Food Packaging Operations Audit

Anna Samuelsson and Sofie Thulin Lennselius

DIVISION OF PACKAGING LOGISTICS | DEPARTMENT OF DESIGN SCIENCES
FACULTY OF ENGINEERING LTH | LUND UNIVERSITY
2024

MASTER THESIS

Food Packaging Operations Audit

An Investigation of IKEA Food's Supply Chain

Anna Samuelsson & Sofie Thulin Lennselius

LUND
UNIVERSITY

Food Packaging Operations Audit

An investigation of IKEA Food's Supply Chain

Published by
Department of Design Sciences
Faculty of Engineering LTH, Lund University
P.O. Box 118, SE-221 00 Lund, Sweden

Publicerad av
Institutionen för designvetenskaper
Lunds Tekniska Högskola, Lunds universitet
Box 118, 221 00 Lund

Subject: Packaging Logistics (MTTM10)
Division: Packaging Logistics
Supervisor: Daniel Hellström
Co-supervisor: Allan Dickner
Examiner: Henrik Pålsson

Ämne: Förpackningslogistik (MTTM10)
Avdelning: Förpackningslogistik
Huvudhandledare: Daniel Hellström
Bitr. handledare: Allan Dickner
Examinator: Henrik Pålsson

ABSTRACT

Supply chain management (SCM) and packaging solutions are essential in the food industry due to their impact on the environment and economics, necessitating innovation. How to efficiently move goods through the supply chain therefore involves a complex network involving a great amount of stakeholders and processes. Food distribution logistics are particularly complex, requiring standard procedures along with additional steps for food safety. This sets the foundation for examining the challenges and opportunities in food supply chain operations and packaging solutions.

This thesis investigates the food packaging operations, focusing on the efficiency of the supply chain and its processes and the impact of packaging system solutions. The methodology involved a singe-case study research approach, analyzing the packaging system performance and its integration within the supply chain. Semi-structured interviews, observations, literature review and some qualitative data have been the foundation for analysis. Findings from the case study revealed insights into the case company's packaging system performance for various products as well as the packaging innovation processes. Key findings are presented as the processes that underperforms the most which are the lack of a unified vision, no proper evaluation and/or follow up procedures as well as weak performing support systems. Lastly, avenues for improvement in the supply chain are displayed, presenting what changes need to be performed, related to the underperforming processes, in order to increase supply chain efficiency. Overall, the study emphasizes the importance of balancing trade-offs in packaging decisions and operations to enhance supply chain performance. By using integrated support systems, clear evaluation processes and understanding the impact good communication has on creating coordination and collaboration between company functions and over organizational boundaries, increased performance can be achieved.

Keywords: Supply chain management (SCM), food supply chain (FSC), packaging performance, communication, evaluation

SAMMANFATTNING

Supply chain management (SCM) och förpackningslösningar är avgörande inom livsmedelsbranschen på grund av deras påverkan på miljön och ekonomin, vilket kräver innovation och nytänkande. Att effektivt transportera varor genom leveranskedjan innebär därför ett komplext nätverk med många intressenter och processer. Logistiken kring livsmedelsdistribution är särskilt komplex, och kräver standardförfarande samt ytterligare åtgärder för hantering av en kyld kedja och livsmedelssäkerhet. Detta ligger till grund för att undersöka utmaningar och möjligheter inom försörjningskedjan för livsmedel, samt dess processer och förpackningslösningar.

Detta examensarbete undersöker processerna i en försörjningskedja för livsmedel med fokus på dess effektivitet samt påverkan av förpackningslösningarna. Metoden omfattade en fallstudie, där förpackningssystemets prestation och dess integration inom leveranskedjan analyserades. Semistrukturerade intervjuer, observationer, litteraturgranskning och viss kvalitativ data har legat till grund för analysen. Resultaten från fallstudien avslöjade insikter i fallföretagets utförande för produkters förpackningssystem samt dess innovationsprocesser kopplade till förpackningslösningarna. Nyckelfynd presenteras relaterat till enhetlig vision, utvärdering och uppföljning samt system och verktyg. Slutligen visas vägar för förbättringar inom leveranskedjan och presenterar vilka förändringar som behöver göras för att öka försörjningskedjans effektivitet. Övergripande betonar studien vikten av att balansera avvägningar i förpackningsbeslut och procedurer för att förbättra försörjningskedjans prestanda. Genom att använda integrerade stödsystem, tydliga utvärderingsprocesser och att ha förståelse för hur god kommunikation påverkar samordning och samarbete, kan stora effektivitetsförbättringar uppnås.

Nyckelord: Supply chain management (SCM), försörjningskedja för livsmedel, förpackningsprestanda, kommunikation, utvärdering

ACKNOWLEDGEMENTS

This master's thesis marks the ending of our Master of Science in Mechanical and Industrial Engineering at the Faculty of Engineering, Lund University. Over the past five years, we have developed the skills needed for our next chapters and we found it particularly rewarding to dedicate the final months of our studies to this topic. We would like to extend our heartfelt thanks to our supervisor, Daniel Hellström, for his insightful guidance, positive support, and encouragement. Your assistance has been invaluable in keeping us motivated and confident throughout this assignment. We would also like to thank our examiner, Henrik Pålsson, for providing valuable and insightful feedback.

The topic of this thesis was introduced to us by IKEA Food. We are deeply grateful to our IKEA supervisor, Allan Dickner and key informant Erik Olsen, for their continuous support, for facilitating contacts with interview candidates, and for engaging in idea exchanges with us. Additionally, we wish to express our appreciation to the employees who participated in interviews and workshops, contributing significantly to our research findings.

This thesis represents a complete collaboration between the two authors, with each contributing equally to every aspect of the project. Lastly, we would like to thank each other for an enjoyable semester and seamless cooperation.

Lund, May 2024

Anna Samuelsson
Sofie Thulin Lennselius

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

BPM	Business Process Management
CI	Continuous Improvement
CO	Customer Order
CPG	Consumer Packaged Goods
CSF	Critical Success Factor
DC	Distribution Center
DP	Delivery Planner
EPAL	Euro Pallet
FDC	Food Demand Coordinator
FSC	Food Supply Chain
IKEA CFLS	IKEA Category Food Logistics Services
KPI	Key Performance Indicator
MDU	Minimum Delivery Unit
NP	Need Planner
PO	Purchasing Order
PPWD	Packaging and Packaging Waste Directive
PPWR	Packaging and Packaging Waste Regulation
RQ	Research Question
R&D	Research and Development
SCM	Supply chain management
SCO	Supply Chain Orientation
SFM	Swedish Food Market
SP	Supply Planner
3PL	Third Party Logistics

LIST OF FIGURES

1. INTRODUCTION

The first chapter sets the stage by offering the reader background information and problem formulation of this thesis's topic as well as the purpose of the study. This lay ground for the research objectives and the clearly stated RQ. Additionally, this chapter discusses the thesis's delimitations to clarify its boundaries. The chapter concludes with an overview of the structure of the thesis and the content of each chapter to provide a roadmap of the following chapters to the reader.

1.1 BACKGROUND

In today's setting, supply chain management (SCM) and packaging serve as an important part of the food business, both from an environmental and economical perspective, putting extra pressure on packaging and supply chain innovation (Akon et al., 2023). Creating a supply chain that efficiently moves goods from supplier to market requires a complex network of stakeholders that has to consider everything from sustainability, regulatory compliance, to consumer preferences (GEP, 2024). More specifically, things such as fill rate, service level, shelf life and packaging design are just a few that have to be contemplated in order to be successful. A food distribution logistics chain is even more complex and demands not only standard procedures, but also additional steps and considerations since it often includes heightened food safety requirements (Aung & Chang, 2014). This introduction sets the stage for exploring the complex dynamics, innovations, and challenges of food supply chains (FSCs) and transport packaging solutions.

The packaging industry is evolving and constantly changing in line with trends, changes in consumer behavior, new regulations and requirements, and other preferences (Billerud, 2024). A significant trend influencing the packaging industry is that consumers are becoming more conscious of the environmental footprint of products and their packaging (Deloitte, 2023). An investigation by Trivium Packaging (2023) shows that 82% are willing to pay more for more sustainable packaging. Another example is the UK market, where, as of January 2023, 81 percent of consumers now seek out products with sustainable packaging (Billerud, 2024). A big challenge with this trend in regards to the food industry is to secure food safety, while striving for sustainable packaging (Feliciano et al., 2022). Food safety is the most important aspect in a FSC (Schaffer, 2024), and risking this might lead to an even bigger environmental impact (Feliciano et al., 2022), why in a FSC it is important to balance the two.

The complex situation of food distribution involves compliant packaging for both food safety and the ever changing landscape for regulations of packaging. Not only

must the packaging provide internal and external food protection, but also comply with strict regulations (Marsh & Bugusu, 2007). Perhaps the most important and relevant regulation in today's packaging landscape is the EU Packaging and Packaging Waste Regulation (PPWR) (Billerud, 2024). As of March 2024, the agreement between the European Parliament and Council, is mandating all packaging to be recyclable, cutting down on unnecessary packaging and increasing the use of recycled materials (Näringslivets Producentansvar, 2024). The agreement still has to be formally approved, but if approved the PPWR says that EU countries must decrease the volume of packaging waste per capita by 5% by 2030, 10% by 2035, and 15% by 2040, relative to 2018 levels (European Commission, 2022; European Parliament, 2024a; DS Smith, 2024). The regulation also states the "mandatory representative and extended producer responsibility" (European Parliament, 2024a), meaning that any company that is shipping goods to a EU country where they don't have a local branch must appoint a representative for extended producer responsibility in each of those countries (Krahl, 2024). Lastly, it requires countries within the EU to reduce the amount of plastic packaging waste by 20% by 2040, and by 2030, all plastic packaging material must be recycled to 55 percent (European Commission, 2022; European Parliament, 2024a; Näringslivets Producentansvar, 2024). On the other hand, it is stated that paper as a substitute to plastic is not a proper alternative (Meng et al., 2024). Research by the European Environmental Bureau (2023) shows that paper-based materials create deforestation and require large amounts of water, as well as chemicals, some hazardous ones, used in paper-based materials are proven to migrate into food (Simonetti et al., 2024).

Supply chains are becoming more complex due to shortening product life cycles, new technological developments and market uncertainty (Chand et al.,, 2022). For a FSC acting on the global market, the challenge regarding regulations and requirements gets even more complex, since it involves both global but also market specific requirements (Haessner et al., 2024). Food safety regulations vary significantly from country to country (Mitchell, 2003), and companies must navigate a complex web of rules making sure food quality, labeling, and packaging comply with these different legal systems (European Commission, 2024a). But the complexity of a global supply chain extends beyond regulations. A large, global supply chain is inherently complex, with multiple interconnected parties that makes visibility, communication and coordination even harder (Foltin & Nagy, 2023). Visibility is of great importance in the food industry, contributing to product safety and requirement compliance (Aung & Chang, 2014; GEP, 2023), and better traceability enables companies to identify potential contamination earlier and hence minimize the impact of a crisis (PwC, 2024). The complex nature of a large, global supply chain system presents challenges in well working visibility (Aung & Chang, 2014). Relationships between network participants, from upstream suppliers to downstream parties, are typically interconnected in a non-linear manner (Cheng et al., 2014). This complexity makes it not only challenging to understand, predict, or control supply chain networks (Huang et al., 2019), but also to ensure the communication is working between all stakeholders (Cheng et al., 2014). Coordination between all stakeholders must be working, in order for the supply chain not to experience disruptions or other shortages (Huang et al., 2020). Supply

chains are therefore and nowadays increasingly reliant on information sharing, exposing companies and supply chains to another risk, leakage of information shared between stakeholders (Colicchia et al., 2018). Effective communication involves timely and accurate information sharing among all parties, where delays or inconsistencies in communication can lead to disruptions and reduced efficiency (Colicchia et al., 2018). Although it is argued that complex supply chains can offer a strategic advantage to a firm's business objective if handled in an efficient way (Aitken et al., 2016). The performance of a supply chain is directly responsible for the organization's performance, and the optimization of the supply chain and control of the complexity is hence important for the overall performance (Chand et al., 2022).

In recent years, global supply chains have faced many challenges, like demand fluctuation, disruptions and transportation corridors, while being put under a lot of pressure from customers (Foltin & Nagy, 2023). One critical process in the supply chain is the transportation, and a larger, global and more complex supply chain makes this even more critical (Foltin & Nagy, 2023; Patrashkov & Suresh, 2020). During recent years there has been an increased risk of disruptions, meaning transportation might take longer than expected. For a FSC this can be critical since food has a best before date and has to arrive at its destination and be sold within this date (Livsmedelsverket, 2023), putting extra pressure on the transport packaging solutions to handle longer transportations, temperature requirements and prolonging shelf life of products (Grimm et al., 2014). The distance between suppliers and end consumers result in a big challenge in managing the supply chain to be environmentally effective (Koberg & Longoni, 2019). Visibility is once again an important part of managing the supply chain, and environmental and economic outcomes have to be evaluated on a regular basis (Grimm et al., 2014). Effective SCM requires continuous and careful consideration and communication with all levels of stakeholders, particularly regarding sustainability and food safety concerns (Grimm et al., 2014).

The acceleration of globalization has driven customers to establish partnerships with third-party logistics (3PL) providers to efficiently outsource their logistics operations and to keep their core businesses (Foltin & Nagy, 2023; Premkumar et al., 2019; Darko & Vlachos, 2022). The efficiency of logistics is crucial for the functioning of the global economy, and provides organizations with a competitive advantage (Prekumar et al., 2019). Outsourcing logistics to third-party providers introduces certain risks, notably loss of control and communication challenges (Darko & Vlachos, 2022). When companies hand over logistics operations to 3PL providers, they relinquish direct oversight, potentially leading to discrepancies in service quality and alignment with corporate values (Premkumar et al., 2019). Additionally, effective collaboration and creating collaborative relationships with a 3PL provider is one of the important challenges organizations face (Darko & Vlachos, 2022), something that demands robust communication channels (Prekumar et al., 2019). Misunderstandings or information delays can disrupt supply chain flows, impacting deadlines and operational efficiency (Patrashkov & Suresh, 2020). Focus areas for organizations using 3PLs should therefore be on improving customer orientation, building long lasting relationships and consider

the 3PL providers as long term strategic partners (Govindan & Chaudhuri, 2016; Darko & Vlachos, 2022).

1.2 PROBLEM FORMULATION

The area of transport packaging solutions at organizations operating in the food industry has been analyzed from an academic perspective with focus on both the technical solutions and its concerned processes in an organization. A supply chain handling food has shown a very high level of complexity due to its many stakeholders and the strict regulations that apply when distributing food (Haessner et al., 2024; Marsh & Bugusu, 2007). To achieve high performance in the FSC it is essential to consider the performance of the packaging solutions and its system, ensuring that goods can move safely from supplier to end consumer (GEP, 2024). Today, the regulations and requirements on packages are many, coming from both governments but also the consumer, who are increasingly aware of the effects products have from a sustainability point of view (Deloitte, 2023).

There are many challenges in managing a FSC, especially in a global one since the complexity increases with every actor involved, putting extra pressure on the processes revolving around the supply chain. One challenge every supply chain manager faces is to optimize the logistical operations both economically and environmentally and there are many trade offs with most decisions (Nooraie & Parast, 2016). In order for an organization within the food industry to operate efficiently the transport packaging solutions as well as the processes included in the FSC need to be performing well. To understand what processes are important and how they can be improved to increase supply chain efficiency, a case study has been performed evaluating the current state of a company's FSC and further also how its food packaging operations can be improved creating increased efficiency.

1.3 PURPOSE & RESEARCH QUESTION

The purpose of this thesis is to assess the current state of ways of food packaging operation processes, as well as understand what constituent processes can be improved to increase efficiency. Food packaging operations refer to both logistics and packaging innovation processes, such as transportation and warehousing processes and packaging development, supplier related and management processes respectively. To fulfill the purpose, the following Research Question (RQ) will be investigated.

> RQ: *How can food packaging operations be improved to increase supply chain efficiency?*

1.4 FOCUS & DELIMITATIONS

The focus of this thesis is primarily to find and investigate challenges and opportunities for transport and logistics packaging solutions within a FSC. These challenges and opportunities will be related to efficiency. The scope of this thesis is confined to a single case study, concentrating on a particular business unit within the organization. This focus centers on the directives and guidelines from the case company. The research will be limited to local range flows, meaning that the studied supply chain will only focus on the flow from Swedish first tier suppliers to a first tier customer in southern Sweden.

The packaging solutions studied come from a portfolio of "problematic products" given by the case company. The products come from different product areas, categories and brands, and are therefore assumed to represent the organization's operations as a whole. All features related to design and visual attributes are excluded from the study, and the focus lies within the efficiency and effectiveness of the packaging system. The production processes of the actual packaging will not be considered in this study, since this is an outsourced activity from the case company, and not enough information and data are accessed in order to involve this in the study.

1.5 STRUCTURE OF THESIS

This thesis consists of six chapters, all explaining different research phases, which can be seen in Figure 1.1 below with the corresponding outputs. The different phases and outputs eventually arrive at the final findings that fulfills this thesis's purpose.

In Chapter 1 Introduction, the background, problem definition, purpose of this study, RQ and focus and delimitations are presented.

In Chapter 2 Literature Review, existing definitions and theory are described and presented. The definition of packaging logistics and supply chain management are introduced along with common challenges related to logistics processes and different ways of working with these.

In Chapter 3 Methodology, the research overview and case study research approach are presented. The case study design is explained, and the selected case is introduced. The preparation, collection and analysis of data is discussed in this chapter. This includes how data through interviews, documentation, records and observations has been gathered, and what is important when collecting data is being discussed. The interview guide used is introduced in this chapter, as well as how the observations have been carried out. The data analysis steps are described, along with the models used for the analysis. Finally, this chapter addresses the credibility and validity of this study.

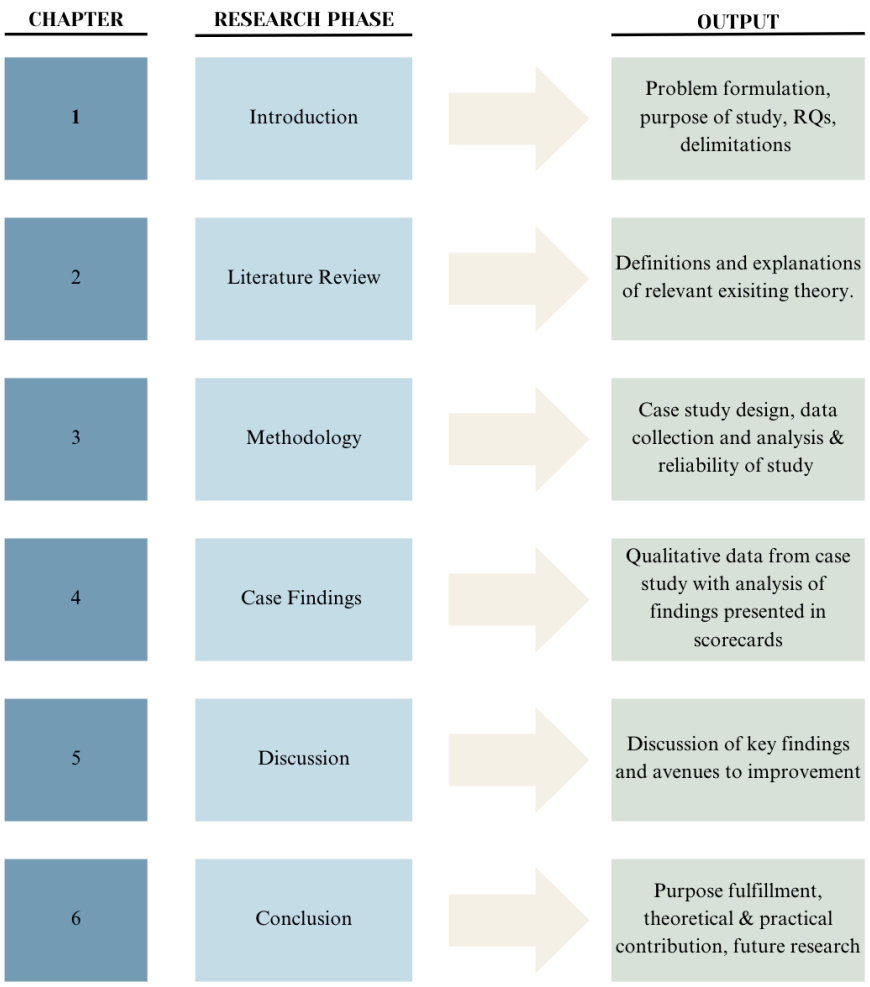


Figure 1.1: The structure of the thesis with each chapter and its corresponding research phase and output.

In Chapter 4 Case Description and Findings, the chosen case to be studied is described, and the case study findings are presented using scorecards and supply chain mapping. The findings are analyzed as well in this chapter.

In Chapter 5 Result and Discussion, the findings from chapter 4 are discussed using theory from the literature review. Suggestions of what to improve is also presented in this chapter, and how this could potentially increase the efficiency and effectiveness of the supply chain operations.

In Chapter 6 Conclusion, the answer to the research question is presented, together with the final remarks. In addition, this chapter explores the conclusion's and recommendation's contribution for both theoretical and practical applications. To conclude, the limitations of the study as well as suggestions for future research and further investigations are presented.

2. LITERATURE REVIEW

In this chapter existing definitions and theory are presented. The concept of supply chain management (SCM) is described with extra effort put into SCM in the food industry. Furthermore, the definitions of packaging and packaging logistics are described and common challenges related to the logistics processes are introduced. Lastly, ways of working with performance measurement, especially in the supply chain, are described.

2.1 SUPPLY CHAIN MANAGEMENT AND LOGISTICS

To understand the definition of supply chain management (SCM), it is first important to understand the meaning of supply chain which easily can be described as a set of companies forwarding materials. Furthermore, it often consists of five different flows which are the flows of information, materials, money, manpower and capital equipment (Mentzer et al., 2001). Another definition is "the functions within and outside a company that enable the value chain to make products and provide services to the customer" (Lummus & Vokurka, 1999). However, Mentzer et al. (2001) presented an ultimate definition of SCM as a result of an elaborate literature review of the subject as:

"The systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole."

Moreover, they created a model showing the flows and functions, trying to visualize the structure of a supply chain. The different flows that act both downstream and upstream are products, services, information and financial resources and also demand which flows in an upstream direction and forecasts that moves downstream (Mentzer et al., 2001). The demand can be described as customers pulling products and/or services through the supply chain, whereas forecasts and the processing of products and/or services is the industry pushing them through the supply chain (Haessner et al., 2024). Then there are the different business units in a company involved in different ways in the supply chain. Marketing, sales, research and development (R&D), forecasting, production, purchasing, logistics, information systems, finance and customer service are all functions that play a vital role for an efficient supply chain (Mentzer et al., 2001). For these functions to create efficiency it is essential that they overcome functional

silos and work on their integration (Croxton et al., 2001). Additionally, both inter-functional coordination emphasized as communication, trust, risk, dependence and behavior and inter-corporate coordination relating to functional shifting, third-party providers, relationship management and supply chain structure need to be managed properly (Mentzer et al., 2001).

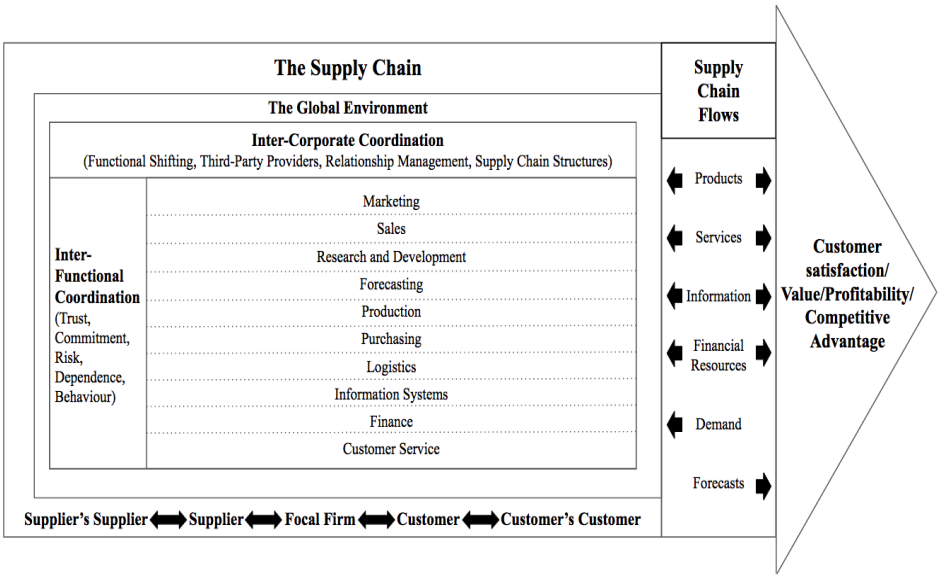


Figure 2.1: A model of supply chain management (Mentzer et al., 2001).

There are also three different levels of supply chains which are direct, extended and ultimate supply chains where a direct supply chain aims at a supply chain complexity consisting of a firm, a supplier and a direct customer. An extended supplier is somewhat more complex since it includes both first and second tier suppliers and first and second tiers customers. The most complex version of a supply chain is the ultimate one which involves all flows upstream and downstream, i.e from raw material to end consumer. (Mentzer et al. 2001) This is shown in Figure 2.2. Apart from complexity related to many suppliers and customers there are also internal complexity within an organization, vertical and horizontal complexity and dynamic complexity. The dynamic complexity refers to the difficulties that come with a fast changing environment related to demand forecasting, delivery accuracy and lead times (Iftikhar et al., 2023). By managing both structural and dynamic complexity the chance of creating a long lasting and efficient supply chain with a high level of robustness increases drastically. When doing so it is important to consider everything from unpredictable demand and supply to logistically managing global distribution and good partnership with other stakeholders involved in the supply chain (Iftikhar, Ali, Stevenson, 2023).

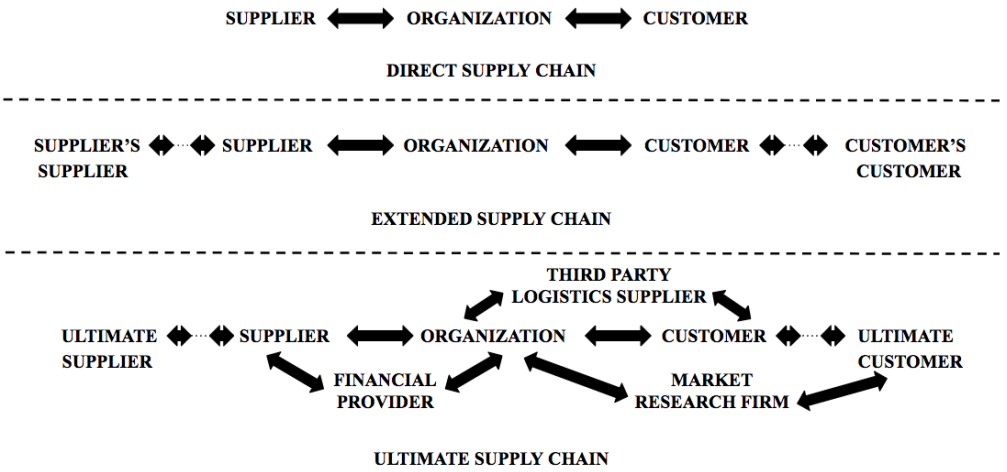


Figure 2.2: Three different complexity levels of a supply chain (Mentzer et al., 2001)

Moreover, there are two distinct parts of SCM, management philosophy which draw attention to the importance of a system view of the supply chain, seeing the entire supply chain as one. The other part is activities needed to implement this SCM philosophy into the organization. Management philosophy implies not only considering the logistical parts of a supply chain but also the strategic decision making and other important functions involved in creating value for the end consumer. To do so, there are three important aspects to consider: having a system approach, a strategic orientation and focusing on what the ultimate customer wants and needs (Mentzer et al., 2001). The activities needed to successfully implement the SCM philosophy are integrated behavior, mutually sharing information, mutually sharing risk and reward, cooperation, the same goals and the same focus on serving customers, integration of processes and partners to build and maintain long-term relationships. Integrated behavior refers to involving external partners in a company's processes and one activity that is needed to do that successfully is to frequently share information and give updates to different stakeholders in the SC. Moreover it is important to share risk and reward since that is one way of finding mutual incentives which will result in a much more efficient supply chain and a stronger feeling of partnership rather than individual parts (Mentzer et al., 2001). (Kache, F & Seuring, S, 2014) states that having an integrated strategy over company boundaries will affect everyone positively. Additionally, they put light on the importance of collaboration between different stakeholders, emphasizing how much proper information sharing affects the performance positively.

2.1.1 Supply Chain Orientation

SCM can also be described as a set of processes that need to be managed in a way to break through functional silos for the involved parties in the supply chain. These processes are management for customer relationship, customer service, demand, fulfillment rate, manufacturing, procurement, R&D and commercialization (Menter et al. 2001). How to structure these processes and activities mentioned above is

often referred to as supply chain orientation (SCO) which can be explained as the systematic and strategic implications that an organization recognizes related to the tactical activities and processes in managing different flows in a supply chain (Mentzer et al. 2001; Esper, Defee, Mentzer, 2010). For a company to implement a successful SCM it is crucial that several companies within the supply chain adopt the same SCO meaning that they have to act based on agreed actions and procedures to be aligned with the remaining stakeholders. According to (Mentzer et al., 2001) “SCM is the implementation of SCO across suppliers and customers” and for a company to be able to implement SCM it is required to first have its SCO in place. Additionally, SCO can imply having shared values and views on strategy to create a broader understanding through the organization how to govern the supply chain. More specifically it means that employees within an organization should operate with a system view in mind, administrating the flows with a holistic approach looking across business unit boundaries as well as company boundaries (Esper et al., 2010).

2.1.2 Food Industry

Looking into a very complex version of a supply chain, the FSC, this has more aspects to consider compared to a regular SC. The complexity partially comes from that there usually is a great amount of stakeholders involved in the production of food and if one stakeholder is affected negatively it directly affects the entire supply chain similarly. Additionally the complexity is due to that a lot of fresh products are handled which comes with a lot of safety regulations. If these products would go bad or the regulations are broken it results in food waste which currently is the biggest issue in the FSC to handle (Haessner et al., 2024). According to Haessner et al. (2024) two thirds of all food waste is caused in the supply chain as a result of poor warehousing, distribution and harvesting. Furthermore, it is important for many customers that sustainability aspects are considered through the FSC meaning that things like natural resources, energy consumption and local production are getting much more valuable for customers. In order for organizations to manage their FSC they need to have a strategy that supports both economic and sustainable efficiency (Haessner et al., 2024) and for management to be able to succeed they need supporting systems and tools that are aligned with chosen strategy through the supply chain (Småros, 2018).

In today's food industry there are a lot of changes happening which need to be addressed to keep relevant. Some changes that retailers need to consider are offering an increased range of options, short shelf life products getting more popular and an increased demand for convenience. To manage these changes an organization needs to have a clear strategy and even more importantly, a supply chain that matches the chosen strategy (Småros, 2018). With these changes in an already complex supply chain there are some challenges that need to be managed and that is communication, fluctuating demand and food safety. Since there are so many actors involved in a FSC, the communication gets more complicated between these actors and hence more important to manage. Good communication involves both having proper information sharing but also building strong partnership with

stakeholders across the SC. The food industry is highly dependent on seasonalities and holidays which both contribute to the volatile demand and hence also the complexity in managerial aspects. Decision making has to be fast and forecasts have to be updated regularly. Furthermore, consumers are very sensitive to shapes and colors on food which puts even more pressure on the FSC and R&D to know their consumers well (Haessner et al., 2024). Lastly, there are challenges that come with regulating food safety which takes place at each step of the FSC and increases the bigger the distribution network is. This follows that the traceability of the products though the supply chain is extremely important which further increases the difficulty of managing the different flows (Haessner et al., 2024).

(Zimon et al., 2020) present six ways to improve the business processes and SCM using ISO 22000 (Svenska institutet för standarder. 2018) in a FSC by organizing clear communication, systemizing activities related to food safety, optimizing resource utilization, effective process control, adequate identification and traceability, and increased quality of food production with feasible repeatability. These further accentuate the importance of the tactical activities needed for an optimized SC. It is also stated that by increasing supply chain efficiency, the level of food waste can also be decreased and hence improving the environmental impact and cost efficiency. To successfully reach optimized supply chain efficiency the relationships with suppliers and customers are also mentioned as crucial. Moreover it is also essential to consider the packaging solutions in a FSC since the sensitivity is much higher for those types of products in regards to food safety and hence also food waste. (Zimon et al. 2020)

2.2 PACKAGING LOGISTICS

In order to properly answer the RQ, knowledge about packaging and packaging logistics are required. To evaluate packaging and how packaging affects the efficiency and effectiveness of the supply chain, an understanding of packaging and the packaging system's role within the supply chain is necessary. Before doing so, the definition of the packaging system and packaging logistics must be well understood, as well as the functions and properties of packaging. Packaging logistics is defined as "*An approach which aims at developing packages and packaging systems in order to support the logistical process and to meet customer/user demands*" (Dominic., 2000). Saghir (2002) instead proposes the following definition for packaging logistics *"The process of planning, implementing and controlling the coordinated Packaging system of preparing goods for safe, secure, efficient and effective handling, transport, distribution, storage, retailing, consumption and recovery, reuse or disposal and related information combined with maximizing consumer value, sales and hence profit"*.

In order to understand what this means, the concept of packaging system has to be defined (Pålsson, 2018). Packaging is, according to the definition of Saghir (2002) "*a coordinated system of preparing goods for transport, distribution, storage, with safe, secure, efficient and effective delivery to the end consumer at minimum cost"*.

A packaging system consists of three different levels of packaging; primary, secondary and tertiary packaging (Pålsson, 2018). The primary packaging is what is closest to the actual product, the secondary packaging contains a certain number of primary packages, and the tertiary packaging is often a pallet or roll container, containing a number of secondary packages (Hellström & Saghir, 2007). These levels of packaging should be viewed as an integrated system and a systems approach should be applied, meaning that the different levels operate together as a cohesive unit and not solely on their own (Pålsson, 2018). The systems approach highlights the interaction between the different levels of packaging and the performance of the packaging system is made up from both the individual performance of each level, as well as the interactions between these (Hellström & Saghir, 2007). According to Pålsson (2018), the use of such an approach in packaging logistics emphasizes the interactions between the different packaging levels, thereby providing a comprehensive view of the various functions of packaging, as well as a better way to analyze and balance different requirements and trade-offs.

2.2.1 Role of Packaging

According to Hellström & Saghir (2007) packaging meets logistics needs by offering a convenient way of handling, distributing and providing information about products. Looking more deeply into these needs and the specifics of packaging and the role of packaging there are some functions that are important to consider and that every packaging should fulfill. These are; protection, apportionment, unitization, containment, communication and convenience, as seen in Table 2.1 (Pålsson, 2018).

Table 2.1: Definitions of the basic function packaging should fulfill (inspired by Pålsson, 2018).

Function	Definition
Protection	To safeguard content
Containment	To hold and maintain content
Apportionment	To reduce large-scale and high-volume production to manageable sizes
Unitization	To modularize the packaging levels to obtain material-handling and transport efficiency
Communication	To identify the packaging in the supply chain and to provide product information
Convenience	To simplify the use of products

When distributed, products are exposed to pressure, shocks, vibration and temperature changes, and packaging's role is to offer protection against these exposures. The packaging should also be strong enough to hold and maintain the

content during the logistics and transport processes, referred to as containment. It is also important that the packaging prevents the content from leaking or diffusing, especially when talking about a FSC. The content should then maintain its characteristics, as well as be contained with the correct barriers in order to prevent degradation, and protect from moisture, air, chemicals etc. In the context of food, protection and containment refer to ensuring that food products are safely stored, transported, and consumed. There are three types of risks when doing so; physical, microbiological, and chemical. Physical protection and containment involve guarding food products against external factors, such as glass or plastics, that could cause physical damage or contamination. Microbiological risks are bacteria, fungi or viruses, and chemical risks can be for example allergens or preservatives. Many organizations today strive for economies of scale, often leading to production of very large volumes. To make these volumes more manageable for customers, packaging is used to apportion or divide them into smaller sizes, referred to as the function apportionment. As mentioned earlier, the different packaging levels should be seen as a system, and for this to work each level has to have unitization. This refers to making sure the primary packaging fits in the secondary packaging, which in turn fits in the tertiary packaging in a proper and efficient way. The communication function of packaging refers to the ability to provide track and trace data about the product and packaging, as well as important product information. Lastly, the packaging should provide convenience, making product and packaging-handling easy throughout the supply chain. (Pålsson, 2018)

Furthermore, packaging is also influenced by legislative requirements and demands and when it comes to the food industry and food packaging, these are subject to stringent regulations. The materials that come in contact with food during the supply chain processes are called Food Contact Materials (FCMs) (European Commission, 2024b). The protection and containment functions mentioned above, will hence be not only to protect and contain the product from external risks, but also from internal ones. This puts extra pressure on food packaging, and also limits the choices that can be made regarding packaging, since the highest priority is to provide and maintain food safety along the life cycle of the product.

2.2.2 Packaging performance in supply chains

To fully comprehend packaging logistics, it's important to understand how the packaging system integrates with and performs within the supply chain. Packaging is an important factor in the performance of the supply chain and according to Hellström & Saghir (2007) "*packaging affects supply chain effectiveness because it represents an interface between the supply chain and its main customer, the end user."* Furthermore, according to Pålsson (2018), the logic of supply chain integration is to consider all processes in the supply chain and synchronize these, and to optimize flows of activities rather than each individual activity. Packaging plays a vital role in this optimization, since there are several activities that need to be synched, related to packaging, along the supply chain and its different actors (Pålsson, 2018). For example, packaging enables communication of important information through labels and stickers, and since packaging influences logistics

throughout the whole supply chain, all these activities have to be synchronized. By emphasizing a holistic view of the packaging system and the processes in the supply chain, the overall performance and efficiency can be analyzed and evaluated (Pålsson, 2018).

In regards to how packaging impacts the efficiency of logistics processes, the significance of this is often known, but not uncommonly overlooked by different stakeholders (Hellström & Saghir, 2007). According to Pålsson (2018) packaging has significant impact on performance and "*a supply chain approach can generate value and cost efficiency by reducing product waste and improving logistics and transport efficiency".* Since packaging is present through the whole supply chain, packaging specifications directly influence the efficiency of every logistics and transport operation. For example, the packaging specifications can directly influence the product lead time, since the packaging impacts the time to completion of packaging operations (Hellström & Saghir, 2007). Another example of how the packaging can influence the logistics operations is if the packaging is insufficient to handle the product throughout the supply chain and lead due to damages and inefficiency in related operations. Consequently, packaging both influences and is being influenced by every logistics activity, and hence has a great impact on logistics cost (Pålsson et al., 2012). Pålsson & Hellström (2016) states that the costs and environmental efficiency is affected by the packaging, most specifically by packaging development, packaging purchasing and/or transportation efficiency. The specification of packaging affects transport, communication, warehousing and other activities, and actions related to these packaging specifics can therefore be motivated by the improvement of one or several of these activities and hence the logistical performance (Hellström & Saghir, 2007). Due to this, it is essential for packaging managers to have information about all packaging related processes in order to make the best decisions possible. In order to do so, all processes that are associated with packaging must be identified and evaluated (Garcia-Arca et al., 2014; Lockamy, 1995). The impact of packaging as well as this examination of processes will provide a competitive advantage for the organization in question (Hellström & Saghir, 2007).

2.2.3 Packaging and Trade-offs

When deciding and evaluating different packaging specifications, it is important to know that trade-offs between different features must be considered. As of today, the collaboration between different actors regarding packaging development is often limited, but one way of improving this is to be aware of trade-offs and make informed decisions about this (Pålsson & Hellström, 2016). There are several features that have to be decided on for packaging, and different features to be fulfilled from different actors. These features, such as minimal environmental impact or cost, are not unlikely to be contradictory. When this happens, the trade-offs between the features have to be carefully considered. One of the most common trade-offs involves cost; for instance a low-cost packaging is preferred by the manufacturer, while a more expensive packaging to ensure protection is preferred by the retailer (Pålsson, 2018). Another typical trade-off between

packaging functions is the balance between product protection and weight efficiency, where enhanced protection can lead to additional weight during transport (Pålsson & Hellström, 2016). Some other common trade-offs are presented in Table 2.2 (Pålsson, 2018; Pålsson & Hellström, 2016).

Table 2.2: Example of trade-offs as an effect of changes in different packaging features (inspired by Pålsson, 2018; Pålsson & Hellström, 2016).

Packaging Feature	Trade-Offs
Increased Logistics Information	Decreases shipment delays. Decreases tracking of lost shipments. Decrease theft, damage and insurance in inventory. Increase product availability. Increases carrying costs and labor costs.
Increased Packaging Protection	Decreases damage and theft in transit, but increases package weight and transportation costs. Increases stacking, but decrease cube utilization due to increased size of dimensions.
Increased Standarization	Decreases handling costs, vehicle waiting time for loading and unloading; increases modal choices for shipper and decreases need for specialized transportation equipment.
Increased Packaging Size	Increases volume efficiency, but bigger packaging size not always convenient and easy to handle.

It is clear that various supply chain actors face different packaging-related trade-offs. What is notable is that both awareness of these trade-offs and the approaches to them vary among the actors. On one hand, a packaging decision made by one actor may require other stakeholders to adapt and manage the resulting trade-offs (Pålsson & Wallström, 2014). From another point of view, another study shows the greatest supply chain performance has been found to result from a combination of standardized and differentiated packaging solutions (Hellström & Nilsson, 2011). A study made by Pålsson & Hellström (2016) showed that features and requirements should be systematically analyzed to maximize packaging system performance in the supply chain. Since different actors have varying priorities and are impacted by decisions differently—some benefiting while others encountering drawbacks—collaboration among all actors is crucial to evaluate overall performance (Pålsson & Hellström, 2016). Within this collaboration, trade-offs need to be carefully considered, and comprehensive information should be gathered in order for actors to make informed decisions about trade-offs. This information should include both cost and environmental aspects. Pålsson & Hellström (2016) also emphasize that in order to obtain the highest packaging system performance, conscious packaging trade-offs need to be conducted. This requires collaboration among stakeholders to identify and evaluate trade-offs, as each actor's perspective is unique.

2.2.4 Environmental Effects and Regulations

From an environmental standpoint, a recent analysis (Doherty & Hoyle, 2009) concluded that packaging initiatives hold a great potential for reducing

environmental impact in supply chains. Previous studies, for instance, Livingstone & Sparks (1994), have also shown that packaging plays a crucial role in strategies used to reduce environmental impact of logistics (Wu & Dunn, 1995). Therefore, a successful packaging selection approach must account for both economic and environmental packaging requirements from various supply chain stakeholders.The environmental impact of the product and its packaging comes from both direct and indirect effects. The direct effects come from production and waste of the packaging material, while the indirect effects refer to the impacts of the packaging on logistics and transport processes (Pålsson, 2018). The indirect effects are often overlooked both in theory and practice, although they are often greater than the direct effects (Pålsson, 2018). When measuring these impacts and effects, there are both different methods and different measures to use. Two common measures are energy consumption and CO_2 emissions. Energy consumption sometimes can be more relevant since it ensures that all sources are analyzed, even the CO_2-free ones, but it is important to use the same measures in comparative analysis (Pålsson, 2018). Different methods for measuring these effects are for instance LCA-analysis (Lewis et al., 2010) or packaging scorecards (Olsmats & Dominic, 2003), which are further discussed later in this section.

Packaging has become a crucial and increasingly complex matter, driven by increased legislation and consumer awareness of the environmental performance of packaging (Pålsson & Sandberg, 2020). In regards to the direct effects packaging has on the environment, the decisions regarding packaging material are relevant to discuss. This refers to the production and waste handling of the packaging material used (Pålsson, 2018). More specifically, the packaging material efficiency includes the act of balancing the amount of packaging, not to mix materials, use more energy efficient materials and do not use hazardous substances. It is important to minimize the amount of material used, without compromising containment and protection of the product. The material used should be as energy-efficient as possible, minimizing energy consumption relative to the number of times the packaging is used, and it should be free from hazardous substances to avoid exposing customers and the environment to harm (Pålsson, 2018). Lastly, by minimizing the number of mixed materials, efficient recycling is facilitated. As mentioned above, the direct effects of packaging also include the waste handling of the packaging.

Currently, a large amount of packaging material is turned into landfill and not recycled (European Parliament, 2024b), pointing out the importance of the decisions regarding packaging material. According to the European Council (2024) the amount of packaging waste has increased by nearly 25% over the past decade and is expected to increase by another 19% by 2030 if no action is taken. The Packaging and Packaging Waste Directive (PPWD) has been in place since 1995, and revised several times since, with the aim to reach recycling targets. However, the directive has been shown not to be successful in reducing the environmental impact of packaging (European Council, 2024). The amount of landfill has to be reduced, and a new attempt to do so within the EU is instead with EU's new PPWR that will replace PPWD. The regulation is still under negotiation, and the exact

contents has not been determined yet, but organizations can expect to be required to decrease the volume of packaging waste per capita by 5% by 2030, 10% by 2035, and 15% by 2040, relative to 2018 levels, as well as being climate neutral by 2050 (European Commission, 2022; European Parliament, 2024a; DS Smith, 2024). If approved, the regulation has to be formally adopted by both the European Parliament and Council before it can enter into force, and will be applied from 18 months after this. For reference of the content of the regulation, the recycling targets of PPWD, which PPWR will replace, are presented below in Table 2.3.

Table 2.3: Targets of packaging waste according to EU's Packaging and Packaging Waste Directive (inspired by European Parliament, 2024c).

Packaging Waste	**Recycling Target Deadlines**	
	31 Dec. 2025	***31 Dec. 2030***
All Packaging Waste	65 %	70 %
Glass	70 %	75 %
Paper & Cardboard	70 %	75 %
Metals	70 %	75 %
Wood	70 %	75 %
Plastic	70 %	75 %

Looking at the indirect effects and the role of packaging in environmentally responsible decisions these refer to the packaging's influence on the logistics and transport processes. Wu & Dunn (1995) discusses how packaging decisions affect the logistics decisions and consequently the environmental impact. In order to make the most efficient decisions that reduce the environmental impact, in terms of for example transport mode, transport handling and warehousing, packaging must have the appropriate features. This means that packaging should provide appropriate handling, stackability and unitization features (Pålsson, 2018). For example, packaging should provide stackability, unitization and volume efficiency in order to optimize space utilization in transports and warehouses. A high level of space utilization will lead to decreased energy consumption since more products can fit in a transport as well as required warehouse heating can be shared amongst more products (Pålsson, 2018). The weight and volume efficiency refers to the utilization of the three packaging levels, and more precisely to the amount of air present in the packaging. This affects utilization in warehouse space, transportation and material handling efficiency, and hence indirectly impacts the environmental effects of the packaging in the supply chain. The choices of packaging specifications will influence the logistics and transport processes, and hence the environment. The size, unitization and stacking capabilities of the packaging

influences the use of warehouse and transportation space, lighter packaging can decrease transportation costs, and more robust packaging can minimize damage (Garcia-Arca et al., 2014).

As mentioned before, the impact from the indirect effects are often greater than the direct. This applies especially for food products, and Grönman et al., (2012) states that "*recent life cycle assessments indicate that the environmental impacts of packaging are small compared with the environmental impacts of the packed food products*". When looking at the supply chain and the energy consumption for different stages, it is clear that food supply represents the biggest energy consumption, illustrated in Figure 2.3 (Pålsson, 2018). Energy consumption in the entire supply chain should be minimized, and it is shown that it is essential to minimize food waste to do so. Packaging is exposed to many challenges during its life-time, as explained in Section 2.2.1. Sufficient packaging with more or better packaging materials and attributes that can protect the product (food) against these challenges will result in positive environmental impact (Pålsson, 2018). The environmental impacts of food losses, if they occur, represent a larger portion of environmental impacts compared to the production of the packaging that contains the food (Grönman et al., 2012). The best packaging is not just the one with the lowest cost, but the one with the most suitable design for the specific product. Adding more protective features to packaging can be evaluated not only by the packaging cost but also by considering the cost of product and packaging losses, where food waste should be prioritized.

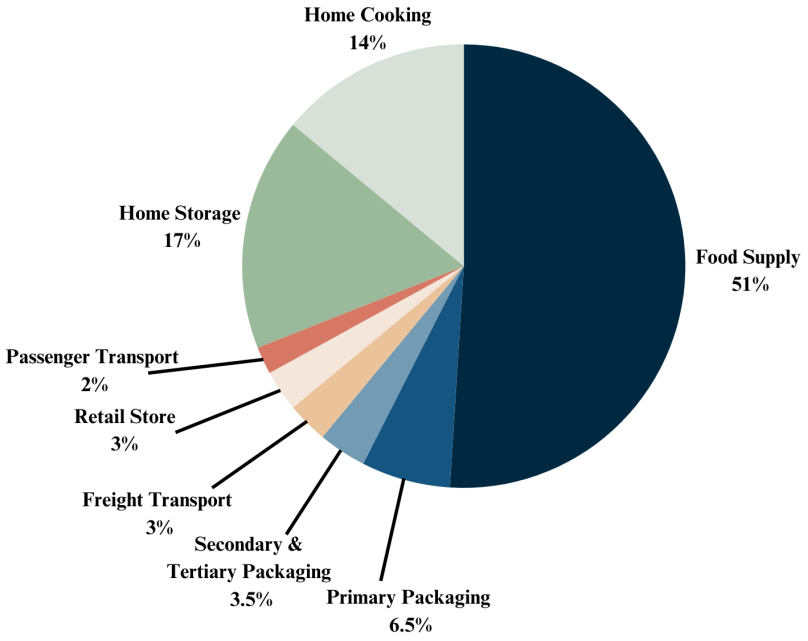


Figure 2.3: Energy consumption of different activities in the supply chain of food packaging (Pålsson, 2018).

To make the best and most informed decisions about packaging and how it affects the supply chain processes, the impact must be measured. One way of doing so is by a life cycle analysis (LCA), which systematically quantifies the impact of the

packaging throughout its life cycle (Pålsson et al., 2012). The method provides an overview of where the biggest environmental impacts lie and the root causes of the impact (Lewis et al., 2010). The method is made up of definitions, protocols and methods from international standards (Lewis et al., 2010), and can according to Pålsson et al., (2012) "*... facilitate strategic planning, prepare regulations, identify hot spots, facilitate comparisons of options within a life cycle, identify research priorities, provide information about environmental impacts*…". Although, LCA has faced criticism due to challenges in implementation since LCA involves extensive data collection, which often is limited in accessibility, and the process of gathering this data is very time consuming (Pålsson et al., 2012). Beyond this, LCA can be costly and necessitates high levels of expertise, further complicating its adoption. Even among LCA specialists, interpreting the results can be challenging (Lewis et al., 2010). Another model which assesses the packaging impact is Olsmats & Dominic's (2003) "Balanced Packaging Scorecard", which is based on functional features and criteria of packaging for every actor and part of the supply chain (Pålsson et al., 2012).

The drawback of this method is that it is a subjective method in some ways, opening up for challenges in distinguishing between the environmental and financial effects (Pålsson et al., 2012). Svanes et al. (2010) propose a methodology that groups factors into five main categories; environmental sustainability, distribution costs, product protection, market acceptance, and user-friendliness. Each category contains specific indicators to evaluate the relevant aspects, and what is unique for this method is that it is focusing on indirect impacts, such as product losses and transport efficiency (Grönman et al., 2013). However, the methodology does assess the significance of these or provide guidance on resolving trade-offs (Grönman et al., 2013). A study by Garcia-Arca (2014) shows that organizations should adopt a "Sustainable Packaging Logistics" approach in order to in the best way integrate both sustainability and efficiency in supply chains. It is suggested to "*implement "sustainable packaging logistics", based on four cornerstones and three stages of evolution is particularly significant, while contributing to improved competitiveness*", with the four cornerstones: definition of design requirements, definition of an organizational structure; a system that measures the impact of a packaging, apply innovations in packaging design (Garcia-Arca, 2014).

2.2.5 Decision support for industrial packaging

When deciding on packaging characteristics, it is important to understand what different principles exist and how these can be used as support for decisions. Pålsson (2018) presents packaging selection principles that should provide guidance on how to manage different trade-offs in the supply chain, seen to both financial and environmental aspects. The five principles presented are; sourcing and production strategies, one way vs reusable packaging, packaging size, scale effects, and volume and weight efficiency (Pålsson, 2018).

The first decision strategy, sourcing and production strategies, is about choosing an option that should guide the organization through sourcing and production and how these are operationalized. Two examples of options are to either minimize costs or to minimize environmental impact. The main message of this strategy is to choose an option and stick to it, since supply will affect packaging efficiency. The second strategy, one way vs reusable, refers to making the decision on using reusable packaging or not. This decision should be based on several factors, like product characteristics and transportation distance, that all determine the packaging effect on the supply chain. The cost and environmental impact should be analyzed in respect to these factors, when making the decision about packaging. The third strategy, packaging size, can be both operational and strategic. It affects the inventory and the space utilization, but also the amount of consumption (lower consumption, smaller packaging). The size does not only refer to the volume of the packaging but also to the shape of it. The fourth decision is about potential scale effects for packaging. These scale effects may show that the use of fewer unique packaging solutions result in more efficient handling and transportation, as well as less complexity and costs. Therefore, the scale effects should be analyzed when deciding on packaging characteristics. Lastly, the fifth strategy, vole and weight efficiency, refers to optimizing the capacity of the packaging system. By filling up packaging, the costs and environmental impact related to material handling, transportation and to some extent packaging material can be reduced. (Pålsson, 2018)

2.3 BUSINESS PROCESS MANAGEMENT

In every organization there are many different processes performed continuously. However, in order for a business to reach their set goals, these processes need to be managed properly. According to Trkman (2010) successful business process management (BPM) is defined as "*If it continuously meets predetermined goals, both within a single project scope and over a longer period of time"*. BPM may seem as a rather straightforward approach to satisfactory performance but the fact is that only about 30% of all business actions taken, are seen as successful. When discussing how a business initiative can result in a successful outcome critical success factors (CSFs) are often brought to attention and there are a few that are mentioned more frequently than others. Top management support, project management, communication and cooperation, and training of end-users (Trkman, 2010). The definition of what top management support is and how it can be practiced, is very broad and sometimes vague. However, it can be described as having the ability to improve coordination, contribute to increased cross-functional and interorganizational information sharing as well as being part of building strong and long-term relationships. Additionally, it can also have a great effect on SCM implementation and facilitating change initiatives. Businesses need to be open for change which top managers play a vital role in, driving it by training and allocating staff members properly in a manner that is aligned with set goals and values (Sandberg & Abrahamsson, 2010).

Another very important CSF, communication, is also mentioned frequently but seems to be more difficult to practice effectively. According to (Falkheimer & Heide, 2022) one way of creating good communication is to coordinate communication for marketing, PR and other internal channels to reach robust communication processes that work over a long period of time. Further it is important to align the communication so it fits and alignes with the overall strategic goals. The difficulty with communication is that it has to be performed by almost every person and business unit which further increases complexity in an organization. How the communication should be conducted is often based on guidance from people specialized within strategic communication and can hence be seen as a process itself. Shribman (2023) states a few ways of making the communication more effective which are by being clear and concise, listening actively, delivering the message with the right body language and facial expression, and much more. By being clear in the communication, whether it is in person or by email or other communication channel the message will be easier for the recipient to understand and act on. Additionally, the ability to listen carefully to what other people are trying to communicate, is the foundation to understanding what the conversation is about and hence also how to formulate a good response. The importance of nonverbal communication such as body language is immense, in fact it is stated to be as much as 55%, making it crucial for a successful face-to-face conversation. Moreover, Shribman also discusses some common challenges with communication such as language barriers, cultural differences, communicating too much and not evaluating the performance of the current communication.

When discussing cultural differences, both personal and between different business units, this is something that can cause functional silos and hence also decrease cross-functional integration. It can be difficult to reach a similar culture over an entire organization that is aligned with the company strategy due to. According to Schein (1996) there are three different cultures that often occur in an organization: the operator culture, engineering culture and the executive culture which are fundamentally different. The operator culture is based on internal performance meaning that it differs a lot between different industries and also between business units within the same organization. Further it follows that the cultures change when technology and other outside effects change. The engineering culture can be described as thinking that there are abstract solutions to every problem which can be solved with products and systems. Ideally they want to find solutions that do not include a lot of human power and prioritize performance, efficiency and safety. The executive culture is instead often based on getting information and having control. They are also very aware that the organization is extremely dependent on its people running the processes, however as people climb up the hierarchy the more impersonal they get since they move from working close to the actual operations to managing other managers that are more likely to think similar to the executive. (Schein, 1996)

To manage these cultural differences and break functional silos, it is essential to create teamwork across business units and hence also build horizontal collaboration. One way this type of collaboration can be facilitated is through learning and understanding those who are different from oneself. However this is

not alway easy which naturally makes it a very important topic for managers, how to accomplish cross-functional work efficiently (Edmondson et al. 2019). What can be used, which is shown to be successful, is cultural brokers who act as a bridge between different teams (Edmondson et al., 2019; Eisenberg & Mattarelli, 2017). It is crucial for the cultural broker to possess an understanding of various teams and their respective cultures to facilitate appropriate coordination. Additionally, by using this type of link the process of coordination gets more efficient since the concerned members do not need to learn about the differences in cultures and working procedures of the other teams (Edmondson et al., 2019).

Another very important aspect of BPM is that in order for a company to set up an efficient business, managers really have to understand their business and the processes in it. Rummler & Brache (1991) stated that while managers may be familiar with the structure of their departments and employees, they often overlook the products and/or services they provide to customers. They further emphasize that there is a distinction between representing the organization and the business itself; merely visualizing the employees and their clusters does not encompass the entirety of the business. When not considering these aspects when thinking about the company there is a great risk of also missing the processes involved. Further problems that can occur in an organization are when it is viewed solely from a vertical perspective, meaning that each business function is by themselves with no cross functional processes and the management acts accordingly (Rummler & Brache, 1991). The vertical view can often be a core reason for functional silos in an organization where departments have their own business with their own key performance indicators (KPIs).

2.4 PERFORMANCE MEASUREMENT

The business environment is constantly changing, and with this a greater understanding of SCM is necessary. SCM, as described in Section 2.1 refers to the strategic coordination of business functions and the tactics within these functions, in order to improve the long term performance. To improve performance, it is crucial to first establish a procedure of what to measure and how to measure this, then to evaluate the supply chain functions to identify areas for improvement. Yadav et al., (2013) points out that the traditional financial performance measurement has been criticized in literature and states that other non-financial perspectives must be integrated in measurements. It is also stated that SCM has shifted to competition between the entire supply chain, not between individual organizations (Jagan Mohan Reddy et al., 2018), and due to this it is difficult to apply traditional measurement methods to gain accurate evaluation (Jiao et al., 2021). Furthermore, performance measurements are described as a set of metrics that measures both effectiveness and efficiency (Shepherd & Günter, 2005), and performance management creates background for performance measurements in a virtuous spiral (Yadav et al., 2013). According to Saleheen & Habib (2023), well executed measurement of performance can be beneficial to organizations in terms of implementing and controlling business strategy. Jagan Mohan Reddy et al.,

(2018) highlight that every supply chain wants to improve their performance, and that it is necessary to have effective performance metrics to measure the efficiency and effectiveness in the supply chain, because without measure there is no improvement. It is not only important for an organization to understand the meaning of a metric, but also why it is being measured, and in combination with how it affects the supply chain performance (Holmberg, 2000). This information should also be shared with internal departments as well as external parties, to use the same measurements and look at a more holistic view of performance, than just the single department or organization (Holmberg, 2000).

To measure the supply chain performance different approaches and tools can be used, including for instance the Balanced Scorecard (BS) by Kaplan and Norton (Shepherd & Günter, 2005), the SCOR model and KPIs (Saleheen & Habib, 2023), which are also the most commonly used ones. BS is used both as a measurement tool but also as a management system to clarify and translate vision and strategy into objectives (Holmberg, 2000). Holmberg (2000) states that this is crucial since managers otherwise might form their own interpretations of what the strategy means to them personally. The SCOR model integrates business processes and performance metrics into a unified structure, while breaking down each supply chain activity into five processes; plan, source, make, deliver, and return (Shepherd & Günter, 2005). Each process has associated metrics, best practices, and workflows, allowing organizations to assess and improve their supply chain performance. Research shows limitations within these methods, and in order to capture all relevant points for supply chain performance it is important to have a holistic point of view (Saleheen & Habib, 2023). Holmberg (2000) claims that systems thinking should not only be applied to the flow of goods but to performance measurement as well. By considering measurement activities as a set, it will allow for recognition of the properties as a whole (Holmberg, 2000). By applying systems thinking to the measurement within the supply chain, it will allow organizations to understand the problems throughout the supply chain and measure the performance as a whole, instead of one specific unit.

2.4.1 Systems thinking in performance measurement

Research shows limitations within performance measurement methods, and in order to capture all relevant points for supply chain performance it is important to have a holistic point of view (Saleheen & Habib, 2023). Holmberg (2000) claims that systems thinking should not only be applied to the flow of goods but to performance measurement as well. By considering measurement activities as a set, it will allow for recognition of the properties as a whole (Holmberg, 2000). By applying systems thinking to the measurement within the supply chain, it will allow organizations to understand the problems throughout the supply chain and measure the performance as a whole, instead of one specific unit. Holmberg (2000) states that by concentrating solely on a single organization and neglecting how other measurement activities fit into the broader context, one misses the opportunity to leverage measurement to improve overall supply chain performance. This means for instance by minimizing the costs in one organization or department

of the supply chain by simply moving it to another part, will improve the performance for that department but not the whole supply chain (Holmberg, 2000). Furthermore, if the cost of different processes in an organization are managed separately, the entity "total cost" would not be possible to measure, and the tradeoffs between the two components would not be possible to be discussed and improved (Saleheen & Habib, 2023; Holmberg, 2000).

To enable the measurement along the supply chain, it is once again important to understand the relevance of SCM and the relationship with other supply chain partners. It is of great importance to study and evaluate the relationship and level of trust between actors in order to increase performance in the supply chain (Panayides & Lun, 2009). Jiao et al. (2021) stated that if the relationship between supply chain actors is good enough, and that there exists trust between these, actors will choose to truly share information. The role of trust can also bring higher performance to the supply chain (Jiao et al., 2021), and building and managing supplier relationships is therefore an important part of performance measurement throughout the supply chain.

2.4.2 Key Performance Indicators

Many companies face challenges with defining a strategy for measuring and managing supply chain performance and assessing improvement opportunities. To measure the supply chain performance, organizations must establish clear key performance indicators (KPIs) suitable for the specific organization (Ying et al., 2009). KPIs are quantifiable metrics that organizations use to monitor and evaluate processes and specific objectives over time (Marinagi et al., 2023). Chae (2009) means that it can be a complicated process to develop and implement KPIs due to lack of incentive and top management support, and the organizational culture. A lot of companies have well-defined business-related KPIs, but lack well-developed ones that are more specifically related to the supply chain, which are also necessary (Chae, 2009).

Common challenges that arise concerning the supply chain performance metrics are; selecting appropriate metrics and examining the financial impact of supply chain improvements (Ying et al., 2009). Regarding the first challenge, companies often track many KPIs which are resulting in complex performance reports and do not reflect the supply chain operations (Ying et al., 2009). Furthermore, some companies have little or no knowledge on how to develop good KPIs for the supply chain (Chae, 2009), and it is common for organizations to have too many and incompatible metrics (Holmberg, 2000). If managed to define the correct KPIs, less KPIs are better for a company (Chae, 2009). Less metrics will lead to less complexity and confusion, and will also result in the top management being more agile in changing market conditions (Ying et al., 2009). To generate relevant information and insight, companies must choose KPIs that reflect strategic objectives and present a comprehensive portrayal of the supply chain performance, integrated across the supply chain (Ying et al., 2009). What is being measured is what is being improved, and if a company has too many metrics, and also

contradictory ones, it will not allow for successful improvements. Chae (2009) proposes to use the SCOR-model to develop KPIs, and Ying et al. (2009) highlights the use of the balanced scorecard methodology. Although, it is important for individual firms to evaluate and customize the approach to their own organization when selecting metrics (Ying et al., 2009). Moving on to the second challenge, examining the financial impact of supply chain improvements, it is crucial to directly link supply chain execution to finance. Without a clear understanding of the critical relationship between measures, companies will not be abe to fully transform SCM into a profitable value-chain strategy (Ying et al., 2009). To do so, Yin et al., (2009) suggest incorporating the supply chain measures with financial measures like Economic Value Added (EVA) or Cost of Capital. Lastly, theory emphasizes the importance of choosing, prioritizing and continuously evaluating and updating the KPIs used within the organization in order to enable supply chain performance improvements (Ying et al., 2009; Chae, 2009; Holmberg, 2000).

2.4.3 Continuous improvement

Related to the fast changing business landscape and the increased requirements on supply chains, organizations are proposed to develop approaches to deal with these to improve performance. One of the most powerful approaches is, according to Prado-Prado (2009) the use of continuous improvement (CI). CI is a process where supply chain processes and activities are being diagnosed and evaluated, and then upgraded where needed (Saleheen & Habib, 2023). Prado-Prado (2009) states that '*there is an assumption that continuous improvement increases employee involvement in decision-making*'. Studies show that CI is recommended in an organization, and that it should be prioritized to identify quantifiable improvement (Prado-Prado, 2009). Although, it is important to understand the concept of CI and gain experience on how to apply this to the organization's actions. To do so, the organization must focus on a culture of continuous improvement, a culture of total quality management (TQM), and on process standardization (Saleheen & Habib, 2023). Kaizen Institute (2024) defines a culture of continuous improvement as "*an organizational environment where the relentless quest for improvement, innovation, and excellence is deeply rooted and valued by every member*". Foster & Gardner (2022) describes TQM as a continuous approach aimed at identifying and reducing errors, or completely eliminating them, within a process. It is a strategy employed to make SCM more efficient and to enhance the quality of an organization's outputs, by continually refining and improving internal processes. This ongoing commitment to quality helps organizations deliver higher value to their customers and maintain a competitive edge (Foster & Gardner, 2022).

In order to benefit from CI and gain competitiveness, CI must operate together with the supply chain and requires participation from the companies within the supply chain. To do so, there are different ways of integrating CI in the supply chain, and Prado-Prado (2009) suggests one way to do so - with the use of improvement teams. These improvement teams should involve employees from the organization, not only the management, since they are an important asset to the

organization (Prado-Prado, 2009). But before starting using these teams, the company must attain enough knowledge and experience about CI, and maturity in driving the process (Cagliano et al., 2005). By doing so, the processes that are used have a higher rate of success and the credibility towards other companies is greater (Prado-Prado, 2009). As previously mentioned, working intercompany is more complicated than internally, but is essential for a transparent and straightforward methodology integrated in the supply chain.

3. METHODOLOGY

This chapter aims to address the chosen methodology and approach of the thesis. A Case Study Research approach is chosen as the methodology, which is motivated more closely in Section 3.1. The methodology and its process is further described in Section 3.2, and how the case study is designed, together with what case is selected, is discussed in Section 3.3. Lastly, measures taken to assure the reliability and quality of the research is described.

3.1 RESEARCH OVERVIEW

The research methodology used for this thesis is case study research. A case study is appropriate when addressing RQs looking at the “why” or “how” (Yin, 2018). This is due to the exploratory nature of these RQs, for which a case study is suitable (Voss et al., 2002). Both the purpose and RQ of this thesis are exploratory, and hence a case study research is determined to be well suitable. It is also considered an appropriate method since sufficient data to the case studied is accessible, contributing to the depth of the thesis. Case studies offer benefits such as high relevance, capacity to give understanding, and exploratory depth, but also drawbacks such as potential access issues, greater time and resource demands, and the need for triangulation (Yin, 2018). To answer the RQ of this thesis, the case study research approach is not sufficient on its own, but a literature review is also necessary. This is to develop an understanding of a research topic as well as the existing theory. Since the RQ will use existing theory to investigate the efficiency of the case company, the case study research approach is combined with an investigation of existing theory in a literature review. The literature review is integrated in the methodology used.

3.2 CASE STUDY RESEARCH APPROACH

In the initial phase of employing the case study method, it is crucial to assess why this approach is suitable. One approach to determining the appropriateness of a case study is by examining the formulation of RQs. According to Yin (2018), the presence of words such as "how" and "why" serves as indicators favoring the use of the case study method since it is of exploratory nature. There are additional indicators that show that a case study method is an appropriate approach, where one is that there are contemporary occurrences that should be studied comprehensively (Yin, 2018). Both of these indicators show that a case study is appropriate to fulfill this thesis purpose.

The starting point of this thesis is based on the premise that a case study would be conducted, and the RQ is formulated to best suit this method. The RQ can be found in Section 1.3. To further strengthen the arguments for why a case study is appropriate, the "twofold definition of a case study inquiry", Table 3.1, provides significant support (Yin, 2018). This thesis examines, in an iterative process, current and near-past events thoroughly based on real life experiences. Furthermore, the case was investigated in relation to its contextual circumstances and the conclusions will be based on multiple sources of evidence using triangulation and relevant data. This means that qualitative data is as much needed, if not more, than quantitative data to manage all the variables of interest (Yin, 2018).

Table 3.1 Twofold definition of a case study inquiry (Yin, 2018).

Definition 1	**Definition 2**
Investigates a contemporary phenomenon (the "case") in depth and within its real-world context, especially when... ...The boundaries between phenomenon and context may not be clearly evident	Copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result... ...Benefits from the prior development of theoretical propositions to guide design, data collection, and analysis, and as another result... ...Relies on multiple sources of evidence, with data needing to converge in a triangular fashion

3.2.1 Case Study Research Model

As previously described, a case study is used in order to answer the RQ, hence the research process will naturally follow a case study research methodology. The model used for this thesis is the *Case Study Research Model* by Yin (2018), with some modifications to fit the purpose and constraints of this thesis. The model by Yin (2018) shows a linear but iterative process containing six activities: *Plan, Design, Prepare, Collect, Analyze and Share,* as illustrated in Figure 3.1. The planning phase motivates why the case study is relevant, and the RQ are clearly defined. The phase design refers to identifying the case and establishing the logic behind it, by developing theories and propositions to ensure a defined path is being followed throughout the research. The preparation phase contains the conducted literature review with the purpose of having enough theory to thoroughly answer the RQ. It also develops a protocol of what is needed to do before collecting case study evidence, which is then collected in the collection phase. The case study data is then analyzed, before finally being composed and reported to a defined audience in the sharing step (Yin, 2018).

An important part of case study research is the use of triangulation, the use of multiple sources, stated by both Yin (2018) and Stake's (1995) *Case Study Research Methods.* According to Stake (1995) triangulation allows the researcher to develop a comprehensive and in-depth understanding of a case, rated more highly seen to quality than researches conducted from a single source. There are four types of triangulation; method, investigator, theory and data source triangulation (Carter et al., 2014). Data source collection is the type that is relevant for this thesis, since it involves the use of multiple data sources to validate evidence and gain different perspectives to these (Carter et al., 2014), and have therefore been given extra importance in this case study research. The use of triangulation, more precisely of multiple data sources, also contributed to the creation of validity, and hence to the quality of the thesis (Stake, 1995).

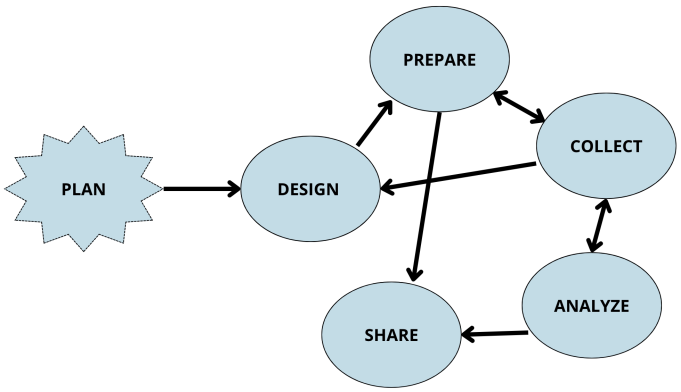


Figure 3.1. The Case Study Research Model by Yin (2018).

The model by Yin (2018) shows an iterative process of how to apply the different activities to a case study, pointing out that the different activities performed in this thesis are developed from and with help from one another. The triangulation step from Stake's (1995) research is considered an important part of this thesis's research process in order to develop a comprehensive understanding of the case, and therefore triangulation is involved in an eminent way in each step of the process. The planning step is already described in this section, and how the remaining steps of the model are applied for the specific case study in this thesis, is further described in Sections 3.3-3.6.

3.3 CASE STUDY DESIGN

The design of a case study is the part that interlinks the data collected with the RQ and furthermore also to the conclusions to be made, by developing theories and propositions. What type of case study to be conducted is decided on in this part. This thesis is performed through a single-case study. One motivation for doing a single-case study is that the circumstances explored are relatively common, i.e. investigating the performance of a FSC and its relevant operations. Moreover, the decision to conduct a single-case study of the mentioned areas does also come from a request from the case company itself. The units of analysis are the logistics and

processes of five transport packaging system solutions with focus on efficiency. This means that the study has multiple units of analysis, thus making it an embedded single-case study, as illustrated in Figure 3.2. When doing a case study it is important to consider both the units of analysis in the case, as well as the units in relation to the context surrounding the case. This means that factors such as environment, culture, and social and economic aspects have been considered in this study to achieve a thorough understanding and, consequently, reach better conclusions.

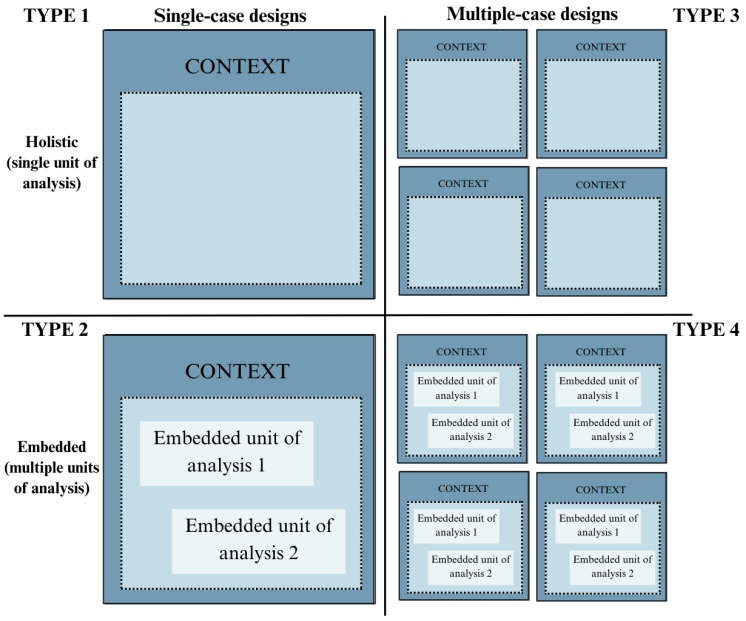


Figure 3.2: Different types of case study designs: the single-case and multiple-case design that can be either holistic or embedded (Yin, 2018)

As mentioned, the units of analysis are the different problematic products which have served as the foundation of the study. This, by studying the product packaging systems and evaluating their performance. Furthermore, these results were used when assessing the packaging innovation processes. The investigation of the packaging solutions hence helped understand what processes are related to the development and operational work in order to create a functioning FSC.

The research design served as a systematic pathway from the starting point to the conclusion of the study, detailing how one progresses from initial inquiries to final conclusions through a structured approach. The design's primary function was to ensure that the undertaken actions are relevant to the RQ at hand. This design usually consists of five parts (Yin, 2018), all of which have been laying the foundation of this thesis method. A more in depth description of these five parts can be found in Appendix A:

1. A case study´s questions
2. Its propositions, if any
3. Its case
4. The logic linking the data to the propositions

5. The criteria for interpreting the findings

3.3.1 Case Selection

Case selection is an important step when performing a case study (Voss et al., 2002). A single case has the benefit of giving more in depth analysis, although, the downside with a single case study is that it is hard to generalize the findings (Voss et al., 2002). In terms of this thesis, a single case have be used, as described in the previous section. When selecting the case, Voss et al. (2002) proposes that some selection criteria should be defined. The criteria defined for this thesis are:

- The case selected should be considered a FSC.
- Access to sufficient data is crucial for the case studied, and due to this, only cases where supply chain data can be accessed are considered.
- In order to be able to perform real time observations, the selected case should be operative locally, that is close to the southern part of Sweden.

From these criteria, the case selected for this thesis is IKEA Food, which is a well suited organization partly because it can provide necessary material in terms of documents and archival documentation. Additionally, its geographical area of operations is placed favorably, which will facilitate conducting interviews and observation. More information about IKEA Food can be found in Section 4.1. IKEA Food´s supply chain reaches a worldwide range and has a high level of complexity, with characteristics that are shared with other producing companies and retailers and it can be argued that the circumstances are common. Furthermore, this selected case can especially provide insights for other companies operating within the food industry that may face similar challenges as IKEA Food.

3.4 CASE STUDY PREPARATION

Before collecting the data, some preparatory work was done. The preparation phase plays an important role in order for the case to be successful. Yin (2018) defines being prepared as having the desired skills and values which relate to the researchers in the study. To help structure this case study research, and the relevant data collection, a protocol was created. This protocol was created consisting of four different parts; *case study overview, procedure of collecting data, protocol questions* and *outline of the report* (Yin, 2018). The protocol was constructed in order to minimize the risk of missing important information and making sure that the right subjects were being investigated, since a big part of collecting data in fact is about understanding information given (Yin, 2018). The complete protocol can be found in Appendix B.

A literature review was also conducted as a preparatory phase, to gather information on existing theory and establish a foundation for answering the RQ. The process of literature review is based on the stages suggested by Rowley & Slack (2004) as described in Figure 3.3.

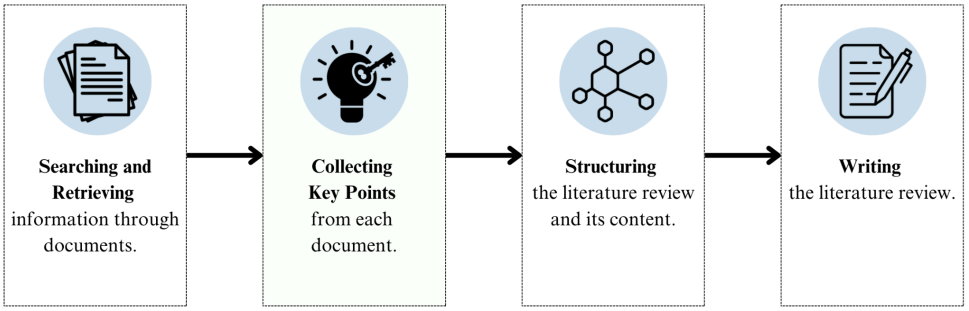


Figure 3.3. The stages of the literature review process in this thesis, inspired by the process steps described by Rowley & Slack (2004).

When searching for documents and publications to support the literature review, the search engine *Web of Science* was primarily used. To ensure the quality of the documents used, only books and published articles were used to gather information. For each part of the literature review, some key sources were used. These are highly relevant and trustworthy sources of information, and were also used to find keywords to use in the search engine to gather more information. Sources cited in the key sources were also considered relevant and of interest, and some of these sources were used for the literature as well. The key sources are presented in Table 3.2. From the retrieved documents, these were briefly read through and summarized with key points connected to each document and relevant for the thesis. When sufficient information and sources were collected, the literature were structured. Lastly the literature review was written with basis in the key points and the structure created. The literature review is an ongoing process, and after the collection of data, a revised version of the literature was made. This meant adding more sources and other documents and information, after feedback and case findings that required further theory and definitions.

Table 3.2: Key sources and what part of the literature review it has been applied.

Key Source	Supply Chain Management	Packaging Logistics	Business Process Management	Performance Measurement System
Haessner et al., 2024	●			
Holmberg, 2000				●
Pålsson, 2018		●		
Pålsson & Hellström, 2023		●		
Saleheen & Habib, 2023				●
Ying, et al., 2009				●
Esper et al., 2010	●			
Zimon et al., 2020	●			
Trkman, 2010			●	
Mentzer et al., 2001	●			
Shribman, 2023			●	

3.5 DATA COLLECTION

As described, the collecting phase includes the actual collection of data and evidence for the case study. Also previously mentioned, the use of data triangulation was applied to this step, in order to develop a more comprehensive understanding of the case studied. Yin (2018) states that the use of multiple sources contribute to more accurate and well supported case findings, something necessary for an in-depth analysis such as a case study. The collection of data can be done through different sources, such as, documentation, archival records, participant-observations, direct-observations, interviews or physical artifacts (Yin, 2018). A full overview of the six sources of data, with its coherent strengths and weaknesses can be found in Appendix C.

With a basis in the use of triangulation, a minimum of three sources was desirable to be chosen, since limiting data collection to one or two sources may result in exclusion of insights to the results (Carter et al., 2014). For the purpose of the thesis, four sources have been chosen for evidence gathering; interviews, documentation, archival records and direct observations. The data collection sources used and their belonging purposes are described in Table 3.3. All of these sources are suited for and commonly used within case study research according to Höst et al. (2006). Fontana & Frey (2000) states that interviews are one of the most powerful tools for gaining an in-depth understanding of a topic and Yin (2018) describes it as the most important source of information for a case study, making it the main source of evidence for this thesis.

Although, there are some weaknesses with interviews, especially risk of biases. By using triangulation with the other three sources to validate the data gathered from the interviews, this risk will be minimized (Yin, 2018). Further work addressed in order to allow for continuous review of the performed interviews and observations, includes that a short summary were created after each interview and observation. This is suggested by Miles & Huberman (1994), to be beneficial for reflection of the information gathered and to give an overview of the main themes discussed or observed.

Table 3.3. Data collection methods used in the thesis, with belonging purpose.

Data Collection Method	Purpose
Documents	Documents of IKEA and IKEA Food's operations are used as supplementary data.
Archival Records	Master data are used as supplementary quantitative data, to verify against interviews and observations.
Interviews	Interviews are used to understand the case company and the employees' ways of working, as well as identify potential issues.
Direct Observations	Observations at the central warehouse and a store was done in order to gain understanding of real time operations.

3.5.1 Interviews

The first source of data collection was compiled from interviews. Interviews can be conducted in several ways; they can be unstructured-, semi structured- or structured interviews (Höst et al., 2006), and prolonged, shorter or survey interviews (Yin, 2018). Structured interviews are a verbally performed questionnaire with structured questions (Ellram, 1996), and are due to its nature very time consuming for the interviewer, but can also increase the participation rate of interviewees according to Höst et al. (2006). The unstructured interview is on the opposite more conversational and can be used to catch and gather key information (Ellram, 1996). In between the two categories, the semi-structured interview can be found, and which simulates a combination of the two previously mentioned structures. This means that the interviews can contain some structured questions, while still allowing for modifications to match the interviewee and situation. According to Yin (2018) interviews conducted during a case study will resemble a guided conversation with fluid questions, rather than a structured query, which will allow the interviewee to speak freely and decide what to be discussed in detail. Due to these motivations, the nature of the RQ, as well as the time constraint of the thesis, semi-structured interviews are considered to be an appropriate approach for this research. However, to fit the purpose of the thesis and its specific topics, certain overarching questions and more detailed sub-questions will be asked.

Regarding the division according to prolonged, shorter and survey interviews, these differ in the length of the interview. The prolonged interview takes place over two or more hours, in one or more sittings, while the shorter interview is more focused and lasts approximately one hour. The survey interview is a structured questionnaire which is used to produce quantitative data (Yin, 2018). The latter is not considered relevant for the scope of the thesis and is not used in the collection phase. Regarding the first two mentioned approaches, the shorter interview encourages the interviewer and interviewee to follow the main purpose of the interview protocol, while still allowing the interviewee to remain open-minded in a

conversational manner (Yin, 2018). Considering the purpose and the time constraint of the thesis, a shorter interview was used in the case study. In the case of deeper insights or extended information is needed, a shorter follow up interview was held.

To summarize this chapter, the type of interviews that were conducted in the case study are primarily semi-structured and shorter interviews, with some complementary follow up interviews. All interviews were aimed to gather insights regarding the RQ, and Table 3.4 presents a summary of the conducted interviews. The purpose of the interviews was to collect qualitative data and to gain further insights on how processes and procedures affect the current performance and hence also how those processes and procedures can be improved. Höst et al. (2006) highlight the importance of asking the structured questions in the same phrasing and order when conducting multiple interviews, to avoid the risk of impacting the answer. With this in mind, an interview guide was created as a preparation before commencing the data collection of the case study. An interview guide is a rough plan, and the one used for this thesis is the interview layout described by Höst et al. (2006). This layout follows four phases; *context, introductory questions, main questions and summary.* The complete interview guide created for the thesis can be found in Appendix D.

The first part of the guide, the context, contains an explanation of the purpose of the thesis as well as the interviews, allowing the interviewee to develop a common understanding for the topic to be discussed (Höst et al., 2006). Further, this part involves a description of how the anonymity of the interviewee as well as the data will be handled. The introductory questions phase has the purpose of asking general questions in order to get the conversation going (Höst et al., 2006), before entering the third phase, main questions. The more general questions consist of questions regarding the interviewee's role at the case company, and the main questions are more linked to the deeper purpose of the interview and case study as a whole. Regarding the main questions, this is the phase of the interview where the order of the questions asked plays an important role, which is why the interview guide was used as a tool to make sure the questions were asked in the correct order, and all questions were in fact asked. The main questions were derived with the goal of understanding the case company's processes and ways of working, as well as issues connected to this. In the last phase of the guide, the summary, the interviewee will be asked to give any other relevant information (Höst et al., 2006). Throughout the interview phase, the interview guide has been evaluated and updated through an iterative process to get as much relevant information as possible. The complete interview guide was used during each interview conducted for the purpose of the thesis.

It is suggested to record and transcribe the interviews, to allow the interviewers to listen closely and undisturbed during the interview (Höst et al., 2006). The transcription was done with the use of an AI-tool, and then carefully proofread to prevent mistakes or wrongful information. The transcript was then coded using the technique open coding according to grounded theory. This means directly describing the data with words or phrases that reflect the content (Corbin &

Strauss, 2014). The process contains two steps; turning the data into small, discrete components of data, and coding each discrete piece of data with a descriptive label (Corbin & Strauss, 2014). The first step means reading through the qualitative data, in this case the transcripts from the interviews, and analytically breaking it up into discrete, bite sized pieces of data. The second step refers to interpreting each piece of data and label it based on the properties of the data. Any two pieces of data that relate to the same subject, should be labeled with the same codes (Corbin & Strauss, 2014). The coding was then used in the data analysis step.

Table 3.4: Summary of interviews conducted during the case study.

Interviewee	Position	Interview Type	Date	Duration
Alpha	Packaging Development Leader	In-person, Semi-structured interview	Feb 5th	60 min
Beta	Packaging Manager	In person, Semi-structured Digital, Unstructured	March 22th, April 18th	45 min 45 min
Gamma	Packaging Development Leader	Digital, Semi-structured interview	March 19th	30 min
Delta	Food Demand Coordinator	In person, unstructured + Follow up interview	March 20th	45 min
Epsilon	Quality Manager	In person, Semi-structured interview	March 20th	60 min
Zeta	Material & Technology Engineer	Digital, Semi-structured interview, combined interview with Zeta, Eta & Theta. Shorter Follow-up interviews with each member,	March 26th	90 min
Eta	Packaging Solution Engineer			
Theta	Packaging Solution Engineer			
Iota	Packaging Solution Engineer	Digital, Semi-structured + Follow up interview	March 26th	60 min
Kappa	Project Leader - Category Food	Digital, Semi-structured interview	March 26th	100 min
Lambda	Business Development Manager	Digital, Semi-structured interview	April 4th	60 min
Rho	Food Demand Coordinator	Digital, Semi-structured interview	April 4th	45 min
Sigma	Service Provider Operations Developer	Digital Semi-structured + Follow up interview	April 9th	45 min
Tau	Kitchen Production Specialist	In person, Semi-structured + follow up interview	April 16th	30 min

3.5.2 Documentations

The second type of data collection is documentation. One important use of documentation is to verify and specify detailed information gathered from other sources, but also as supplementary data. Documentation is likely to be useful for case studies, but must be carefully used before validating that the content is truthful

(Yin, 2018). Examples of internal documents can be documents about lessons learned or project reports produced by the company (Höst et al., 2006). The documents collected in the case study are related to the processes within the company as well as the strategy and concept of ways of working in the organization. These are collected with the basis in the performed interviews, and are used to specify corroborate information gathered from other sources as well as strengthen the case study with some quantitative and further qualitative data. The documentations' specifications are presented in Table 3.5. below. The documents are internal for IKEA, and the detailed content has not been shared in this thesis due to confidentiality concerns.

Table 3.5: Summary of the documentations collected during the case study.

Document Type	Title	Description
Qualitative	IKEA Packaging & Identification Direction Now-FY28	IKEAs new packaging direction and the main movements going forward.
Qualitative	The IKEA Franchise System	Document about the IKEA organization and its structure.
Qualitative & Quantitative	Visit DC Helsingborg	Documentation of the workshop conducted at the DC in Helsingborg.

3.5.3 Archival records

Archival records will be used as a source of data collection, especially in regards to raw data about products and processes of the case company. Archival records are similar to documentation, in the sense that it will be provided from the case studied, but the archival records are usually more of a quantitative nature rather than qualitative (Yin, 2018). According to Yin (2018), when studying quantitative data caution must be taken in regards to the accuracy of the numbers and data. Due to this, the archival records were used together with the other sources as a way to validate and strengthen the qualitative data. Further description of what archival records were used in the case study research are displayed in Table 3.6. The records are internal for IKEA, and the detailed content has not been shared in this thesis due to confidentiality concerns. When collecting the data the conditions of the archival records were noted and appreciated, since most archival records have been compiled for a specific purpose other than this case study (Yin, 2018).

Table 3.6: Summary of the archival records collected during the case study.

Record Type	Title	Description
Qualitative	Item_Masterdata_SE_HGB	Masterdata of products.
Qualitative	Volym_DC_Till_Malmö_FY24_September_2023-February_2024	Volume of certain products sent to retailer in Malmö during FY24.
Qualitative	Claims_Malmö	Claims reported at retailer in Malmö with reason of claims.
Qualitative	Claims_Helsingborg	Claims reported at DC HBG with reason of claims.

3.5.4 Observations

The fourth source of data collection is direct observations. In regards to the scope of the thesis, the ways of working are examined, something that takes place in a real life setting. According to Yin (2018) this allows for the opportunity of direct observations. Referring back to triangulation and the ambition to gather data from different points of views, not only the theoretical view will be studied, but also the immediate and actual implementation of this. The data collection in the shape of direct observations can be used to complement the understanding of processes (Höst et al., 2006). The ways of working in the logistics process, such as warehousing and palletizing, will therefore be observed in real-time. To increase the reliability of the observational evidence, more than one observer should be used (Yin, 2018), hence both parties of the thesis were present for all observations made. Table 3.7 specifies the observations made.

Table 3.7: Summary of the observations performed during the case study.

Observation	Description	Attendees	Date
Warehouse visit & workshop	Workshop with focus on investigating specific products at the central DC, as well as the daily operations.	Gamma, Zeta, Eta, Sigma	April 10th
Store visit	Observation of the operations in the Malmö Store, with focus on the specific products in the thesis.	Tau	April 16th

3.6 DATA ANALYSIS

After evidence has been collected, this has been analyzed in the analysis step. This refers to displaying the data in different ways, developing an analytic strategy and looking for patterns in the evidence (Yin, 2018). The purpose of the analysis is to identify areas of improvement in the logistics and transport activities of the studied case, as well as generalizing the findings to contribute to science. The performed data analysis is based on general strategies suggested by Yin (2018) and Höst et al. (2006), and further developed with processes from Pålsson (2018), Pålsson &

Hellström (2023) and Gardner & Cooper (2003). The process is further described below.

Yin (2018) suggests four general strategies that can be used for analyzing qualitative data; *theoretical propositions, working data from the "ground up", developing a case description,* and *examining plausible rival explanations.* Since the thesis is based on a purpose rather than propositions, the first strategy is presumed irrelevant for this case study. Examining plausible rival explanations refers to defining and testing existing rival explanations. This approach relates to something outside the scope of the thesis and will hence not be considered either. The last two strategies *working data from the "ground up"* and *developing a case description* instead focus more on the actual data collected. Developing a case description is a strategy where the collected data is organized according to a descriptive framework (Yin, 2018). Working data from the "ground up" implies that the data should be "played with" to try and identify a pattern to serve as a basis for further analysis and additional relationships in the data.

Different ways of "playing with the data" involves searching for patterns and insights by for example doing the following (Yin, 2018):

- Putting information in arrays
- Making matrices of contrasting categories
- Creating visual displays, e.g. flowcharts and other graphics
- Tabulating different events
- Putting information in chronological order

An overview of the analyzing steps are presented in Figure 3.4. Consistent with Yin's approach (2009), each source of collected data was first analyzed independently, before being integrated with each other. To bring forward useful concepts and help provide a good structure for the analysis a case description will be developed, which can be found in Section 4. When working with the data from the "ground up", it was used in order to organize the data and more easily find patterns. One model that was used to create a visual display of the data and information is a framework about supply chain mapping developed by Gardner & Cooper (2003), described in Section 3.6.1. To surface relevant data and to find and match patterns, the concept of pattern matching was used in the analysis. Yin's (2018) approach to pattern matching was used in this step, and a further explanation can be found under Section 3.6.2. Furthermore, when patterns have been found, the data and patterns were structured, presented and analyzed using the framework from Pålsson & Hellström (2023) and Pålsson (2018) which are described below in Section 3.6.3-3.6.4. For the rest of the data, Höst et al. (2006) suggest four steps for a qualitative data analysis that will be used. These steps are *data gathering, coding, grouping and conclusions*. The data gathering is previously described in Section 3.5. The coding step involves giving important things in documents keywords, which are then organized in different sections accordingly in the grouping step. This was performed in order to be able to analyze and draw conclusions regarding the content (Höst et al., 2006). When coding the interviews open coding was used.

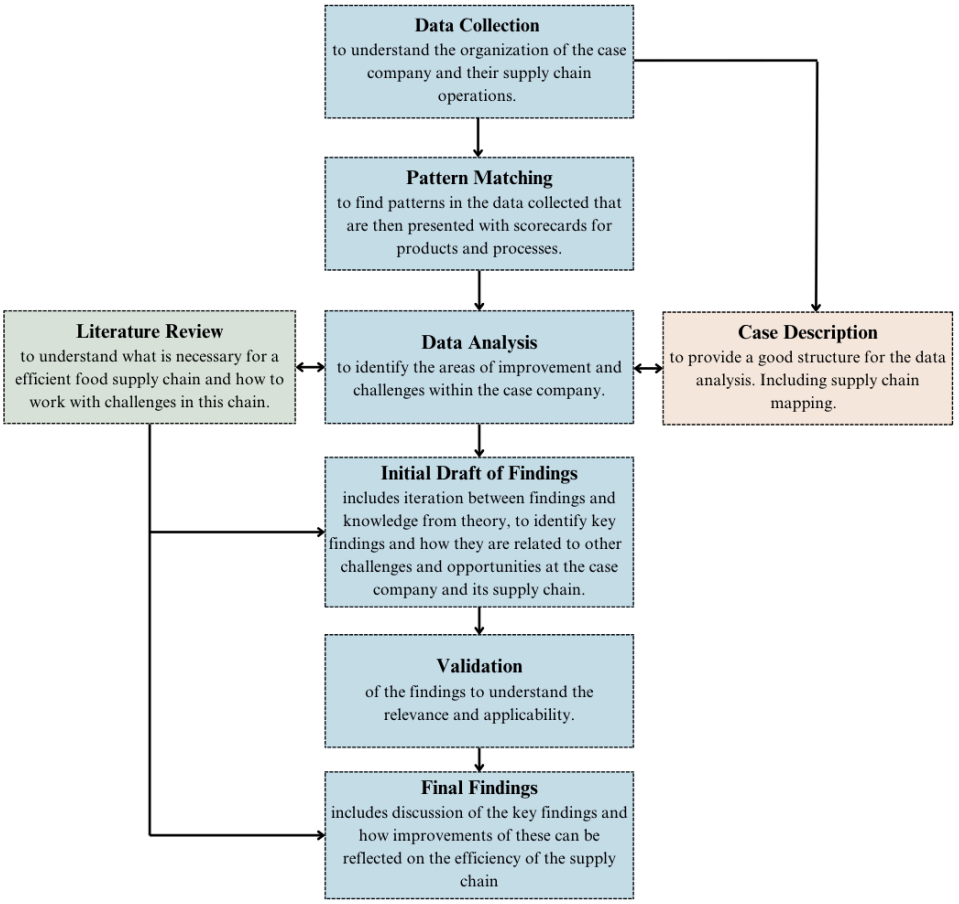


Figure 3.4: Overview of the data analysis process of the research study.

3.6.1 Supply Chain Mapping

In the framework developed by Gardner & Cooper (2003) strategic supply chain mapping approaches are presented. They suggest that visualization of the supply chain is needed, as well as a well-established process of doing this in order to exchange valuable knowledge. A well executed strategic supply chain map is according to Gardner & Cooper (2003) a good basis for supply chain and logistics analysis, and helps the understanding and evaluation of the current state of working within the supply chain. They also state that supply chain mapping can lead to improvements in the supply chain processes, which can be linked back to the purpose of this thesis.

The collected data was further organized and mapped in visual frameworks in the shape of a supply chain map. The map illustrates the organization, and processes of the information and physical flow (Gardner & Cooper, 2003). The map according to Gardner & Cooper (2003) has standardized icons that come from either academics, trade associations or other sources. The map is also linked to a database (Gardner & Cooper, 2003), hence the compiled data in previous steps of the

analysis will be used. The mapping of the case company can be found under Section 4.

3.6.2 Pattern Matching

When analyzing collected data in a case study, a commonly used technique is a pattern matching logic (Yin, 2018). There is no universal definition for what a pattern is, but related to a case study it is typically understood as a configuration of events, incidents or outcomes that come from the collected data (Gardner et al., 2014). In case-study research, pattern matching will help enhance the precision of the study, and identified patterns can contribute to stronger internal validity (Gardner et al., 2014). The purpose of the pattern matching is to find patterns in the collected data and match these with the stated proposition of this thesis, which can be found in Section 3.3. Consistently with Gardner et al. (2014), each source of data collection has been analyzed separately, and patterns for each source have been researched. Yin (2018) presents two different ways of using the pattern matching technique; patterns in a non-equivalent dependent variables design, or patterns in a non-equivalent independent variables design.

In regards to this study, the data collected was analyzed with the independent variables approach, meaning that the patterns found should be compared to the stated proposal. If the pattern of the findings match the stated proposition, then the finding supports the proposition (Hak & Jul, 2009). If the pattern does not match, a rival explanation is needed to explain the non matching pattern (Hak & Jul, 2009). The process of pattern matching was conducted, as previously described, where the collected data first was “played with” and examined. To achieve this, the data was coded and then put into the various scorecards to identify different patterns. The tools utilized for identifying and matching these patterns related to the proposition are the packaging performance scorecard and the packaging innovation scorecard. These scorecards will then be further analyzed with the purpose of this thesis. Explanations of the scorecards can be found under Section 3.6.3 and 3.6.4 respectively.

3.6.3 Packaging Performance Methodology

The packaging performance methodology by Pålsson (2018) is a way to measure the overall performance of a packaging system and its three levels of packaging. The methodology consists of four different steps, where a scorecard for the performance of each packaging level is the main outcome. The first step includes mapping the supply chain for the packaging system, which was done together for all products, since they’re all a part of the same supply chain analyzed for this thesis. This was done and analyzed with the mapping described in previous Section 3.6.2. The fourth step includes brainstorming for ways of improving the packaging system, which is out of the scope for this thesis and will hence be left out. Instead, the scorecard was used in order to find patterns, using the pattern matching technique previously described, that was analyzed and used to answer the research

questions within this thesis. Regarding the first three steps of the methodology, they are as follow (Pålsson, 2018):

1. Map the packaging system for the product throughout the supply chain
2. Capture data for packaging system performance in the supply chain
3. Evaluate and visualize the packaging system performance

The mapping of the supply chain is mentioned earlier, and done according to Section 3.6.1. Capturing data for the packaging system is done according to what is described in the collect data section. The data shall according to Pålsson (2018) be collected using the 17 features included in the packaging scorecard. Not all features are applicable to all actors in the supply chain, and neither for the limited scope of this thesis. Because of this a framework consisting of a number of specific features was created for this thesis specifically. All features were examined and the ones suitable and relevant for this thesis were selected and further used when collecting data, and in step three when evaluating and visualizing the packaging system performance. All features can be found in Appendix E, and the ones used in this thesis are presented in Table 3.8. Each feature was evaluated by rating it both on satisfaction and importance, on a scale from 1-5, where 5 is the best performance or highest importance, and 1 is the worst performance or lowest importance. The rating was made by the researchers with a basis in collected data and interviews. Key informants from the case company provided detailed information about the product's performance that was also used in the rating. However, to make sure each product was equally evaluated, a set of requirements and specifications were set for each feature and number on the scale.

Since the promotional attributes and other value adding features are outside of this scope they were not included in the scorecard. Neither were any attributes connected to production, material or reverse handling, with respect to the limitations of this study. The features track and trace, hazardous substances, security and unwrapping are considered to have little relevance for the effectiveness and efficiency of the supply chain, as well as focus on the end consumer, which is not the scope for this thesis, and are hence left out of the scorecard. Lastly, apportionment and convenience are two features with not enough available data to be examined and are also therefore not applied in this study. It is important to keep in mind that since all features are not assessed, some trade offs between features may also not have been identified.

Table 3.8: Features used in the packaging performance scorecard for this thesis with explanations (inspired by: Pålsson, 2018).

Area	Feature	Definition
Product Waste	Protection & Containment	Safeguard, hold and maintain the content
Logistics	Unitization	Modularization of the packaging levels
	Stackability	Stacking of packaging with content
	Volume & Weight Efficiency	Utilization of the volume and weight capacity
Packaging Material	Packaging Cost	The cost of the packaging
	Packaging Waste	Minimal amount of packaging waste

When evaluating and visualizing the packaging system performance, the importance score was normalized, according to Equation 3.1 and 3.2 for each feature (Pålsson, 2018), in order to enable comparisons and calculations. This evened out the risk of under- or overestimating the packaging features, leading to a more reliable evaluation (Pålsson, 2018). These calculations were used in further analysis and visual figures, to evaluate what features are working better and worse.

$$Normalized\ Average\ Packaging\ Performance_{feature\ x,\ actor\ y} = (Importance_{feature\ x,\ actor\ y} * Satisfaction\ Value_{feature\ x,\ actor\ y})/ \sum(Importance_{feature\ x,\ actor\ 1} + \ldots + Importance_{feature\ x,\ actor\ 5}) \quad for\ all\ actors\ y = 1, \ldots, 5\ and\ features\ x = 1, \ldots, 6 \tag{3.1}$$

$$Normalized\ Average\ Packaging\ Performance_{feature\ x} = \sum(Normalized\ Average\ Packaging\ Performance_{actor\ 1,\ feature\ x} + \ldots + Normalized\ Average\ Packaging\ Performance_{actor\ 5,\ feature\ x}) \quad for\ all\ features\ x = 1, \ldots, 6 \tag{3.2}$$

3.6.4 Packaging Innovation Scorecard

The packaging innovation scorecard by Pålsson & Hellström (2023) is a scorecard based on a conceptual model for packaging innovation process, consisting of eight different processes; *leadership, resourcing, systems and tools, concept generation, packaging development, process innovation, technology acquisition, and*

competitiveness and climate performance. Each process and its definition and subprocess are described in Figure 3.5.

PROCESS	DEFINITION	SUBPROCESS
Concept Generation	Identification and planning of new packaging concepts	Plan packaging innovation Generate new packaging concepts Being inventive and creative
Packaging Development	Transformation of a packaging concept and a set of assumptions about manufacturing, packaging technology and user needs into a package available for use	Packaging development process Integration with product development Collaboration with packaging users Transfer to packaging manufacturing
Process Innovation	Introduction of new methods of producing packaging	Identify innovations for packaging manufacturing process Implement new packaging manufacturing processes Continuos improvement
Technology Acquisition	Mapping, classifying and assessing technological options and sourcing opportunities	Technology strategy Technology sourcing Sustainability considerations in technology acquisition
Leadership	Support and direction from top and middle management	Packaging innovation goals Processes for generating and implementing packaging innovation Conditions for packaging innovation
System & Tools	Availability and development of systems and tools	Systems Tools for packaging innovation
Resourcing	Availability and deployment of human and financial resources	Human resources Financial resources
Competitiveness and climate performance	Packaging performance based on the output of the packagin innovation process	Goals Measurement Innovation perfromance

Figure 3.5: Processes and subprocesses for the packaging innovation process.

The scorecard developed by Pålsson & Hellström (2023) consist of statements for each subprocess and the level this is being achieved (bad, mediocre, good or best practice). To assess the case company and on what level the different processes are performing, the researchers based the evaluation on data and observations, and compared this towards the defined specifications for bad, mediocre, good or best practice. For the complete scorecard with statements, see Appendix F. To fit the

thesis, the scorecard was modified and some processes have been removed from the measurement. The process “process innovation” and all its sub processes have been removed since the production of packaging is not relevant for either this thesis nor the case company. The “packaging development” subprocess “transfer to packaging manufacturing” was also removed with the same reasoning. Figure 3.6 shows how the processes are related and how they affect each other.

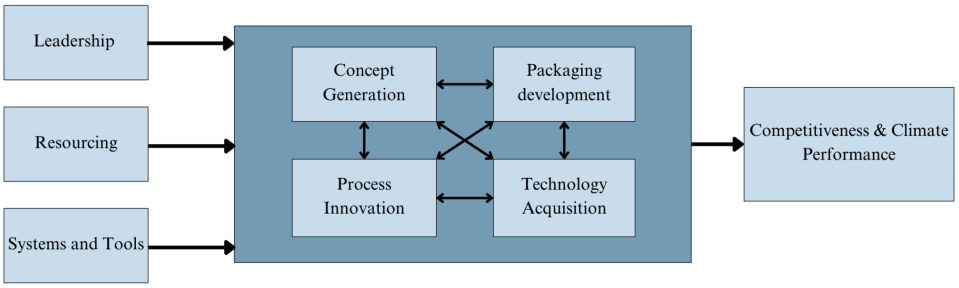


Figure 3.6: Conceptual model for packaging innovation process, modified to fit the scope of this thesis (Pålsson & Hellström, 2023).

3.7 RESEARCH RELIABILITY

The final step in the case study research approach is the sharing stage. The overall goal of this step is to compose textual and visual material for the defined audience (Yin, 2018). This has been made in the shape of a written report. An important step of this stage is reviewing and validating throughout the process according to Yin (2018). Corrections and validations made to a research and its processes will enhance the case study’s accuracy as well as increase the construct validity of the study (Yin, 2018), see further explanation in Section 3.4. To make sure that the quality of the research design is satisfying, four types of logical tests can be conducted which are used frequently within the areas of social research (Yin, 2018; Halldórsson & Aastrup, 2003). The four tests are: construct validity, internal validity (which is only used for explanatory studies), external validity and reliability, and to promise a high quality of the thesis these need to be used continuously throughout the process. However, Halldórsson & Aastrup (2003) believe that there are four other types of criteria that are more fitted when researching logistical issues and qualitative research methods. The criterias which all together lead to the common denominator “trustworthiness” are instead: credibility, transferability, dependability and confirmability. Credibility relates to the truthfulness, transferability to if one can find similarities with the world (the higher level of similarities the better), dependability to the trackability and confirmability to how findings can be confirmed, which often is through some type of external party affirming the findings (Halldórsson & Aastrup, 2003).

How validation can be conducted is through check, question and theorize, meaning that researchers have frequently used triangulation and been critical to their own work. Further it means making sure that the same questions are investigated to minimize the risk of finding different messages of an interview and/or text as well

as having similar theoretical viewpoints of the questions that are researched (Halldórsson & Aastrup, 2003). The research quality and validation made for this thesis is presented in Table 3.9.

Table 3.9: Research quality criteria used in the study and the actions taken within these (Inspired by; Halldórsson & Aastrup, 2003)

Research Quality Criteria	Actions Taken	Phase				
		Design	*Prepare*	*Collect*	*Analyze*	*Share*
Credibility	Conducted several interviewees			●		
	Sent out additional follow up questions			●		
	Recorded and transcribed interviews			●		
	Open coding of transcribed interviews				●	
	Interviewees approved used information				●	●
	LTH and case company supervisors reviewed interview guide		●			
	Key informants reviewed the thesis report				●	●
Transferability	One case with several units of analysis were investigated	●	●	●	●	●
	Detailed description of the case company and its operations			●	●	
	Description of the products and its packaging systems			●	●	
	Use of scorecards that can be applied to a general business				●	
Dependability	Conducted literature review on SCM, packaging logistics, BPM and performance measurements		●			
	Use of references that are frequently cited		●			
	Detailed description of the scorecards' methodology		●		●	
	Feedback review on methodology chapter		●	●		
	Detailed description of the overall case study methodology	●				
Confirmability	Send out verification questions to key informants			●		
	Transcribed and coded interviews			●	●	
	Semi-structured interview approach			●		
	Triangulation in interviews and literature		●	●		
	Literature review method is described in detail		●			
	Reducing bias through two thesis authors			●	●	
	LTH and case company supervisors gave consistent feedback	●	●	●	●	●

4. CASE DESCRIPTION & FINDINGS

This section gives a general introduction to the IKEA organization, as well as a description of where IKEA Food operates within the organization. The purpose of this section is to give an understanding of the organization, the role of IKEA Food, as well as an overview of the supply chain operations and what the supply chain looks like. Chapter 4.2 will then describe the case to be studied, IKEA Food. The units of analysis will be presented, and are products within IKEA Food's range that in some way have been identified as problematic. The products have been chosen in dialogue with IKEA, and are carefully chosen as a convenient sample to represent the whole operations of IKEA Food. The processes connected to the logistics and transport packaging solutions are also described and presented, together with other findings during the case study.

4.1 THE IKEA ORGANIZATION

IKEA is a renowned global retailer recognized primarily for its diverse range of home furniture, and operates through two main entities: Inter IKEA Group and IKEA franchisees. Within Inter IKEA, there are several key components: Inter IKEA Systems, which owns and develops the IKEA concept; IKEA of Sweden, responsible for design aspects; IKEA Marketing & Communication, tasked with crafting communication strategies; IKEA Supply, responsible for sourcing; and IKEA Industry, which handles manufacturing processes. On the other hand, IKEA franchisees, comprising twelve independent entities, oversee the operation of IKEA stores in various markets, see Figure 4.1. Among these franchisees, Ingka stands out as the largest player (IKEA, 2024).

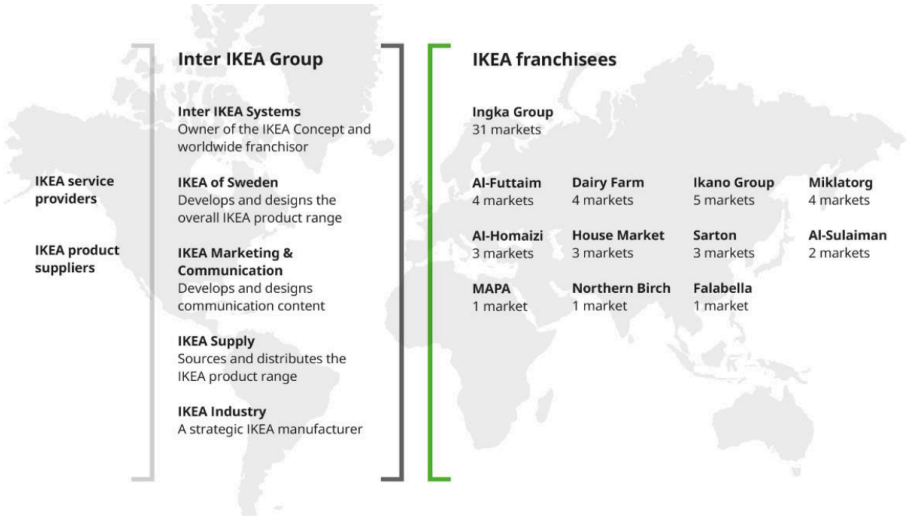


Figure 4.1: Overview of Inter IKEA Group and the IKEA franchise system.

Inter IKEA Holding B.V. is the holding company of the Inter IKEA Group, and can be divided into three core business areas; Franchise, Range and Supply, illustrated in Figure 4.2. The part of IKEA's organization that is referred to as Range, is the developing organ of the organization and decides on what products will be included in IKEA's assortment. For reference, this part of the organization is usually referred to as R&D within other organizations. The Range area consists of a number of different "ranges", where BA Food is one and in charge of developing the food products and packaging. The Supply area handles purchasing and procurement for IKEA. This area is segmented into various categories, each responsible for the procurement of a specific set of products.

It's important to note that while the Range and Supply teams collaborate closely, they are organized differently. The Range team is divided into categories like "kitchen," "living room," "IKEA restaurant," and "consumer packaged goods" (CPG). In contrast, the Supply team is segmented into categories like "wood," "plastic," and "meatballs". This organizational structure means that the Range team does not have direct counterparts in Supply, requiring them to communicate and coordinate with multiple roles within the Supply team. Similarly, the Supply team must interact with several different roles within the Range team. This difference in structure leads to complexity in communication and collaboration between the two groups.

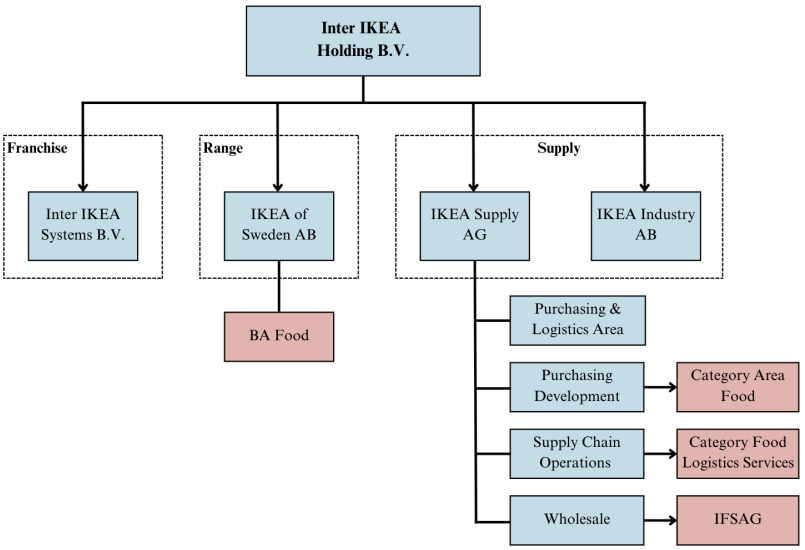


Figure 4.2: The organizational structure of IKEA, with focus on where IKEA's food business is located within the organization.

4.2 IKEA Food

IKEA Food started as a supplementary service to the furniture side, with the basis in Ingvar Kamprad's famous statement "it's difficult to do business with someone on an empty stomach". Even though IKEA Food started as a service within the furniture business, it has grown into being an important part of IKEA. It drives customers to the stores and offers both an affordable meal and Swedish specialties and completes the offer that is IKEA. It was from the start a concept meant to serve as a service that would contribute to the experience and hence increased sales. It still is today, but it does not only strengthen IKEAs brand but also acts as a restaurant where people come just for the culinary experience.

IKEA Food has since 2017 been an integrated part of IKEA, with its own range, BA Food. Before this, Bring SCM was acting as the logistics service provider for IKEA Food and handled all logistics regarding food for IKEA. All employees, IT systems, storing and transportation was performed by Bring SCM. In 2017 IKEA acquired Bring SCM and hence took over the logistics for the food business. After the acquisition, the business was moved from Malmö and Helsingborg to Älmhult, meaning that the employees had to move as well, resulting in competence loss for IKEA Food. At the same time they're investing in their food development in Älmhult and hired around 30 new employees. Today the organizational structure for IKEA Food has developed into a complex organization within IKEA. Something that was once a trading organization, is now in charge of the operational work and the responsibilities that comes with this. Even though IKEA is now handling more of the operational work, a big part of the supply chain is outsourced to third party logistics providers. IKEA Food has no own production but buys all products from external suppliers, and the operations at the distribution centers (DCs) are outsourced to 3PLs who also handles the transportation of goods to and

from the DCs. The operation at the markets is overseen by IKEA's franchisees, similar as to the rest of IKEA's businesses.

Within the food organization, like the rest of the IKEA organization, there is an area for food in both the Range and Supply part of the organization. As mentioned before, they work close to each other when developing products and its packaging, where Range develops an idea, and Supply handles the procurement of the idea, including finding suppliers and negotiating contracts with these to align with the developed product from Range. On the Range side, specifically within the Business Area (BA) Food, the division is organized into two subcategories: CPG and Food Services. The actual product and packaging are developed by six division teams, specialized on a set of products, see Figure 4.3. Within these teams, IKEA has designated roles, Packaging Solution Engineers, that each specifically has responsibilities to work with developing products and packaging for their area within food. Although, since no production is IKEA owned, Range is limited in their decisions on the packaging meaning that they are presented with set options, since a lot of them are taken by the supplier of the products. A further description of the processes and the work between Range and Supply can be found in Section 4.1.3.

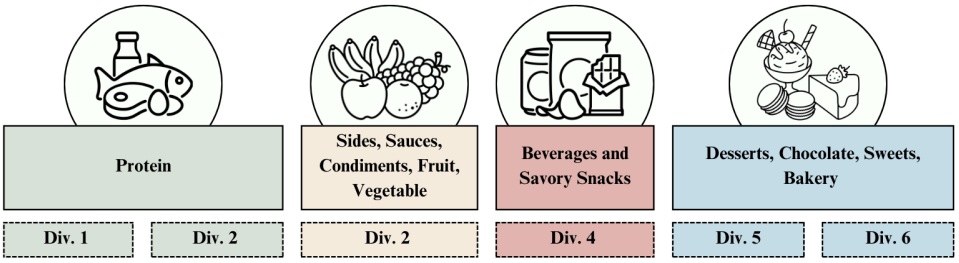


Figure 4.3: The six different division teams within Range.

4.2.1 Food Operations

The flow for a product within IKEA Food can be divided into two different flows - one when an idea is developed and introduced to IKEA Food, and one of the physical distribution of an existing product within IKEA Food's range. As mentioned before, the study will be limited to look at the local range, and hence only the supply chain of products going to the retailer in Malmö. To fully understand the food operations, the different roles of IKEA Food has to be understood. These consist of; demand planner, need planner (NP), supply planner (SP), delivery planner (DP), food demand coordinator (FDC) and service provider operations developer (SPOD). The roles, as well as where in the supply chain processes they operate, are further described in Figure 4.4 and later in the physical distribution flow.

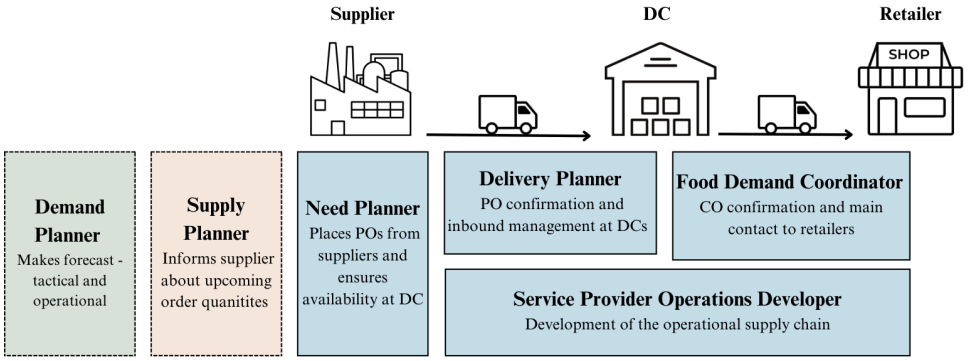


Figure 4.4: The roles of IKEA Food operations and where in the supply chain they operate.

In regards to the flow where an idea is developed and introduced to IKEA, it is an iterative flow between Range, Category and supplier. This process can be seen in Figure 4.5. The part of IKEA's organization that is referred to as Range, is the developing organ of the organization and decides on what products will be included in IKEA's assortment. The Packaging Solution Engineers together with their Range team make the decision to include a new product in the assortment. When this is done they inform Category (Supply) about this and the requirements of the product and packaging. Category is handling the sourcing of a supplier for the specific product, since IKEA is not producing anything themselves, and will find a few alternatives of suppliers, products and packaging solutions. When they receive the suppliers' proposals, they give these to Range that evaluates the proposals according to the requirements they have set for the product. When they have chosen one solution, they inform Category about this, who starts the negotiation of the contract between IKEA and the supplier.

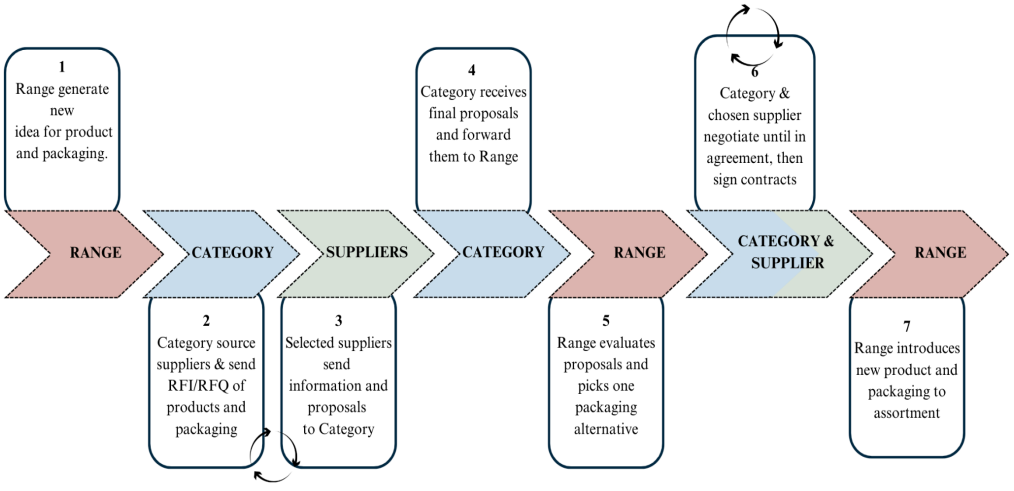


Figure 4.5. Process of introducing a new product into the assortment of IKEA Food.

In regards to the already existing products the operational flow consists of both information and physical aspects, facilitating the movement of goods. This

segment of the organizational structure sees close collaboration between IKEA Food employees, suppliers, logistic providers, and franchisees, and highlights the significance of effective stakeholder communication. At IKEA the roles previously described, demand planner, SP, NP, DP, FDC, drive the distribution process. These are mainly in charge of the information flow and will inform the operational workers about orders and need for products, as visualized in Figure 4.6.

The demand planner plays an important role by forecasting the needs of IKEA Food, determining the quantity of products to be procured from each supplier. This forecast serves as the foundation for the SP and NP's tasks, which involve communicating upcoming quantity requirements to suppliers and issuing purchasing orders (POs). Before transmission to suppliers, POs undergo acceptance and confirmation by the DP. Upon receipt of the PO, suppliers prepare and dispatch orders to the DC in Helsingborg. Subsequently, goods are warehoused at DC Helsingborg until the receipt of a picking list. This list is generated when a store, such as the Malmö Store, places a customer order (CO) that is relayed to the FDC. The FDC verifies the order, contingent upon the availability of stock at DC Helsingborg. Upon confirmation, a picking list is dispatched to the DC, initiating the picking and shipment process to the Malmö store. Upon arrival in Malmö, products are made available for sale in various outlets such as Swedish Food Market (SFM), the IKEA restaurant, or the bistro. SFM is the shop located after the cashier area in IKEA stores, selling CPG. The bistro is also situated after the cashier, offering lighter meals such as hot dogs and ice cream.

Notably, all communication between the store and IKEA channels through the FDC, underscoring their role as intermediaries between the retailer and DC Helsingborg. It is important to notice that the information flow is iterative, meaning that the demand planners receive input from the retailers and the markets in terms of CO outflow data and data from the Service Office. In a similar way the SP gets information through the claims data from stores and DCs in order to work with continuous improvement of the quality of the products.

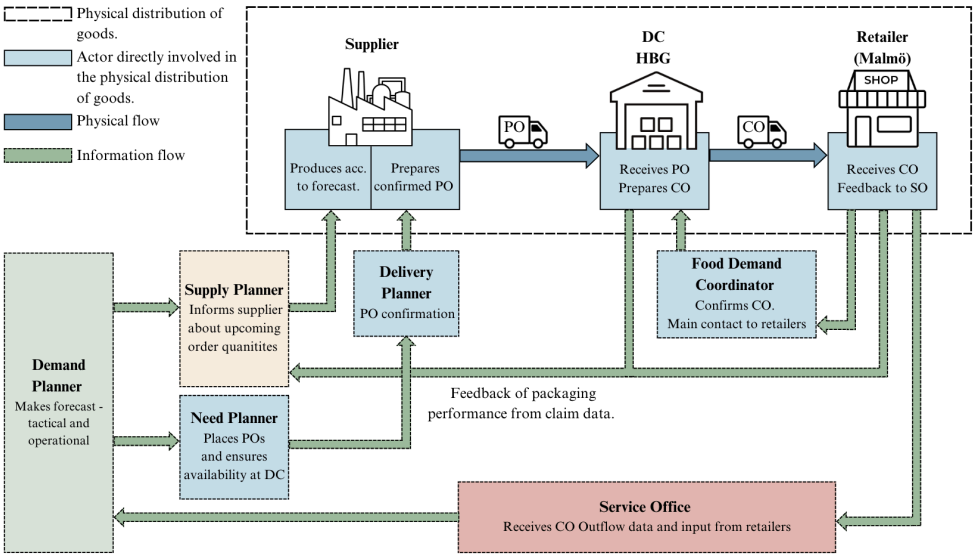


Figure 4.6. Distribution process of goods from IKEA to the Malmö Store including information flow and physical flow.

4.3 PACKAGING SYSTEM PERFORMANCE

In order to see how different packaging systems are performing in the supply chain, five products were as mentioned before studied more closely after dialogue with IKEA on what is considered problematic, was researched. This portfolio includes products from both frozen and chilled chain, IKEA and supplier branded, as well as SFM, bistro and restaurant products, and is hence considered a good explanation of the operations as a whole. The packaging system performance scorecard was used to evaluate the different products, and are presented for each product and packaging level. As a reminder to the reader, the packaging system performance is only evaluated to local range, that is from supplier to a retailer in Malmö, and does not necessarily reflect the global supply chain of the product. This means that if a product is non-problematic in this evaluation, it is not equivalent with a product being non-problematic in the global supply chain. Longer transportation and different conditions than the ones studied can affect the product and might increase the risk of damage. Hence, it cannot be ruled out that issues can arise in a global supply chain, just because they are not present in the studied local supply chain. Although, a problematic product in the researched supply chain, can be assumed to be problematic in the global supply chain as well.

Worth noticing is that most products will be packed on a mixed pallet once leaving the DC. Due to this, the scores for stacking will be hard to estimate, but assuming all mixed pallets are non-stackable, they will all be assigned the lowest satisfaction score. Most products are packed on mixed pallets once leaving the DC, and are therefore hard to maximize with respect to volume and weight efficiency. Since all mixed pallets look different depending on the packed products, they will all be evaluated as a mediocre (3) satisfaction score.

4.3.1 Mild Mustard Packaging System Performance

Unit of analysis C is the “Mild Mustard 500g” and its primary packaging is a round bottle made out of hard plastic with a lid on top. The secondary packaging is a cardboard tray wrapped with plastic and the tertiary packaging is a European pallet (EPAL) and plastic wrapper. The minimum delivery unit (MDU) is a carton which in this case means one tray and between DC and retailer it is packed on a mixed pallet.

The packaging performance of this product is overall not performing well, see Figure 4.7. Due to the shape of the primary packaging (plastic bottle) it is difficult to optimize the rest of the packaging system. The lit of the bottle sometimes breaks due to high pressure which the packaging is not designed to carry. These are two of

the weakest features that affect the whole packaging system. Though the stackability perfromes adequately it does not pass the tilting test due to spaces between some secondary packaging (tray and plastic wrapper) which in practice means that a stacked pallet is not as stable during transportation due to movement. A tilting test is a test where the pallet is tilted a certain degree (27 degrees), which is equivalent to a friction coefficient, to make sure the pallet can handle movement during transportation. The round shape of the primary packaging and the spaces between secondary packaging on pallets also affect the volume and weight efficiency negatively through the supply chain since it is both expensive and not sustainable transporting and warehousing unnecessary amounts of air.

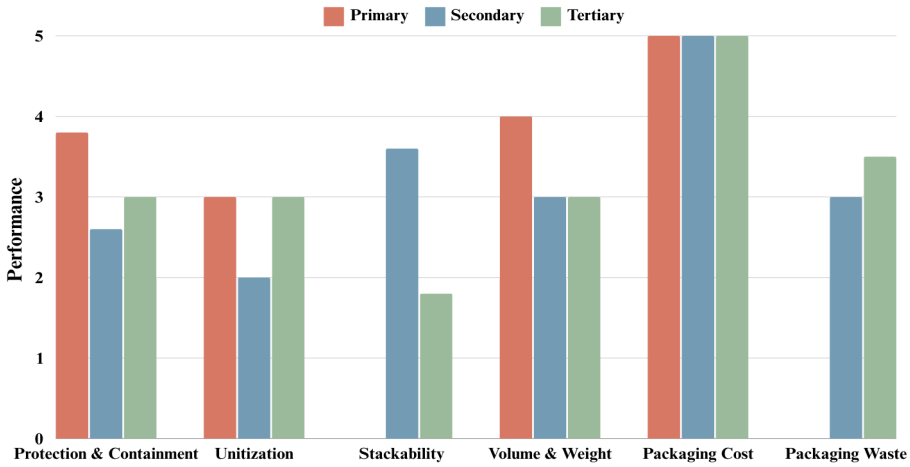


Figure 4.7: Performance of the measured features for each level of Mild Mustard packaging system.

This primary packaging, Figure 4.8, is not performing that well from an optimization point of view. The round shape and the tilting at the top of the primary packaging makes it difficult to use the full space of the packaging system. Another problem with this product and primary packaging is that the lid has to carry a lot of weight which it is not designed for, leading to the lid breaking. Since the products are placed in one layer there is no stacking and hence no satisfactory score has been placed. Similarly, the packaging cost does not affect transport and DC leaving those actors without any satisfactory score. The score can be found in Table 4.1.

Figure 4.8: Primary packaging for Mild Mustard.

Table 4.1: Packaging scorecard for primary packaging of mild mustard 500g

Area	No.	Features	Supplier	Trans. 1	DC	Trans. 2	Retailer
Product Waste	PW1	**Protection and containment**	5	3	4	3	4
Logistics	L1	**Unitization**	3	3	3	3	3
	L3	**Stackability**	-	-	-	-	-
	L4	**Volume and weight efficiency**	4	4	4	4	4
Packaging material	PM1	**Packaging cost**	5	-	-	-	5
	PM2	**Packaging waste**	-	-	-	-	-

The secondary packaging (cardboard tray and plastic wrapper, Figure 4.9) is also a packaging level that is underperforming. This is partially due to the shape of the primary packaging and suboptimal unitization. One secondary packaging is filled with 15 primary packages making it impossible to fully utilize a pallet which naturally also affects the performance for volume and weight efficiency. Moreover, since the secondary packaging only consists of a cardboard tray and thin plastic around it, the protection is insufficient making the risk of damage higher as the primary packaging is somewhat exposed to the surroundings. Furthermore, while the secondary packaging is stackable, their performance still has room for improvement due to the spaces that render the stacking surface unstable. The recycling process at the retailer is not the easiest to perform due to that two different materials are used leading to higher time consumption when sorting the waste. The packaging cost has a high performance since the cost is low. The satisfactory scores for the secondary packaging can be found in Table 4.2.

Figure 4.9: Secondary packaging for Mild Mustard 500g.

Table 4.2: Packaging scorecard for secondary packaging of Mild Mustard 500g

Area	No.	Features	Supplier	Trans. 1	DC	Trans. 2	Retailer
Product Waste	PW1	**Protection and containment**	3	2	3	2	3
Logistics	L1	**Unitization**	2	2	2	2	2
	L3	**Stackability**	4	3	4	3	4
	L4	**Volume and weight efficiency**	3	3	3	3	3
Packaging material	PM1	**Packaging cost**	5	-	-	-	5
	PM2	**Packaging waste**	-	-	-	-	3

Due to that the pallets cannot be filled entirely it creates spaces between some secondary packaging which leads to that the pallet is not passing the tilting test. This is just one weakness found in the tertiary packaging (wooden pallet and plastic wrapper, Figure 4.10). Table 4.3 presents the performance of the tertiary packaging. The tilting test is executed to make sure the pallet can handle friction and movement in the transports. Another effect of the spaces on the pallet is that the volume and weight efficiency scores lower since it is not utilized properly. Furthermore, the pallets are non-stackable during transportation between supplier and DC because their height is too high, preventing two pallets from fitting on top of each other in the trucks. Additionally, this is also a product with MDU of a secondary packaging meaning that it is delivered on a mixed pallet between DC and retailer which is not stackable.

Figure 4.10: Tertiary packaging for Mild Mustard 500g. To the left and middle, a pallet sent to DC and to the right, a mixed pallet sent from DC.

Table 4.3: Packaging scorecard for tertiary packaging of Mild Mustard 500g.

Area	No.	Features	Supplier	Trans. 1	DC	Trans. 2	Retailer
Product Waste	PW1	**Protection and containment**	3	3	3	3	3
Logistics	L1	**Unitization**	3	3	3	3	3
	L3	**Stackability**	3	1	3	1	1
	L4	**Volume and weight efficiency**	3	3	3	3	3
Packaging material	PM1	**Packaging cost**	5	-	5	-	5
	PM2	**Packaging waste**	-	-	4	-	3

4.3.2 Ketchup Packaging System Performance

“Ketchup 3x5kg " is a supplier branded product with a primary packaging as a plastic bag á 5 kg made for the Bistro. They are packed in a secondary packaging which is a cardboard box with three units in it. This tertiary packaging is also a combination of a wooden EPAL and plastic wrapper. The MDU is a carton and is therefore repacked at the DC on to a mixed pallet which is then shipped to the retail store.

This packaging system is underperforming in many aspects. Firstly there is some extra room for air in the secondary packaging (cardboard box) which lowers the satisfaction for unitization and volume and weight efficiency. Secondly, the primary packaging (plastic bags) are relatively fragile resulting in them breaking if too much pressure is put on it. Thirdly, due to that the primary and secondary packaging are not designed without taking the other packaging level into consideration this also affects the performance of the tertiary packaging. The tertiary packaging (wooden EPAL and plastic wrapper) do not pass the tilting test without damaging the secondary and primary packaging. What happens is that the pressure on the corner boxes when tilting carry too much weight the the boxes get compressed which sometimes also affect the plastic bags. The overall performance for each feature and packaging level can be seen in Figure 4.11.

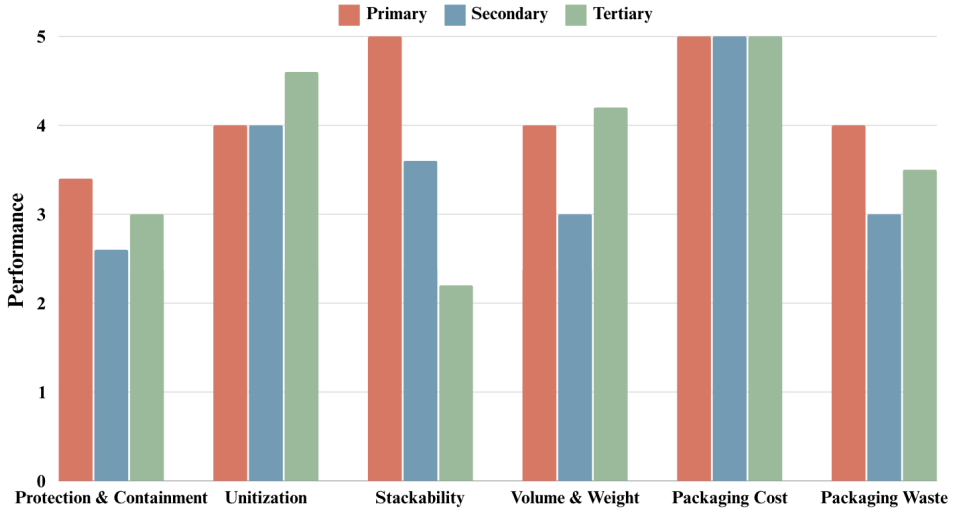


Figure 4.11: Performance of the measured features for each level of Ketchup packaging system.

The primary packaging (plastic bag) of Ketchup 3x5 kg, which can be seen in Figure 4.12, is not strong enough to hold the liquid in the bags if it is exposed to too much pressure. This can lead to breakage of the plastic bag during transportation where the risk of friction and movement is highest and therefore also shifts in pressure. It has also been stated that these plastic bags easily break if they were to be dropped on the floor when handled in the retail store, which naturally happens sometimes. Other aspects of this primary packaging are performing well meaning that the size of the primary packaging is well suited for the consumer product giving high satisfactory scores for both unitization and volume and weight efficiency. The cost of the product is good due to its low cost and it is easy to recycle and manage the waste at the retailer store. See Table 4.4 for the primary packaging performance.

Figure 4.12: Primary packaging for Ketchup 3x5KG.

Table 4.4: Packaging scorecard for primary packaging of Ketchup 3x5KG.

Area	No.	Features	Supplier	Trans. 1	DC	Trans. 2	Retailer
Product Waste	PW1	**Protection and containment**	4	3	4	3	3
Logistics	L1	**Unitization**	4	4	4	4	4
	L3	**Stackability**	5	5	5	5	5
	L4	**Volume and weight efficiency**	4	4	4	4	4
Packaging material	PM1	**Packaging cost**	5	-	-	-	5
	PM2	**Packaging waste**	-	-	-	-	4

Looking at the secondary packaging, Figure 4.13, the cardboard boxes are not designed to properly carry the weight of the ketchup, meaning that when a full pallet is moving (which is most common during transportation) the boxes in the bottom layer are squeezed which can lead to boxes breaking due to that they cannot handle that type of pressure, this can be seen in the picture to the left in Figure 4.13. Furthermore, this packaging is not performing as well as it could be for volume and weight efficiency since there is air on top of the three primary packages. The secondary packaging is therefore not designed with full focus on the other parts of the packaging system. The satisfactory scores for the secondary packaging can be found in Table 4.5.

Figure 4.13: Secondary packaging for Ketchup 3x5KG.

Table 4.5: Packaging scorecard for secondary packaging of ketchup 3x5kg

Area	No.	Features	Supplier	Trans. 1	DC	Trans. 2	Retailer
Product Waste	PW1	**Protection and containment**	3	2	3	2	3
Logistics	L1	**Unitization**	4	4	4	4	4
	L3	**Stackability**	4	3	4	3	4
	L4	**Volume and weight efficiency**	3	3	3	3	3
Packaging material	PM1	**Packaging cost**	5	-	-	-	5
	PM2	**Packaging waste**	-	-	-	-	3

The tertiary packaging from supplier to DC has both some stronger but also weaker features. The squared boxes fit nicely on one pallet and therefore the volume and weight efficiency and unitization has high satisfactory scores. Though there is one aspect that affects the general performance tremendously which is the stackability. As mentioned before, since the pallets do not pass the tilting test, the risk of breakage is even higher when stacked. How the boxes break during the tilting test can be seen in Figure 4.14. Moreover, the ketchup cartons are picked on to mixed pallets from DC to retailer and these pallets are not stackable at all and can be unstable depending on what other products are packed on the same pallet, therefore the lower satisfactory scores on stackability in Table 4.6.

Figure 4.14: Tertiary packaging for Ketchup 3x5KG. To the left, a pallet sent to DC and to the right, a pallet sent from DC.

Table 4.6: Packaging scorecard for tertiary packaging of ketchup 3x5kg

Area	No.	Features	Supplier	Trans. 1	DC	Trans. 2	Retailer
Product Waste	PW1	**Protection and containment**	3	3	3	3	3
Logistics	L1	**Unitization**	5	5	5	4	4
	L3	**Stackability**	3	3	3	1	1
	L4	**Volume and weight efficiency**	5	5	5	3	3
Packaging material	PM1	**Packaging cost**	5	-	5	-	5
	PM2	**Packaging waste**	-	-	4	-	3

4.3.3 Plant Balls Packaging System Performance

“Plant balls 10,8kg” is a IKEA branded product made for the restaurant business. These are packed in boxes with two primary packages, each weighing 5,4kg. The primary packaging is made of a plastic bag. This is then packed in the secondary packaging which is a cardboard box and the tertiary packaging is a combination of a wooden EPAL and plastic wrapper.

This packaging system is performing well overall and not many weaker features were found during the study. Though there were two features performing lower than the others which is volume and weight efficiency and unitization which is a result of unnecessary air both in the primary and secondary packaging taking up extra space in the packaging system. As this product was presented as problematic, an assumption is, as mentioned before, that it may not be performing as well when looking from a global perspective. However, studying local range no greater weaknesses were found and overall performance can be found in Figure 4.15.

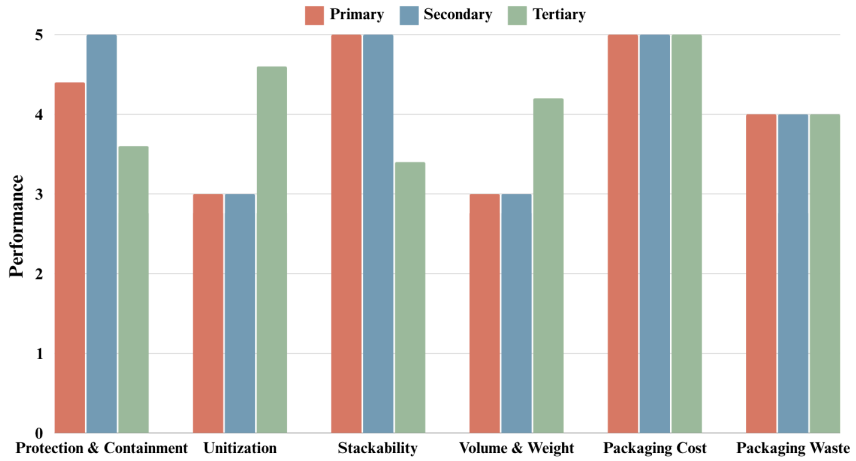


Figure 4.15: Performance of the measured features for each level of Plant Balls packaging system.

The primary packaging for plant balls, Figure 4.16, is performing rather well overall with a few weaker features, see Table 4.7. One of those being volume and weight efficiency due to that the plant balls are not packed in a compact manner which gives unnecessary room for air. Similarly, that also affects the unitization when later packing it in the rest of the packaging system. Looking at better performing features, the primary packaging is stackable, meaning it is possible to lay two primary packages on top of one another. Additionally, since the packaging is made out of one single material, plastic, it is relatively easy to recycle.

Figure 4.16: Primary packaging for Plant Balls 10.8KG

Table 4.7: Packaging scorecard for primary packaging of Plant Balls 10.8KG

Area	No.	Features	Supplier	Trans. 1	DC	Trans. 2	Retailer
Product Waste	PW1	**Protection and containment**	5	4	5	4	4
Logistics	L1	**Unitization**	3	3	3	3	3
	L3	**Stackability**	5	5	5	5	5
	L4	**Volume and weight efficiency**	3	3	3	3	3
Packaging material	PM1	**Packaging cost**	5	-	-	-	5
	PM2	**Packaging waste**	-	-	-	-	4

Also for the secondary packaging (cardboard box, Figure 4.17), the volume and weight efficiency is lacking. This is due to that there is extra space on top of the two primary packages in the secondary box which leads to that the height of the box is unnecessarily high. The stackability is performing well for the secondary packaging due to its square boxes that are robust enough to carry high pressure. Furthermore, the secondary packaging is also made of one material if the small amount of tape is not considered, which is cardboard meaning that this product is easy to recycle. The performance can be found in Table 4.8.

Figure 4.17: Secondary packaging for Plant Balls 10.8KG.

Table 4.8: Packaging scorecard for secondary packaging of Plant balls 10.8KG.

Area	No.	Features	Supplier	Trans. 1	DC	Trans. 2	Retailer
Product Waste	PW1	**Protection and containment**	5	5	5	5	5
Logistics	L1	**Unitization**	3	3	3	3	3
	L3	**Stackability**	5	5	5	5	5
	L4	**Volume and weight efficiency**	3	3	3	3	3
Packaging material	PM1	**Packaging cost**	5	-	5	-	5
	PM2	**Packaging waste**	-	-	-	-	4

The tertiary packaging, Figure 4.18, is performing well for every feature and every actor except for the stackability and protection and containment between DC and

retailer. From supplier to DC the tertiary packaging is formed by a pallet wrapped with plastic but when transported from DC to retailer the secondary packaging are picked and placed on mixed pallets, resulting in a not so stable pallet that is not stackable. The pressure may not be evenly spread which increases the risk of damage to the product. No tests are made to make sure the pallets can handle enough friction and movement which also can contribute to increased risk of something breaking. The satisfactory scores can be seen in Table 4.9.

Figure 4.18: Picture of the tertiary packaging (mixed pallet) of Plant Balls 10.8KG

Table 4.9: Packaging scorecard for tertiary packaging of Plant balls 10.8KG.

Area	No.	Features	Supplier	Trans. 1	DC	Trans. 2	Retailer
Product Waste	PW1	**Protection and containment**	4	4	4	3	3
Logistics	L1	**Unitization**	5	5	5	4	4
	L3	**Stackability**	5	5	5	1	1
	L4	**Volume and weight efficiency**	5	5	5	3	3
Packaging material	PM1	**Packaging cost**	5	-	5	-	5
	PM2	**Packaging waste**	-	-	4	-	4

4.3.4 Biscuits with Chocolate/Raspberry Filling Packaging System Performance

Unit of analysis D is the product “Biscuits w Chocolate/Raspberry Filling”. The product is a IKEA branded biscuit aimed for SFM and is shown in Figure 4.20. The primary packaging of the product is a thin plastic wrapping that is sealed with glue. The product is then packed in the secondary packaging, a cardboard tray, in a set of 48 units. The cardboard tray covers the bottom ~5cm of the product, and the rest of the product is unprotected. The tertiary packaging is a wooden EPAL wrapped in plastic wrapping in order to keep the product in place. The MDU of the item is a pallet, meaning the product will always be stored and transported as a whole pallet.

The packaging system for the chocolate or raspberry-filled biscuits offers several strengths but also some weaknesses, see Figure 4.19. The primary packaging (soft plastic) is efficient at reducing air but lacks durability, leading to potential damage due to impact. Additionally, the rounded shape of the primary packaging complicates its integration into secondary packaging. The secondary packaging (cardboard tray), partially protects the biscuits but leaves the top exposed, increasing the risk of damage during transport. It is stackable and designed to support additional weight, but internal movement within the packaging remains a concern due to its open structure. The efficiency of weight and volume is generally good, though the design of the primary packaging creates air gaps within the secondary packaging. The tertiary packaging (EPAL with plastic wrapping) provides a stable platform for storage and transport but once again adds little in terms of additional protection. The large MDU of a full pallet can also be problematic for retailers, as the product is not a fast mover, leading to storage issues and tied-up capital. Overall, while the system is cost-effective and efficient in terms of material use and recycling, it needs improvement in protection and containment. Addressing the weaknesses in impact protection and optimizing the secondary packaging could significantly enhance the system's performance, ensuring better product safety and reducing waste.

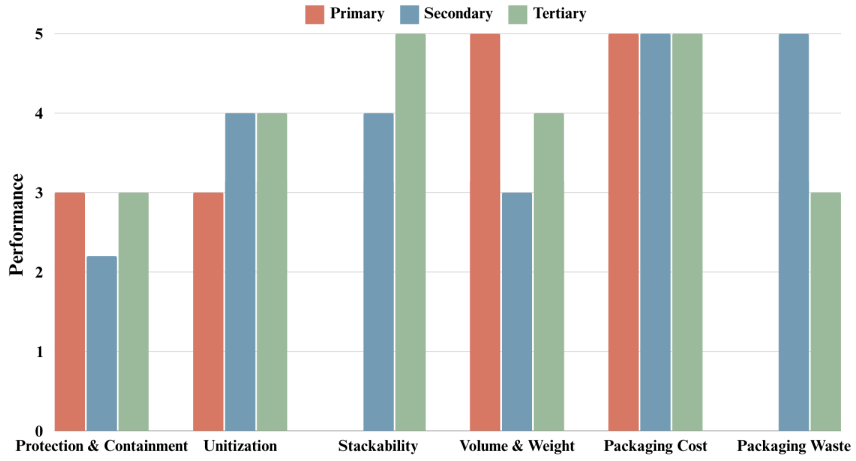


Figure 4.19: Performance of the measured features for each level of Biscuits w. chocolate/raspberry filling packaging system.

The biscuits with chocolate or raspberry filling are overall performing well in the supply chain, see Table 4.10. The primary packaging (soft plastic, Figure 4.20), is well suited for the product, without unnecessary air present. Although, the absence of air means that the brittle products are exposed to damage due to impact. The packaging is also sealed with glue that on occasion releases, making the packaging open up and exposing the product inside, risking food safety. Lastly, the primary packaging is round, making the optimization of the secondary packaging hard, affecting the unitization performance. The primary product is not stackable, but is not of importance, since this is not something that is done with only the primary packaging. Lastly, the primary packaging is performing well on packaging cost and waste. The packaging material is cheap, and is only made out of one material,

making recycling and handling waste easy. Although, it is made out of plastic, which is lowering the performance of packaging waste slightly.

Figure 4.20. Primary packaging of the product Biscuits w. chocolate/raspberry filling.

Table 4.10: Packaging scorecard for primary packaging of Biscuits w. Chocolate/Raspberry Filling.

Area	No.	Features	Supplier	Trans. 1	DC	Trans. 2	Retailer
Product Waste	PW1	**Protection and containment**	3	3	3	3	3
Logistics	L1	**Unitization**	3	3	3	3	3
	L3	**Stackability**	-	-	-	-	-
	L4	**Volume and weight efficiency**	5	5	5	5	5
Packaging material	PM1	**Packaging cost**	5	-	-	-	5
	PM2	**Packaging waste**	-	-	-	-	-

The secondary packaging (cardboard tray, Figure 4.21), of the product is also contributing to this issue with the brittle product being exposed. This is since only the bottom part of the primary packaging is covered by the cardboard tray and the rest is exposed and unprotected against impact. The secondary packaging is also not keeping the product in place that well, leading to movement inside of the secondary packaging. These issues result in a mediocre performance in regards to protection and containment. The secondary packaging is stackable, it can handle the weight of another secondary packaging and has a flat surface. Worth noticing here is that the MDU of the product is a pallet, so the only secondary packaging that will be stacked is one containing cookies as well. This means the packaging can handle the weight of that stacked product, but it does not guarantee that it can handle more weight and pressure than that. The volume and weight efficiency is optimized as well as possible, but due to the round primary packaging the secondary packaging contains a bit of air. Lastly, the packaging is cheap, and is using minimal amounts of a single material resulting in the best performance for packaging cost and waste. The performance of the secondary packaging can be found in Table 4.11.

Figure 4.21. Secondary packaging of the product Biscuits w. chocolate/raspberry filling.

Table 4.11: Packaging scorecard for secondary packaging of Biscuits w. Chocolate/Raspberry Filling.

Area	No.	Features	Supplier	Trans. 1	DC	Trans. 2	Retailer
Product Waste	PW1	**Protection and containment**	2	2	2	2	3
Logistics	L1	**Unitization**	4	4	4	4	4
	L3	**Stackability**	4	4	4	4	4
	L4	**Volume and weight efficiency**	3	3	3	3	3
Packaging material	PM1	**Packaging cost**	5	-	-	-	5
	PM2	**Packaging waste**	-	-	-	-	5

The tertiary packaging, the wooden EPAL with plastic wrapping (Figure 4.22), is working well for the product, see Table 4.12. The secondary product fits well and fills out the whole pallet, making it performing well in unitization and volume and weight efficiency. Since the product is already exposed in the primary and secondary packaging, the plastic wrapper in the tertiary packaging does not offer a much better containment of the brittle product, lowering the performance score for protection and containment. However, the plastic helps keep the product in place. From a retailer's point of view, the MDU of a pallet is considered a bit of a problem, since the product is not a fast selling product, resulting in the pallet with products taking up storage space at the store as well as means tied up capital for the retailers. In regards to the packaging waste and cost the packaging system is performing well. The packaging is cheap, and the standardized pallet is reusable, which is minimizing the waste. The plastic wrapping will turn into waste at the DC and at the retailer, making the performance lower at these actors. Lastly, due to the minimum quantity of a pallet the tertiary packaging is stackable, and ensures double stackability in both storage and transport throughout the whole supply chain.

Figure 4.22: Tertiary Packaging of the product Biscuits 175g, without the plastic wrapping.

Table 4.12: Packaging scorecard for tertiary packaging of Biscuits w. Chocolate/Raspberry Filling.

Area	No.	Features	Supplier	Trans. 1	DC	Trans. 2	Retailer
Product Waste	PW1	**Protection and containment**	3	3	3	3	3
Logistics	L1	**Unitization**	4	4	4	4	4
	L3	**Stackability**	5	5	5	5	5
	L4	**Volume and weight efficiency**	4	4	4	4	4
Packaging material	PM1	**Packaging cost**	5	-	-	-	5
	PM2	**Packaging waste**	-	-	-	-	3

4.3.5 Letter Biscuits Packaging System Performance

The item “Biscuits 175g” is the unit of analysis E. This IKEA branded product is sold in SFM and displayed in Figure 4.24. The primary packaging of the product is a thin, squared cardboard box sealed with glue. The product is then packed in the secondary packaging, another cardboard box covering all 15 units of primary packaging. The tertiary packaging is a wooden EPAL wrapped in plastic wrapping in order to keep the product in place. The MDU of the item is a half pallet, meaning the product will always be stored and transported as at least a half pallet.

The packaging solution for this item has some strengths, but there are notable weaknesses in maintaining product integrity. The primary packaging (paper box) is vulnerable to being pressed together or ripped open, risking damage to the cookies inside. The air in the packaging can also cause cookies to break even when the box is intact. However, the squared design of the box is favorable for unitization and stackability, as it aligns well with secondary packaging and allows efficient stacking. The packaging is also cost-effective and easily recyclable, though there is some impact on efficiency due to excess air. The secondary packaging (cardboard box) is generally robust, but can sometimes collapse under pressure or due to

movement, especially at the corners. This can lead to the primary packaging being compromised, causing the cookies to break. Despite this, the design optimizes volume and weight efficiency, with little wasted space between the primary packaging. The tertiary packaging (EPAL with plastic wrapping) provides a high stacking performance, ensuring stability even after DC handling. Overall, while the packaging system is cost-effective and has good stackability, improvements are needed in primary packaging durability and secondary packaging resilience. The performance can be seen in Figure 4.23. Addressing these issues would enhance the protection of the cookies and reduce waste throughout the supply chain.

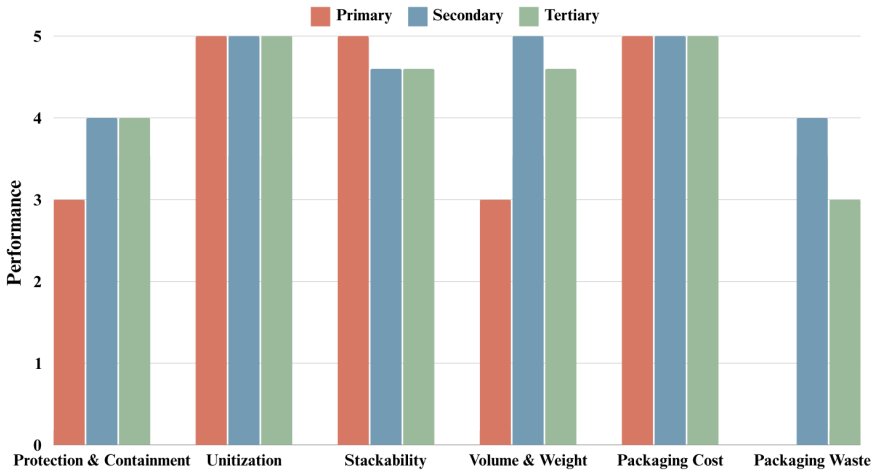


Figure 4.23: Performance of the measured features for each level of Letter biscuits packaging system.

Regarding the primary packaging solution for this item, there are a few things that stand out, see Table 4.13. The shape of the cookie is very important for this item, since it is supposed to look like letters. It is hence essential that the cookies are intact within the packaging when it is sold. An issue for the item is that this is not always the case, the primary packaging (paper box) risks being pressed together and losing its shape or even being ripped open. The amount of air inside the packaging leads to the cookies sometimes breaking even if the packaging is intact. The air inside the primary packaging also results in worse performance on the weight and volume efficiency feature. On the other note, the packaging is a squared paper box, which performs very well on unitization and stackability, since it optimizes the secondary packaging well and can be stacked. Once again, the packaging is cheap and the waste can easily be recycled.

Figure 4.24: Primary Packaging of the product Biscuits 175g.

Table 4.13: Packaging scorecard for primary packaging of Biscuits 175g.

Area	No.	Features	Supplier	Trans. 1	DC	Trans. 2	Retailer
Product Waste	PW1	**Protection and containment**	3	3	3	3	3
Logistics	L1	**Unitization**	5	5	5	5	5
	L3	**Stackability**	5	5	5	5	5
	L4	**Volume and weight efficiency**	3	3	3	3	3
Packaging material	PM1	**Packaging cost**	5	-	-	-	5
	PM2	**Packaging waste**	-	-	-	-	-

Concerning the secondary packaging (cardboard box, Figure 4.25) it performs well on most of the features, see Table 4.14, except that the secondary packaging consists of a cardboard box that on occasion cannot handle the pressure or movement leading to it being pressed together, which in turn can affect the primary packaging breaking. This mainly happens in the corners of the packaging. Even this packaging is a squared cardboard box, that is well optimized in regards to the volume and weight efficiency, as well as unitization since it contains no air between the primary packaging. Lastly, the packaging is cheap and the waste can easily be recycled. One downside to the recyclability aspects is that there is a plastic label glued onto the cardboard and has to be removed before being turned into waste.

Figure 4.25: Secondary Packaging of the product Biscuits 175g.

Table 4.14: Packaging scorecard for secondary packaging of Biscuits 175g.

Area	No.	Features	Supplier	Transp. 1	DC	Transp. 2	Retailer
Product Waste	PW1	**Protection and containment**	4	4	4	4	4
Logistics	L1	**Unitization**	5	5	5	5	5
	L3	**Stackability**	5	4	5	4	5
	L4	**Volume and weight efficiency**	5	5	5	5	5
Packaging material	PM1	**Packaging cost**	5	-	-	-	5
	PM2	**Packaging waste**	-	-	-	-	4

The tertiary packaging (EPAL with plastic wrapping) is working well for this product. The protection of the primary and secondary packaging makes the plastic wrapping well suited for this packaging solution. Although, since the plastic wrapping is fragile there is always a risk of it breaking and not protecting the content, which we can see at the protection and containment evaluation. Due to the MDU being a half pallet, the stacking of the pallets is more likely than for the completely mixed pallets, so the stacking performance is high even after the DC. The tertiary and secondary packaging are well optimized together, making the pallet perform high on both unitization and volume and weight efficiency. The plastic wrapping becomes waste at the DC and the retailer, reducing their operational efficiency. The performance of the tertiary packaging can be found in Table 4.15.

Table 4.15: Packaging scorecard for tertiary packaging of Biscuits 175g.

Area	No.	Features	Supplier	Trans. 1	DC	Trans. 2	Retailer
Product Waste	PW1	**Protection and containment**	4	4	4	4	4
Logistics	L1	**Unitization**	5	5	5	5	5
	L3	**Stackability**	5	5	5	4	4
	L4	**Volume and weight efficiency**	5	5	5	4	4
Packaging material	PM1	**Packaging cost**	5	-	-	-	5
	PM2	**Packaging waste**	-	-	-	-	3

4.4 PACKAGING INNOVATION PROCESS PERFORMANCE

To evaluate and assess how IKEA is working with packaging innovation and the processes regarding this, the packaging innovation scorecard was applied to the operations of IKEA Food. Table 4.16 shows the performance within the seven examined processes and their specific subprocesses. The evaluation is based on the

collected data, through interviews, documents and observations. It can be seen that the operations of IKEA Food lack coordination, particularly within integration with product development, systems used and clear communicated goals. The organization has little or no control over the packaging development, since they do not own their own production of products and packaging. This means that the operations within these processes instead involved IKEA Food setting requirements on the packaging, which should be communicated to the suppliers and later followed up and evaluated. Currently these processes are not working well and this is shown at the performance of these. In regards to the systems in place, they do not currently align with the organization's needs within evaluation, follow up, data collection, or other essential operations and processes, resulting in bad performance. Lastly, IKEA Food's lack of clear common goals and vision of the organization, and absence of ways of measuring performance shows an area of improvement. The ways of measuring performance are today simple or non-existent, and when existing the employees often lack knowledge about how to use these in the most efficient ways. When discussing the goals and vision of IKEA Food the answers are scattered and no document or similar is found that explains this in a clear way. The overall performance of processes for packaging innovation within IKEA Food show room for improvement, especially within the areas mentioned above, but also for other subprocesses. These are all further described and discussed below in the following sections.

Table 4.16. Packaging innovation scorecard for IKEA Food organization and their ways of working.

Process	Subprocess	Bad practice	Mediocre practice	Good practice	Best practice
Concept Generation	Plan packaging innovation				
	Generating new packaging concepts				
	Being inventive and creative				
Packaging Development	Packaging development process				
	Integration with product development				
	Collaboration with packaging users				
Technology acquisition	Technology strategy				
	Technology sourcing				
	Sustainability considerations in technology acquisition				
Leadership	Packaging innovation goals				
	Processes for generating and implementing packaging innovation				
	Conditions for packaging innovation				
Systems and Tools	Systems				
	Tools for packaging innovation				

Resourcing	Human resources				
	Financial resources				
Competitiveness and climate performance	Goals				
	Measurement				
	Innovation performance				

4.4.1 Concept generation

IKEA Food has as mentioned before appointed teams that are working with packaging solutions and the identification and planning of new packaging concepts. These have limited decision making, since they work closely with the suppliers who have the most decision power. This means that IKEA's decision making rights regarding the next generations of packaging solutions are affected in regards to making it difficult or impossible to always consider all relevant innovation areas. Although, the environment within these teams highlights entrepreneurial thinking and encourages new ideas. The teams involve packaging solution engineers, specialized in packaging, that are encouraged to be inventive and supported for coming up with new or improved packaging solutions. Once again, the influence of the suppliers limits the implementation of these ideas, and hence systems for handling unforeseen events make it a good, but not best practice. The knowledge of the limitations of implementation risks reducing the motivation of the employees to come up with and present their new ideas. The score and motivation can be found in Table 4.17.

Table 4.17: Packaging innovation scorecard for the concept generation processes with motivation of current performance.

Subprocess	Bad practice	Mediocre practice	Good practice	Best practice	Motivation
Plan packaging innovation					• Limited decision making rights which limits the development • Risks of reducing the motivation of the employees to come up with and present their new ideas
Generating new packaging concepts					• Not much evaluation related to logistical performance and customer needs (retailers) • Retailers have no way of informing the packaging teams of what is working well and not with products and packaging
Being inventive and creative					• Entrepreneurial environment, encouraged to come with new ideas. Still limited by suppliers • Incentives for generating new ideas exist by showing appreciation but are limited

Regarding existing solutions, IKEA lacks evaluation related to the logistical performance of these. The customer contact, in IKEA's case contact with retailers, is limited and there are no direct links to the retailers to being able to work with ongoing improvement when generating new packaging concepts. For example, it was found that the retailers have no way of informing the packaging teams of what is working well and not with products and packaging. The plant balls studied were pointed out as a problematic product, but when at the retailer it was found that they experience it as a well working product. Similarly, the letter biscuits as mentioned before sometimes break in the primary packaging, something that often is not noticed until they reach the end consumer. The retailer then receives complaints about this, but has no way of reporting it back to the packaging teams, showing the lack of customer contact and ongoing improvement.

To summarize the concept generation process, the entrepreneurial environment within IKEA and the packaging teams allow for new ideas and initiatives to be invented. But the influence from suppliers limits the implementation of ideas, and the knowledge of this is leading to restrictions in including all innovation areas in the planning of next generation packaging. IKEA also lacks evaluation of existing packaging solutions, especially in regards to involving direct communication with customers to identify their needs. Consequently, the contact with customers, consideration of all relevant innovation areas, set and communicated requirements for the suppliers, as well as systems for analysis and unplanned events has improvement potential.

4.4.2 Packaging development

When working with transformation of a packaging concept into usable packaging IKEA's divisions Range and Supply are working closely with each other. The packaging engineers for each range have procedures for the packaging development process that are adjusted to each team's and each range's operations. Although, the development processes in place are basic and not well integrated between the Range and Supply operations, showing that more work is needed for it to be a good practice, which can be seen in Table 4.18. Since IKEA does not own their own production of products and packaging, the packaging development process is a process of setting requirements and contracting suppliers to perform the supply of the packaging. IKEA's approach to packaging development with its suppliers presents significant challenges due to a lack of structured processes and clear communication. The absence of sufficient formal requirements and documentation, together with insufficient oversight, creates an environment where problems and difficulties easily can arise without clear ways for correction.

Table 4.18: Packaging innovation scorecard for the packaging development processes with motivation of current performance.

Subprocess	Bad practice	Mediocre practice	Good practice	Best practice	Motivation
Packaging development process					• Packaging engineers for each set of solutions (range) • Basic and isolated packaging procedures. • Not communicating requirements to suppliers in a good way
Integration with product development					• IKEA does not have the possibility to develop the packaging together with the product • Picks the packaging solution that best fits the product, or just accept the packaging that already exists • The opportunities to give feedback on the packaging's performance are limited
Collaboration with packaging users					• They are trying to communicate between different parts of the company but the complexity of the organization makes it difficult • Lacking active involvement and understanding of the entire supply chain

When developing or introducing a new product for IKEA Food, the product and packaging are developed separately, with the limitations that come from the suppliers. The process looks different depending on if it is an IKEA branded or supplier branded product. For the supplier branded products, the product and packaging already exist and is completely developed by the supplier. For the IKEA branded products, the product is developed and the packaging is chosen from a few suggestions given by the supplier. This means that IKEA does not have the possibility to develop the packaging together with the product, but rather pick the packaging solution that best fits the product, or just accept the packaging that already exists. Once IKEA Food selects a packaging solution, they lose visibility of the packaging system to some extent. The suppliers do not always provide the correct and sufficient information about the specifics of the pallet the product is being packed on. Due to this, both the requirements set on the packaging solution and the opportunity to give feedback on the packaging's performance are limited. This was shown for several of the products in this study. The pallets were studied at the DC, meaning that they have been approved and shipped from the suppliers. It was found that for example the mild mustard pallet is too tall and packed with a large amount of air. Both the mild mustard and ketchup had several pallets containing damaged products. Another product, Långlur (boxed fruit juice) was also packed on pallets containing damaged or deformed packing. All this was not known by IKEA prior to the workshop, showing the lack of visibility and sufficient information about the pallets leaving the supplier.

In order for IKEA to have as much visibility and traceability for the packaging, they have contracts with the suppliers that should state the requirements that IKEA has on the packaging. As of today, these contracts do not contain sufficient

information about the packaging requirements that IKEA would need to have. There is no database, routine or internal documentation that gathers all the requirements or guidelines for what requirements should be included in the contracts for all products and its packaging. This absence of clear guidelines means suppliers are not held to a consistent standard, which can lead to varied interpretations of what is expected. In addition to lacking written requirements, IKEA includes some, but not sufficient, detailed packaging specifications in supplier contracts. This lack of contractual clarity results in limited accountability when packaging issues occur. Furthermore, the approval process of the chosen packaging solution is a one, or few times, approval process. Once the packaging solution is approved, there is no ongoing quality check up or follow up on the set requirements to ensure compliance with the original specifications. The suppliers do not provide documentation of the actual design, materials or other specifications of the packaging system, for IKEA to obtain. For example, the suppliers are required to perform various tests of the packaging system, especially of the tertiary packaging, before it is approved to be sent to the DC and further along the supply chain. It is found that even if pallets of some packaging solution is approved and shipped to the DC, when the tests are performed there to verify the pallet, several of the pallets do not pass the test. Two of the products not passing the test are the ketchup and mild mustard in this study. Both of the products are packed on approved pallets, and when performing the tilting test both products did not only fail the test, but the test had to be interrupted earlier due to the products on the pallet breaking. This is something that proves that IKEA does not conduct follow-up checks, to ensure packaging is consistently produced to approved standards.

Throughout this packaging development process, not only the range-specific teams are responsible for creating packaging solutions, but there are project based teams as well. These teams work with broader packaging solutions that address for example transportation and mixed palletization. An example of this is IKEA's newly developed paper pallet "multiway picking platform" that is developed with the intention to improve stackability for mixed pallets and be a more sustainable option than the wooden pallet that is being used today. The fact that this exists indicates good practice of collaboration with packaging users. Since IKEA here is in charge of the design of these kinds of packaging solutions, the packaging development process is more developed and these procedures are adjusted to the project in a more efficient manner. Although, the evaluation and follow up part of these processes are neither in place, and similar to the range-specific teams, once a project is finished, the packaging solution is considered to be approved for use.

To summarize, IKEA's lack of influence of creating and designing the packaging solutions has led to their developing process instead containing the processes of creating, communicating and evaluating the requirements that IKEA has to ensure continued compliance. As of today, the process of this exists, but is not thoroughly developed and specified in a clear way for neither the internal stakeholders at IKEA nor the suppliers. IKEA has no complete database over the requirements for internal use. The requirements set are not sufficient, and the contracts with the suppliers do not include all the information and standards that are needed. IKEA

does not perform follow ups on the procedures and the performance of the solutions, which is shown in the supply chain of products that are approved but do not comply with the tests that should have been performed by the suppliers. Despite IKEA's concerted efforts to foster communication among internal stakeholders, the organization's large-scale complexity creates significant challenges, often resulting in incomplete input and hindered collaboration. The packaging development processes are restricted to basic procedures that are team- or project specific, with some limited internal input and some adjustment to each project.

4.4.3 Technology acquisition

Regarding the technology acquisition at IKEA, the organization has a good understanding of knowledge about packaging technology and materials. As mentioned before the range-specific teams have clear roles for research and development and are focused and specialized on a certain product and/or area. IKEA has a long history in working with developing packaging and has extensive contact and close relationships with leading technology providers, i.e. universities, industry consortia and government agencies, to gain the best technology sourcing. IKEA's involvement in these allows them to collaborate with other industry leaders on technology and sustainability initiatives. However, IKEA Food is a fairly new part of the IKEA organization that requires new technology since food is being handled differently than the rest of the products in IKEA's assortment. To enhance IKEA Food's technology strategy, further developed expertise and competencies of packaging technology tailored to the food sector can be strengthened even further. The score for technology acquisition within IKEA Food can be seen in Table 4.19.

Table 4.19: Packaging innovation scorecard for the technology acquisition processes with motivation of current performance.

Subprocess	Bad practice	Mediocre practice	Good practice	Best practice	Motivation
Technology strategy					• They have good understanding and knowledge about packaging technology and different materials • Needs more extensive information since food is being handled differently than the rest of the products in IKEA • They follow and make changes relevant to new EU-regulations
Technology sourcing					• Clear roles for R&D in house, with separate teams focused on certain areas • Ongoing contact with external stakeholders
Sustainability considerations in technology acquisition					• Existing policies and procedures, to fit with sustainability regulations • Constant trade offs: cheap vs sustainable

Additionally, a deeper monitoring of trends and competitors' technology use specifically for the food industry would improve the performance of IKEA's technology strategy. Including sustainability factors in technology acquisition, IKEA has policies and procedures to adhere to sustainability regulations. Since IKEA's strategy and brand relies on being affordable for the many people, there is a constant trade off between cost and sustainability, limiting the company to not go beyond regulations and sustainability work regarding packaging technologies. Because IKEA aims to remain affordable for a broad customer base, the company sometimes prioritizes cost-effective packaging solutions. This cost-focus, however, may lead to compromises in sustainability focus of packaging technology, making it a second priority. The use of lower-cost packaging can increase the risk of damage, resulting in food waste, packaging waste, or other issues that arise from inadequate protection. To sum up, IKEA has a strong foundation with substantial expertise in packaging technology and has established robust collaborations with external stakeholders to improve and optimize these processes. However, this expertise primarily stems from years of experience in the furniture industry, not as much within the food sector since it is a relatively new addition to IKEA's product range. The distinct requirements for food packaging as compared to furniture suggest that IKEA could benefit from deepening its understanding of the food sector. By developing greater insights into food packaging needs, IKEA can enhance its technology acquisition strategies to better support this evolving aspect of its business.

4.4.4 Leadership

Looking at the leadership within IKEA Food and its goals for packaging innovation, it is underperforming in many aspects. The IKEA organization has plenty of goals for packaging, but these are not worked on and modified to fit the food packaging operations. This makes the area of food somewhat overlooked and goals have to be interpreted and translated to be useful in the business of food. The leadership within IKEA Food have failed to successfully formulate these goals, as well as clearly communicate them for specifically food packaging. Above this, management is not active in setting up processes for generating and implementing packaging innovation. This refers to that the goals set, do not align with the rest of the food operations, and neither with the systems and processes currently in place in the organization. The motivated score for the leadership processes are displayed in Table 4.20.

Table 4.20: Packaging innovation scorecard for the leadership processes with motivation of current performance.

Subprocess	Bad practice	Mediocre practice	Good practice	Best practice	Motivation
Packaging innovation goals					• Documents regarding goals, packaging is seen as a strategic component. • Long term goals, but these are developed for the furniture area and not adjusted to fit the food area. • Management is not successful in incorporating product development, and the organization lacks clear goals connected to improvement of operations.
Processes for generating and implementing packaging innovation					• Management is not active in setting up processes for generating and implementing packaging innovation. • No communication of how to work with packaging innovation is presented. • There exists a specific group working with innovation but are not working proactive with extensive support or integration with the other operations.
Conditions for packaging innovation					• Management lacks performance measurement and fails to integrate different departments in measuring performance.

Furthermore, even though groups focusing on finding new innovations with support from management exist, the processes of new ideas and innovations are performing mediocre. This innovation work is not proactive, and has very limited integration with the other operations. Management lacks performance measurement and fails to integrate different departments in measuring performance. Today there is more focus on putting out fires, than on finding better solutions to the processes not working properly. No measurement of performance means that the ground for innovation and improving packaging is very limited and results in an unclear way of working with packaging innovation. The performance of innovation could be improved if management worked with more extensive and proactive support within the area of food, and made sure to integrate it with the rest of the operations. Further, the encouragement of taking risks is present but could be improved slightly. Today, the procedure appears to be that employees present an idea, and the management team will review it and express gratitude toward the individual who proposed it. Why this is not all the way to best practice is due to that it is not communicated actively that new ideas are appreciated and the reward for new ideas is limited. It is apparent that the leadership at IKEA Food has not been successful in adjusting the goals to food packaging innovation, as well as clearly stating and communicating how to work with processes of packaging innovation. Additionally, the business purpose has not been clearly communicated and there is a lack of collaboration between the different departments and processes within the organization that would allow for better conditions for packaging innovation.

4.4.5 System and Tools

Regarding systems and tools, IKEA has a lot to work on, which can be seen in the motivation in Table 4.21. Firstly there is no real information system for collecting data about the performance of the packaging, posing a problem through the entire supply chain. The collaboration between different stakeholders is ineffective and there is no real set up for working procedures. As of today, information about the performance comes primarily in the form of claims, which informs IKEA when and how a packaging is not working. When a claim is made it is sent to QDM (Quality Deviation Management) who generates a deviation report. However, the final destination of these reports is unclear, and there appears to be no defined procedure for addressing these issues or assigning responsibility. There is a lack of visibility in the supply chain since there is no simple tool nor process to make sure that the effect of a claim is seen. Additionally, it is said that all damages affecting the consumer product as well as other damages affecting the operations are being reported as a claim, however it has been understood through interviews and observations that this is not always the case. This can also be argued by the fact that only 24 claims from the DC have been made for the studied product during the entire 2023. Only one claim each has been made for Ketchup 3x5kg due to damaged goods which is assumed to be a lower amount than reality since it was observed how easily the cardboard boxes got compressed and when tilting, see Figure 4.13. Similarly, Mild Mustard 500g also has only one claim due to “other problem”. Another example showing this is that only 127 claims due to broken labels have been made over a period of 18 months which in average is seven claims each month. However during a warehouse visit it was observed that 6 labels were broken just in one day. One reason for damages not being reported can be that the existing system for reporting claims is inefficient to use and is relatively time consuming and there are not enough incentives for the DC and retailer to always take the time to report it. Today, retailers are solely driven by reimbursement for the damaged goods and the DC takes extra time to fix the problem which is put on the invoice sent to IKEA.

Moreover, there is no system for collecting and storing general performance data of the different products and packaging which makes continuous evaluation very difficult. Instead the procedure consists of sending different emails back and forth, which naturally is very time consuming and risks important information being lost. An explanation to why some products do not perform well is that IKEA, before acquiring Bring, had very little visibility since most parts of the operations were outsourced which made it difficult for IKEA to find these problematic products. However, that is not the whole truth since it has been observed that a newly introduced article, “Långlur”, that has been developed and introduced to the market all under the IKEA Food operation still does not live up to the requirements. This is yet again an augment for the evaluation and verification of products not working properly.

Table 4.21: Packaging innovation scorecard for the systems and tools processes with motivation of current performance.

Subprocess	Bad practice	Mediocre practice	Good practice	Best practice	Motivation
Systems					• Lack of systems supporting operations or desired packaging data. • No sufficient information system collecting performance data. • Inefficiency in how information is shared, employees use different or no systems. No integration throughout the organization.
Tools for packaging innovation					• Inefficient tools for the claim reporting process. • Tools are used to improve packaging, but not used systematically to capture the operational performance well.

Though there is a system with information about different materials that can be used when designing new packaging products, the collaboration and communication with suppliers are deficient. This results in solutions that do not fulfill important requirements for packaging and food. Similar to the leadership, the division of food is somewhat overlooked due to that it is a newer business area for IKEA and therefore information is not as extensive for food than for furniture. Another difficulty that IKEA Food has is that IKEA does not own their suppliers within food, something that the furniture area does, and the packaging engineers do not have the same ability to influence the design of the packaging solutions. Instead they are presented with packaging alternatives, making it challenging to design effective packaging solutions.

All over the IKEA Food organization there is lack of tools and systems to support processes regarding evaluation and verification of performances and requirements resulting in packaging systems that do not live up to expectations. Furthermore, the engineers do not have as much information stored as proper materials to use since IKEA Food is a fairly new organization which makes it more difficult to design proper packaging. The information sharing between different stakeholders is also deficient creating problems getting information about how suppliers, DCs and retailers perform.

4.4.6 Resourcing

Since IKEA Food is a part of the IKEA organization, it is a company with an overall large amount of resources, both human and financial. Employees involved in packaging within food in general possess good knowledge about packaging through experience and education. The resourcing processes and its score and motivation can be found in Table 4.22. In regards to IKEA Food specifically, there is some lack of knowledge related to food specific requirements, since the reorganization resulted in lots of personnel transitioning from the furniture

division. Such a transition requires a different mindset and priorities related to what is most important for the food industry. It has been found that this is not always the mindset of employees at IKEA Food. The lack of understanding of the food industry has resulted in employees wanting to optimize the transport and logistics packaging aligned with what is shown to be the most efficient on the furniture side of IKEA.

Through interviews and observations, it has been revealed that the mindset differs between employees with a background within furniture and within food. The food industry comes with more complications and restrictions than most other industries, meaning that further education and understanding is required before reaching the best practice regarding human resources. Worth mentioning as well is the restructuring that IKEA Food went through when acquiring Bring and moving the office to Älmhult. This led to a competence loss, since a lot of the employees did not move with the company, and IKEA Food lost important human resources with a lot of experience and knowledge about both the IKEA Food operations as well as the food industry at once. This competence loss can affect the view employees have of how important it is to verify that basic requirements are fulfilled such as tilting tests and attaching labels that can withstand humidity. Further difficulty related to human resources is that service offices (those in contact with retail stores) often have a great amount of retailers to consider and keep in contact with. This affects their ability to know how processes at the retailers work and what retailers need and want in order to be successful. An example that was mentioned during interviews and observations was that the MDU for Biscuits with raspberry/chocolate filling and Biscuits 175g is too big. Making the retailers order and tying up much more than what is desired.

Table 4.22: Packaging innovation scorecard for the resourcing processes with motivation of current performance.

Subprocess	Bad practice	Mediocre practice	Good practice	Best practice	Motivation
Human resources					• Good knowledge of packaging, but sometimes lacks understanding of what is required for the food industry. • Specialized roles with knowledgeable employees, leading to good human resources. • Different backgrounds (Bring/food/furniture) resulting in shattered ways of working, prioritizing and perceiving what is efficient.
Financial resources					• A part of an organization with a lot of financial resources. • These finances are not always correctly allocated, resulting in some limitations to where they can be used.

Furthermore, IKEA has lots of financial resources, enabling necessary investments. While these financial resources exist, the decision to make greater investment is

more complex in the food department due to its reliance on external parties who must also be willing to implement the same changes. Given that IKEA represents a relatively small proportion of most suppliers' business, any production changes or similar adjustments could incur substantial financial costs, particularly if IKEA is the only client requesting these changes and is responsible for covering the costs of new machinery or other required investments. If suppliers require IKEA to bear the expense of such changes, IKEA typically lacks the incentive to do so due to its comparatively low order volumes. Another issue regarding the financial resources is connected to the systems of IKEA Food. Through interviews it has been found that expectations exist on the employees to improve their ways of working, but that the existing systems do not comply with this. But, IKEA Food does not always have enough experience and knowledge about what needs to be improved regarding systems, meaning that they sometimes lack willingness to invest in new or improved systems, to enable this. For example the system iFood that is used today, but does not have all the attributes required for the desired ways of working, but neither invested in to be improved. At the same time, they did invest in Qlik Sense, another system. So even if the financial resources exist at IKEA, they are not always allocated to parts of the food business, and the knowledge about what to invest in regards to improvements of IKEA Food is lacking.

One final point to highlight is that IKEA Food is a new entity, integrated in another much larger organization. As a result, IKEA Food is both new, but also very quickly expanding within a short period of time. The amount of available resources is not always enough or allocated in an optimized manner in regards to the speed IKEA Food is growing, resulting in a challenge in keeping up with its development.

4.4.7 Competitiveness and Climate Performance

IKEA prioritizes packaging and views it as a strategic component of their business. However, the approach to handling packaging varies across different categories and teams. Moreover, there are different KPIs between different departments, i.e. range and category, which makes it difficult to compare the performance between these. Another problem due to different KPIs is that the landed cost is not measured, a measurement that should be one of the most important ones. As each team aims to excel within their specific metrics, it creates misalignment in the development stages. One example is that category strives to lower their costs while range seeks high-quality products while still being aligned with IKEA's strategy of creating products for the many people. To illustrate the performance related to competitiveness and climate, Table 4.23 is presented.

Table 4.23: Packaging innovation scorecard for the competitiveness and climate performance processes with motivation of current performance.

Subprocess	Bad practice	Mediocre practice	Good practice	Best practice	Motivation
Goals					• Few existing goals of packaging performance, and divided between the different departments. • Goals are not strategic and operational. • No functional supply chain orientation. • Does not measure landed cost, which is an important financial goal.
Measurement					• Very limited measurements of performance. • Each department looks solely at their own performance and does not integrate with others to measure for instance landed cost. • Lack of follow up and evaluation of performance of packaging.
Innovation performance					• Environment of "what is done is done" • Does not measure performance of a finished project • Performance of packaging solutions are not evaluated and can not be improved and innovative.

The vision for IKEA Food is not clear since personnel have different views on what the purpose of the business is. One perspective is that the business of food is merely a selling point to drive more customers to the stores, since many of the customers often end up buying other products from home furnishing and accessories departments. Some describe the purpose as a very important part of IKEA and should hence be seen as equally important as other departments on the furniture side. Lastly, some believe that the business of food should be profitable while others believe that its most important task is to be qualitative food for an affordable price and that the money rather should be earned on the furniture side. In regards to what the vision is for IKEA Food no official document has been found in terms of what the core purpose of the business is and should be. Even if such a document does exist, management has not been successful in communicating this to the rest of the organization and hence the "identity crisis" as one interviewee formulated it and others insinuated.

Another sign of IKEA Food not being integrated, is the scattered and inefficient way of communicating between different roles and departments. For example, the FDC is coordinating the communication between all stores within a market, the DC, service office and transportation company. Similarly, the complex interaction between Range and Supply means that they have to communicate with a big number of people each day, either forcing them to prioritize the communication and risking their daily tasks. All this shows that IKEA Food does not have a proper SCO meaning that personnel are not having a holistic view of the organizational goals and do not know what strategy to work aligned with. Further, the lack of unification and SCO can cause some cultural differences as a result of the reorganization where some have come from the Bring organization and some from

IKEA Food or furniture. The acquisition itself seems to have been successful but the work that is necessary to create a unified organization has not been done.

Additionally, the evaluation of products and their packaging that have reached the markets is almost non-existing which makes it even more difficult to collect accurate data. Further related to evaluation, there seems to be a culture in IKEA that when a project is completed people want to move on to the next task and are not very interested in verifying that the solution is actually performing as predicted. As an example it was found that the product “Knäckebröd" arrives at the retail stores looking undamaged, however when a consumer opens it at home the bread is broken. This leads to complaints from the consumer to the retail store but since there is no way for the store to report this, nothing is done to improve the performance of this product.

5. DISCUSSION

This chapter starts with a synthesis in order to summarize and pinpoint the key findings of the case study. It helps the reader to be reminded of the results of the case study before going into the discussion of these findings. The key findings are discussed in conjunction with the packaging innovation scorecard to show what is lacking in the organization's processes and how these relate to each other. The output of this chapter are the most important areas of improvement and what consequences improvements of these possibly could have on the case company's operations and performance.

5.1 KEY FINDINGS

As the case study findings show, there are some processes that are performing well and some that are less well working. While IKEA Food overall benefits from good partnerships and strong resources, they face significant organizational and communication challenges that limit their ability to have well working packaging and packaging process performance. It is found that the organization has good access to relevant packaging technology as well as extensive contact and close relationships with leading technology providers, providing IKEA Food with good conditions. It has also been discovered that IKEA Food is a part of a larger organization that has the possibility to provide resources, both human and financial, provided they gather enough knowledge of where and when to use this. However, the findings demonstrate several processes that are underperforming, and three key issues are identified at IKEA Food; a divided vision, none-existing evaluation and follow up processes, and insufficient systems and tools.

Firstly, it is shown that IKEA Food is working as different organizations and the findings demonstrate that the vision and the goals of IKEA Food are very unclear. No employee had a clear answer, the answers were scattered and no document or similar describing the purpose of IKEA Food was found or mentioned. What is lacking within the processes of leadership is the communication of goals for the future, which is shown to be due to both lack of goals and well working leadership. Coupled with this, the KPIs measured varied across departments, and there is no unified KPI, such as landed cost, present. Human resources lacking food packaging knowledge, as described in Section 4.7.6, indicates that employees want to optimize packaging in alignment with what is deemed most efficient for their department, once again demonstrating a divided organization. These findings indicate that IKEA Food lacks a proper supply chain orientation, showing that employees do not have a comprehensive understanding of the organization's objectives and are unclear about which strategy to follow. This non unified and

unclear vision for IKEA Food poses a big uncertainty among employees and leaders, and results in a scattered organization.

Secondly, the organization does not have sufficient systems and tools to support the supply chain operations. There is no platform for gathering performance data or other important information about packaging systems, but this is instead often shared from person to person via email. Another issue has to do with the systems for reporting issues or problems that arise in the supply chain. The system, reporting claims, is shown not to not be used to its full potential and the findings indicate that this is not the most efficient tool. Lastly, no extensive and well working platform to store packaging materials data and historical data exist, once again exhibiting that IKEA Food is underperforming in this area. The absence of supporting systems and tools of the packaging process makes the operation inefficient. Furthermore, it is demonstrated that IKEA Food struggles to identify which systems need improvement, which leads to hesitancy in investing in the new or upgraded solutions needed.

Thirdly, the findings reveal that IKEA Food does not follow up and evaluate the packaging performance throughout the supply chain. The packaging development process involves creating requirements that should be communicated to the suppliers. Currently, no such clear and explicit requirements exist and are only communicated to suppliers to a limited or no extent. In addition to this, IKEA Food does not receive any specifications about the actual packaging system once developed, and does not follow up on if pallets leaving the suppliers are compliant with the requirements or not. Furthermore, the claiming process existing at IKEA Food is revealed to not be fully utilized. It is shown that even though some stakeholders claim it to be working, documentation, interviews and observations reveal that this is not the case. Employees involved with the operations in the supply chain often have no or little incentive to report claims. Energy is often rather focused on putting out fires instead of reporting the deviation, leading to not enough data and information regarding performance. In those cases when claims are being reported, there is a lack of knowledge about how to use this information or where this information ends up. Finally, the organization's excessive amount of KPIs has resulted in unnecessary complexity. With too many KPIs, improvement efforts are shown to be lacking, as the KPIs frequently conflict with one another and employees lack clear guidance on how to interpret the data. Despite measurement, little actionable follow up is present within the organization. Evidently, IKEA Food has inconsistent evaluation and follow up routines in several departments of the operations, and they lack systems and tools for collecting and communicating data, KPIs and other objectives. IKEA Food’s relationship and work with suppliers is not working well enough for them to set the packaging requirements needed according to IKEA Food’s needs.

5.2 AVENUES FOR IMPROVEMENT

From key findings it is found that especially three areas should be improved. These areas are related to; lack of unified vision, evaluation and follow up, systems and tools, and are further discussed in following sections. The discussion also includes the effects improvement of these areas potentially could have on IKEA Food's supply chain operations, as well as the transport packaging systems. But before discussing the avenues for improvement related to the three key findings, it is important to understand how these are all related to each other, as shown in Figure 5.1. When looking at this, it is clear that in order for the packaging innovation process to be successful, a well working integration between the different processes has to be in place (Pålsson & Hellström, 2023), visualized as the arrows in the figure. The case study findings demonstrate that this is not the case for IKEA Food. The organization is lacking well performing communication and integration, resulting in weak connections between the processes, and common for all three key findings.

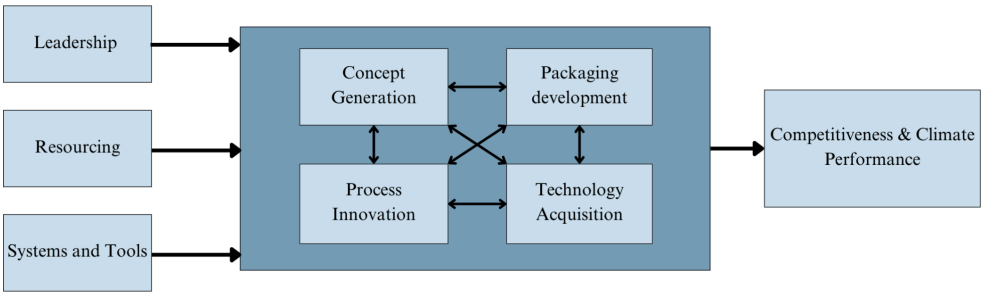


Figure 5.1: The processes and subprocesses of the packaging innovation scorecard Pålsson & Hellström (2023).

Addressing the three key findings will not be enough in order to improve the performance of packaging operations at IKEA Food. First, the organization has to start working on integrating the different processes and parts of the operations (Croxton et al., 2001), to ensure that these will lead to increased competitiveness and climate performance. Without the integration, the arrows, it does not matter how well the individual processes are performing, since it will not lead to improvement in the packaging innovation process as a whole. With this in mind, IKEA Food first needs to address the improvement of communication, information sharing and integration within the organization to make sure the connections are in place (Mentzer et al., 2001; Zimon et al., 2020; Trkman, 2010; Shribman, 2023). The organization should ensure that the processes are cohesive, and is suggested to implement a cross-functional integration. Then, the organization can focus on the three avenues for improvement to optimize the processes and hence the competitiveness and climate performance even more (Pålsson & Hellström, 2023). What is clear from the key findings is that two of the three supporting processes are underperforming; leadership and systems and tools. In IKEA Food's complex organization, it is not enough for leadership to be a mediocre practice, but it has to be ensured to be as good as possible to achieve efficiency (Sandberg & Abrahamsson, 2010).

To further discuss this, it is evident that there has to be a way of communicating and sharing information within the organization in a more efficient way. The organization is big and complex, and due to this many middle hands are involved in relaying information, sometimes resulting in a “whispering game” effect, where important details can be misunderstood, distorted or lost as they pass through multiple intermediaries. To prevent this from happening, it is suggested to improve the process of information sharing by creating a platform where all the relevant information and data can be shared and easily accessed when needed (Kache & Seuring, 2014). This should first of all contain an overview of the organization and explanations of the different roles to ensure employees have a clear understanding of the IKEA Food organization and what different roles are in charge of what. A document stating this would mean that the risk of information or tasks being lost or not well utilized decreases, and employees can always easily look up what roles and teams are involved in tasks and would benefit from certain information. A platform meant for information sharing would also mean that the roles communicating with a large number of people on a daily basis could instead upload relevant and important information for all entities to access, and hence save time and minimize risk of errors and misunderstandings (Esper et al., 2010). Furthermore, the platform should provide an opportunity to gather all the evaluation and follow up work, as well as performance measures, to make data regarding this accessible to the whole organization (Yadav et al., 2013). Clear procedures on where to find the information should also be created, as well as education sessions to make sure all employees are aware of how the systems work.

Lastly, since IKEA Food lacks well performing information sharing between different roles and stakeholders in the organization, the organization is recommended to start educating people about the change in communication routines for these to be efficient. This means, by informing the organization about the new systems and tools (see Section 5.2.3) put in place and arrange training sessions on how to use these (Falkheimer & Heide, 2022). A change in culture also has to be implemented, promoting an environment of continuous improvement and evaluation, and where employees are encouraged to share information on the platform to ensure this as well as allowing a cross-functional integration.

5.2.1 Unify the Vision

The first key finding is the lack of a unified vision across IKEA Food, making it very difficult to align processes and procedures in different business units. What is meant by not having a unified vision is that people's view of what the purpose of IKEA Food is differs a lot, as described in Section 4.7.7. This affects the organization by increasing difficulty when communicating, since the foundation of the business is not clearly set. It is important to understand that it is management that has to take an active role in working to unify the vision (Trkman, 2010). This means that the leadership processes have to be improved, see Section 4.7.4, and be integrated with processes within competitiveness and climate performance to improve overall performance (Mentzer et al. 2001). Further, poor communication

can cause a big variety of problems such as misunderstanding, inefficiency and decision making that is not aligned with the rest of the organization (Patrashkov & Suresh, 2020). Moreover, how to design packaging and what the overall quality of the product should be is highly dependent on having a set goal since that will affect pricing and profit for IKEA Food (Hellström & Saghir, 2007; Pålsson, 2018). If the goal is to be cheap to drive consumption of other products, the cost for developing and processing the product needs to be as low as possible. On the other hand, if the goal instead is to see food as just another department of the store that should profit from its business, the quality and overall impression need to be higher and hence also the prices. These two ways of thinking and operating are fundamentally different resulting in different priorities and discussions depending on which strategy is chosen.

Additionally, since IKEA Food does not measure the landed cost of their products, they also lack information about how these products affect the business and what margins it contributes to. The landed cost is further discussed in Section 5.2.3. This creates unnecessary uncertainty and a weak ground for decision making on what to improve and how to increase the efficiency at this department of the organization (Saleheen & Habib, 2023). Similarly, the environmental effects are not measured from a holistic perspective and hence complicates goal setting and implementation of those goals since the premise is not known. Since goal setting is not clear, departments move in different directions and act on what they believe is the right way. This decreases the level of SCO which in turn affects the operations related to SCM (Mentzer et al. 2001; Esper et al., 2010)). Another complication, related to the organization's complex structure earlier mentioned, is that employees do not always know who is in charge of what. This uncertainty leads to a missing understanding between roles and departments, with people assuming that the responsibility for a task lies with someone else. This is shown to result in a silo mentality, where different departments or teams operate as if they are separate entities. IKEA Food working as several separate organizations creates an obstacle for sharing information with all relevant parties, as people are often unsure which roles are involved and who might benefit from certain information.

To enhance synchronization and unity within IKEA Food, managers must clearly communicate the business's purpose and vision to the entire organization, ensuring a shared understanding and collaborative effort across employees and departments. This will lead to enhanced understanding throughout the entire organization and will help unify the different departments to work as one. Additionally, SCO has to be in place, meaning that the structure of IKEA Food needs to be clear to everyone. This includes each department, such as Range, Category, knowing what their tasks are and deliverables are, and that these are aligned with the overall goals and vision. When aligning the teams to new goals, strategies and improved processes, it must be considered how to initiate and structure communication to increase collaboration. Secondly, the different cultures in the departments that occur due to different backgrounds and previous experiences, are also extremely important to consider and understand in order to create a stable ground where everyone can work smoothly together. If there are employees that have experience from several departments or industries involved in processes, they should get extra

responsibility by acting as a cultural broker since that has shown to contribute to success (Edmondson et al., 2019; Eisenberg & Mattarelli, 2017). By doing so, the time spent on building well performing cross-functional teams will be minimal, since it happens naturally throughout the process and not through learning colleagues of these differences beforehand. Thirdly, it is essential that personnel understand what processes a product goes through from idea to sold product, with design to procurement to logistics and administrative work. If this is achieved, it will be easier to find synergies in processes which will improve the performance of both technicalities of the packaging solutions as well as the overall efficiency in the organization. With better solutions and higher efficiency, IKEA can decrease operational costs since fewer claims will be done both at the DC and at the retail store. Furthermore, employees need to spend less time putting out fires and can focus on strengthening their collaboration and how to continuously improve the business which will have great impact when solving future problems and adapt to all the change that is happening in the business of food and retail.

5.2.2 Evaluate & Follow Up

The second key finding of the case study is related to the limited process of evaluation and follow up of IKEA Food's operations. It is important to have effective performance metrics to measure the efficiency and effectiveness in the supply chain, since without measure there is no improvement. To improve performance in the supply chain, the first step for IKEA Food is to establish a procedure of what to measure and how to measure it. To facilitate the selection of metrics, IKEA Food could use a methodology like the SCOR-model (Chae, 2009) or the Balanced Scorecard methodology (Ying et al., 2009). There are other methodologies as well, and the management of IKEA Food should evaluate how these could be customized to fit the organization better and hence be applied to the performance metrics selection in the best way. The important thing is that IKEA Food states a clear procedure of deciding what KPIs to measure. As the name indicates, it is the key indicators, the most important ones, that will lead the organization in the right direction. At IKEA Food, what currently occurs is an excessive measurement of numerous scattered, sometimes contradictory, KPIs that are analyzed in regards to relevance after being measured. Due to the absence of a clear routine for utilizing this information, employees demonstrate lack of incentive to measure and utilize the KPI data effectively. The conclusion of this is that IKEA Food should reconsider the portfolio of performance metrics. The organization should invest time in finding the accurate KPIs, but also in prioritizing these metrics (Holmberg, 2000).

When deciding on the most important KPIs, IKEA Food could opt for a few overarching ones. When evaluating operational and supply chain performance, the organization could initially focus on these overarching KPIs to see if they are performing well. If they indicate satisfactory performance, there would be no need to invest time in analyzing the underlying ones. However, if issues arise, the underlying KPIs can be analyzed to find root causes of the problems. This will result in IKEA Food not wasting time in analyzing more KPIs than necessary, and

can instead invest time on improving the performance. Having fewer KPIs will also lead to less complexity in the organization, which is crucial for IKEA Food's already complex organization. Limiting the number of KPIs will result in a more manageable number of metrics and will reduce the risk of these being contradictory. This will also mean that IKEA Food has a higher chance of actually measuring these thoroughly and hence allow for continuous performance improvement and increasing the efficiency of the operations. However, the process of defining KPIs is complex, and therefore an improvement team with the right competencies and knowledge should be in charge. This team should be well educated in CI, and to gain valuable insights from the whole organization the team is suggested to involve both employees and management.

Furthermore, the differences in KPIs between different departments show that IKEA Food lacks understanding of the overall performance. The absence of the KPI "landed cost", shows lack of synchronization between the different departments. By choosing the landed cost as a KPI, IKEA Food will improve the understanding of different choices throughout the supply chain, and would enhance the possibility to motivate different trade off decisions in packaging solutions to optimize efficiency and lower the total cost. The metric's data can be used as an incentive to make packaging decisions throughout the supply chain (Yadav et al., 2013; Saleheen & Habib, 2023). For instance to justify the choice of more expensive packaging, if it shows less packaging and food waste and hence a lower total cost. The issue regarding KPIs is not the only evaluation related problem identified in the case study. The case study findings also revealed that IKEA Food lacks an overall follow up and evaluation process. When IKEA Food has established a procedure of selecting the accurate performance metrics, they also have to make sure that these are continuously evaluated. All the follow up information and lessons learned should be communicated through the platform described in Section 5.2, meaning that findings and lessons learned can be used in further improvement processes, preventing IKEA Food from repeating mistakes.

The non-existing clear requirements of packaging as well as insufficient specifications from suppliers, lead to lack of follow up and present another big issue. IKEA Food has to start by setting clear and explicit requirements of what they expect from their packaging and make sure this is turned into a routine well known internally. This is currently in process, but should be secured to be followed through and be well executed. Once the organization has clear requirements internally, these should be communicated to the suppliers efficiently and made sure to be included in the supplier contracts (Haessner et al., 2024). In this process, IKEA Food should also make sure to establish routines for the suppliers to provide sufficient packaging specifications. If these two processes are established correctly, it would first of all mean less room for varied interpretations from suppliers in what is expected of the packaging. It would also mean that IKEA Food has two packaging documents to compare, and can make sure the actual packaging matches with the agreed packaging solution and what IKEA Food expected. The contracted requirements and specification can also serve as evidence if something breaks in the supply chain, to see if it was compliant with the requirements or not. By doing so, IKEA Food has the possibility to track deviations and issues and see where they

are rooted, and then improve this to prevent it from recurring. However, to receive the specifications from the suppliers can be a challenging task. It is suggested for IKEA Food to clearly include the requirements in the contracts, so that the suppliers are well aware of the expectations. The requirements should also be used in the supplier selection, to make sure the best possible suppliers are selected and that these comply well with IKEA Food. IKEA Food should also invest time in strengthening supplier relationships, since this is shown to increase the chances of accessing the specifications required (Zimon et al., 2020).

While having the process around requirements and specifications in place is a good start for evaluation and follow up, it is not enough. The case findings show that although pallets sent from the supplier to the DC must have passed certain tests, this is not always the case. In order to overcome this problem and ensure that suppliers actually live up to the requirements set and contracted, IKEA Food must start to follow up on this. It is suggested that the company should perform check ups both at the supplier as well as at the DC, to be able to establish early as possible in the supply chain if something goes wrong and to make sure the actors comply with the contracts. It is suggested to perform continuous check ups, until the process is thoroughly established, meaning that they may be more frequently performed early on than when a product is really established on the market. It could be reduced to semiannually, if assessed to work well. IKEA Food should also make sure to create and establish a routine for CI with suppliers, by first making sure they are compliant with the set requirements, and then have continuous evaluation of this to ensure they keep on doing so. For instance, making sure the packaging system actually passes the required tests and then continuously following up on this and using the evaluation as a basis for improvement.

Lastly, the performance measurement issue regarding insufficient reporting in the supply chain should also be worked on to improve the efficiency. As of today, the claims that are reported at IKEA Food are almost solely the ones with financial incentive. It also appears that the organization has an environment where energy is focused on quickly putting out fires instead of reporting a problem. The lack of reporting means that IKEA Food cannot be aware that a problem exists and has no chance of improving it. Based on this, it is clear that the organization has to make sure to start reporting problems, even the smaller ones and non-financial ones, in order to enable continuous improvement of the efficiency and effectiveness in the supply chain. To do so, IKEA Food has to implement and focus on a culture of continuous improvement and a culture of total quality management (Saleheen & Habib, 2023), and hence emphasize the importance of reporting. IKEA Food should clearly state and establish an environment where improvement and innovation is deeply rooted. Since the organization is outsourcing big parts of its supply chain, it will not be enough to only establish this internally, but is also something that should be kept in mind when selecting suppliers and other logistics service providers, to make sure they align with this. IKEA Food also has to find incentive, not only financial, for employees to start reporting. To find effective incitement can be challenging, and not always the right way to go if not used properly. Management at IKEA Food should invest time in getting to know the organization and what motivates people, to find incentives most suitable.

Something that is shown to increase incentive is collective risk and reward, and making sure employees feel like they can influence and be a part of change (Simatupang & Sridharan, 2005). For the reporting and its incentive to be effective, employees need to be educated in how to report, but also in what benefits the reporting will have for them and for the organization.

A good way to motivate employees to start reporting is to show that the organization takes action from the reports. The case findings show that the employees at IKEA Food have little or no knowledge about what happens with the claims when they are reported. This has led to the employees having no motivation to report, since no action is shown to be taken with the information provided. By educating the organization in what happens with the claims after being reported, the employees will be more likely to report an issue in the future knowing the value it will provide. Depending on the problem that was reported, the action taken will look different, but making sure that employees know that action will be taken is what is important (Simatupang & Sridharan, 2005). First of all, IKEA Food has to start by actually using the information from reporting in evaluation and improvement work. Another way that is relevant for IKEA Food is to make the data and information collected available for employees that would benefit from the reports. For instance, the claims about packaging and what is not working, should be reported to the packaging solution engineers, in order to serve as a basis for improvement of the packaging solutions. As of today, this information is not available, and without performance data it is impossible to make improvements of the packaging solutions. By reporting and following up on issues, it provides a valuable opportunity to reflect on past experiences and identify areas for improvement. It will allow IKEA Food to gain a better understanding of what did not work, and what can be modified and improved in the future. If improving the systems and tools for reporting, described in Section 5.2.2, employees should also be trained in how to use these, and improved tools will lead to a more efficient reporting process.

5.2.3 Systems & Tools

The third key finding is that systems and tools need improvements to support IKEA Food operations. Firstly, the case findings indicate that the current system and procedure for claims is time consuming making it a lacking process. This can be further argued since not every deviation is reported, resulting in developers not receiving information about packaging performance. The findings demonstrate that developers struggle to improve products and packaging efficiently and systematically, leading to prolonged poor performance in these areas (Jagan Mohan Reddy et al., 2018). To improve this process, IKEA would benefit from implementing a new working procedure for the claim reporting process by implementing a new system including all steps from a claim being made (that also include feedback from end consumers) to a claim-report arriving to the suitable employees. However, this is a significant change and investment. Another solution could be to actively work on it by clearly defining how this process should be performed, including all steps and identifying the departments involved at each

stage and hence ensuring that the information reaches the relevant employees (Holmberg, 2000). By implementing this change, time that today is spent on handling information that actually does not lead to any improvements will instead have great effects on the performances of the packaging solutions which in turn can help employees in initial designing phases to learn from previous mistakes.

Moreover, IKEA Food should implement a system supporting the overall operations in an integrated way. Today there are several different systems used by different departments, from M3 to Excel, iFood and QlikSense. By having this many systems further complicates an already complex organization since it inhibits collaboration and visualization. Having a more integrated system would foster better SCO and would help break the functional silos that today are spread around the organization. A more cross-functional organization with a common system as a foundation would promote increased openness (Mentzer et al., 2001), leading to better performing packaging solutions and increased efficiency. This since all aspects would be considered when designing a product such as logistics, handling of goods, administrative work and supplier related information. Further, this integrated system should also visualize overall performance showing relevant KPIs important for the entire IKEA Food operation as well as team specific KPIs that will contribute to achieving the overall goals (Ying et al., 2009). Ideally, it would also be beneficial if the claims procedure would be integrated into this system making sure evaluation processes go smoothly. Important to consider is how to implement this change as seamlessly as possible, taking into account both data management and employee attitudes (Schein, 1996). Therefore, efficient change management procedures should be utilized, including active listening to address any concerns employees may have about the change and conducting learning sessions (Schein, 1996). For an integrative system to contribute to even higher efficiency and hence also higher performance, it needs to be integrated with both suppliers and customers (retailers). Additionally, it would be preferred if IKEA Food's systems were integrated with the rest of IKEA as well, especially since one goal with the acquisition of Bring is to integrate the two businesses to one united business.

Lastly, IKEA Food is in need of a platform collecting and storing information related to material selection for different products, something that is more extensive at the furniture departments. Here, IKEA Food could benefit from taking inspiration from how other departments apart from IKEA Food work since they seem to have structured this information platform in an effective way. Having this type of platform would promote packaging innovation and design (Pålsson, 2018), taking it to the next level as all information needed is in the same place presented in a structured manner. Moreover, historic data should be included that shows what has worked in previous designs and what has not. By doing so, the efficiency in the process of designing and redesigning products and packages will increase drastically as it will be easier to make well informed decisions based on both theory and previous experience and will further result in higher efficiency throughout the entire supply chain (pålsson, 2018).

6. CONCLUSION

This chapter provides the conclusion of the thesis. The conclusion of the thesis's purpose and RQ are described and discussed in Section 6.1. The chapter then provides an explanation of the practical and theoretical contribution to science in Section 6.2. Furthermore, the limitations with the study, along with suggested future research are presented at the end of this chapter.

6.1 FULFILLING THE PURPOSE

Revisiting the purpose of this thesis "*to assess the current state of ways of working with transport packaging solutions, as well as understand what logistics processes can be improved to increase efficiency*", it is concluded that the conducted study has fulfilled this purpose. Section 4.1 and 4.3 presents the current state of working within the case company, IKEA Food, by describing the organization and the current state of working within different processes related to food operations and packaging. The packaging innovation scorecard provides a clear understanding of what logistics processes are performing well and not in the organization, and serve as a good foundation when identifying what processes need to be improved in order to increase the efficiency in the supply chain, which is the second part of the purpose of this thesis. It also presents recommendations of what has to be improved within the company in order to gain more competitiveness and climate performance. Lastly, the avenues for improvement present three key areas that are identified as the most critical ones to improve. The section also gives an understanding of how these improvements will result in increased efficiency, and hence fulfill the purpose of this study.

6.1.1 Research Question Conclusion

In order to understand how food operations can be improved to increase supply chain efficiency, the current ways of working first has to be understood. To do this, a single case study was conducted and several units of analysis were studied in the case. This was performed by interviews, direct-observations, documents and archival records, to understand the studied case company and its food operations. The interviews were coded using open coding, and the rest of the collected data was then structured and analyzed using supply chain mapping, as well as two different scorecards; packaging performance methodology and packaging innovation scorecard. The scorecards were also used as a way to present the patterns found in the data, and were then further used within the analysis of the operations and current ways of working in the company. This resulted in the

identification of existing challenges and opportunities in the supply chain operations.

The result of the analysis was three key case findings that were identified as critical areas of improvement to enable improvement of efficiency in the supply chain. These key findings are; *unify the vision, evaluate and follow up, systems and tools.* It was also found that to be able to improve the efficiency of the supply chain food operations, the connections between these areas have to be implemented and further developed by the management at the case company. This was found by investigating the current state of the processes with the existing theory, which was also used to state the suggestions for the case company regarding what challenges to address and how to address these.

Taking these findings and suggestions into account, it is found that the RQ; *How can food packaging operations be improved to increase supply chain efficiency?,* is successfully fulfilled. The current food packaging operations are described and presented with the help of supply chain mapping, as well as the packaging performance methodology that gives clear examples on how some packaging systems are performing in the supply chain. The packaging innovation scorecard reveals the challenges and opportunities in the specific processes in the operations, using the packaging performance as common ground to stand on when motivating the performance. This is also further deepened with the collected data through interviews and archival records that surface the challenges present in the company. Lastly, with basis in the literature, specific suggestions on how to improve the challenges are found, and the packaging innovation scorecard is used to explain how these can be worked on in order to improve the food packaging operations and hence the supply chain efficiency.

6.2 PRACTICAL & THEORETICAL CONTRIBUTION

The practical contributions of this study are many. First of all, the findings and suggested improvements at IKEA Food would contribute to better practice at the company. Since the study involves all processes related to packaging innovation, it is believed that companies can identify similarities between IKEA Food and its own operations, and hence take learnings from the suggested avenues to improvements. Considering the study being a case study, it is difficult to generalize the findings. However, the case company can use the findings and the suggestions to improve the efficiency of their supply chain since it points out the opportunities to improve the food packaging operations. Other companies cannot draw conclusions from the study's findings, but it can rather be eye opening for other companies in what they should evaluate within their operations. The method used can serve as an example on both what to evaluate and how to evaluate it. The companies can potentially see recognition in the processes exist and are beneficial to evaluate. They can use a similar method to investigate their packaging operations, and where their strengths and weaknesses are located.

Furthermore, the theoretical contribution of the study is first of all regarding the scorecards used in the thesis, as they show a clear understanding of examples on how to use and apply the different frameworks. Since the frameworks are modified to further suit the case studied, it contributes as the scorecards have been refined to also be relevant for a non producing company. Additionally, the thesis could contribute to the theoretical knowledge of how a company within the food field can optimize their operations and hence improve the efficiency. This is based on IKEA Food being a well-established company that handles large markets all over the world, as well as having well-functioning logistics for products.

6.3 LIMITATIONS OF THE STUDY

This thesis is limited to only analyze the FSC and the transport packaging solutions from a local range perspective, meaning that primarily it has been the Swedish market and further, the south of Sweden that has been investigated. Some results may be affected, i.e. the performance of plant balls, biscuits with raspberry/chocolate filling and biscuits 175 g which in this thesis are stated to perform rather well. However, these products were investigated since those had been reported as underperforming products in a global setting. On the same theme, only five products were investigated more thoroughly which also can have an effect on found results, especially since three of them were found to perform well. This means that the conclusions made are based on quite a narrow dataset. Why the number of products were relatively low, was due to time constraints and making the study feasible to execute. The same reasoning is behind the decision to only examine one retailer. However, all of these decisions lead to a less robust foundation for drawing conclusions.

Further, only one case study was conducted which also can result in a one sided perspective of what challenges and opportunities exist with packaging solutions and operations in a FSC. Therefore this thesis does not state the challenges in this case as general. However, assumptions can be made through other research that some of these problems are common since organizational and process optimization is complex to achieve. Additionally, the recommendations made in this thesis are not specific in terms of how these should be performed. Instead it is presented what needs to be improved and not as much how since there are many different ways an improvement can be performed such as different types of supporting systems and communication methods. The case company themself needs to decide what methods are suited to fit their organization and its personnel to achieve the best possible results.

6.4 FUTURE RESEARCH

For future research there are more packaging system solutions that would be interesting to examine in closer detail. This, because there are several items that

appeared as problematic during the study. Related to those products, the assumption is made that if these are underperforming in a local range, there may be even bigger issues in a global context. A few examples of problematic products include: “Långlur” which often has broken corners in its secondary packaging, “Påtår” which loses its airtight function and Bearnaise sauce which is packed in a plastic container that easily ruptures.

Moreover, it would be beneficial to study other companies within the food industry to determine if there are common challenges existing across these processes from a broader perspective. Doing so could then lead to a better understanding of why some activities and processes are more difficult to handle efficiently and how these challenges could be addressed. Additionally, it would be interesting to investigate the performance of the entire FSC at IKEA since it provides results closer to reality, highlighting what challenges should be highest prioritized. Furthermore, it could be explored how the recommendations could be implemented in more detail. That would require more extensive information and understanding of the organization, meaning that things such as functional and organizational culture, historic actions, visions and financial capabilities would have to be explored. This to understand the effects different actions would have on the processes and if they would contribute to improvements in the supply chain.

REFERENCES

Akon, T., Islam, R., Monjur, E. I. (2023). Supply Chain Management and Logistics: How Important Interconnection Is for Business Success. *Journal of Business and Management* 11(5). doi: 10.4236/ojbm.2023.115139

Aitken, J., Bozarth, C., Garn, W. (2016). To eliminate or absorb supply chain complexity: a conceptual model and case study. *Supply Chain Management: An International Journal,* pp. 759 –774. http://dx.doi.org/10.1108/SCM-02-2016-0044 (Accessed 2024-05-03)

Aung, M.M. & Chang, Y. S. (2014). Traceability in a food supply chain: Safety and quality perspectives. *Food Control,* 39, pp. 172-184. https://doi.org/10.1016/j.foodcont.2013.11.007 (Accessed 2024-05-06)

Billerud (2024). *Five key packaging-industry trends to look out for in 2024.* https://www.billerud.com/trends-and-cases/all/five-key-packaging-industry-trends-to-look-out-for-in-2024 (Accessed 2024-05-02)

Cagliano, R., Caniato, F., Corso, M., Spina, G. (2005). Collaborative improvement in the extended manufacturing enterprise: lessons from an action research process. *Production Planning & Control*, 16(4), pp. 345–355. https://doi-org.ludwig.lub.lu.se/10.1080/09537280500063251 (Accessed 2024-05-09)

Carter, N., Bryant-Lukosius, D., DiCenso, A., Blythe, J., Neville, A. J. (2014). *The Use of Triangulation in Qualitative Research.* Oncol Nurs Forum 41(5):545-7. doi: 10.1188/14.ONF.545-547. PMID: 25158659.

Chae, B. (2009). Developing key performance indicators for supply chain: an industry perspective. *Supply Chain Management: An International Journal*, pp. 422–428. doi:10.1108/13598540910995192

Chand, P., Kumar, A., Thakkar, J., Ghosh, K. K. (2022). Direct and mediation effect of supply chain complexity drivers on supply chain performance: an empirical evidence of organizational complexity theory. *International Journal of Operations & Production Management* 42(6), pp. 797-825. doi: 10.1108/IJOPM-11-2021-0681

Cheng, C-Y., Chen, T-L., Chen, Y-Y. (2014). An analysis of the structural complexity of supply chain networks. *Applied Mathematical Modelling*

38(9-10), pp. 2328-2344. https://doi.org/10.1016/j.apm.2013.10.016 (Accessed 2024-05-0

Colicchia, C., Creazza, A., Noè, C., Strozzi, F. (2018). Information sharing in supply chains: a review of risks and opportunities using the systematic literature network analysis (SLNA). *Supply Chain Management: An International Journal,* pp. 5–21. http://dx.doi.org/10.1108/SCM-01-2018-0003 (Accessed 2024-05-02)

Croxton, K. Garcia-Dastugue, S. Lambert, D. Rogers, D. (2001). The Supply Chain Management Processes, *The International Journal of Logistics Management* 12(2). https://www.emerald.com/insight/content/doi/10.1108/09574090110806271/full/pdf (Accessed 2024-05-7)

Darko, E. O. & Vlachos, I. (2022). Creating Valuable Relationships with Third-Party Logistics (3PL) Providers: A Multiple-Case Study. *Logistics*, 6(2). https://doi.org/10.3390/logistics6020038 (Accessed 2024-05-03)

Deloitte (2023). *The Sustainable Consumer 2023.* Deloitte. https://www2.deloitte.com/uk/en/pages/consumer-business/articles/sustainable-consumer.html (Accessed 2024-05-02)

Dominic. C (2010). *Packaging Logistics Performance.* [Licentiate Thesis, Packaging Logistics] Packaging Logistics, Lund University.

Doherty, S. & Hoyle, S. (2009) *Supply Chain Decarbonisation: The Role of Logistics and Transportation in Reducing Supply Chain Carbon Emissions*, www.greeneconomypost.com/green-supply-chainstudies (Accessed 2024-05-07)

DS Smith (2024). *PPWR: The Packaging and Packaging Waste Regulation Explained.* DS Smith. https://www.dssmith.com/media/our-stories/2024/4/ppwr-the-packaging-and-packaging-waste-regulation-explained (Accessed 2024-05-02)

Edmondson, Amy C., Casciaro, Tiziana. & Jang, Sujin. (2019). *Cross-Silo Leadership*. Harvard Business Review. https://hbr.org/2019/05/cross-silo-leadership (Accessed 2024-05-10)

Eisenberg, Julia. & Mattarelli, Elisa. (2017). *Building Bridges in Global Virtual Teams: The Role of Multicultural Brokers in Overcoming the Negative Effects of Identity Threats on Knowledge Sharing Across Subgroups*. Journal of International Management. 23(4) 399-411

Ellram, L. M. (1996). The Use of the Case Study Method in Logistics Research. *Journal of Business Logistics* 17(2), s. 92-138.

Esper, Terry., Defee, C, Clifford. & Mentzer, John. (2010). *A framework of supply chain orientation*. The International Journal of Logistics. 21(2). DOI 10.1108/09574091011071906

European Council (2024). *Packaging: Council and Parliament strike a deal to make packaging more sustainable and reduce packaging waste in the EU.* Council of the European Union. https://www.consilium.europa.eu/en/press/press-releases/2024/03/04/packaging-council-and-parliament-strike-a-deal-to-make-packaging-more-sustainable-and-reduce-packaging-waste-in-the-eu/ (Accessed 2024-05-10)

European Commission (2022). *Packaging waste.* European Commission. https://environment.ec.europa.eu/topics/waste-and-recycling/packaging-waste_en (Accessed 2024-05-02)

European Commission (2024a). *Labelling and packaging.* European Commission. https://trade.ec.europa.eu/access-to-markets/en/content/labelling-and-packaging (Accessed 2024-05-02)

European Commission (2024b). Food Contact Materials. European Commission. https://food.ec.europa.eu/safety/chemical-safety/food-contact-materials_en (Accessed 2025-05-06)

European Environmental Bureau (2023). *Disposable paper-based food packaging: the false solution to the packaging waste crisis.* EBB. https://eeb.org/wp-content/uploads/2023/09/Paper-based-packaging-report-1.pdf (Accessed 2024-05-02)

European Parliament (2024a). *New EU rules to reduce, reuse and recycle packaging.* European Parliament. https://www.europarl.europa.eu/news/en/press-room/20240419IPR20589/new-eu-rules-to-reduce-reuse-and-recycle-packaging (Accessed 2024-05-02)

European Parliament (2024b). *Plastic waste and recycling in the EU: facts and figures.* European Parliament. https://www.europarl.europa.eu/topics/en/article/20181212STO21610/plastic-waste-and-recycling-in-the-eu-facts-and-figures (Accessed 2024-05-07)

European Parliament (2024c). *Revision of the Packaging and Packaging Waste Directive.* European Parliament. https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/745707/EPRS_BRI(2023)745707_EN.pdf (Accessed 2024-05-10)

Falkheimer, Jesper. & Heide, Mats. (2022). *Research Handbook on Strategic Communication, Ch.1 Introduction: the emergent field of strategic communication*. https://doi-org.ludwig.lub.lu.se/10.4337/9781800379893

Feliciano R. J., Guzmán-Luna, P., Boué, G., Mauricio-Iglesias, M., Hospido, A., Membré, J-M. (2022). Strategies to mitigate food safety risk while minimizing environmental impacts in the era of climate change. *Trends in Food Science & Technology* 126, pp. 180-191. https://doi.org/10.1016/j.tifs.2022.02.027 (Accessed 2024-05-02)

Foltin, P. & Nagy, J. (2023). The Effects of Supply Chain Complexity on Resilience – A Simulation Based Study. *Scientific Journal of Logistics* 19 (4), pp. 641-654. https://doi.org/10.17270/J.LOG.2023.933 (Accessed 2024-05-02)

Fontana, A., & Frey, J. H. (2000). *The interview: From Structured Questions to Negotiated Text*. In N. K. Denzin, & Y. S. Lincoln (Eds.), *Handbook of qualitative research.* 2nd edition (pp. 645-672). Thousand Oaks, CA: Sage.

Gardner, J. W. & Foster, S. T. (2022). *Managing Quality: Integrating the Supply Chain.* 7th edition. Wiley & Sons Inc.

Garcia-Arca, J., Prado-Prado, J. C., Gonzalez-Portela Garrido, A. T. (2014). "Packaging logistics": promoting sustainable efficiency in supply chains. I*nternational Journal of Physical Distribution & Logistics Management* 44(4), pp. 325-346. doi: 10.1108/IJPDLM-05-2013-0112

Gardner, J. T. & Cooper, M. C. (2003). Strategic Supply Chain Mapping Approaches. *Journal of Business Logistics,* 24(2), pp. 37-64. https://doi.org/10.1002/j.2158-1592.2003.tb00045.x (Accessed 2024-04-16)

Gardner, G., Almutairi, A., McCarthy, A. (2014). Practical guidance for the use of a pattern-matching technique in case study research: A case presentation. *Nursing and Health Sciences,* 16(2), pp. 239-244. https://doi.org/10.1111/nhs.12096 (Accessed 2024-05-27)

GEP (2024). *A Comprehensive Guide to Food Supply Chain.* GEP. https://www.gep.com/blog/strategy/food-supply-chain-stages-models-challenges-best-practices (Accessed 2024-05-02)

Govindan, K. & Chaudhuri, A. (2016). Interrelationships of risks faced by third party logistics service providers: A DEMATEL based approach. *Transportation Research Part E: Logistics and Transportation Review* 90, pp. 177-195. https://doi.org/10.1016/j.tre.2015.11.010 (Accessed 2024-05-03)

Grimm, J. H., Hofstetter, J. S., Sarkis, J. (2014). Critical factors for sub-supplier management: A sustainable food supply chains perspective. *International Journal of Production Economics* 152, pp. 159-173. https://doi.org/10.1016/j.ijpe.2013.12.011 (Accessed 2024-05-03)

Grönman, K., Soukka, R., Järvi-Kääriäinen, T., Katajajuuri, J-M., Kuisma, M., Koivupuro, H-K., Ollila, M., Pitkänen, M., Miettinen, O., Silvenius, F., Thun, R., Wessman, H., Linnanen, L. (2012).Framework for Sustainable Food Packaging Design. *Packaging Technology & Science*, 26, pp. 187–200. doi: 10.1002/pts.1971

Haessner, P. Haessner, J., Mcmurtrey, M. (2024) Trends & Challenges in the Food Supply Chain. *Journal of Strategic Innovation and Sustainability* 19(1). doi: 10.33423/jsis.v19i1.6868

Hak, T. & Jul, J. (2009). Pattern Matching. *Erasmus Research Institute of Management.* http://hdl.handle.net/1765/16203 (Accessed 2024-05-26)

Halldórsson, Á., & Aastrup, J. (2003). Quality criteria for qualitative inquiries in logistics. *European Journal of Operational Research,* 144(2), pp. 321-332. https://doi.org/10.1016/S0377-2217(02)00397-1 (Accessed 2024-03-15)

Hellström, D. & Nilsson, F. (2011). Logistics-driven packaging innovation: a case study at IKEA. *International Journal of Retail & Distribution Management,* 39(9). pp. 638-657 doi: 10.1108/09590551111159323

Hellström, D & Saghir, M (2007). Packaging and Logistics Interactions in Retail Supply Chains. *Packaging Technology and Science,* 20, p. 197–216. doi: 10.1002/pts.754

Holmberg, S. (2000). A Systems Perspective on supply chain measurements. *International Journal of Physical Distribution & Logistics Management,* 30(10), pp. 847-868. https://doi.org/10.1108/09600030010351246 (Accessed 2024-05-08)

Huang, Y., Han, W., Macbeth, D. K. (2020). The complexity of collaboration in supply chain networks. *Supply Chain Management: An International Journal.* pp. 393–410. http://dx.doi.org/10.1108/SCM-11-2018-0382 (Accessed 2024-05-02)

Höst, M., Regnell, B., & Runeson, P. (2006). *Att genomföra examensarbete*. 1st edition. Studentlitteratur.

IKEA (2024). *The IKEA Franchise System.* IKEA Food. Internal document.

Iftikhar, A. Ali, I. Stevenson, M., (2024). The Silver Lining of Supply CHain Complexity: Building Supply Chain Resilience and Robustness through Exploitation and Exploration. *Supply Chain Management: An international Journal* 29/2, 244-259, DOI 10.1108/SCM-01-2023-0022], https://www.emerald.com/insight/content/doi/10.1108/scm-01-2023-0022/full/pdf (Accessed 2024-05-06)

Jagan Mohan Reddy, K., Neelakanteswara Rao, A., Krishnanand, L. (2018). A

review on supply chain performance measurement systems. *Global Congress on Manufacturing and Management.* doi: 10.1016/j.promfg.2019.02.007

Jiao, H., Ding, W., Wang, X. (2021). Supply Chain Trust Evaluation Model Based on Improved Chain Iteration Method

Kache, Florian. & Seuring, Stefan. (2014). *Linking collaboration and integration to risk and performance in supply chains via a review of literature reviews*. Supply Chain Management: An International Journal. [DOI 10.1108/SCM-12-2013-0478]

Kaizen Institute (2024). *Building a Continuous Improvement Culture.* Kaizen Institute. https://kaizen.com/insights/continuous-improvement-culture/ (Accessed 2024-05-06)

Koberg, E. & Longoni, A. (2019). A systematic review of sustainable supply chain management in global supply chains. *Journal of Cleaner Production* 207, pp. 1084-1098. https://doi.org/10.1016/j.jclepro.2018.10.033 (Accessed 2024-05-03)

Krahl, J. (2024). *New EU packaging regulation PPWR: what does it mean for e-commerce?* Ecosistant. https://www.ecosistant.eu/en/eu-packaging-regulation-e-commerce/ (Accessed 2024-05-02)

Lewis, H., Verghese, K., Fitzpatrick, L. (2010). Evaluating the sustainability impacts of packaging: the plastic carry bag dilemma. *Packaging Technology and Science,* 23, pp. 145–160. doi: 10.1002/pts.886

Livingstone, S. & Sparks, L. (1994), The New German Packaging Laws: Effects on Firms Exporting to Germany. *International Journal of Physical Distribution & Logistics Management*, 24(7), pp.15-25.

Livsmedelsverket (2023). *Best before and use by dates.* https://www.livsmedelsverket.se/en/food-habits-health-and-environment/food-loss-and-waste/plan-wisely-and-use-leftovers/vad-betyder-datummarkningen (Accessed 2024-05-03)

Lochamy, A. (1995). A Conceptual Framework For Assessing Strategic Packaging Decisions. *The International Journal of Logistics Management*, 6(1), pp. 51-60. https://doi.org/10.1108/09574099510805251 (Accessed 2024-05-06)

Lummus, R. & Vokurka, R. (1999). Defining Supply Chain Management: a Historical Perspective and Practical Guidelines. *Industrial Management & Data Systems* 99(1), 11-17, MCB University Press.

https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=61561ebe64769dc66088d1df346c06eb07f09f6e (Accessed 2024-05-06)

Marinagi, C., Reklitis, P., Trivellas, P., Sakas, D. (2023). The Impact of Industry 4.0 Technologies on Key Performance Indicators for a Resilient Supply Chain 4.0. Sustainability 2023, 15, 5185. https://doi.org/10.3390/su15065185

Marsh, K. & Bugusu, B. (2007). Food Packaging—Roles, Materials, and Environmental Issues. *Journal of Food Sciences* 72(3), pp R39-R55. https://doi.org/10.1111/j.1750-3841.2007.00301.x (Accessed 2024-05-02).

Meng, F., Brandão, M., Cullen, J. M. (2024). Replacing Plastics with Alternatives Is Worse for Greenhouse Gas Emissions in Most Cases. *Environmental Science & Technology* 58(6), 2716-2727. doi: 10.1021/acs.est.3c05191

Mentzer, T. J., DeWitt, W., Keebler, S. J., Min, S., Nix, W. N., Smith, D. C., Zacharia, G. Z. (2001). Defining Supply Chain Management. *Journal of Business Logistics* 22(2), ABI/INFORM Global

Miles, M. B., & Huberman, M. A. (1994). *Qualitative Data Analysis.* 2nd edition. SAGE Publications, Inc.

Mitchell, L (2003). Economic Theory and Conceptual Relationships Between Food Safety and International Trade. *Agricultural Economic Report,* Number 828. United States Department of Agriculture. https://www.ers.usda.gov/webdocs/publications/41603/15644_aer828_1_.pdf?v=9660.1 (Accessed 2024-05-02)

Nooraie, S. V. & Parast, M. M. (2016). Mitigating supply chain disruptions through the assessment of trade-offs among risks, costs and investments in capabilities. *International Journal of Production Economics,* 171(1), pp. 8-21. https://doi.org/10.1016/j.ijpe.2015.10.018 (Accessed 2024-05-10)

Näringslivets Producentansvar (2024). *PPWR formellt antagen i Europaparlamentet.* Näringlivets Producentansvar. https://npa.se/om-oss/nyheter/aktuellt/ppwr-formellt-antagen-av-europaparlamentet (Accessed 2024-05-02)

Olsmats, C. & Dominic, C. A. (2003) Packaging Scorecard–A packaging performance evaluation method. *Packaging Technology and Science,* 16(1), pp. 9-14. doi: 10.1002/pts.604

Panayides, P. M. & Lun, Y. V. (2009). The impact of trust on innovativeness and supply chain performance. *International Journal of Production Economics,* 122(1), pp. 35-46.

Patrashkov, I. S. & Suresh, P. (2020). *Risk management in global supply chains – A*

review based on the impact of COVID-19. Linköping University. https://liu.diva-portal.org/smash/get/diva2:1548538/FULLTEXT01.pdf (Accessed 2024-05-03)

Prado-Prado, J. C. (2009). Continuous improvement in the supply chain. *Total Quality Management*, 20(3), pp. 301 – 309. doi: 10.1080/14783360902719519

Premkumar, P., Gopinath, S., Mateen, A. (2019). Trends in third party logistics–the past, the present & the future. International Journal of Logistics: Research and applications 24(6), pp. 551-580. https://doi.org/10.1080/13675567.2020.1782863 (Accessed 2024-05-03)

PwC (2024). *Visibility in the food supply chain.* https://www.pwccn.com/en/industries/food-supply-and-integrity/visibility-in-the-food-supply-chain.html (Accessed 2024-05-02)

Pålsson, H. (2018). *Packaging Logistics: Understanding and managing the economic and environmental impacts of packaging in the supply chain*. Kogan Page Ltd.

Pålsson, H., Finnsgård, C., Wänström, C. (2012). Selection of Packaging Systems in Supply Chains from aSustainability Perspective: The Case of Volvo. *Packaging Technology and Science* 26, pp. 289-310. doi: 10.1002/pts.1979

Pålsson, H. & Hellström, D. (2016). Packaging logistics in supply chain practice–current state,trade-offs and improvement potential. *International Journal of Logistics and Applications,* 19(5), pp. 351–368. http://dx.doi.org/10.1080/13675567.2015.1115472 (Accessed 2024-05-06)

Pålsson, H. & Hellström, D. (2023). Packaging innovation scorecard. *Packaging Technology and Science.* 36(11): 969-981. doi:10.1002/pts.2769

Pålsson, H., & Hellström, D. (2016). Packaging logistics in supply chain practice – current state, trade-offs and improvement potential. *International Journal of Logistics Research and Applications*, 19(5), pp. 351–368. https://doi.org/10.1080/13675567.2015.1115472 (Accessed 2024-05-08)

Pålsson, H. & Sandberg, E. (2010). Paradoxes in supply chains: a conceptual framework for packed products. *The International Journal of Logistics Management,* 31(3), pp. 423-442. doi: 10.1108/IJLM-12-2019-0338

Romme, A.G.L. & Dimov, D. (2021). Mixing Oil with Water: Framing and Theorizing in Management Research Informed by Design Science. *Designs* 5 (13). https://doi.org/10.3390/designs5010013 (Accessed 2024-02-16)

Rummler, Geary A. & Brache, Alan P. (1991). *Managing The White Space*. Training. 28(1).

Saleheen, F., Habib, M. (2023). Embedding attributes towards the supply chain performance measurement. *Cleaner Logistics and Supply Chain,* 6. https://doi.org/10.1016/j.clscn.2022.100090 (Accessed 2024-05-08)

Saghir, M. (2004). *The concept of packaging logistics.* Packaging Logistics, Lund University

Sandberg, Erik & Abrahamsson, Mats. (2009). *The role of top management in supply chain management practices*. International Journal of Retail & Distribution Management. 38(1). 57-69. DOI 10.1108/09590551011016331

Schaffer, E. (2024). *Use It or Lose It: Sustainability Challenges in Fresh Food Packaging.* Food Engineering. https://www.foodengineeringmag.com/articles/101423-use-it-or-lose-it-sustainability-challenges-in-fresh-food-packaging (Accessed 2024-05-02).

Schein, Edgar H. (1996). *Three Cultures of Management: The Key to Organizational Learning*. Sloan Management Review

Shepherd, C. & Günter, H. (2005). *Measuring supply chain performance: current research and future directions*. International Journal of Productivity and Performance Management*,* 55 (3/4), pp. 242-258. doi: 10.1108/17410400610653219

Shribman, Michael. (2023). *A Guide For Mastering The Art Of Business Communication*. Forbes https://www.forbes.com/sites/forbesbusinesscouncil/2023/11/20/a-guide-for-mastering-the-art-of-business-communication/ (Accessed 2024-05-10)

Simatupang, T. & Sridharan, R. (2005). Supply chain discontent. *Business Process Management Journal*, 11(4), pp. 349-369. doi: 10.1108/14637150510609390

Simonetti, G., Riccardi, C., Pomata, D., Acquaviva, L., Fricano, A., Buiarelli, F., Senofonte, M., Di Filippo, P. (2024). Studies of Potential Migration of Hazardous Chemicals from Sustainable Food Contact Materials. *Foods* 13(5)*,* pp. 645. https://doi.org/10.3390/foods13050645 (Accessed 2024-05-02)

Småros, Johanna. (2018) *Winning the food fight: Best practices for managing the retail grocery supply chain.* RELEX. ch.1. https://www.relexsolutions.com/resources/managing-retail-grocery-supply-chains/
(Accessed 2024-02-10)

Stake R. E. (1995). *The Art of Case Study Research.* SAGE Publications, Inc.

Svanes, E., Vold, M., Møller, H., Pettersen Kvalvåg, M., Lardsen, H., Hanssen, O. J. (2010). Sustainable packaging design: a holistic methodology for packaging design. *Packaging Technology and Science,* 23(3), pp. 161-175. https://doi-org.ludwig.lub.lu.se/10.1002/pts.887 (Accessed 2024-05-06)

Svenska Institutet för Standarder. (2018). *ISO 22000 – ledningssystem för livsmedelssäkerhet*. https://www.sis.se/iso-22000/ (Accessed 2024-05-08)

Trkman, Peter. (2010). *The critical success factors of business process management*. International Journal of Information Management. 30(2). 125-134. https://www.sciencedirect.com/science/article/pii/S0268401209000905?casa_token=pbtcSckIa5kAAAAA:sdG_3mbFDEKmO_BdBwaBQWl-YSMtrYiylsZyFtFjaZi3csdsFhNOamr0wrDtpZu0XRo37Anip5E (Accessed 2024-05-09)

Trivium Packaging (2023). *2023 Buying Green Report.* Trivium Packaging. https://www.triviumpackaging.com/media/pe5hfxsp/2023buyinggreenreport.pdf (Accessed 2024-05-02)

Voss, C., Tsikriktsis, N. & Frohlich, M. (2002). Case research in operations management. *International Journal of Operations & Production Management*, 22(2), pp. 195-219. doi:10.1108/01443570210414329

Yadav, N., Sagar. S., Sagar, M. (2013). Performance measurement and management frameworks: Research trends of the last two decades. *Business Process Management Journal,* 19(6), pp. 947-970. doi: 10.1108/BPMJ-01-2013-0003

Yin, R. K. (2018). *Case Study Research and Applications: Design and Methods.* 6th edition. SAGE Publications, Inc.

Ying, L., Lijun, X., Wei, S. (2009). Designing Supply Chain KPIs for Upper-Level Management. ITA *International Conference on Services Science, Management and Engineering,* Zhangjiajie, China, 2009, pp. 19-21, doi: 10.1109/SSME.2009.139.

Wu, H-J. & Dunn S. C. (1995). Environmentally responsible logistics systems. *International Journal of Physical Distribution & Logistics Management,* 25(2), pp. 20-38. https://doi.org/10.1108/09600039510083925 (Accessed 2024-05-07)

Zimon, Dominik., Madzik, Peter. & Domingues, Pedro. (2020). *Development of Key Processes along the Supply Chain by Implementing the ISO 22000 Standard*. Sustainability 2020, 12(15), 6176. https://doi.org/10.3390/su12156176 (Accessed 2024-05-08)

Interviews

Packaging Development Leader *Alpha* at IKEA Food. (2024). Interviewed by Thulin Lennselius, S. & Samuelsson, A. 2024-02-05.

Packaging Manager *Beta* at IKEA Food. (2024). Interviewed by Thulin Lennselius, S. & Samuelsson, A. 2024-03-22.

Packaging Manager *Beta* at IKEA Food. (2024). Interviewed by Thulin Lennselius, S. & Samuelsson, A. 2024-04-18.

Packaging Development Leader *Gamma* at IKEA Food. (2024). Interviewed by Thulin Lennselius, S. & Samuelsson, A. 2024-03-19.

Food Demand Coordinator *Delta* at IKEA Food. (2024). Interviewed by Thulin Lennselius, S. & Samuelsson, A. 2024-03-20.

Quality Manager *Epsilon* at IKEA Food. (2024). Interviewed by Thulin Lennselius, S. & Samuelsson, A. 2024-03-20.

Material and Technology Engineer *Zeta* at IKEA Food. (2024). Interviewed by Thulin Lennselius, S. & Samuelsson, A. 2024-03-26.

Packaging Solution Engineer *Theta* at IKEA Food. (2024). Interviewed by Thulin Lennselius, S. & Samuelsson, A. 2024-03-26.

Packaging Solution Engineer *Iota* at IKEA Food. (2024). Interviewed by Thulin Lennselius, S. & Samuelsson, A. 2024-03-26.

Project Leader - Category Food *Kappa* at IKEA. (2024). Interviewed by Thulin Lennselius, S. & Samuelsson, A. 2024-03-26.

Business Development Manager *Lambda* at IKEA Food. (2024). Interviewed by Thulin Lennselius, S. & Samuelsson, A. 2024-04-04.

Food Demand Coordinator *Rho* at IKEA Food. (2024). Interviewed by Thulin Lennselius, S. & Samuelsson, A. 2024-04-04.

Service Provider Operations Developer *Sigma* at IKEA Food. (2024). Interviewed by Thulin Lennselius, S. & Samuelsson, A. 2024-04-09.

Kitchen Production Specialist *Tau* at IKEA Food. (2024). Interviewed by Thulin Lennselius, S. & Samuelsson, A. 2024-04-16.

APPENDIX A: Description of the five parts of a case study

The Case Study´s Questions

In the first part of the design, the case study´s questions were discussed, including the formulation of the questions to best align with the case study model. Furthermore, there are three suggestions to consider in regards to the questions that can help them be as purposeful as possible (Yin, 2018), with one of them being reviewing literature in order to collect what may be interesting topics to study. This, without focusing too much on specific questions. Secondly, it could be favorable to look closer into a few key sources since they potentially could guide one into finding new interesting research topics. Lastly, Yin (2018) suggests that other literature on similar topics should be investigated to reinforce the purpose of the topic. Except from these three suggestions one could also start investigating through conducting a few interviews or observations to which also could provide with interesting topics to investigate, although this could potentially be just as time consuming as performing a literature review. If doing this, one needs to be aware that some conditions are temporary and therefore does not lead to insightful research questions. (Yin, 2018)

Purpose as Proposition

The second stage of the research design focuses on the propositions of the study. This is used to clarify what is actually to be studied since the research questions sometimes are too vague. Though the exploratory case study may not have any propositions but instead a clear purpose that can define more in depth what is to be studied. With a purpose instead of a proposition it is important to also state how the study is seen as successful. This thesis is more of an exploratory type and a purpose is therefore formulated which can be seen in Section 1.3.

Identify The Case

After the first two steps, it is time to describe and identify the case and its purpose which is found in Section 3.3.1. This step consists of two parts: “defining the case” and “bounding the case” where defining the case implies that the more specific the questions and purpose, the more likely it is to stay within reasonable limits. Yin (2018) explains that it is a good idea to test the case selection through explaining the research questions and why the chosen case is a good choice to a colleague. This will help to verify that the definition is clear enough and if the case actually can answer the research questions. When the definition phase is complete, the next step is “bounding the case” which simply means drawing boundaries for what is inside of the study and what is seen as being outside of the study. The limitations and boundaries of this thesis can be found under Section 1.4.

Linking Data to Purpose

In stage four on linking the data to the propositions, in this case to the purpose, the preparatory work for how the analysis can be completed is done. This part´s focus is therefore to understand what the different techniques implies. There are five techniques that are options: pattern-matching, explanatory building, time-series analysis, logic models and cross-case synthesis. Important to state is not only one technique will be used since a combination of some will provide a stronger analysis. The chosen techniques are presented in section 3.3.5 with more in depth arguments for why those are the most appropriate choices.

Criteria For Interpreting the Findings

The final step would be to seek other answers and rival explanations to our found results, and argue why these are not feasible (Yin, 2018). Due to the time constraints to this thesis, this is out of the scope and the thesis will instead rely on the quality of the methodology and the trustworthiness and validation work described in Section 3.7.

APPENDIX B: Protocol

Section A. Overview of the Case Study

1. Presenting challenges and opportunities for IKEA Food SC

RQ: *How can food packaging operations be improved to increase supply chain efficiency?*

This thesis is considered successful when challenges and opportunities can be presented, along with potential effects of certain improvements.

2. Key readings:

SCM:

Haessner, P. Haessner, J., Mcmurtrey, M. (2024) Trends & Challenges in the Food Supply Chain. *Journal of Strategic Innovation and Sustainability* 19(1). doi: 10.33423/jsis.v19i1.6868

Mentzer et al. (2001). Defining Supply Chain Management. *Journal of Business Logistics* 22(2), ABI/INFORM Global

Packaging Logistics:

Pålsson, H. (2018). *Packaging Logistics: Understanding and managing the economic and environmental impacts of packaging in the supply chain*. Kogan Page Ltd.

BPM:

Trkman, Peter. (2010). *The critical success factors of business process management*. International Journal of Information Management. 30(2). 125-134.

Performance Measurements:

Holmberg, S. (2000). A Systems Perspective on supply chain measurements. *International Journal of Physical Distribution & Logistics Management,* 30(10), pp. 847-868. https://doi.org/10.1108/09600030010351246 (Accessed 2024-05-08)

Saleheen, F., Habib, M. (2023). Embedding attributes towards the supply chain performance measurement. *Cleaner Logistics and Supply Chain,* 6. https://doi.org/10.1016/j.clscn.2022.100090 (Accessed 2024-05-08)

Section B. Data Collection Procedures

Meeting with Allan Dickner (company supervisor)

Interviews within the field: (fill out with names)

- Logistics
- R&D
- (Marketing & sales)

(Finance)
Purchasing
Warehouse & store manager
Manager

Documents:
Overview supply chain
"Worst performing products"
Packaging information
Archival records:
Data for worst performing products
Order qty, fill rate, waste, shipping volumes, etc
Data for more holistic view of the supply chain
Observations:
Visit to DC HBG
Visit to store in Malmö
Interviews: interview guide, and list of questions (specific and overall)
Documents: documents will serve as a basis for the interview guide as well as the checklist for the observations
Archival records: same as for documents
Observations: protocol/checklist

Section D. Tentative Outline for the Case Study Report

1. The audience for the case study is IKEA Food as well as LTH. The findings will be presented in a report as well as a presentation, with different adjustments depending on which one of the two audiences.
2. EU regulations and laws, especially regarding packaging and Food SCM.
3. The level of innovativeness in the case study is low, since the research relies on current knowledge and practices.

APPENDIX C: Strengths and Weaknesses of the Six Sources of Data Collection.

DATA COLLECTION	STRENGTHS	WEAKNESSES
Documentation	• Stable - can be reviewed repeatedly • Unobtrusive - not created as a result of the case study • Specific - can contain the exact named, references and details of an event • Broad - can cover along span of time, many events and many settings	• Retrievability - can be difficult to find • Biased selectivity, if collection is incomplete • Reporting bias - reflects (unknown) bias of any given document's author • Access - may be deliberately withheld
Archival Records	• [Same of those for documentation] • Precise and usually quantitative	• [Same of those for documentation] • Accessibility due to privacy reasons
Interviews	• Targeted - can focus directly on case study topics • Insightful - provides explanations as well as personal views (e.g. perceptions, attitudes, meanings)	• Bias due to poorly articulated questions • Response bias • Inaccuracies due to poor recall • Reflexitivity - e.g. interviewee says what interviewer wants to hear
Direct Observations	• Immediacy - covers actions in real time • Contextual - can cover the case's context	• Time consuming • Selectivity - broad coverage difficult without a team of observers • Reflexitivity - actions may proceed differently because participants know they are being observed • Cost - hours needed by human observers
Participant Observations	• [Same as for direct observations] • Insightful into interpersonal behavior and motives	• [Same as for direct observations] • Bias due to participant-observer's manipulation of events
Physical Artifacts	• Insightful into cultural features • Insightfyl into technical operations	• Selectivity • Availability

APPENDIX D: Interview Guide

The interview guide used in the interviews of people at the case company. The interview is divided into 5 parts. In these parts there are overarching questions presented in Italic text. Below these questions, there are bullet points that allow for the interviewer to tick off the areas needed and relevant from each question and interviewee.

INTRODUCTION

Us

- Introduce us, the thesis and its purpose
- Get insights about what the sc for food looks like and what the different steps are in order to create packaging solutions?
    - What aspects are important when creating a packaging for food
    - What are the challenges?
- Do you have suggestions on how to improve your work or tasks related to you?
    - What is working fine?
    - Find out what the challenges in the supply chain are at the moment and how people involved in the processes think these can be improved.
- Explain the purpose of the interview
- The interviewee will be anonymous
- Ask for allowance to record the interview

Interviewee

- Can you describe your role at IKEA (FOOD)? If not at IKEA Food, how are you connected to the organization?
- What are your tasks? (Desk job? Meetings? etc)
- How long have you been in this role?
- Can you describe a normal work day?
- Where in the organization are you?
- Can you describe the organization from your point of view
- Who are you collaborating with on a regular basis? What other roles do you have insight into? What other teams/departments are you working closely with?

SUPPLY CHAIN MANAGEMENT

Strategy

- What is the purpose of IKEA Food? (the furniture's side is being available for the many people etc)

- Do IKEA (FOOD) or your department have a specific strategy? If yes, what is the strategy?
- From your point of view do people in general work aligned with the strategy?
- Do there exist any protocols of how to work
- What are your KPIs?
- *Communication*
- How is the communication between internal departments?
- How is the communication between external partners such as warehouse and transportation?
- Would you say that you are involved in decisions or do you get informed if/when a change of some sort is taking place?

Information systems
- What information systems are you working with?
- Are you happy with the system?
- If not, what is not working properly?
- Do you use any other programs? (like excel, PowerBI)

Challenges & Change processes
- Is there something that is extra challenging in your work/in the supply chain?
    - Is there something that you have noticed is working poorly in the supply chain?
    - What is working well?
    - What do you think has to be improved? Do you have any ideas about how this can be improved?
- How are you working with follow ups and evaluating either routines, processes or packaging solutions that have already been made?
    - How do you use this to improve your work in the future?
- From your point of view, are there many changes happening at IKEA (FOOD)? If yes, How often would you say things change?
- Do things change according to the potential problems/challenges you have?

Field specific questions
- Are you/your department in any way involved in the physical handling of the products?
- How well do you think the employees in the department understand the rest of the supply chain and what is actually happening? (ex. How are things packed, stored, and shipped?

ORGANIZATION

Organizational structure
- What does the organizational structure look like at IKEA (FOOD)?
- Where in the organization are you/your role/your team? If in the chain of activities, who are “before” and “after” you?
- What teams? How are they linked? What are they responsible for?
- Hierarchy-structure?

- Who is taking decisions and how much are each department involved in decisions taken/not taken?
- How does the information flow work?

DATA

Is there any kind of information that we can access? Such as data or documentation of:

- Supply chain
- Product or process data

SUMMARY

- Are there any documents or other supplementary data relating to the case that we can access?
- Is it ok for us to contact you again if we missed asking a question?
- Explain that the interviewee will receive and be able to approve what is used from the interview, to ensure that we have understood correctly

APPENDIX E: Features in the Packaging Performance Scorecard

Description of all features in the packaging performance scorecard.

Area	No.	Feature	Description
Product waste	PW1	Protection and containment	Safeguard, hold and maintain the content
	PW2	Apportionment	Manageable packaging size with sufficient product quantity
Logistics	L1	Unitization	Modularization of the packaging levels
	L2	Material handling	Enable efficient material handling
	L3	Stackability	Stacking of packages with content
	L4	Volume and weight efficiency	Utilization of the volume and weight capacity
	L5	Production efficiency	Enable efficient processing in production
	L6	Track & trace capability	Capture data and provide data to the supply chain
	L7	Reverse handling	Facilitate reverse handling, eg stack empty packaging
Value adding	V1	Product information	Provide product information
	V2	Convenience	Simplify the use of products
	V3	Promotional attributes	Promote and sell the product
Packaging material	PM1	Packaging cost	The cost of the packaging
	PM2	Packaging waste	Minimal amount of packaging waste (incl recyclability)
	PM3	Hazardous substances	Minimal amount of hazardous substances in the packaging
	PM4	Security	Protect the product from theft
	PM5	Unwrapping	Easy to open and remove used packaging

APPENDIX F: Packaging Innovation Scorecard with Statements

Description of the core and enabling processes in the packaging innovation scorecard.

Process	Definition	Subprocess
Concept Generation	Identification and planning of new packaging concepts	Plan packaging innovation Generate new packaging concepts Being inventive and creative
Packaging development	Transformation of a packaging concept and a set of assumptions about manufacturing, packaging technology and user needs into a package available for use	Packaging development process Integration with product development Collaboration with packaging users Transfer to packaging manufacturing
Process innovation	Introduction of new methods of producing packaging	Identify innovations for packaging manufacturing processes Implement new packaging manufacturing processes Continuous improvement
Technology acquisition	Mapping, classifying and assessing technological options and sourcing opportunities	Technology strategy Technology sourcing Sustainability considerations in technology acquisition
Leadership	Support and direction from top and middle management	Packaging innovation goals Processes for generating and implementing packaging innovation Conditions for packaging innovation
Systems and tools	Availability and deployment of systems and tools	Systems Tools for packaging innovation
Resourcing	Availability and deployment of human and financial resources	Human resources Financial resources
Competitiveness and climate performance	Packaging performance based on the output of the packaging innovation process	Goals Measurement Innovation performance

Description of the different practices in the packaging innovation scorecard

A.1 | Concept generation

	Bad practice	Mediocre practice	Good practice	Best practice
Plan packaging innovation	Lack of packaging planning.	Next generation of packaging planned within a few innovation areas (materials, packaging technology, design, etc.)	Next generation of packaging planned with consideration of all relevant innovation areas.	Next two generations of packaging planned with consideration of all relevant innovation areas.
Generate new packaging concepts	New packaging development unplanned.	Packaging concepts developed in one department with limited customer contact.	New ideas sought in the marketplace with research into customer needs and with logistics, marketing and technical functions involved.	Direct links with customers and leading users to identify expressed and latent needs. A broad range of functions involved in concept development and screening and with early analysis.
Being inventive and creative	Creativity and inventiveness are not rewarded in control systems.	New ideas encouraged, but risk avoided.	Risk-taking encouraged and initiatives for new ideas supported.	Creative and innovative behaviour encouraged and rewarded and mechanisms in place to fund unplanned activities.

A.2 | Packaging development

	Bad practice	Mediocre practice	Good practice	Best practice
Packaging development process	Lack of packaging development procedures.	Basic and isolated packaging development procedures applied in a similar manner in all projects.	Advanced packaging development procedures with some adjustment to each project.	Advanced and integrated packaging development procedures with flexibility to move small projects through quickly.
Integration with product development	Lack of integration with product development (packaging developed after the product).	Packaging introduced late in the product development process.	Packaging development gives feedback on product development in several stages of the product development process.	Packaging development is included in the product development team from the first stage.
Collaboration with packaging users	Isolated functions without intraorganisational communication.	Work mainly conducted in functions with some intraorganisational communication, but with weak overall project management.	Project-oriented teams with input, but limited active involvement, from product production, logistics, purchasing and suppliers.	Project-oriented teams with involvement from internal (product production, logistics, purchasing) and external stakeholders (suppliers, customers).
Transfer to packaging manufacturing	New packages are handed over without a transfer process.	Communication between packaging developers and packaging manufacturers close in time before transfer.	Packaging manufacturing gives feedback on packaging development in several stages of the development process.	Packaging manufacturing and product development have effective capability to test and modify prototypes and ramp-up new packaging production.

A.3 | Production processes

	Bad practice	Mediocre practice	Good practice	Best practice
Identify innovations for packaging manufacturing processes	Unaligned process requirements and available technology.	Investment in standardised technology without an overall manufacturing strategy.	Manufacturing strategy ensures that technology investments are aligned with process needs and capabilities.	Clear structures for continuous information capture and testing of new process technology.
Implement new packaging manufacturing processes	Lack of documentation and interest to implementation.	Implementation considered as installation by specialists rather than a process with learning.	Implementation by cross-functional teams until the new process is tested.	Implementation by cross-functional teams which stay together into full production to ensure learning and improvement adjustments.
Continuous improvement	Lack of proactivity where equipment is repaired when it is broken.	Maintenance of processes, but no improvement.	Process engineers identify and address needs for continuous improvement of processes.	Work teams identify and address opportunities for continuous improvements.

A.4 | Technology acquisition

	Bad practice	Mediocre practice	Good practice	Best practice
Technology strategy	Lack of a technology strategy and mechanisms for understanding technology.	Identify technology needs on a project-by-project basis.	Identify technology needs in each function with continuous monitoring of trends and collaboration with technology providers.	Clear understanding of core competencies in technology and formal policies, procedures, long-term plans and resources for identifying and strengthening technology needs, including collaboration with technology providers and monitoring of trends and competitors' technology use.
Technology sourcing	Lack of a sourcing strategy (in-house technology development).	Participate in industry-wide technical associations and communities, but have limited external technology sourcing.	Ongoing contacts with universities, government agencies, industry consortia, etc. and close relationships with leading technology providers and customers.	Formal policies and procedures for technology sourcing with clear roles for in-house R&D and technology providers.
Sustainability considerations in technology acquisition	Lack of sustainability policies and controls.	Formal policies and procedures to comply with sustainability regulations.	Active management to comply with and go beyond sustainability regulations.	Proactive management to foresee sustainability trends and design packaging and packaging processes to minimise negative environmental and social impacts.

A.5 | Leadership

	Bad practice	Mediocre practice	Good practice	Best practice
Packaging innovation goals	Lack of packaging innovation goals and management involvement.	Lack of packaging innovation goals and no representation packaging knowledge isolated in a packaging function without representation at project and board levels.	Packaging seen as value-adding and a means of gaining competitive edge. It is incorporated in product development, sustainability and logistics projects.	Packaging is seen as a strategic component and has explicit and challenging long-term goals for improving a company's business in terms of sustainability, sales and operational performance.
Processes for generating and implementing packaging innovation	Not on the management agenda.	Management encourages ideas for packaging innovation, but are not active in setting up processes for generating and implementing packaging innovation.	Top management addresses and supports packaging innovation management with resources.	Top management is proactive in ensuring best practice in packaging innovation with extensive resource support.
Conditions for packaging innovation	Management encourages short-term profitability and risk minimisation by managers and employees at the expense of packaging innovation.	Management encourages ideas for packaging innovation but lacks performance measurement and rewards.	Management measures the performance of packaging innovation regularly and promotes good ideas.	Management ensures that risk taking is encouraged rather than penalised and new ideas rewarded. It ensures that the strategic importance of packaging innovation is shared and understood throughout the company.

A.6 | Systems and tools

	Bad practice	Mediocre practice	Good practice	Best practice
Systems	Lack of packaging performance data in information systems.	Information system with packaging data used by packaging engineers and other packaging experts.	Systems for packaging engineering and packaging design support and systems links with suppliers and customers.	Advanced systems for measuring, simulating and improving packaging innovation, packaging design, packaging development and packaging performance for maximum competitive advantage and sustainability performance.
Tools for packaging innovation	Minimal number of tools for packaging development and innovation.	Tools are used to some extent but without generally agreed objectives and not systematically.	Some use of tools to improve effectiveness and creativity within packaging development and innovation.	Widespread use of appropriate tools to ensure effective packaging development and innovation. The tools should capture operational performance and customer needs and facilitate to align with established protocols, such as design for X.

A.7 | Resourcing

	Bad practice	Mediocre practice	Good practice	Best practice
Human resources	Lack of key skills for packaging innovation and no planning for such human resources.	Key skills for packaging innovation are known and available but take time to make available for projects.	Skills required for packaging innovation are identified and fully resourced through recruitment and training.	Career structures support packaging innovation by promoting and valuing packaging knowledge.
Financial resources	Cost for packaging innovation in the previous year is adjusted up for inflation and down for cash availability.	The packaging innovation budget aligns with industry average and is subject to sharp fluctuations from year to year.	Formal policies on how packaging innovation should be funded and mechanisms to ensure that capacity is available in IT, production, sourcing, marketing and from external actors (e.g., packaging suppliers and technology providers).	Cost for packaging innovation is determined by potential business contribution over short- and long-term with minimal fluctuations despite cash flow variation.

A.8 | Competitiveness and climate

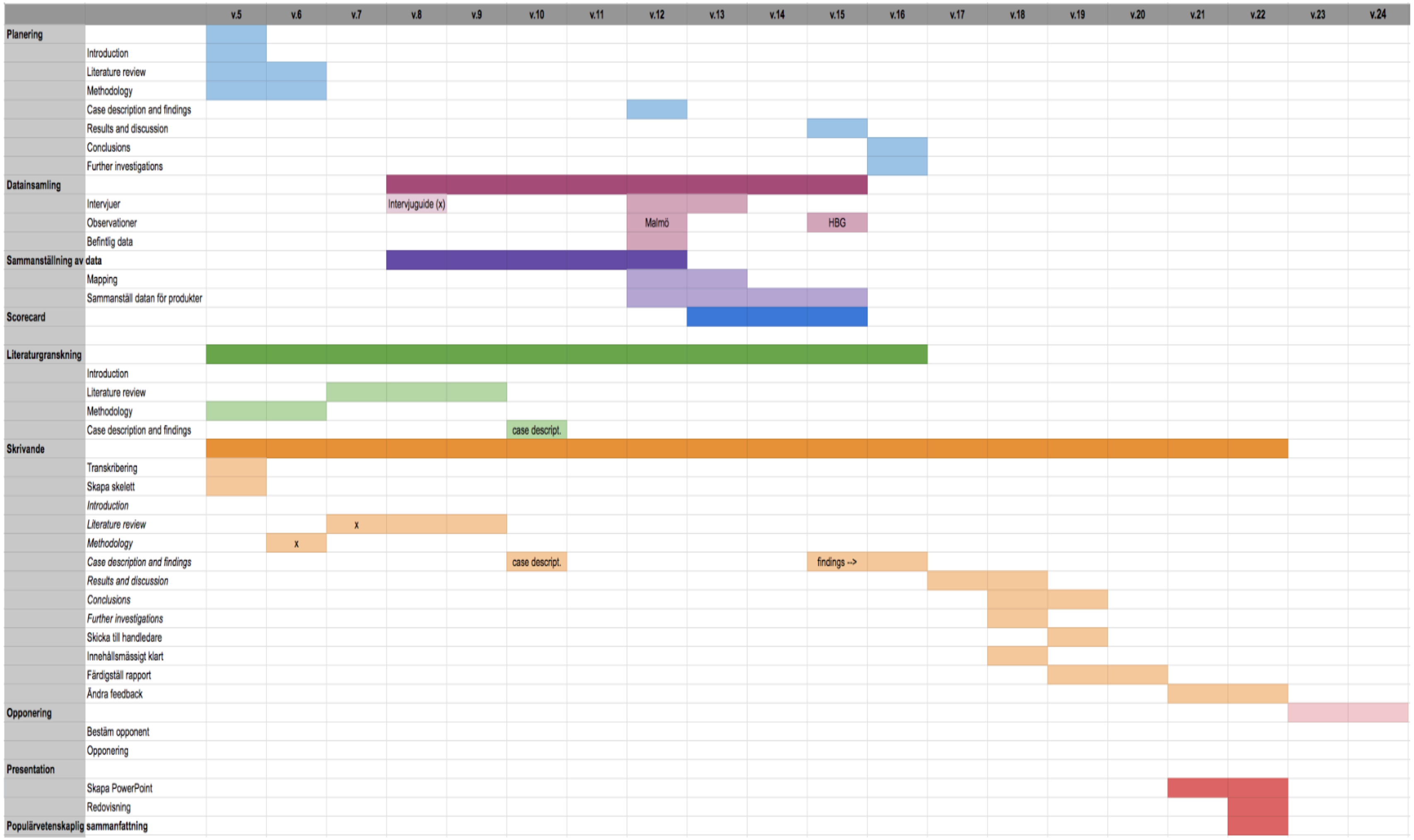
	Bad practice	Mediocre practice	Good practice	Best practice
Goals	Lack of goals for packaging performance.	Financial packaging performance goals.	General sustainability goals for packaging performance.	Strategic and operational packaging performance goals.
Measurement	Lack of measures for packaging performance.	Financial measures of packaging cost.	Aggregated measures for cost and environmental performance of packaging (e.g., amount of plastic waste per year in the firm).	Detailed data from packaging performance in packaging production and its use phases (input to the core processes).
Innovation performance	Anecdotal evidence only.	Trends for packaging cost in different product categories, market areas, etc.	Financial and environmental results of specific packaging innovation projects.	Excellent and detailed financial, environmental (and social) results of the entire packaging innovation process (both projects and continuous improvements).

APPENDIX G: Work Distribution

Part of thesis work	Anna Samuelsson	Sofie Thulin Lennselius
Planning phase	50%	50%
Data collection	50%	50%
Compilation of data	50%	50%
Analysis	50%	50%
Writing	50%	50%
Presentation	50%	50%
Popular scientific summary	50%	50%

APPENDIX H: Project Plan and Outcome

Below, the initial time plan for the project can be seen. Overall the actual time frame has been relatively similar to the plan. However, during weeks 8-11 much of the work was paused due to occurrences at the case company. Instead the data collection period got shorter but still long enough to conduct all interviews and study visits necessary for the project. The writing process has been conducted more intensively during the beginning of the project, focusing on introduction, methodology and initial steps of the literature review and later in the project focusing on the literature review, case findings, discussion and conclusion.


v.5
v.6
v.7
v.8
v.9
v.10
v.11
v.12
v.13
v.14
v.15
v.16
v.17
v.18
v.19
v.20
v.21
v.22
v.23
v.24
Planering
Introduction
Literature review
Methodology
Case description and findings
Results and discussion
Conclusions
Further investigations
Datainsamling
Intervjuer
Intervjuguide (x)
Observationer
Malmö
HBG
Befintlig data
Sammanställning av data
Mapping
Sammanställ datan för produkter
Scorecard
Literaturgranskning
Introduction
Literature review
Methodology
Case description and findings
case descript.
Skrivande
Transkribering
Skapa skelett
Introduction
Literature review
x
Methodology
x
Case description and findings
case descript.
findings -->
Results and discussion
Conclusions
Further investigations
Skicka till handledare
Innehållsmässigt klart
Färdigställ rapport
Ändra feedback
Opponering
Bestäm opponent
Opponering
Presentation
Skapa PowerPoint
Redovisning
Populärvetenskaplig sammanfattning