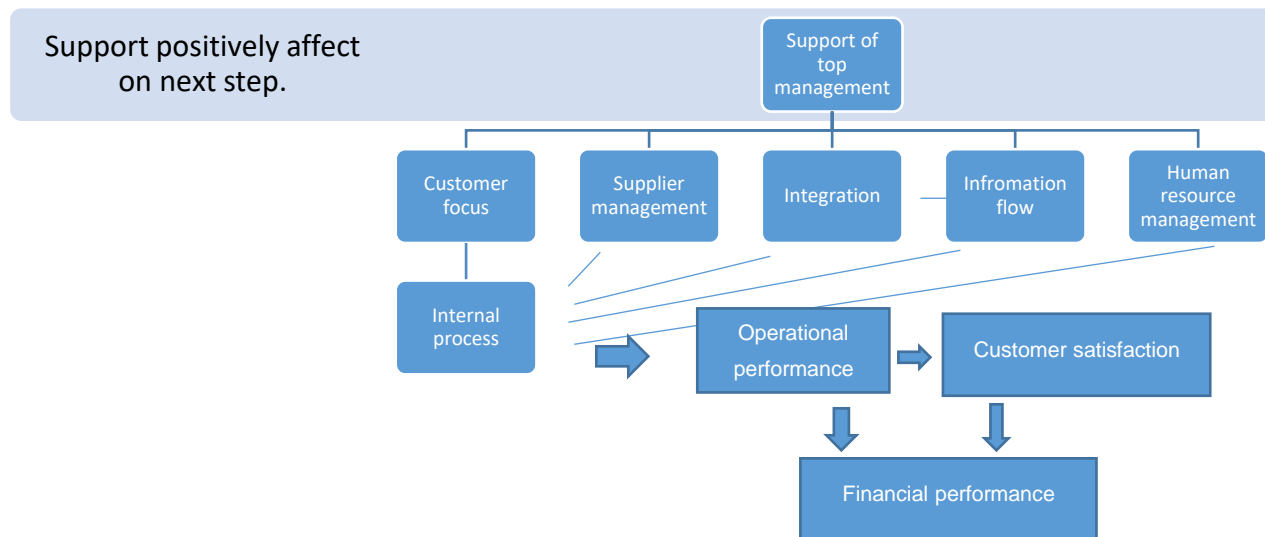


Figure 1. What is needed for supply chain integration and how it affects further. (Quang et al. 2015)

Hong and Ha (2021) researched if risk management positively impacts supply chain integration. The results were collected from 378 replies from Vietnamese companies. The results proved that risk management positively impacts supply chain integration. Further, supply chain internal integration has a positive impact on performance, and customer integration can be highly improved by internal integration.

Prajogo et al. (2016) have studied whether integration positively affects companies' operational performance. According to this study, integration indirectly

affects the company's operating performance. Results were gathered from 232 manufacturing companies in Australia. A study showed no direct solid link between integration and good operational performance. However, the study proved that integration positively impacts "inbound supply performance and lean production processes." It was also discovered that lean production positively impacts the incoming supply chain and operational performance.

Sundram et al. (2016) have researched the relationships between supply chain integration, practices, and performance. Study results were gathered from 156 electronics firms in Malaysia. The study confirmed that supply chain management practices offer better opportunities to achieve integrated supply chains and improve performance. The result shows that in this study, information quality, shared vision, target, and strategy are the most critical supply chain practices which positively affect integration. In this study, risk and reward sharing did not play a vital role in integration.

Yu et al. (2019) researched how environmental scanning impacts company performance, supply chain integration, and responsiveness. In this study, the data has been collected from 329 manufacturing companies in China. Environment scanning means finding information about what is happening outside the company, for example, on the market, and with competitors. With this method, the company can adapt the strategy to respond to changes and reduce uncertainty while planning it. From a strategic point of view, following the trends and signals is vital to lead the company in the correct direction. In theory, it has already been proven that integration positively impacts supply chain responsiveness. Integration decreases chain uncertainty and increases collaboration, enabling quick reactions to change. This study found evidence that environmental scanning positively supports integration and operational performance.

Khanuja and Jain (2021) researched how supply chain integration and flexibility affect performance in the global environment. The result is based on data from 187 Indian companies. This study's results indicate that external integration, logistics, and sourcing flexibility influence supply chain performance. Strong integration within the downstream partners enables them to adapt the

capacity to respond to uncertain demand. Shared information on the market situations allows external partners to react to changes in demand and offer the opportunity to respond to the company's varying needs.

Integration is a complex topic to research because integration forms from internal and external (supplier, customer) parts, and many variable issues influence integration. For this reason, the results are different in different contexts. (Yu et al., 2019.)

Integration has been studied by many researchers using different points of view and contexts. Several researchers have reported that supply chain integration positively impacts a company's performance, and this theory is commonly accepted. However, there has been little agreement on what supply chain integration affects, how, and why. Recent evidence suggests that integration needs coordination, cooperation, and collaboration to have one process to follow. Goals need to be clear to have a smooth and straightforward process. Commonly, the positive effects of the integration are lower costs, better customer service levels, and a positive impact on logistics activities and company performance. However, this requires deep collaboration within the supply chain partners to reduce barriers. (Kotzab et al. 2023.) Although extensive research has been conducted on supply chain integration, no single study exists that could prove how the most valuable integration level can be achieved, which would apply to each case and context.

3.2 Tools to implement supply chain integration

Moon (2019) reveals three base elements to implement SC integration: culture, process, and organizational structure. All three parts need to be considered to achieve a proper integration, but culture plays the most pivotal role. Unfortunately, this part is the most difficult one to change. (Moon 2018, 1–13, 26.) Moon (2018) has presented how the integration is possible to achieve by using supply chain management as a tool:

First comes the organizational structure. Matrix organization structure is the easiest method to support integration. The purpose is to create a horizontal

line between different organizations to lead them to work together, which supports integration. Organizational structure should be set in a method in which everyone knows who is responsible for what actions and to whom. However, more than that is needed to achieve proper integration. The company should have a standard process to follow on the workflow steps. (Moon 2018, 26–28.)

Working culture influences supply chain integration, the most. A common culture, which supports integration, facilitates the achievement of the implementations. Culture affects attitudes, communication, and the capability to adapt to changes. If the company has many diverse cultures, influencing the working culture is even more difficult. The company should create a culture where people are willing to cooperate and prioritize common goals, even if it means tasks “outside” their department’s area. (Moon 2018, 1–13.)

Goals should be set to support integration and guide the departments to achieve the best results from an entire company's point of view. Goals come from the business strategy, and all departments should consider those goals in every action. Even if the company has split the process step into different organizations, it cannot lead to silos. (Moon 2018, 1–13.) Goals should be measured, and the company needs to motivate employees to reach the targets, which must be rewarded. Common targets encourage people to cooperate with different organizations to complete the work. On top of this, education and training are needed. When people understand how their contribution is helping achieve the company's targets in the overall process, they are more motivated to help each other and collaborate. (Moon 2018, 13.)

Leaders have a vital role in creating culture, which has been proven in several studies and practices. Employees follow leaders' signs, and therefore, leaders can affect employees' attitudes and behavior. For that reason, leaders need to convince, by their words and especially with actions, of the importance of integration, but leaders cannot make the change by themselves. Everyone’s input is needed (Moon 2018, 1–13.)

The company should eradicate silo-thinking. "Us" should mean the whole company, not only one department. The most effective method to break silos

is a training session where employees from different departments simultaneously participate in the same class. This situation offers an excellent opportunity to gain experience beyond everyone's role and department. This is an effective method to learn more from other departments' work and better understand one's position. People naturally want to be good at their job and, therefore, will contribute to integration if they only understand the difference compared to nonintegrative behavior. To keep up this shared understanding and cooperation is vital to schedule regular meetings/activities to share information and knowledge. (Moon 2018, 14, 42, 61.)

Visibility is the base requirement for supply chain integration. The information must be available fast, in the right place and time for the correct persons. ICT platforms help with information sharing, but participants in integration still need to know why the extra effort is needed. It is essential to share the information to increase the understanding of how the employees can impact the process through their contributions and decisions. Clear roles and responsibilities support the collaboration and clarify whom to contact in each case. Performance indicators are an effective method to show and follow how actions and partnerships create value. (Robertson 2022, 52.)

It is possible to improve external integration by offering long-term contracts which enable shared goals and performance levels to be set. Companies should align the supply chain strategy with the most critical suppliers, service providers, and customers to increase their interest in investing in collaboration. Of course, collaboration is impossible without trust between the buyer and the selling company. (Sadler 2007, Chapter 1.5; Andersson et al. 2021, 248.)

External integration needs trust between the companies and the leaders, which helps to set common goals. If some parts of the supply chain have more power than others, some partners might take advantage of the situation and prevent integration. (Sadler 2007, Chapter 1.1.)

However, external information sharing should be considered closely. Before sharing information and knowledge, there must be trust between the companies. Companies must have a common sense of how the information is used and shared for cooperation with external partners. It is necessary to consider what information needs to be communicated to achieve the collaboration benefits and, on the other hand, consider closely what harm it might bring. When it has been decided what is necessary to share, it needs to be chosen how the information can be shared safely because data cannot end up in competitors' hands. (Hugos 2018, 111–112.)

4 RESEARCH METHODS AND PROGRESSION OF EMPIRICAL RESEARCH

The commissioner company is an international manufacturing company that delivers goods worldwide. This study researched the company's order flow process. The process is quite different for each market. However, the company has struggled the most in the container business order flow. The volumes for these markets are high, so it was reasonable that this study concentrated only on that specific area. The goal was to produce a more detailed description of this order flow process and recognize improvement areas. To better understand this process, it needed to be analyzed from each participant's organizational point of view because each department, sales, production, and vessel planning have its role and perspective in the process. This study analyzes the order flow process from customer requests to confirm the orders with the correct dates into the system and produce the order just in time to catch the planned vessel. The company's external partner, port, has its role in this order flow process and was thus included in this study.

This study aimed to discover development areas for improving the company's order flow process for selected markets. Results indicate the actions that need improvement to achieve an effective and agile supply chain. The study was conducted as a case study to understand the current situation and to provide an action plan that fits the current situation and supports the company's targets. This chapter describes the procedure and methods used in this investigation.

4.1 Research methods

The intrinsic case study focuses deeper on a unique topic or process, offering a more detailed approach if the researcher wants to understand some specific processes on a detailed level and from different perspectives. This approach aims to understand how operators experience the process. The researcher is in an active role and creates a description of one possible "truth" of the case, which is justified. (Eriksson 2014, 15–18.)

The case study answers may indicate different topics than the researcher initially thought. Respondents may consider the questions from their perspective and raise issues that are essential to them. A conflict between the queries and the respondent may lead to a situation where all data is dismissed because it needs to be more fitting to preconceptions of the study. (Eriksson 2014, 29.) Therefore, an interview is an excellent tool for collecting data when the respondent is seen as an active participant, and the case is wanted to understand through the experiences in different departments. The interview gives more space for answers, and asking for more information or arguments is possible. (Hirsjärvi & Hurme 2022, chapter 3.1.)

Moreover, semi-structured interviews offer an approach to going deeper within selected themes. The benefit of this approach is that the researcher can guide the conversation based on the answers in the correct direction while keeping the discussion on the given themes. It is a valuable tool for understanding how the topics are experienced because something vital to someone is irrelevant to another. This approach offers respondents the possibility to define the value of different topics. There has been discussion if the same questions need to be asked of everyone in the same order, but it is not mandatory and depends on the results' purpose. However, the target is to achieve meaningful answers to the research question while not creating any limitations for solutions that might affect results based on prejudice, which is why theory should provide a basis for selected themes. Semi-structured interviews require that the interviewee understands the themes the same way as researchers because results are difficult to interpret otherwise. (Tuomi & Sarajärvi 2018, chapter 3.1.1.)

First, the researcher investigated the theoretical framework and identified topics influenced by supply chain integration. It was revealed that there are several topics, and going through them separately in interviews would have been too time-consuming. Therefore, the researcher decided to select three headline themes which were selected to guide the conversation. These themes were selected because the researcher considered that these topics enabled most to bring additional topics (Table 2) to the conversation. Headline themes are introduced in Table 1, and the sources are listed to justify the topics.

Table 1. Headline themes for semi-structured interviews

| | |
|---|---|
| Theme 1. Processes & Targets | Sadler 2007; Hokkanen et al. 2011; Moon 2018; Hugos 2018; Morana & Morana 2018; Khan & Yu 2019; Straka 2019; Stanton 2020; Andersson et al. 2021; Blanchett 2021; Ngoc et al. 2021; Robertson 2021. |
| Theme 2. Information sharing & system functionality | Sadler 2007; Hokkanen et al. 2011; Iloranta & Muhonen 2012; Moon 2018; Hugos 2018; Morana & Morana 2018. Straka 2019; Stanton 2020; Ngoc et al. 2021; Khanuha et al. 2021; Robertson 2022. |
| Theme 3. Culture and leadership | Sadler 2007; Sarrivo et al. 2015; Hugos 2018; Moon 2018; Morana & Morana 2018; Blanchart 2021; Robertson 2022. |

Because the researcher wanted to ensure that all topics which influence supply chain integration based on the theory were possible to estimate by respondents, it was decided to present all other topics above the headline themes because it was still being determined how familiar theoretical frameworks were to respondents. Therefore, the following topics were added under headline themes as an additional topic, presented in Table 2.

Table 2. Additional topics for semi-structured interviews

| | |
|---|--|
| Forecasted demand | Hugos 2018; Morana & Morana 2018; Stanton 2020; Andersson et al. 2021; Blanchart 2021; Khanuha et al. 2021; Robertson 2022 |
| Organization structure | Moon 2018; Morana & Morana. 2018. |
| Customer focus | Sadler 2007; Inkiläinen 2009; Quan et al. 2015; Hugos 2018; Stanton 2020; Blanchart 2021; Robertson 2022. |
| Exceptional handling | Sadler 2007; Hugos 2018; Khan & Yu 2019; Stanton 2020; Blanchart 2021; Hong & Ha 2021. |
| Transparency & visibility | Sadler 2007; Iloranta & Pajunen-Muhonen 2012; Hugos 2018; Moon 2018; Morana & Morana 2018; Khan & Yu 2020; Andersson et al. 2021; Blanchart 2021; Robertson 2022 |
| Roles & responsibility | Hugos 2018; Moon 2018; Morana & Morana 2018; Andersson et al. 2021; Robertson 2022. |
| Goals | Iloranta et al.. 2012; Hugos 2018; Moon 2018; Morana & Morana 2018. |
| Risk management | Cagnin et al.. 2015; Hugos, 2018; Morana & Morana, 2018; Blanchart, 2021; Hong & Ha, 2021; Robertson, 2022. |
| Decision making | Iloranta & Pajunen-Muhonen 2012; Hugos 2018; Moon 2018; Blanchart 2021; Ngoc et al. 2021. |
| Communication, knowledge, best practices & Silos/barriers | Sadler 2007; Kalini et al. 2016; Hugos 2018; Moon 2018; Andersson et al. 2021; Robertson 2022. |
| Training & coaching | Moon 2018. |
| Lean thinking | Prajogo et al. 2016; Hugos 2018; Andersson et al. 2021. ; Blanchard 2021; Fodiatis et al. 2022. |
| Collaboration | Sadler 2007; Hugos 2018; Moon 2018; Morana & Morana 2018; Yu et al. 2019; Andersson et al. 2021; Blanchard 2021; Robertson 2022. |

4.2 Progression

The present state and improvement areas of the process have been examined by interviewing the organizations participating in the selected process: sales department, vessel planning, production planning, and port. To gain more reliable results and secure anonymity for respondents, it was decided to interview two to five persons from each internal organization.

The researcher sent an introduction to this study by e-mail to internal departments' team leaders, explained the purpose of this study, and requested that managers discuss this with their team and decide who would participate. Departments had the best knowledge of the most suitable individuals to represent their area, so teams decided by themselves who participated in this study. The only limitation was that the person should be aware of how the orders live in the system from their own organization's point of view.

An interview is a communication between the researcher and interviewee based on the language. Interaction is formed from words and how those are understood and interpreted. (Hirsjärvi & Hurme 2022, chapter 4.3.) The researcher needs to be able to create a confidential environment for the interview. Otherwise, there is a risk that the respondents will not dare to tell their opinions truthfully. (Puusa et al. 2020, chapter 6.) Therefore, it was communicated that interviews would be done via teams and recorded, but only for the researcher's use. It was promised that the researcher would not identify individuals in the report so that results would be expressed at organizational levels. This way, the researcher offered a confidential environment for the discussion and aimed to ensure honest replies.

Once the selection of all participants from internal organizations was decided, to make each interviewee feel as comfortable as possible, the interviewer sent the study introduction and the presentation in advance to offer them time to prepare and check with colleagues if they would like to add something.

The presentation first described what this study was about, the research question, which departments were participating, how the data was collected, and the purpose of this study. It was advised that all interviews are recorded but not shared with anyone, and the report will be written in a method where it is impossible to identify anyone. Also, the results will be shared with all participants afterward. Then the main themes were introduced (Table 1, p 28) and requested to analyze the current order flow process through the given themes from customer requests to get the orders JIT produced to catch planned vessel. The researcher requested that the respondents consider how these

themes support the current process and what parts need to be improved to achieve a more effective order flow process. In addition, it was mentioned that there are gathered topics (Table 2, p 29) under the headline themes which might influence the main themes, but there is no need to use them if those are not considered relevant. Also, it was guided that respondents can, and it is preferable to raise any additional topics important to the interviewee's department regarding this process.

In total, ten internal interviews were completed for this study, and the duration of the interviews was approximately 1 to 2,5 hours each. The same presentation was used for each interview, but each conversation was different because respondents raised different topics. However, each interview followed the same framework and went through the headline themes one at a time. The interview proceeded with these three main themes, but the interviewees chose the critical areas to discuss and used additional given topics if they wanted.

Once all internal interviews were concluded researcher traveled to the port to interview them. The interview was more like an open conversation where they introduced their systems and work. During the conversation, they told what improvement areas they recognized and what worked well. They also arranged an introduction visit to the terminal and port area. The duration of this visit was approximately four hours. This visit was not recorded, but the researcher made notes of all relevant information.

After the interview, the data was transcribed into text to facilitate the analysis. The transcript needs to reflect what has been said fully. Otherwise, it might change the meaning of the sentence. The more accurate the transcript, the more dependable the results are. (Puusa et al. 2020, chapter 5.) All internal interviews were recorded and transcribed word by word except the interview with the external partner, port. On that appointment, the researcher wrote down only the main topics.

The results of this study were analyzed by identifying themes. According to Puusa et al. (2020, Chapter 9), themes consist of topics that more than one

person has recognized. Therefore, the data of this study were normalized using themes that more than one participant had identified. Based on the identified topics, themes representing the interview results were created. Results are introduced on a standard level to secure anonymity; therefore, the exact number of replies to each question is not revealed. It would not have been possible to provide anonymous answers if the result were reported in more detail.

The qualitative study should be implemented to question the current process and find the best solution (Vilkka 2021, Chapter 7). Improvement proposals were created for the themes that participants identified, and improvement ideas partly question the current process.

5 CURRENT PROCESS

In this chapter, the current process steps are presented in detail. Each department described its process steps in the interviews, and this chapter's descriptions are collected from those answers. The purpose is to create an overall picture of the process to provide a better understanding of results and improvement areas in the coming chapters. Below, Figure 2 presents the current process briefly.

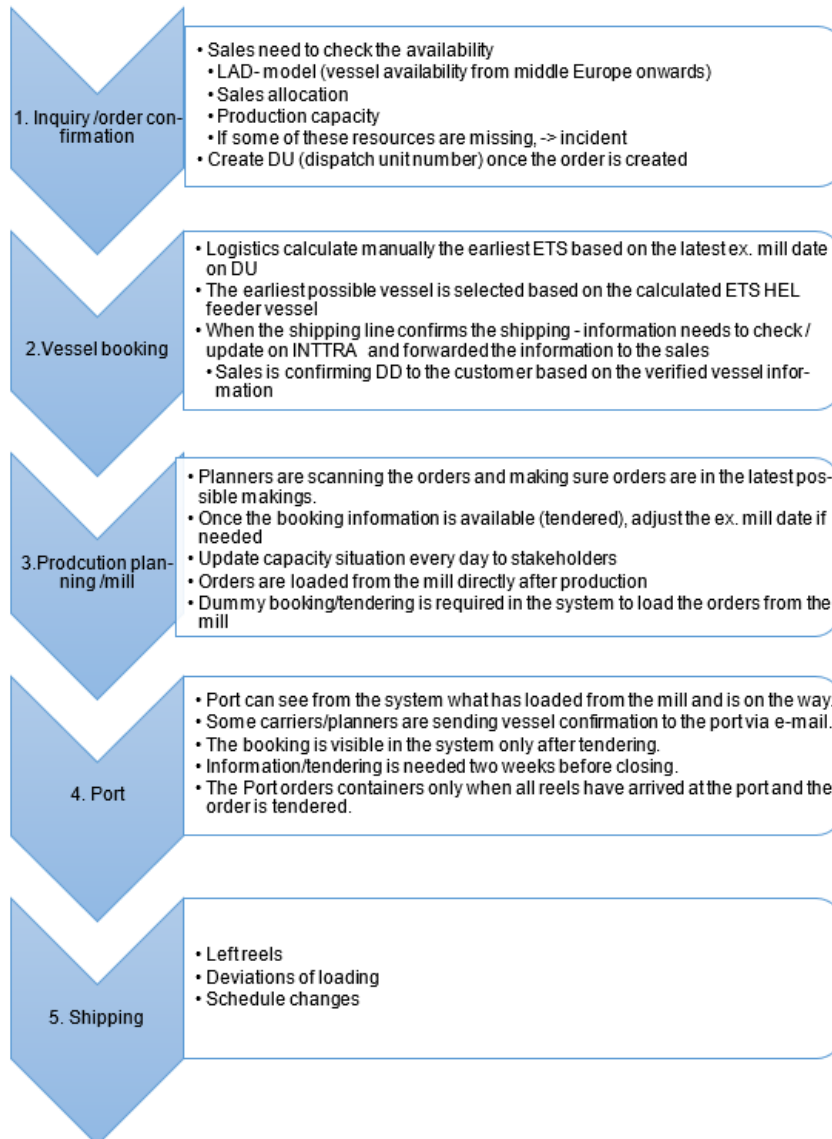


Figure 2. Current order flow process steps

5.1 Process step 1: inquiry/ order confirmation

When the sales department receives an order, first, they need to check how the ordered quantity fits containers, then choose a container size that gives a shipment a better payload and adapts the order quantity to respond to full containers. The Company has two diverse orders in the container business for OVS markets. In the first order type, the requested DD, delivery date, is the ETS, estimated sailing time from Helsinki port. In the second order type, the DD is the ETA, estimated arrival time, and date at the destination port. The invoice occurs on a given DD, and in which part of the process it depends on the order type.

For both order types, the sales department needs to check the vessel capacity on the LAD model before booking an order. From the LAD model, sales can see how many containers are planned for a specific week from Central European ports onwards per market. For each market, there is estimated availability for weekly container amounts that the sales team should follow and adjust order booking accordingly. Therefore, the estimated logistics capacity guides and defines where to schedule the orders. Last-minute orders and additional quantities need to be checked independently by the logistics department. When the logistics availability is known, sales need to calculate the needed ETS HEL and ex. mill date manually. Ex. mill date is when the goods need to be ready for loading from the mill to catch the selected vessel. Based on the ex. mill date, sales can check which week the order should be produced and if production capacity and sales allocation are available. Some sales employees check the availability directly from the system on the logistics dashboard, a tool to check production capacity and sales allocation, and others send an e-mail to the sales allocation team or production planning when it is possible to produce the orders.

The sales department forecasts how much they invoice each month, and the forecasted quantities per market area are transferred into the estimated production weeks, which forms sales allocation. Product group management (PGM) can manage sales allocation weekly, bi-weekly, or monthly. PGM informs the sales department weekly of the current capacity situation and planned stops. The ERP system automatically checks sales allocation and production capacity during the order entry. If those resources are unavailable in the same period, it is impossible to confirm the order. The sales department needs to investigate which resource is a bottleneck and request more production capacity/sales allocation. Once all resources are available, sales can confirm the order with the correct dates. The order booking process steps are shown in Figure 3.

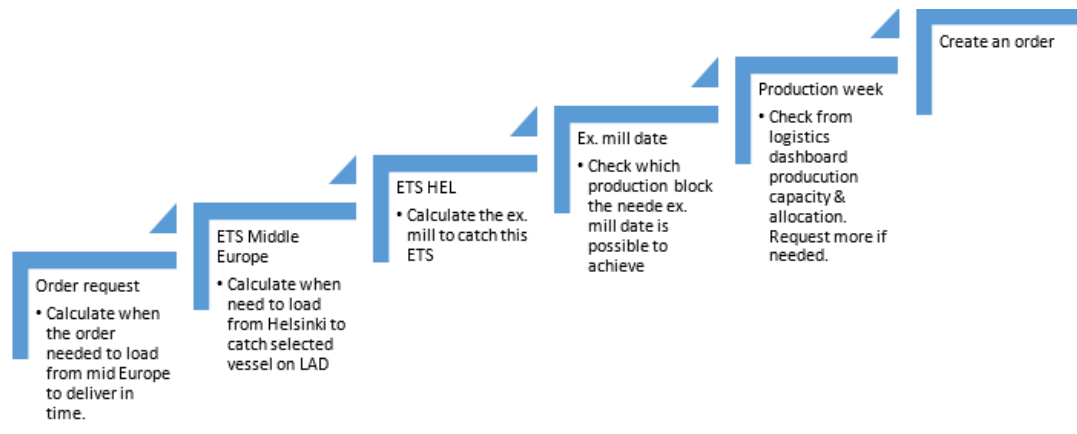


Figure 3. Order confirmation process steps

5.2 Process step 2: vessel booking.

The vessel booking process for the case mill is quite different than in other mills. However, the process starts when logistics get the DU number from sales. Dispatch unit, DU number, might include several order numbers, or sales may split significant customer orders to several DUs to allow logistics to check availability for smaller batches from different carriers. The logistics dept. plans vessel bookings 3 to 4 weeks before the requested ETS, so the sales department needs to create the DUs asap after order entry. Before requesting the booking, logistics calculates how many containers are required and the earliest ETS date, which is possible to catch based on the latest confirmed ex. mill date on DU and selects a carrier in INNTRA. INNTRA is an external platform to plan, book, and track shipments for ocean carriers integrated into the company's ERP, SAP. Each market has nominated carriers that are used within the agreed allocations. The system in INNTRA searches for the best schedule from the HEL port to the destination port as one journey with the selected carrier, and then logistics select the vessel with the most suitable dates for the DU. Carriers send booking confirmations back to SAP, which transfers the data automatically to TPVS, a vessel fine-planning tool. However, some carriers send the booking confirmation to INNTRA with data ETS from Central Europe, not Helsinki. The logistics need to check the booking confirmation e-mail's correct date and update the dates to INNTRA before sending confirmation to sales.

After all, this is done, logistics need to fill an Excel file and upload it to the system. The upload is creating a resource for sailing in TPVS. Otherwise, it is not

possible to tender, fine planning the order. Before uploading the file, it needs to be changed to the correct format, and the carrier number, DU-number, booking confirmation number, port of load, vessel name, port of dispatch ETS, ETA, CD, and weight must be manually filled. When all the data is filled correctly, it is possible to upload to MES vogue-transaction. Even if booking details are already visible in TPVS, this file is needed because otherwise, all the needed data is not appropriately transferred to the port and mill system. The system only sends direct messages from TPVS of billing of loading, and logistics remarks. All other information comes from the uploaded Excel file.

The logistics team follows via Excel file, which DU's needs to tender next. They have gathered all the DU's on the Excel file and tender orders in the sequence according to the closest sailing dates. They need this Excel file to keep the order status on track. If the orders have any blocks in the system, the order is not possible to tender even if the order already has a booking confirmation in INTTRA.

For the case mill, the whole DU is planned as one. For example, one hundred tons of DU is scheduled as one go, and the needed container amount is written down in logistics remarks. In other mills, it is more like fine planning; splitting the quantities for several containers is possible. Also, shipments are planned for status E for other mills, like the company plans their direct truck deliveries. The shipments for the case mill's OVS orders are planned only for status C. The reason for this difference is not known, and it is making order changes more difficult.

In fine planning, logistics need to delete the dummy booking first before they can arrange the actual booking. A dummy booking is formed for orders automatically if an order is planned for production to ensure the mill can load the goods, which is impossible without a booking. Order is possible to tender after the shipment is planned for status C, and only after tendering can logistics send the confirmation message back to the carrier via INTTRA. Tendering sends the booking confirmation to the port and vessel information to the mill system. The vessel booking process steps are presented in Figure 4.

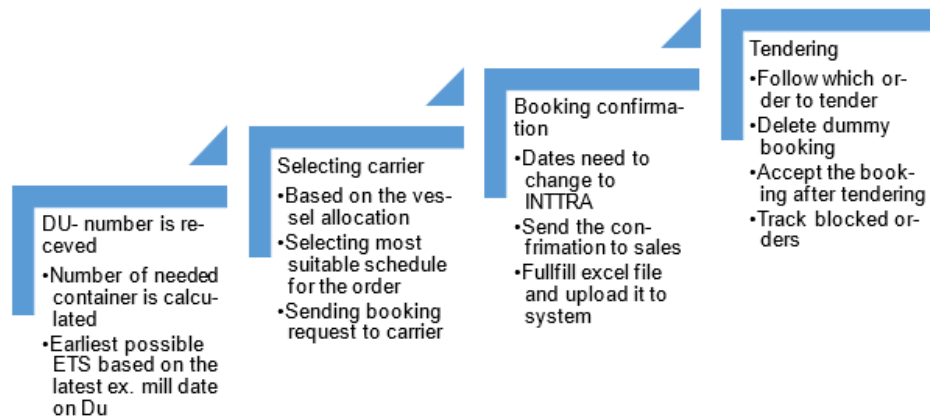


Figure 4. Vessel booking process steps.

5.3 Process step 3: production planning/mill

Production planners aim to maintain production capability so that orders are easy to book. Each morning the planner checks if a new order is tendered for OVS markets and ensures that ex. mill date and closing date match according to set rules. If the lead time does not match the confirmed ETS, planners adjust the ex. mill and production dates. The production planner scans the order book daily and reschedules orders to the latest possible blocks to avoid early production and updates the PM order booking situation daily, visible to several companies' internal stakeholders.

Production runs are usually fine planned only 2 to 4 days in advance because planners would like to keep the production runs open as long as possible to offer sales and customers the possibility of making order changes if needed. When the order is planned for production, changes are not possible anymore via SAP because orders get a fixed status and receive a dummy booking automatically. Manually made changes are causing extra work for everyone, so it is preferred to plan orders for production closer to the actual production date to avoid manual changes. If changes for fixed orders are necessary, vessel booking needs to be deleted first and then unplanned in production. Mill planners have instructions for deleting the dummy booking, which usually works. Sometimes, the cancellation message is not coming to the MES system and help from the logistics team is needed.

The mill has a small warehouse with no room to store anything, so all produced goods must be transported asap to the next warehouse or port in the logistics chain. Loading the goods from the warehouse without a booking is impossible, which is why the dummy booking process has been created. After an order is produced, the warehouse loads the goods into the wagons. Transit time from the mill to the port usually takes 1 to 2 days, but it is essential to notice that the port is not unloading wagons on weekends.

5.4 Process step 4: port

The company uses a third party to lead the terminal activities, which include everything after goods arrive at the port and leave from the harbor. Port sees in the system what was loaded and is on the way from the mill but requires a tender message to see when the goods will be shipped. A tendering message usually comes relatively late, and therefore the port would need booking confirmation in advance as soon as possible. Some carriers/vessel planners forward the data via e-mail, but not all. Usually, it is missing in shipments delivered by Hapag Lloyd and Maersk.

The port creates instructions for container loading after the tender message has arrived in the system. The terminal can plan its workload only after instructions are received, and orders containers when all information is available, and all goods have arrived at the port.

The Port is shipping the DUs according to the booking confirmation and making a VMG announcement for the company via INTRRA. If there are leftovers, the port informs the company's logistics department. If all is loaded as planned, they send the information of successful shipment to the Cracow logistics team, which manages invoices and reporting.

5.5 Process step 5: shipping

Shipping is not a separate process step if everything goes as planned. Exception handling is described in chapter 7.1.5.

6 EMPIRICAL RESEARCH FINDINGS

This chapter presents a summary of the main findings, and in chapter 7, the results are described in more detail to prove how these challenges are visible in practice. Themes were presented differently in this results chapter than in the interviews to link the results better between each other. The themes process, transparency, and system functionality recurred throughout the database, so these themes are merged in the chapters below. Communication, roles, and responsibilities were linked during the conversation, creating theme two. Targets, training, and culture emerged in many interviews, and the results showed they influence one another, which is why theme number three is formed of them.

6.1 Theme 1: process, system functionality & transparency

The current study found that the company has placed process steps to follow. However, the results indicated that the process steps could be more straightforward, and the company needs to improve transparency through systems support. The challenges exist in the “normal” process but are even more evident in exceptional handling cases. Also, it was recognized that the system does not support the “first time right” -order handling process and order changes.

Another important finding was that the current system could not provide the required visibility and support for the process at an appropriate level. The needed information is challenging to find, needs to be combined from various places, and is only sometimes available or dependable. Even if the information is available, employees must know how to use it.

6.2 Theme 2: communication, roles & responsibilities

Regarding communication, roles, and responsibilities, this study found that the coronavirus pandemic has significantly improved the department’s collaboration because the chaos forced departments to close collaboration. PGM placed weekly cross-functional calls, which improved communication and col-

laboration. However, in daily communication, there is still room for some improvements. Some respondents think they need quicker replies, while others think the request was sent with incomplete information. Part of the reason is that the system does not support transparency and causes a considerable number of e-mails and incidents, which is overloading, especially the logistics department.

Based on the answers, roles, and responsibilities could be more straightforward to support the process. One challenge is that it is not always clear who is responsible for what because how the tasks are shared among the departments within employees is not always known. Another challenge was that it is not always known whose responsibility it is to react, pass on the message, and to whom if there are any deviations in the process.

6.3 Theme 3: targets, training & culture

Most of those who responded to this item felt that the targets are set to support the end-to-end process. However, based on the individual answers, there are conflicts between targets now and then. The main reason for conflicts is that what has been agreed upon or promised to the customer is sometimes unknown. Lack of knowledge makes departments optimize their targets because they do not know that harms the overall process. However, they would decide to contribute to the end-to-end process if they had all the needed information.

Results showed that employees should be trained better, especially new employees. Based on the replies, getting to know other departments' tasks and colleagues is considered valuable. Process and system functionalities must be clarified because too little training is causing difficulties throughout the supply chain.

Most respondents think the atmosphere is helpful and creates trust because more close collaboration has broken the silos. Managers are also encouraging collaboration. Nevertheless, unclear cases hurt working culture, and it is challenging to solve the cases because some consider the investigating process

as individual blame instead of solving the problem. This behavior indicates that the lean philosophy is not yet implemented in daily tasks.

Overall, these results indicate that the challenges in theme one negatively affects themes two and three, which is why the most urgent theme to improve is theme one: process, transparency, and system functionality.

7 EMPIRICAL RESEARCH FINDINGS IN DETAIL

Suppose the company would like to have a more detailed description of the challenges and understand the background better: this chapter describes the results in more detail. Also, this chapter can be used to share information and increase knowledge of how others experience the process, what challenges they are facing, and why.

7.1 Theme 1: process, system functionality & transparency

Each department has identified daily challenges in the process, system functionality, and transparency, and a common view amongst interviews was that improvements are needed in this theme. This chapter identified and introduced several issues, one process step at a time.

7.1.1 Process step 1: inquiry /order confirmation

There are several steps (Figure 3, p 35) that sales need to check before they can place an order, and the information needs to be searched from various sources. Above that, part of the lead times must be calculated outside the system before booking an order. However, some interviewees think the process steps and system are clear enough to follow. This can be seen in interview Extracts 1 and 2.

Extract 1 *"System functionality is not hard for us. We have booked so many orders before. We know which department to chat with and what we need if we cannot book the ex. mill data we need, we know the reason".*

Extract 2

"We need to know how to use this kind of environment information and hardware to use it."

Nevertheless, some interviewees considered system functionality problematic because they felt it was difficult to know why the orders were not confirmed as requested. All resources need to get available in the correct period to confirm the order. Therefore, problem-solving requires many e-mails between different colleagues and organizations, which is very time-consuming. This is seen in interview extracts 3 and 4.

Extract 3

" We get the error messages like APO confirmations. So even if we have loaded the allocation, even if we can see capacity on the block orders, it is not confirmed. Why is it not confirmed? "

Extract 4

"We cannot control the system... The only thing we can control is human work. "

Usually, the orders do not get a confirmation line because the production capacity and allocation are on a different week. Reasons might be that the order is rescheduled in the system, and allocation has not been followed, or only part of the DCP allocation has been uploaded. Most respondents estimated that a considerable number of incidents are created because the allocation and production capacity is on different weeks in the system, making order booking and order changes more difficult. This can be seen in the following extract 5-8.

Extract 5

"What we also find is, for example, we might have DCP, but then it is not necessarily loaded on the system. Then we have to obviously approach allocation team."

Extract 6

"It's like playing the game."

Extract 7

"Anything that can improve in a system can make everybody's life easier."

Extract 8

"It would be nice to avoid rework and have everything in place correctly in the first place."

The sales department also brings up a challenge: orders regularly delay two to four weeks from the requested DD for ETA markets because, most of the time, system-calculated lead times are shorter than reality. For that reason, the sales team calculates more lead time outside the system to minimize order delays. Lead time is not dependable; therefore, sales only confirm the "estimated" arrival date when the vessel booking confirmation is available.

LAD-model tool divides opinions. Some employees think the LAD model is beneficial, while others think it is complicated. Challenges come if overbooked weeks exist because sales must reschedule the orders, creating extra work. Also, vessel delays distort the report because orders are rolling from the previous weeks, and then weeks are overbooked even though sales have placed the orders correctly. Sales would like better visibility on booking orders "first time right" to avoid rescheduling. It is challenging to serve the mill, book according to logistics availability, minimize the stock times, and provide high-quality customer service.

Another topic on the LAD model was that sales departments consider it as forecasted demand and are not allowed to book anything additional. The sales department believes that only as exceptionally is it acceptable to require more logistics capacity. However, additional volumes might be possible to book, but those have to be checked separately with logistics.

Exceptional handling/ the case mill-related topics.

Part of the respondent considers opening an account, managing the credit limits, and sales allocation for smaller new customers as time-consuming. Above that, they felt that serving small and significant customers on the same high

customer service level is challenging even though the smaller customer is vital to the Company's order booking. Challenge is that merchants can offer more flexible service for smaller customers than the Company. Part of the respondents considers that e-commerce would make ordering easier for customers.

Sales departments consider working with the case mill easier because the requests are always understood and reacted to quickly. Case mill production planners are authorized to change the sales allocations in the system to correspond to the production capacity; therefore, an order confirmation is coordinated quicker. With other mills, requests are declined more often, and the sales department gets the impression that they do not always understand that the requests are coming from the customer. Even if it is causing the company's supply chain extra work, it needs to react to guarantee high-quality customer service. Additionally, the sales teams are like a filter between customers and the supply chain and decline the impossible request and forward only essential modifications to the mills or logistics departments. Behind each request is the customer who must be served if the request is reasonable. Also, the sales department considers that there are more order delays from other mills, especially from Italian mills, than case mill. Above that, other mills are fixing production runs much earlier, which creates more challenges for order booking and modifications. Because of the above reasons, the sales department is confident it is easier to work with a case mill. This is seen in interview extracts 9 and 10.

Extract 9

"For us booking from other mills, there are more problems for us, I think."

Extract 10

"I think case mill is easier."

7.1.2 Process step 2: vessel booking

The logistics department considers that the ocean vessel booking process has changed dramatically recently because the Company usually had weekly service from carriers. Still, at least partly, it is gone now. Also, an order booking

situation is changed because volumes are not spread evenly. However, the situation is better for the case mill than other mills.

The logistics team considers it challenging to coordinate the order booking because there are differences in how carriers provide the allocations. Some carriers are engaged to an agreed allocation per year, and others manage the allocation in a shortened period. Therefore, booking enormous quantities at once is fine for some carriers, while others prefer an exact amount weekly. Additionally, some carriers do not offer guaranteed regular service at all. They sell the capacity in sequence when the order arrives, which might cause the order to get a vessel 1-2 weeks later than the sales team has requested. For some carriers, the Company can book more than agreed, and they only notice if the Company uses less than agreed. At the same time, some carriers are not accepting any additional tons. Also, logistics must use "spot" markets cheaper than "tendered" vessels.

However, the procedure is that sales must book according to the agreed rules and check with logistics separately before booking additional tons. If they do not, they might get a much later vessel than requested. Orders with a DU number are visible in LAD and offer the logistics team visibility to identify a potential bottleneck and time to react and check the availability from the spot market. Spot market prices follow the market situation. Still, changes after confirmation are more expensive; therefore, any changes must be avoided if decided to use the spot market's vessel capacity.

Another challenge is that Maersk, Seeland, and a few more carriers constantly update INTTRA the ETS from the main port, Central Europe, and then logistics must manually change the information in INTTRA before forwarding vessel details to sales. If the carrier sends an update, it overwrites the corrected information, and the "wrong" information becomes available in the system, confusing other departments. Therefore, the mill and sales department need to double-check if the information in INTTRA is correct. This is causing several e-mails to the logistics team from each organization, and this double-checking creates much non-value additional work for all departments.

The logistics team also considered that one challenge is that carriers seldom inform of the delays, so logistics are not getting the delay information in each case. Sometimes, the carriers postpone the booking after confirmation without notification. However, part of the logistics team considers that keeping the orders in stock for another week is okay for other mills. The case mill is the only one where production planners adjust the dates and production according to the vessel booking to minimize the stock time. This is because there is no close connection with other mills and logistics; therefore, logistics informs sales of the delays, and they will postpone the orders if needed.

Blocked orders are also challenging the vessel booking process. For blocked orders, it is possible to request vessel booking via INTTRA, but fine planning is possible only after the order is released. That is why logistics need to keep a list of the orders to track their status, and if the block is not released on time, orders must be postponed. This means vessel allocation is lost, and the extra cost is accrued for last-minute changes. The logistics team would like to have blocked orders released earlier to avoid additional costs and difficulties in the vessel booking process.

Exceptional handling

The vessel booking process for the case mill is different than for other mills, and the process includes many steps (Figure 4, p 37), and it is time-consuming. Logistics hopes that part of the manually made steps in the system could be automated in the future because, for the case mill, there are even more steps to take than for other mills.

For example, in this case, mill logistics must fill the vessel details into an Excel file and upload it to the system. This upload creates a resource for TPVS, enabling it to plan the order. The logistics team does not know all the details of why this additional step is needed; therefore, it is considered frustrating. Also, the case mill OVS shipments are planned only for status C while all other shipments are planned for status E. The difference is that status C must tender separately to send the information to other systems, MES, and port. Another difference is that shipment modification is not possible, and if changes need to

make, the whole booking need to cancel, and vessel allocation might be lost. Therefore, logistics guide sales not to change the orders after it is linked to DU.

Because vessel details are visible in MES only after tendering, the case mill requests tendered bookings a lot in advance. Usually, logistics plans according to the ex. mill dates, and the mill is requesting to plan according to production dates, which are much earlier. Some respondents from logistics consider it weird, and all agreed it creates extra work for logistics. The company's external partner, the port, needs vessel information as soon as possible to ensure that orders are shipped as booked. Because the company's system sends the information to the port only after tendering, planners need to forward the booking confirmation to the port separately by e-mail.

Also, the case mill's dummy booking process creates additional work for several process steps. The purpose of dummy booking is to ensure that the mill can load the produced goods from the mill if the order is still waiting for the actual booking. Sometimes the messages for the dummies or actual bookings do not come through the MES system and port, and that is why logistics need to unplan an order and do it again, which causes extra work for logistics. Tendering is always made via the same method, but sometimes the messages fail, and only key users can create incidents for system issues to investigate the error in the system. This problem has not been investigated yet, so the reason is unknown. The reason is that the logistics team considers that creating incidents for the systems team is causing several e-mails, and logistics feel they were bothering them with their questions.

7.1.3 Process step 3: production planning/mill

The main goal is keeping the production capacity available so that sales can book the order "first time right." However, there are still cases where orders do not get the requested dates, and sales must create the incident for production planning. For OVS markets system need to find a resource for sales allocation and production capacity to confirm the order. Usually, the incident is required because these two resources are not matching, for reference cycle reasons,

or because the order status needs to decrease. Case mill planners have access to adjust the allocation of the sales to get the orders confirmed to correct makings. However, sales should request the sales allocation via the "allocation" button from the system to create an automatic e-mail with needed information, such as the requested week, quantity, or market. The problem is that now this e-mail goes only to the allocation team, and when sales create incidents for production planners, they need to dig all the data from the system separately. Above this, the allocation of the sales should follow the order in the system if the production week is changed. Often, it is not which is causing difficulty. The allocation must be moved manually to the correct week, which is non-valuable work. Also, in high season this causes a massive number of incidents for production planners, and therefore is not always possible to update the orders; planners are just adjusting the resources and request the sales department to update the order by themselves.

Another issue causing confusion and extra work is that vessel information is visible in MES only after tendering, even though booking confirmations are available earlier. However, planners need the info ca. two weeks before planned production or even earlier to optimize the order flow. Because of vessel booking process challenges, getting the requested ETS is not always possible. Therefore, vessel booking details are needed to minimize the stock time and prioritize the orders in production. The planner can check the booking information in INNTRA, but it is not always sure if the information is correct, and then the planner needs to double-check with the logistics team by e-mail.

Exceptional handling

Because the vessel booking details are available for MES and port only after tendering port of Vuosaari often asks from the mill schedule for urgent orders with only dummy bookings available in the system. Sometimes the outcome is that the order has a confirmed ex. mill date much later than the planned ETS. Usually, the reason is that the sales team has postponed the order without notifying the logistics team after the vessel booking has already been requested, or the vessel booking detail has not been updated in the system. To avoid this

kind of miscommunication system need to provide correct and updated information. Additionally, there are situations where an old booking is visible even though a new one is planned because sometimes a new booking is not overwriting the old data in MES. The response from logistics for cases like these is relatively slow but has improved during the last few years. The mill follows planned vessel bookings and adapts the ex-mill dates according to the confirmed CD, closing date. However, the problem is that the mill does not know whether this is the final booking. There are several cases where ex. mill date is postponed according to the booking, and earlier vessel booking appears in the system at the last minute. When cases like this appear, it is not always possible to advance the order, and vessel booking needs to be postponed. Therefore, production planners need to know on which information they can rely.

7.1.4 Process step 4: port

Because of the vessel booking process port gets booking information via the system relatively late, and therefore port needs booking confirmations in advance by e-mail from logistics. The port needs to have visibility of orders that are planned to follow-ups that the booking is correct and in time in the system to ship the orders as planned. Unfortunately, booking confirmation is not always shared, and therefore, the booking must be postponed regularly because the port gets the booking information message too late to react. It would be convenient to have the tendering message in the system two weeks before the closing date, and if for some reason it is not possible, inform the port separately.

The port also requests a few improvements to the system if the Company is making changes to it. The port hopes to get the broke / weight correction via message. Now a system team is updating the data, and sometimes, waiting for the update takes too long if there is a rush to get corrected data into the system to catch the planned vessel. They would also prefer to send MRN messages automatically via message to carriers. The MRN form is received via e-mail; they need to print it and scan the barcode into the system.

Exceptional handling

Credit-blocked orders also create difficulty for the port because they can only partially rely on the booking confirmation they get via e-mail. Based on the confirmation, they cannot know if the order is credit-blocked or released on time to catch the planned vessel. Orders may be released with noticeably short notice, leaving no time to react from the port side, so booking needs to be postponed. The port expects better communication of the credit-blocked orders and notification if orders are tendered at the last minute.

Leftovers are also creating difficulty at the port. The terminal always informs logistics if the container amount needs to match or if leftover reels need to be re-planned. However, leftovers are not visible in DU's, so the terminal needs to know to load them. Therefore, if any leftovers are planned for DU's logistics need to add a remark for DU. This method system provides visibility in the instructions; everyone knows what is needed to load.

The port also recognized challenges in the company's re-selling process. The port considered that the communication could be in better shape. Port would appreciate having information on the reselling cases in advance with complete information and enough time to react. The Company needs to provide appropriate information for the port because the process happens outside the system. Therefore, they need information on which order/batch is planned against the new orders. Order sizes are usually significant, so the port needs time to prepare the shipment.

Currently, the reselling cases come up when the port asks from the mill when the orders are coming to the port because the booking is relatively close. Then mill checks and notices in the system that it is a reselling case and requests information from sales, but usually without an answer. The port only has the new order number but nothing else, forcing them to manually check all leftover reels to determine what should be loaded. It is time-consuming and always leads to shipment delays.

Also, other exceptional handling cases have the same challenges as the re-selling process. Therefore reselling, re-routing, special deliveries, and other

exceptional cases that happen often must be clarified. Orders are often delivered later than planned because the process steps are unclear and take too long to solve. In exceptional cases, the right colleagues from each department should be involved from the beginning to check what is needed from everyone's side to get it done correctly.

7.1.5 Process step 5: shipping

Currently, it is challenging to track orders. The sales team needs to know where to check if everything was shipped as planned and where to find information on leftovers and delays. The sales department considers that order tracking from the port onwards could be more transparent. This is seen in interview extract 11.

Extract 11

Shipping "that is a black hole."

Shipping is a global issue, but still, sales have an impression that other companies can offer more accurate information about shipping to the customers even though the company cannot affect carriers' schedule changes. However, sales need more precise information on loading deviations and schedule changes to pre-alarm the customer if the delivery date or quantity changes. For that reason, more accurate lead times and visibility are required.

Therefore, the information must be shared if the shipment is delayed. The challenge is that carriers change the information in INNTRA and only sometimes notify the logistics department. Above that, now and then, INTTRA has different information than the carrier's website offers, and it is difficult to know which information is correct. The sales team must check the schedules separately from logistics because reliable data is needed, and sales have no visibility to track the orders. If the customer asks when the orders are ready, shipping schedules, or arrival dates, currently sales department needs to check each case with logistics to get reliable information. However, logistics is extremely busy and understaffed, so they cannot offer the service level that customers would need.

The sales team also identified challenges with leftover goods. The dummy booking process makes re-booking leftovers nearly impossible because dummy booking does not allow the creation of SA, scheduling an agreement, to plan the leftover goods. Even though logistics delete the dummy booking from the order, it constantly returns, causing several e-mails between logistics and sales. This is seen in interview extract 12.

Extract 12

" Getting rid of the vessel booking from OVS markets is impossible."

7.2 Theme 2: communication, roles & responsibilities

Respondents considered that the chaos caused by the COVID-19 pandemic got the departments working in closer collaboration; therefore, communication and information sharing has improved recently. However, all organizations still recognize improvement areas under this theme: communication, roles, and responsibilities. Most replies considered that the Company's organizational structure is working okay. Nevertheless, roles and responsibilities would need some clarification. The main issue is that people need to learn who is responsible for specific working areas, for example, who is the salesperson/ vessel planner for a specific market and how the tasks are divided at the mill. This information would provide an advantage in urgent cases where a reply is needed quickly. This is seen in interview extract 13.

Extract 13

"It might not be practical for us to have contact people, but even group e-mails like your allocation teams for specialty or graphics. It is very frustrating; sometimes can go days without getting responses."

The second unclear identified challenge regarding the roles and responsibilities was a lack of knowledge of whose responsibility it is to inform and react if the confirmed vessel booking is something other than what the customer initially requested. The sales department considers that the logistics team needs to inform if the confirmed booking is later or if the container size differs than requested. The sales department's responsibility is then react based on the

given information. If the container size change, they need to adapt the order quantity to avoid leftovers, or if the dates are later than requested, sales need to check with the customer if they can accept the later dates. The sales team only gets the information from a booking confirmation once the logistics department forwards it to them. However, the sales team would need more time to check the options upfront if the booking is something other than requested. The challenging part is that, in some cases, customers get the same e-mail of vessel confirmation as sales which leads to an uncomfortable situation for the sales team because the customer demands an explanation for delays, and the sales team does not have an answer yet.

On the other hand, the logistics team considers that sometimes the sales department is not creating DU's correctly as agreed, and the sales team should indicate clearer when the order is needed, ETA. The sales team is adding LTS (the latest time for shipment) for the DU. However, that ETS date is already visible on the DU, and therefore requested, ETA would offer more information for the logistics team to make correct decisions. Also, DU-number might include orders which have too late ex. mill dates to catch requested ETS, which causes the logistics team need to calculate the earliest possible ETS outside the system to ensure the goods are on time at the port to catch the planned vessel. Above that, sales departments sometimes request to advance the booking before the ex. mill date, which is not acceptable.

Based on the results, all departments understand that an exact sailing date for the order is impossible to know before the booking confirmation. And therefore, OVS customers need to be flexible with the dates, and they are, but the final confirmed dates need to be relatively close to the requested ones. Nevertheless, more communication is required to solve this kind of challenge. As explained above, some unclear areas in this part of the process regarding communication, roles, and responsibilities need to be clarified. This is seen in interview extract 14.

Extract 14

"There needs to be more communication between the logistics and sales."

Based on the results, the logistics team considers that they get quick feedback from the mill if there is a conflict between the ex. mill date and planned bookings. The case mill adapts the dates to avoid early making. However, logistics wants to know if the mill produces orders before the ex. mill date because then DU's might catch earlier vessels, and ETA or logistics could maximize the utilization rates of a vessel. Also, the port requested information from the mill to clarify production and vessel scheduling, so both departments agreed that effective communication between the mill and logistics is required. Part of the logistics team was worried that adjusted dates might cause trouble because those are not visible in INTTRA. However, logistics can check if the ex. mill date is changed manually in TPVS. This column is called "finish date" which is always the same as in MES. Nevertheless, informing the mill if the logistics team needs to change the tendered booking is preferable to avoid misunderstandings.

The Company has an official tool that should be used for communication in daily tasks. This ticketing tool is dividing opinions. Some consider it a useful tool and provide fast replies, usually within one to three hours which is quick enough for the customer. However, some respondents think they need to get answers sooner, or they are getting an incomplete reply; therefore, e-mails are required to solve the issue. Part of the sales employees gave feedback that the mill should constantly update the orders if an incident is created instead of just adjusting the resources in the system.

The respondents who are solving the tickets shared that tickets are difficult to solve if the inquiry has incomplete information. Finding the needed data, or the request is misunderstood, takes unnecessary time, so it is vital to include all relevant details.

Above this official channel, according to results, some sales department has different procedures to order intake. They use e-mails to align the order schedule. However, sometimes all responsible employees are not included in this conversation and therefore might be that the request is declined because someone does not know what is agreed upon. These cases cause forwarding e-mails to the correct person, lost time, and the customer needs to wait for an answer. Additionally, if e-mails are forwarded in the middle of the conversation, results indicated that it would be convenient to have clarification in a few

lines of what is needed from their side so that it is not needed to go through the whole e-mail, which can be pages. Also, for logistics-related issues, the logistics team would appreciate having the DU number included for all inquiries. For unclear cases, some respondents consider Teams an excellent and quick tool for sharing information because screen sharing is possible if any help is needed, enabling learning as well. Results proved that daily communication needs improvements, as seen in interview extracts 15-18.

Extract 15

"We have to send e-mails thousands and thousands of times. No idea how the ticketing tool is working because we are not getting replies from logistics. "

Extract 16

"The only way to get a reply is to send the e-mail directly to the vessel planner. Replies to incidents take way too long. The customer cannot wait. Sometimes urgent information is needed if the containers are loaded or not. Or with big stockpots. The situation is better due to the low order booking situation. But the thing which happened 1-2 years ago cannot happen again."

Extract 17

"Logistics may take one day to 1 week to reply. "

Extract 18

"Replies are relatively slow from each mill and logistics. The system does not have 100 % correct information. Communication needs to be faster and smoother. "

Results proved that every organization (sales, mill, port) sends several e-mails above the incidents on a daily/weekly basis to the logistics team to check the needed information because the information is not visible in the system or there is a concern that the information is unreliable. Therefore, all departments shared an understanding that the logistics team is overburdened and cannot provide information as quickly as it would be needed. Still, this is causing troubles in managing daily tasks in other organizations and providing the required customer service level. Therefore, improvements in this area are needed.

Nevertheless, the positive news is that when the global shipping issues started, cross-functional calls were placed between the sales, logistics, and PGM departments. Nowadays, there are fewer calls than before, but most respondents consider the calls valuable, and participants learned a lot from different organizations. Also, production planners participated in some of the calls and got valuable information. However, some respondents consider having a more precise role and responsibilities on the calls would be appreciated. In each call, participants checked the current situation in detail; does each DU have a booking confirmation, are the orders tendered, and are there any credit block orders. Respondents gave positive feedback on these calls because it enabled them to raise any critical topic and have an open discussion. This provided knowledge of other organizations' points of view, making it an excellent channel to learn and make decisions together.

Also, each respondent considered that exceptional handling cases are unclear. The main reason is that it is not known who is in charge, what information is needed to share, what is the sequence of each step and what are the roles and responsibilities on these cases. Therefore, roles and responsibilities need to be clarified to improve communication.

7.3 Theme 3: targets, training & culture

This chapter presents the identified challenges in theme 3, targets, training, and culture.

7.3.1 Targets

Most respondents answered that targets are set on excellent methods to support our supply chain processes. However, based on the answers, decisions are sometimes made only from one department's perspective due to a lack of knowledge of the overall process. Some replies considered that they could not comment on this topic because they do not know another department's targets or processes.

The sales department considered that the primary goal is to deliver the goods on time to the customer, which is sometimes quite complicated because of

shipment delays. At the same time, the logistics team needs to maximize the utility rate and try to choose the cheapest carriers; therefore, logistics departments are not constantly checking the earliest ETS but the best price. The conflict between targets appears when the logistics team does not know what the sales department has promised customers and might make “wrong” decisions for overall targets. Nevertheless, the sales team also considers it vital to decrease total expenses within the supply chain to ensure a competitive price for the customer. So, both departments aim for the same result, but a lack of information might lead some decisions in the wrong direction. The production planning team considered customer service the primary goal, but it has to be done with reasonable prices. Each organization tries to optimize the stock times and deliver the goods on time to the customer, but credit-blocked orders challenge the process even more. If the order release happens too late, the order will miss the planned vessel, which causes the company to lose vessel allocation, order delay, increase stock levels, and extra charges from the carrier and the port.

All departments agreed that it is vital to manage the stock levels; therefore, they shared an opinion that it is excellent that the mill monitors the orders and adjust the ex. mill and production dates based on the confirmed vessel booking. This action supports each department’s target of minimizing stock times. Sales and logistics departments would appreciate it if other mills also took this working method into their daily tasks. If, for some reason, it is impossible to ship the order right after a confirmed ex. mill date, it should not be produced to stock in advance but to postpone the order to later making and produce the orders JIT.

The sales department also estimated their targets and felt that forecasting had become even more difficult after the covid-19 pandemic started because prices suddenly increased. Customers did not have to afford to buy from the Company anymore. The sales team follows the forecasted demand constantly, adjusts it, and releases the budget for other markets’ use if the demand decrease. They also place orders for production in advance if the sales allocation, production, or logistics capacity requires it. However, forecasted

demand is part of the KPIs, and sales must stick to the budget. The sales department needs to keep track of the sales budget and sometimes increase the stock levels to achieve this KPI, which means some goals are achieved, and the losses elsewhere are accepted.

7.3.2 Training

Based on the replies, the Company also has room for improvement in training. The firm has many new employees, and the training needs to provide, especially for them. In the past, there has been a "training program" in the system where new employees could play around and practice the system functionality. Although manuals and instructions are good, they are not working alone, and having system tools to support the teaching process would be great. Some respondents felt it challenging to teach new employees alongside their work. Training takes a lot of time and effort for an extended period. Also, knowledge is getting lost when employees change; therefore, there have been situations when training support is needed from other departments.

Correctly placed orders are the basis for the straightforward process; therefore, sales department employees need to be trained well because potential mistakes affect the supply chain. Luckily, there is always help and support available. However, some respondents felt they need to spend too much time advising other department employees. Eventually, it starts to feel like a burden that affects the working culture negatively. Therefore, the Company has to provide better training from the beginning. The previous department needs to provide complete and corrected information to get everything set first time right.

The Company arranges physical meetings between some organizations and offers the opportunity to discuss concerns face-to-face. Face-to-face meetings are considered as the best method to learn from each other. Visits create closer collaboration when getting colleagues' names and faces, enabling them to learn and get to know each other. Getting to know each other's work is an excellent method to learn what information need to provide to other departments and why, to share best practices and knowledge. Some departments are spreading detailed knowledge to ensure that a backup person has the

same knowledge as the person in charge to secure the process and customer service level. Better collaboration is also desirable for the customer's sake, as seen in interview extract 19. Also, changes in the system functionalities or new systems must be trained better before going live because some employees felt they needed to struggle independently.

Extract 19

"If we can cooperate better in the end, the customer will win."

7.3.3 Culture

The one challenge for the Company is siloed. Most of the respondents recognized that the company has silos. The situation has improved significantly after the COVID-19 pandemic started because cross-functional calls were placed, which improved communication and information sharing. Increased communication between organizations has increased some knowledge for decision-making, decreased blaming culture, and enabled colleagues to learn from each other, which has created a trust and provided better collaboration. This is seen in interview extracts 20–22.

Extract 20

"It was really like we were working against each other's in the beginning."

Extract 21

"Coronavirus crisis trigged a bit the thinking in the company to work closer to each other because It is more important than ever to be able to react to a different thing which is happening."

Extract 22

"Better collaboration is creating more trust between all the different locations."

Results proved that collaboration and communication offer much better visibility to potential bottlenecks and leave more time to react. Some respondents considered that managers encourage collaboration and growth to understand the processes beyond departments. Furthermore, if something is not working, it is not pushed further by force, but the plans are re-checked and adapted.

Managers visit employees (Gemba) and ask for their opinions and perspectives, which creates trust because they offer an opportunity to open conversation and ask questions about decisions and strategy.

Regarding the working culture, usually, the atmosphere is considered helpful because everyone is trying to support each other as much as possible. Most respondents felt that it is easy to rely on everyone doing what is agreed, and if someone makes a mistake, there is no need to blame anyone because everyone concentrates on solving that problem.

However, exceptional handling cases stand out because no one has the overall picture of the process and responsibility areas. If no one knows the reasons behind the challenges in the process, employees might think it is someone's fault or mistake. This is not good and negatively influences working culture because it creates a blaming culture, silos, and a negative atmosphere. If the process is unclear, everyone is trying to push it to another department because each needs to figure out what to do, and no one is in control.

Results also showed that lean culture is not yet implemented in daily tasks. Problem-solving is difficult if solving the challenge requires another department's help to identify the root cause of the issue. When help is needed for problem-solving from another department, some colleagues feel they are bothering them with their questions. Some considered that the replies might be rude, or there is no reply at all which gives the feeling that someone does not want to help solve a complex problem. Also, it is challenging to learn the reasons behind the complicated process step or repeatedly happening deviations because some take questions as criticism towards personal working skills. Of course, this is not the case. Everyone is doing an excellent job, but it does not close the possibility that there is some room for improvement in the process. As seen in interview extracts 23–27, lean culture is not achieved.

Extract 23

"Instructions are followed too conscientiously. We have to be able to adapt and search for the best solution."

Extract 24

"It can't be changed. So why discuss?"

Extract 25

"Actually, I have never questioned this procedure."

Extract 26

"I don't know. It was done ten years ago and before this. It was always done like this."

Extract 27

"Do you know the reason behind this? – I don't know, but they used this when I started to handle it. So, I'm not sure what the reason behind that is."

8 CONCLUSIONS

The following conclusions, presented in this chapter, can be drawn from the present study. The findings make several contributions to the current literature. Constantly changing markets are causing poorly forecasted demand, and to respond to this supply chain needs to be agile to adapt to rapidly changing situations. (Iloranta & Pajunen-Muhonen 2012, 340–346; Staka 2019, 23.) As mentioned in the literature review, the forecasted demand must be known to create an agile supply chain, which means the ERP system need to support information sharing. Overall, Blanchard and Stanton highlight the need for transparent forecasted demand. (Blanchard 2021, 47–49, 82; Stanton 2020, 11–15.)

The evidence from this study suggests that supply chain organizations must know what has been promised to the markets and customers. The S&OP process balances the forecasted demand, logistics, and production capacity. Based on that, provide the allocation of the sales, which promises volumes for the customer. Understandably, plans change now and then, and forecasted demand needs to adapt accordingly to provide the latest information for the supply chain, which enables them to react. The company should provide information to follow the forecasted demand, what has been booked, and what is still expected to come. However, the information must be available in a format that employees know how to use it.

The result of this study supports the idea that it is vital to share up-to-date information on forecasted demand and provide a possibility to track the situation. An advantage is that the supply chain could prepare better, be more agile, offer better customer service, make better fact-based decisions, and pull together the potential risks. Also, when the customer can trust that they get what was promised, they do not need to create speculative reservation orders, which according to Andersson et al. (2021 242–245), provides more accurate order booking and decreases the bullwhip effect in the supply chain. The reasons mentioned above prove that forecasted demand must be visible for every supply chain department, leading us to improvement idea one.

1. improvement idea: Sales allocation is managed as forecasted demand in the system.

The system should quickly provide information for the sales department on the order booking situation and support “first time-right” -order management (Hugos 2018, 90–91). The findings of this study suggest that the sales department needs a tool to track availability to see where to place an order quickly. Therefore, the company should provide clearer visibility on the availability, which is why sales allocation and vessel capacity should be managed as one (Improvement idea 2). According to Robertson (2022, 42–47), service levels need to be ensured with suitable contracts with suppliers and subcontractors. The results indicated that the details of the contracts are not shared, which creates confusion and might cause wrong decisions in the process. No one knows what has been agreed upon with carriers and how they are committed to managing the yearly estimated volumes. A reasonable approach to tackle this issue could be to share the information agreed upon with carriers to guide the order booking and support “first time right” order management (Improvement idea 3). The Company should also provide a possibility to track forecasted demand on a suitable level. Organizations have different interests, so information needs to be available in a format that is easy to use. (Improvement idea 4).

2. Sales allocation and logistics capacity should be managed as one.

3. Agreements with carriers need to be shared.
4. Following the forecasted demand and outcome on a suitable level.

Some issues that emerged from the findings relate to the current system. The systems cannot appropriately provide the required information and therefore are not supporting the process. All information is in the system, but the needed information is challenging to find, needs to be combined from separate places, and is only sometimes available or dependable. Transparency must be improved throughout the system support. Khan and Yu (2019, 13–14), Stanton (2020, 11–15), and several others highlight that visibility and transparency decrease the variations in the supply chain and offer a more effective process and higher customer service level. Hugos (2018, 90–91, 168–169) and Blanchard (2021, 54, 31, 36) have said that system should provide information for order tracking and accurate information to measure and follow the process. The findings suggest, in general, that a more transparent process is needed. The company needs to have accurate information (Improvement idea 5,7) in the system to decrease manually made changes and eliminate the need for adding buffers/ actions outside the system to create reliable data to the system which can be measured. Only after these actions is it possible to measure and follow up the process correctly (Improvement idea 6).

5. Correct lead times.
6. Measure and follow the process.
7. Vessel information needs to be dependable and more visible.

Morana (2018, introduction xxiii), and Moon (2018, 26–28), among others, have concluded that creating a straightforward and transparent process that supports visibility, information sharing, communication, targets, and continuous improvement is vital. Moon (2018, 14) describes that training in the overall process provides a better understanding of people's roles and responsibilities.

This study has shown that the roles and responsibilities are unclear without a straightforward, transparent process. Also, employees need to know the overall process and system functionalities to know what information needs to be

shared and why (Improvement idea 8). Blanchard (2021,82) highlighted that to enable the best performance of the supply chain company needs to use all the employee's talent to create the best process. Unfortunately, the company will miss this opportunity if the overall process is unfamiliar (improvement idea 9).

8. Instruction for "regular" exceptional handling cases.
9. Everyone needs to understand the overall order flow process better, who participates in it, and which roles.

With better training and understanding of the overall process (Moon 2018, 14, 42, 61.), it is possible to break silos and improve collaboration. Blanchard (2021, 75) argued that employees must understand the entire process and how their actions influence it to implement the lean part of daily tasks to identify improvement areas, recognize the root causes, and consider solutions. It was also shown that lean culture is not yet implemented, and company managers must encourage and support people to improve the process. If the lean philosophy is unfamiliar, managers must coach how lean thinking can occur in daily tasks. As Blanchard (2021, 75) noted, the process is never complete because the environment constantly changes. That is why it is vital to get continuous improvement as part of everyone's daily work. An optimized process is more resilient and decreases the need for firefighting.

The Company is aiming to implement the Lean philosophy, but it is challenging to improve the process, identify bottlenecks and define the root causes of the overall process is unknown. Even though employees would be motivated to improve the process, it is impossible without all the information (Improvement idea 10-11).

10. Better training is needed.
11. Managers need to guide and encourage how to make lean thinking part of daily tasks.

In the best-case scenario, the improvement ideas offer tools for a more straightforward process, more accurate customer deliveries, increased vessel utilization rate, customer satisfaction, and reduced speculative orders, offering better visibility for order booking and demand. However, several significant

changes need to be made. All improvement ideas mentioned above are collected in Table 3 and presented with some benefits to justify the need for changes.

Table 3. Improvement ideas

| Improvement ideas | Benefit of improvements |
|---|--|
| 1. Sales allocation is managed as forecasted demand in the system. | Forecasted demand is visible for every department in the order flow process; what has been already booked and is still expected to come. If any changes appear, updated data is visible to everyone immediately. |
| 2. Sales allocation and logistics capacity should manage as one. | If these two resources are aligned, it will offer better visibility for order booking, offering the information in the same place and making it easier to follow and share. |
| 3. Agreements with carriers need to be shared. | Ensuring vessel availability, guide order booking, and first time right -order management. |
| 4. Following the forecasted demand and outcome on a suitable level. | There are unique needs to monitor order booking. For example, logistics and sales need visibility to monitor forecasted demand on the mill/ market level. |

| | |
|---|---|
| 5. Correct lead times. | Customers get orders as confirmed, reducing manually calculated buffers outside the system to provide correct information into the system, which can be measured and therefore make challenges visible. |
| 6. Measuring the process | The correct information is needed for the system to measure the process more effectively. Also, someone should follow orders after those are loaded from the mill until they are delivered to the customer. |
| 7. Vessel information needs to be dependable and more visible. | It reduces double-checking, which is a waste. |
| 8. Instruction for "regular" exceptional handling cases. | Unclear cases are time-consuming and negatively affect collaboration and culture with instruction; this can be avoided. |
| 9. Everyone needs to understand the overall order flow process better, who participates in it, and which roles. | Support collaboration, decision-making, risk management, communication, roles, responsibilities, and lean philosophy. |
| 10. Better training is needed. | Support collaboration, decision-making, risk management, and lean philosophy. |
| 11. Managers must guide how to make lean thinking part of daily tasks. | Identifying improvement areas, more effective process, and supply chain. |

9 IMPROVEMENT IDEAS IN MORE DETAIL

This chapter presents improvement ideas 1-11 in more detail (Table 3, p 67).

9.1 Theme 1: process, system functionality & transparency

The results showed that the company must improve transparency and clarify process steps. Vessel availability guides the order booking, and therefore, offering better visibility for vessel availability and aligning it with sales allocation is vital. Sales forecast how much they can sell and invoice each month. Most container markets are invoiced when the goods are shipped from HEL port, ETS, and some when the order arrives at the destination port, ETA. Forecasted demand is transferred for the production weeks according to estimated lead times. However, it is difficult to know which week or month the orders need to be produced due to the reference cycle, throughput times, order booking situation, technical stops, unreliable lead times, manually calculated buffers, and other deviations. Also, production capacity is managed on a different resource by different colleagues, which makes it hard to keep aligned with sales allocation. Because of the challenges mentioned above, dividing sales

allocation to respond to the correct production week is complicated. Additionally, at least part of the volumes must be produced in different months than invoiced.

Orders are confirmed for production runs where the production capacity and allocation are available to meet the requested DD. Therefore, orders might confirm too early production and need to postpone to a later production run to have a clear picture of order booking and avoid early production. Orders must be postponed manually so sales allocation is not following in the system. Postponing via SAP would take too much time and creates additional work. However, manually rescheduled orders use sales allocation and production capacity from different weeks in the system. Therefore, modifying the order afterward without losing the confirmation line is impossible. Nevertheless, order modifications need to be accepted to provide better customer service. Currently, the system does not support order modifications or the “first time right” order management and causes non-value work for several departments. This system setup makes it impossible to follow forecasted demand against confirmed orders because it uses sales allocation from incorrect periods, making it difficult to see if the sales department has already booked all volumes or if some are still expected to come.

Table 4 presents how the forecasted demand is transferred to production weeks and maintained in the system currently. The example is simplified to visualize one production line sales allocation and calculated for the ETS market, which has a 9-day standard lead time from the mill to catch ETS from HEL. Above this has to be 2,5 days standard throughput time for production, which means orders should be produced approximately two weeks before the invoicing date.

Table 4. How the allocation of the sales is managed in the system currently

| | WEEK 51 | WEEK 52 | WEEK 1 | WEEK 2 | WEEK 3 | WEEK 4 |
|-------------------|------------|------------|--------|-----------|--------|--------|
| Forecasted demand | | | 210 | 210 | 210 | 210 |
| Sales allocation | 210 | 210 | 210 | 210 | | |

As explained, estimating the needed production week for forecasted volumes is complicated. The current process is even more complex because each department follows and uses different dates in communication; production week, ex. mill date, DD, ETS middle Europe, ETS HEL, ETA, and forecasted demand. This makes checking all resources and communication between different departments even more challenging.

Therefore, the first improvement idea would be to change the sales allocation management in the system to be equal to forecasted demand (invoicing) instead of transferring the forecasted demand to production weeks. If sales allocation were managed at this level, the information would be more accurate because there is no need to estimate the potential production week on a detailed level. Of course, estimation is done in the S&OP process. During the S&OP process, the Company confirms which invoicing volumes they can commit with each market. So, sales allocation, vessel, and production capacity are harmonized in this process. For that reason, it would be clearer to keep the allocation of the sales as the forecasted demand instead of transferring the figures to production weeks. This method allows the sales department to follow up on the order booking situation and makes sharing information with other departments easy. If the change were made, sales allocation would be managed in the following method (Table 5).

Table 5. How the allocation of the sales should be managed in the system

| | WEEK 51 | WEEK 52 | WEEK 1 | WEEK' 2 | WEEK 3 | WEEK 4 |
|-------------------|------------|---------|-----------|------------|-----------|-----------|
| Forecasted demand | | | 210 | 210 | 210 | 210 |
| Sales allocation | | | 210 | 210 | 210 | 210 |

Most container markets are invoiced when the goods are shipped from HEL. In these cases, forecasted demand and sales allocation equal the ETS date. Then there is no need to manage and follow vessel allocation separately, which leads to improvement idea two; sales allocation and vessel capacity should be managed as one in the system.

Vessel planners book vessels as one journey from HEL to the destination port. Therefore, it would be possible to manage container availability and follow the availability from the starting point, HEL, instead of following it from Central Europe onwards. This means the vessel capacity can be managed with sales allocation instead of the LAD model. For example, suppose the company has 20 containers available per week. In that case, PGM can manage the allocation of the sales on a weekly level and guide the order intake based on the vessel capacity. For some markets, carriers can accept the whole month's allocation in one go; then, sales allocation should be managed on a monthly level unless there is a need to limit production capacity differently on a market level. The benefit would be that vessel allocation does not need to be checked separately and calculate the speculative lead times from ETS Central Europe to ETS HEL anymore outside the system. The sales department needs to check if a sales allocation is available for the requested delivery date and then book the order. LAD-model is still available to use above this if required.

With this new method, forecasted demand is easy to share with carriers and to discuss how they can manage the volumes, which leads us to improvement idea three; what has been agreed with the carriers need to be shared. Vessel planners, sales, PGM, and production planning should know what has been agreed with carriers and if there is a weekly/monthly service. Also, information on how to proceed with additional tons should be clarified. It would be beneficial to have information on what was agreed in contracts to guide order intake and support "first time right" -order management.

For markets where invoicing creation date is the arrival date, ETA, on the destination harbor, the company needs to provide a list of the system-calculated lead times so that it is possible to transfer the forecasted demand to HEL ETS figures for vessel planners. However, calculating the dates should be relatively easy because the lead time is fixed days (Table 6). Otherwise, the idea and benefits are the same, and if there is a weekly service on vessels, sales allocation must also be managed on a weekly level to guide order intake. So, if sales allocation (forecasted demand, DD) is divided based on the vessel availability, ETS dates follow due to the fixed lead times.

Table 6. How to follow up ETS volumes based on ETA date if the lead time is six weeks

| Sales allocation | ETA week 7 | ETA week 8 | ETA week 9 | ETA week 10 |
|------------------|------------|------------|------------|-------------|
| ETS HEL | ETS week 1 | ETS week 2 | ETS week 3 | ETS week4 |

Different departments have unique needs to monitor the forecasted demand, leading us to improvement idea four which is to improve visibility in the logistics dashboard. Now there is a possibility to check on the logistics dashboard for free sales allocation per market and production capacity into one production line. However, the vessel capacity needs to manage at the mill level, so it would be beneficial to have the opportunity to monitor the forecasted demand at the mill level for each market. Moreover, booked quantity must be visible to see what was booked and what is still expected to come to make monitoring and information sharing more straightforward. If this information were visible on the logistics dashboard, everyone could easily follow it and get the latest information quickly. Furthermore, if there is a need to adjust the sales allocation between production lines, it is easy to balance the total volumes to match with confirmed vessel allocation. Table 7 shows how the forecasted demand and booked orders should be visible in the logistics dashboard to provide each organization with the needed information. This example uses 850 tons volumes and weekly vessel allocation for specific markets. It might also be valuable to show the estimated production weeks for volumes, lead times, and ETS dates for ETA markets (Table 6) to provide all the needed information in the same place.

Table 7. Visibility in the logistics dashboard

| | Week 51 | Weeks 52 | Week 1 |
|-------------|---------|----------|--------|
| Line 1 free | 100 | 150 | 150 |
| Line 2 free | 200 | 100 | 300 |
| Line 3 free | 350 | 0 | 200 |
| | | | |
| Used | 200 | 600 | 200 |
| Tot | 850 | 850 | 850 |

After the changes mentioned above, the sales department can see which DD they can book the orders based on the sales allocation. This new approach would remove the problem in order management where production capacity and allocation are used from the different weeks and is causing difficulty; therefore, manual adjusting for sales allocation would not be required anymore, which decrease non-valuable work. The order booking process would be more transparent and support "first time right" -order booking. If the sales department cannot book the order even though they have sales allocation, it is due to the limitation of production capacity. In this case, they need to create an incident for the production planning team. Sharing lead time information for each market is vital so that production planners can calculate the week the order should be produced to meet the requested DD.

Additionally, for each market, nominated carriers have estimated ETS days. If there are many carriers for specific markets with different estimated ETS dates, sales must select an earlier one and add the specific date requested DD. For example, if market x has the feeder vessel ETS HEL in most cases on Tuesday or Wednesday, the requested delivery date must be on Tuesday to ensure a correct lead time against the wanted ETS week. This information must be shared with all departments to ensure that orders catch the required vessel for a specific week. Additionally, the sales department must share the requested ETA date for ETS markets to provide all the information needed for vessel planners.

Improvement idea five was to get correct lead times into the system to provide reliable information and decrease unnecessary actions outside the system. The first part of this improvement idea is to fix the lead time from the mill to the port. Lead time from ex. mill date to ETS HEL is nine days in each case for OVS markets. For some reason, the system is confirming ex. mill date now and then with shortened lead times. Therefore, lead time needs to be re-defined to 9 days, so logistics do not need to calculate earlier possible ETS outside the system. This minimizes misunderstandings about the required ETS week. The second part is lead times from HEL to destination ports because the lead times are longer in reality. Transit times need to be updated based on the average actualized time.

Correct lead times would give the Company reliable information to measure the process. This will lead us to improvement idea six, measure the process and identify improvement areas. Correct information in the system enables comparison of the request delivery date with the actualized, which offers an easy tool to monitor if, for example, the vessel bookings are confirmed as “agreed” and if the lead times in the system are correct and dependable. Moreover, someone should follow deviations that might happen after the goods are loaded from the mill and arrive at the customer. Follow-ups would offer visibility to recognize deviations, react quickly, and take corrective actions.

The vessel booking process includes many steps (Figure 4, p 38) and requires manually filled data. It would be good to understand better why all the steps are needed. Therefore, it would be reasonable to investigate if eliminating or automating some steps would be possible. For example, the dummy booking process is causing extra work in several steps. However, it is still needed to ensure orders will not get stuck in the mill warehouse. Nevertheless, sometimes dummy booking is not appearing automatically, or the actual booking is not coming through to MES. If this kind of case appears incident needs to be created for the system team to investigate and fix the problem. Whenever there is a system issue, it needs to be investigated to avoid the same challenges in the future. To make the vessel booking process more manageable, the actual booking should automatically delete the dummy booking because it is unnecessary to remove it separately. Also, the logic of dummy booking needs to change to reduce re-work. So, a dummy booking should not appear automatically if an order has an actual booking, or the actual booking is deleted after it gets status completed. This would make order handling easier if, for example, the sales department needs to create an SA scheduling agreement for leftovers.

Order modifications are one part that needs to be investigated in the vessel booking process. Only fine planned vessel booking blocks order modification system-wise; therefore, it is unknown why the system does not allow changing the order if the booking dates are kept the same and the company is still planning volumes for a reserved vessel. Carriers constantly update the details, so

why the company cannot do the same is unknown. Lead times to OVS markets are long, so customers need to place orders in advance. To provide better customer service, the company needs to allow order modifications as long as possible if changes are vital for the customer.

The third challenge in the vessel booking process is that some carriers send booking confirmation details to INTTRA with the ETS date from the main port in Central Europe. This needs to be clarified because it confuses other departments, making information unreliable and creating additional work for logistics. Also, the Company must demand that the carrier informs of the shipment delays. With these two improvements with the carriers, the company can provide reliable information on shipping details, improvement idea seven. All departments need information about the confirmed booking details as soon as possible. Booking information is transferred automatically from SAP/INTTRA to TPVS, the dispatch planning tool, so getting the same information available to MES and APO, the rough planning tool, should be possible. With this method, it would be easier to monitor and follow that orders are produced JIT-based, share information with the port about what is coming, and credit-blocked orders. This system-supported visibility would reduce non-valuable work from the logistics department because they could fine-plan the shipments closer to the actual closing date and get fewer e-mails regarding the scheduling. However, it might be good to check with carriers when the booking must be confirmed (tendered) to carriers at the latest to get the reserved capacity. If the company can provide this visibility, logistics need to notice that they must constantly inform production planners if they change already confirmed vessel booking.

The fourth challenge in the vessel booking process is credit-blocked orders. Those create difficulties if they are released too late and delayed by a planned vessel. Short-term changes create extra costs, and vessel allocation needs to recover, so this process step needs further investigation. It would be good to follow how often credit-blocked orders must be postponed and how long they stay at the port. Further actions are possible to take after the monitoring period. Suppose it is impossible to improve the credit-blocked order process due

to customer agreements. In that case, the company should provide better visibility to follow up on the credit-blocked orders and improve the information flow between different departments. The credit control department should always notify logistics and port if orders are released near the order's closing date.

The fifth challenge is that tracking the shipments is complicated, and sales departments need to get information if deviations or delays appear in shipping. According to the port, they share the information on loading deviations with the logistics team. Still, it might be good to include the sales department in the e-mails to get this information to the customer faster. Carriers need to inform logistics of all the shipment delays and update the correct information to INTTRA, but currently, information might differ in INTTRA and on carriers' websites. The delay information is more vital for the sales department than the logistics team because the sales department needs to inform the customer. And therefore, carriers should inform sales directly in case of schedule changes if there is no additional value, keeping a logistics intermediary.

Improvement idea eight was to create instructions and process steps for exceptional handling cases. For the reselling process, for instance, instructions are needed on whose responsibility it is to allocate the goods for the new order in the company's system, create a list of the "old" batch numbers so that the port can identify the goods, who is providing all the information and which department needs it. The company has many exceptional handlings cases, which are still appearing regularly. Therefore, it is possible to create some guidelines for these cases to reduce hassle and negative effects on collaboration and working culture.

All the improvement ideas mentioned above aim to provide a more straightforward and transparent process that would support "first time right" -order booking and offer clear instructions for the supply chain for the needed actions. In Table 8, all these improvement ideas are gathered, and benefits are listed.

Table 8. Detailed improvement ideas for process, transparency, and system functionality.

| Action plan | Benefit of improvement |
|--|--|
| <p>Change allocation management in the system is equal to forecasted demand (invoicing) and manages sales allocation and vessel allocation as one. Agreements with the carriers must be shared to manage the resources.</p> <p>Mill-level selection, estimated ETS/ production week, lead times available, and used quantity visible to the logistics dashboard.</p> | <p>Decreases manual work to adapt sales allocation & production capacity.</p> <p>Order booking and requesting allocation are easier for sales.</p> <p>More of a transparent process with fewer steps.</p> <p>Orders are using resources in the correct place, easier to follow.</p> <p>All resources are possible to check from the logistics dashboard.</p> <p>No need to calculate outside the system dates for LAD.</p> <p>Forecasted demand is visible to everyone; what is in and expected to come.</p> <p>Forecasted demand is easy to share with carriers.</p> <p>Easier to balance sales allocation on mill level per market.</p> <p>The visibility provides more structured communication between departments.</p> <p>Change in demand is immediately visible to everyone.</p> <p>Easier fact-based decision-making, optimization, and risk management.</p> <p>Support straightforward and transparent processes.</p> |

| | |
|--|--|
| <p>Sales need to add the requested ETA for DU's so that lead times are easy to follow.</p> <p>Lead time needs to update in the system and provide a list of them.</p> <p>The process needs to measure more actively when goods are loaded from the mill until DD. Also, better knowledge of responsibilities is needed.</p> | <p>Lead times are easier to follow and measure.</p> <p>No more unclear ETA dates</p> <p>No need to add a buffer and calculate outside the system.</p> <p>The system offers correct information because calculating outside the system is not needed anymore.</p> <p>Easier to follow actualized vessel booking vs. requested.</p> <p>Customers get orders on time.</p> <p>Easier to recognize improving areas.</p> <p>Possibility to improve the process.</p> |
| <p>The carrier confirms the booking always ETS HEL.</p> <p>Insist separate delay information.</p> <p>Get booking information visible from TPVS to APO -> MES.</p> <p>Update vessel booking instead of canceling the shipment.</p> <p>Improve the dummy booking process.</p> <p>Port and carriers must add the sales department to e-mails regarding loading deviations or schedule changes.</p> | <p>Information is dependable in INTTRA.</p> <p>No need to tender before two weeks ETS.</p> <p>Logistics has less non-valuable work and gets a lot fewer e-mails.</p> <p>Mill has visibility for vessel bookings immediately after they are confirmed.</p> <p>The mill can provide a list of bookings within two weeks to port and notify credit blocked orders.</p> <p>Easier to follow orders that do not have a booking or planned vessel</p> <p>Easier order handling and reduced waste.</p> <p>Better communication of delays -> possible to the pre-alarm customer.</p> <p>Easier to manage leftovers.</p> |
| <p>For exceptional cases need to provide instructions and process steps.</p> | <p>More straightforward exceptional handling process.</p> <p>Support collaboration and positive working culture.</p> <p>Order is sent faster.</p> |

Improvement ideas also bring some disadvantages, which are presented in Table 9.

Table 9. Disadvantage of changes

| Disadvantage of changes |
|---|
| <p>After the change, declining capacity for specific production weeks is more challenging. PGM / production planners must know how to do it on the forecasted demand level.</p> |
| <p>Expected orders for each production week need to check from the S&OP report or know how to transfer the forecasted demand to production weeks (if not possible add this information to the logistics dashboard).</p> |
| <p>Sales cannot follow directly in the system which week they "need" to book orders. However, the time for the "booking window" is not changed (if not possible to add this information to the logistics dashboard).</p> |

9.2 Theme 2: communication, roles & responsibilities

Improvement ideas for process, transparency, and system functionality provide a more straightforward process to support communication, roles, and responsibilities. However, the company needs to offer knowledge of the overall process and responsibilities to support the second theme further, leading to improvement idea nine; everyone needs to understand the overall order flow process better, who participates in it, and which roles. Overall knowledge of the process gives a better understanding of which information needs to be shared and to whom. Also, communication is more manageable when employees know whom to contact in each case.

The company has a lot of new employees, and therefore it is not so clear who is responsible and for what area. To get an overall picture of who works in which organizations, departments should create a presentation or a list of colleagues and their primary responsibilities. Also, backup colleagues should be mentioned. This information could be shared on SharePoint and should be updated if changes appear. Also, exceptional handling cases and other suitable information could be shared on the same platform.

In the process, sales must share the needed ETA date because logistics needs to know what sales have promised to the customer. The information helps logistics to make decisions while booking the order because they also need to balance the costs, and it is easier to check options for the DU when all the information is available.

On the other hand, logistics needs to inform sales if booking the orders as requested is impossible before requesting a booking. Then sales can check with the customer if they can accept the new dates or different quantities in case of a later vessel or container size change. If not, sales and logistics need to check the options together. Sometimes it might be that order needs to be planned for an earlier vessel to deliver on time to the customer, and in this case, production planning needs to be involved in the conversation. Discussing with sales in advance for the options if it is impossible to book as requested ETA reduces re-work because there is no need to cancel the booking

and start over. Lead times are monitored continuously in this approach, enabling the company to adjust lead times if they are too long or short. It is everyone's benefit that lead times are correct.

If sales change an order, they must check if it already has a booking request. If yes, they need to notify logistics of the changes. Logistics must inform the mill if they change the confirmed vessel booking afterward. And on the other hand, the mill must inform logistics and sales if it is impossible to catch the planned vessel for any scheduling reasons. Also, if logistics have a case where advancing the order to an earlier vessel, the company can save a considerable cost; it is always an option to request the mill to advance orders.

The ticketing tool is suitable in straightforward cases. If the reply takes too long or the answer is incomplete, it would be good to discuss the reasons behind that. It is also possible to agree separately that some cases can be managed via Teams or phone. The ticketing tool makes it easier to share tasks within the team because all requests come in the same place and are visible to everyone. If the topic is complex and many people are involved, requesting a meeting is the most convenient method to manage the case.

Cross-functional calls got positive feedback from the respondents because shared information deepens the understanding and helps to identify improvement areas. In the future, calls should involve the production planners more often. On those calls, the participant can also raise topics of best practices, process improvement ideas, and challenges, ask for help, or give feedback, for example, if there are some issues with incidents.

Table 10 summarizes the main improvement ideas and benefits for communication, roles, and responsibilities.

Table 10. Improvement ideas for communication, roles, and responsibilities.

| Action plan | Benefit of improvement |
|------------------------------|--|
| Share overall process steps. | A better understanding of what information needs to share and to whom. |

| | |
|--|--|
| <p>Introduce each organization and its members. Share instructions and other valuable information in SharePoint.</p> | <p>Everyone knows whom to contact in each case. More clear roles and responsibilities improve collaboration.</p> |
| <p>Possibility for communication also outside the ticketing tool.</p> | <p>Share knowledge and best practices. Solve unclear cases faster and reduce frustration.</p> |

9.3 Theme 3: targets, training & culture

The overall process could be more familiar to every employee within the supply chain, which leads us to improvement idea ten, better training is needed. There are many employees in a supply chain, and understandably, allowing everyone to visit other organizations is impossible because departments are physically in different countries. However, it is possible to offer a “tour” to all organizations to get to know other departments and tasks better. This tour can be arranged by doing “introductory” presentations from sales departments, logistics, and production planning in SharePoint. Each department could introduce its process and targets, which departments organizations collaborate closely with, what information they need, and from whom daily.

New starters are initially getting much information, and understandably, it is impossible to internalize it all at once. The material offers an easy method to share knowledge with newcomers, and shared presentations offer the possibility to return repeatedly to check details. The situation constantly changes in the supply chain, and exceptional cases are impossible to avoid. Still, if the company could provide an overall picture of the process from the beginning, it would make understanding the consequences of different decisions in different cases easier.

The material could support the learning process but not forget face-to-face teaching. Also, if there are training lessons provided for the system changes or some individual functions, those could be recorded and shared for everyone’s use. Then it would be possible to return to those if needed or use the material supporting training for new employees.

When all this information is shared and available to everyone, it will break the silos even more because it will be easier to have an open discussion when

everyone's perspective is known better. Managers must guide how to make lean thinking part of the daily task, improvement idea eleven. Lean philosophy can be implemented as part of daily tasks if employees are constantly encouraged to improve their work and question the process. Employees need to feel that they have the possibility to affect their work and improve it. Improving the process beyond the organization's borders requires an open-minded environment for discussions and changes. Table 11 presents improvement ideas and some benefits for Theme 3, targets, culture, and leadership theme.

Table 11. Improvement ideas for targets, culture, and leadership

| Action plan | Benefit of improvements |
|--|---|
| Introduce all organizations within the order flow process. | Knowledge of the overall process and different perspectives. Break silos. Support training for newcomers Enable Lean thinking. |
| Encourage employees to lean thinking | Increase motivation. Improve process and reduce waste. Positively influence on working culture. |

A successful supply chain requires a positive working culture. All these improvement ideas introduced in this report aim to create a more transparent and straightforward process and improve communication and information sharing, leading to better collaboration. Improvements in these areas will positively impact working culture and employees' well-being.

10 DISCUSSION

The aim of this study was to clarify several aspects of the order flow process, to get knowledge of improvement areas, and to provide solutions for those. The theoretical framework offered an excellent guideline for creating relevant themes for semi-structured interviews. All participants shared the intention to improve the process and were willing to share knowledge to collect the needed data. Based on the result, it was possible to analyze the overall order flow process and identify the shortages. While comparing the results to theory, it was easy to see how the process's challenges could be improved. Results

showed that all the supply chain management elements were implemented, but the integration was not yet at a suitable level.

This investigation aimed to assess improvement ideas to improve collaboration and integration within the supply chain, and all reported improvement ideas to aim to provide tools for that. In summary, these results show that theme 1, process, system functionality & transparency is the most vital area to improve. Theme 1 directly impacts other themes, which means that if the challenges in theme 1 are solved, it provides solutions for themes 2. communication, roles & responsibilities, and 3. targets, training, and culture. As this case very clearly demonstrated, the Company needs to provide more transparent and straightforward processes with systems support.

10.1 Answer to research question

The study aimed to address the following question:

Q: What needs to be improved in the order flow process, and how to achieve better collaboration and integration levels between sales, vessel booking, and production planning departments?

The results of this study indicate that the company needs to provide transparency and training for the order flow process to ensure a straightforward process that is easy to measure and to recognize deviations. A clear and transparent process provides clear roles, responsibilities, and targets. With this information, employees would know when to react or share information. All these elements are needed to support communication which, according to Robertson (2022, 53–55), enables collaboration, and collaboration creates trust. Trust builds positive working culture, making working and coordinating tasks even more desirable.

With trust, it is possible to feel that everyone is on the same “team” and release all the talent to improve processes. Collaboration offers an opportunity to improve the process together, and it is easier to accept the need for improvement if the process steps are shared commonly. Everyone can learn the

reasons behind the requests and offer improvement ideas. Being capable of impacting work motivates employees and makes them feel valued; a content employee positively affects the working culture, which creates a positive cycle.

10.2 Validity and reliability

Validity means estimating if the data collection tools measured the selected topic correctly and accurately. Validity responds to how well the result answers the research question and whether the results are dependable. (Golaf-sani 2003.) The data was collected for this study from a different department offering different process perspectives. Two to five colleagues from each department were selected per internal organization to gain more valid results. The purpose of this study was presented in advance for participants to offer more time to think about answers which were relevant to selected process with nominated departments. Results replied to the research question, indicating that the study measured the proper objects, and based on this, validity is achieved.

Reliability examines how well the selected research method measured the studied topic and whether the results are the same and stable if the study is repeated (Golaf-sani 2003). The research results are strongly linked to the investigated process in the company. If the order flow process steps were changed, it might influence the replies. The researcher works at the company and knows the current systems and procedures quite well. This offered benefits for the interviews because the root causes were easier to recognize when the knowledge was shared. On the other hand, the fact that the researcher is working for the same company and is part of the supply chain might have affected replies. It is possible that interviewees did not want to give negative feedback “face to face” to the researcher’s department, which might have affected the results.

The company announced just before the interviews that they would sell some mills from the company, and the case mill was one of those, which caused uncertainty in the departments. Future organizational structure was unclear,

which might have influenced the results too. Quite a few participants highlighted how the organizational structure is excellent now, even though it had the same value as other topics in the presentations. However, this part was the only one separately raised to say nothing needed to be changed, which might indicate that the announcement had created insecurity within the supply chain. It is pretty clear that it affected the results. Unfortunately, it is impossible to estimate how and how much this affected the results.

10.3 Proposal for further inspections

This study focused on investigating the current order flow process. Further study could be done to investigate this same process again after the changes have been implemented and take participants from various levels of organizations, including managers. Also, a future study to further investigate the order flow process from the port to the customer would be remarkably interesting. Another area of future study would be to investigate the S&OP process because, from the company's point of view, it could be exciting to research how the process is currently going and if there is any room for improvement. Furthermore, studying how the forecasted demand has come true and investigating how to get more accurate data might be interesting to the case company.

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