



**SUSTAINABLE SUPPLY CHAIN MANAGEMENT IN SURPLUS FOOD E-COMMERCE – SUCCESS FACTORS AND BARRIERS**

Lappeenranta–Lahti University of Technology LUT

Master's Programme in Supply Management, Master's thesis

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## ABSTRACT

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### **Sustainable supply chain management in surplus food e-commerce – success factors and barriers**

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This master's thesis explores the sustainability challenges in the supply chain of surplus food e-commerce. The research is motivated by the urgent need for solutions to the food waste crisis. As global food waste continues to rise globally, solutions are needed, one of which is surplus food e-commerce.

Surplus food e-commerce is distinct from other industries and characterized by the potential to decrease the amount of food waste as well as a rapid pace, making effective supply chain management essential. The findings of the study further emphasize this distinct nature. Using a mixed methods approach, this study captures the perspectives of both the suppliers and surplus food e-commerce businesses. The results underline the importance of sustainability as well as an optimized supply chain.

Although sustainable supply chain management is a well-studied topic, this study aims to fill the gap that exists when it comes to studies related surplus food e-commerce. The research addresses the unique dynamics of this new and emerging industry and emphasizes the significance of understanding these specific characteristics and challenges that this field is encountering.

## TIIVISTELMÄ

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Kauppätieteet

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### **Kestävän hankintaketjun hallinta ylijäämäruoan verkkokaupassa – menestystekijät ja esteet**

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Tässä pro gradu -tutkielmassa tutkitaan kestävyiden haasteita ylijäämäruoan verkkokaupan hankintaketjuissa. Tutkimuksen taustalla on akuutti tarve ratkaisuille ruokahävikkikriisin ratkaisemiseen. Kun ruokahävikki kasvaa globaalisti, tarvitaan keinoja sen vähentämiseksi, ja yksi näistä on ylijäämäruoan verkkokauppa.

Ylijäämäruoan verkkokauppa erottuu monista muista aloista erityisesti potentiaalissa vähentää ruokahävikkiä sekä nopeatempoisuudessa, mikä tekee tehokkaasta hankintaketjusta välttämättömän. Tutkimuksen tulokset korostavat tätä erityisluonnetta. Mixed Methods -menetelmää hyödyntäen tämä tutkimus ottaa huomioon sekä toimittajien että ylijäämäruoan verkkokaupan näkökulmat. Tulokset alleviivaavat erityisesti kestävyiden sekä optimoidun hankintaketjun merkitystä.

Vaikka kestävä hankintaketjun hallinta (sustainable supply chain management) on hyvin tutkittu aihe, tämä tutkimus pyrkii täyttämään ylijäämäruoan verkkokaupaa koskevan tutkimusaukon. Tutkimus käsittelee tämän uuden ja kehittyvän alan ainutlaatuista dynamiikkaa ja korostaa sen erityispiirteiden ja haasteiden ymmärtämisen tärkeyttä.

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In Märsta, September 22<sup>nd</sup>, 2024

Tuomas Kiviniemi

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# 1 Introduction

The challenges regarding the sustainability of businesses and their supply chains have put pressure on companies to implement sustainable supply chain management practices. Companies, organizations, and individuals are paying more and more attention to climate actions as well as sustainability, which is creating new industries or business fields. The emergence of surplus food e-commerce is presenting a new viewpoint on environmental issues and climate actions, as food waste is currently contributing massively to the greenhouse gas emissions of the globe. According to Food and Agriculture Organization of the United Nations (2011) about one third of the food produced globally is either lost or wasted. Stenmarck, Jensen, Quested & Moates (2016) add that it is therefore becoming a huge issue globally for food security as well as environment and it has enormous social, economic, and environmental impact.

Surplus food field is very different in nature from many other industries. The nature of surplus food makes this business very hectic and bad optimization of supply chain can result in large amounts of food waste as well as losses to the companies. Therefore, supply chains on this field are crucial for the companies operating on the field. Meanwhile the companies are focusing on the functionality and success of their supply chains, they should also contribute to the sustainability of it. Balancing between these two aspects can be difficult for any company, but on this industry, it is even more critical.

For confidentiality reasons, the name of the company under study has been anonymized. Throughout this thesis, the organization will be referred to as "Company A".

## 1.1 Background

The global food waste is increasing in alarming amounts as the population grows. Meanwhile, the amount of starvation is also increasing, creating an absurd situation, where part of the population is having too much food to consume, and other part is having too little to eat. The research on supply chain sustainability is becoming wider as different studies are published, and this study positions itself within this concept, alongside with the global drive towards more sustainable businesses.

Sustainable supply chain management is a well-studied topic today. There is an increasing amount of research about this subject as well as other sustainability topics as well. On the other hand, surplus food e-commerce is a niche, not so well-studied. There is research on food waste in general, but not about the e-commerce concentrating on that. This is a small industry of only some businesses in the Europe, as well as in the world, but something that is gaining more and more attention. The industry is also growing, as people are willing to look for alternatives to becoming more sustainable in their everyday lives and also to save money since the costs of living are increasing. Surplus food offers an opportunity: it is easy to decrease the amount of your food waste with mindful eating but alongside with the new industry that is selling surplus food, you can also do more as an individual. As the industry is growing, so is the need for research and studies focused on this field. It is not guaranteed that other SSCM studies apply on this field, as it is so different in nature. In fact, studies like the one of Zhu & Sarkis (2006) show that drivers, barriers, practices, and success factors vary a lot depending on the industry. Therefore, we need new information for the sake of sustainability on this specific industry that is continuously growing.

Coverage of the supply chain refers to the depth of the supply chain and its stages covered in this study. As the food supply chain could be tracked many stages from the surplus food e-commerce, this study concentrates on the sourcing of surplus food and other surplus items. The point where a product becomes surplus can be initiated by past best before date, overproduction, faulty appearance or packaging, or the fact that it is a seasonal product and currently out of season. Due to the lack of research on this field, this study covers only the purchasing of surplus food and concentrates on the relationship between a surplus food e-commerce business and its suppliers. There would be multiple other stages and phases to study, but since the topic is wide and unstudied, it is necessary to focus on only certain aspect of the topic.

## 1.2 Literature review

The purpose of this chapter is to introduce the main previous studies regarding the subject. It must be noted that surplus food e-commerce is barely studied subject, whereas SSCM and its success factors and barriers as well as food waste in general has been studied especially

in the past few years. Therefore, this literature review will not include studies concerning surplus food e-commerce.

Supply chain management is today a critical part of business (Morana 2013, 16-19). When the supply chain becomes sustainable, companies can yield multiple benefits such as firm performance (Wang, Zhu, Feng & Feng 2023; Qorri, Gashi & Kraslawski 2020; Golisic & Smith 2013) or innovativeness (Wang et al. 2023). Despite all the benefits, Wang et al. (2023) suggest that sustainable supply chain management is often seen as a burden. Still, many companies choose this path, but there are many drivers to that such as legislation and environmental, financial, internal business process, customer, and social drivers (Saeed & Kersten 2019). Sajjad, Eweje & Tappin (2020) add to these ethical values of managers, management commitment, cost reductions, efficiency, risk management, customer expectations, and reputation management. Regardless it is sometimes seen as a burden, Qorri, Gashi & Kraslawski (2020) note that SSCM practices are in correlation with firm performance

The factors that make sustainable supply chain management implementation successful, are many and studies have discovered multiple success factors such as top management commitment and better strategies (Kumar, Singh & Shankar 2015), cooperation with stakeholders (Subramani 2004), customer loyalty, corporate image, transparency, and efficiency (Wittstruck & Teuteberg 2012).

Table 1. Literature review: Success factors of sustainable supply chain management.

<b>Authors &amp; year</b>	<b>Name</b>	<b>Findings (key success factors)</b>
<b>Towill D., R. (2005)</b>	The impact of business policy on bullwhip induced risk in supply chain management.	Strengthening cooperation with partners.
<b>Olugu E., U., Wong, K., Y. &amp; Shaharoun A., M. (2010)</b>	Development of key performance measures for the automobile green supply chain.	Processes transparency can improve all the dimensions of TBL. Resource efficiency can improve environmental and financial performance. Supplier satisfaction is also seen as a success factor.
<b>Wittstruck, D. &amp; Teuteberg, F. (2012)</b>	Understanding the Success Factors of Sustainable Supply Chain Management: Empirical Evidence from the Electrics and Electronics Industry.	Customer loyalty, corporate image, transparency, performance of processes, and resource efficiency.
<b>Kumar, A., Choudhary, S., Garza-Reyes, J., A., Kumar, V., Rehman K., S., A. &amp; Mishra, N. (2023)</b>	Analysis of critical success factors for implementing Industry 4.0 integrated circular supply chain - moving towards sustainable operations.	Coordination and collaboration inside supply chain, change management, knowledge of circular supply chain, training and development, high quality data, effective planning and execution, integration of technology platforms, data security, knowledge management system, ability to adopt new business models, skilled employees, top management commitment, management leadership, and financial resources.

Numerous barriers to SSCM and sustainability have been discovered. They can be divided into internal and external barriers (Sajjad, Eweje & Tappin 2020). Cost concerns is one of the key barriers for many companies (Sajjad, Eweje & Tappin 2020; Seuring & Müller 2008; Walker, Di Sisto & McBain 2008) Morali & Searcy (2008) also add that it's not only

financial costs that can act as a barrier, but also other types of resources like time and personnel. Planning these kinds of efforts is also very difficult as it can be nearly impossible to estimate the outcomes (Pullman, Maloni & Carter 2009). This emphasizes the significance of planning and strategies. Morali & Searcy (2008) add that there are also very few indicators to show or estimate the successfulness of the sustainability efforts and those that exist, are mostly from only one aspect of sustainability (economical, environmental, or social). Therefore, lack of indicators and measurement tools seems to be connected to the issue of estimating the outcomes. Grosvold, Hojmosse & Roehrich (2014) address this concern. Moreover, barriers to SSCM can also include behavioural, psychological, and legislative barriers (Sajjad, Eweje & Tappin 2020) or coordination, complexity, and communication (Seuring & Müller 2008).

Table 2. Literature review: barriers of sustainable supply chain management.

<b>Authors and year</b>	<b>Name</b>	<b>Findings</b>
<b>Sajjad, A., Eweje, G. &amp; Tappin, D. (2020)</b>	Managerial perspectives on drivers for and barriers to sustainable supply chain management implementation: Evidence from New Zealand.	Internal barriers: concerns about costs, strategic/structural barriers, and behavioral/psychological barriers. External barriers: supply/demand barriers, legislation, and lack of public awareness, standards, or cultural issues.
<b>Walker, H., Di Sisto, L., &amp; McBain, D. (2008)</b>	Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sectors.	Key barrier in including environmental and social aspects in sourcing processes is increased costs.
<b>Pullman, M., E., Maloni, M., J. &amp; Carter, C., G. (2009)</b>	Purchasing and supply management sustainability: Drivers and barriers.	It is difficult to estimate the benefits of sustainability efforts, therefore, making it difficult to justify these initiatives.
<b>Morali, O. &amp; Searcy, C. (2013)</b>	A Review of Sustainable Supply Chain Management Practices in Canada.	Sustainability efforts require a lot of resources. It can also be difficult their success. On top of that, supplier's lack of knowledge can function as a key barrier.
<b>Giunipero, L., C., Hooker, R., E. &amp; Denslow, D. (2012)</b>	Food for thought: social versus environmental sustainability programs and performance outcomes	Costs, difficulty to measure return on investment and to satisfy shareholders in terms of profit and simultaneously to commit to long-term sustainability goals.

### 1.3 Research questions

The ultimate goal of the study is to find out the success factors for sustainable supply chain management in surplus food e-commerce. The theory will play a crucial role in this as there is no research about surplus food e-commerce, although there are studies about success factors of sustainability in other industries. Therefore, this research is aiming to either

confirm or reject the success factors studied in earlier studies. In order to understand the results of this study, it is important to also understand the characteristics of this industry, therefore it is the first sub-research question of the study. Second sub-research question aims to find out the barriers of sustainability on surplus food e-commerce.

The main research question is:

*What are the key success factors in implementing sustainable supply chain management in surplus food e-commerce?*

The sub-research questions are:

*What are the characteristics of supply chain management in surplus food e-commerce?*

*What are the main barriers to achieving sustainability in the supply chain of surplus food e-commerce?*

#### 1.4 Conceptual framework

Conceptual framework of the study is presented in figure 1 below. The aim of the conceptual framework is to support the structure of the study including research questions and theory related to it. According to the conceptual framework of this study, sustainable supply chain management consists of social, economic, and environmental aspects, as presented in the TBL. The aim is to identify barriers and success factors that are affecting it within the surplus food e-commerce field. The theory related to the subject includes SSCM and its barriers and success factors. Additionally, as there is no existing theory related to e-commerce in surplus food context, theory of e-commerce and food waste is applied as an attempt to combine those two topics into a relevant entity.

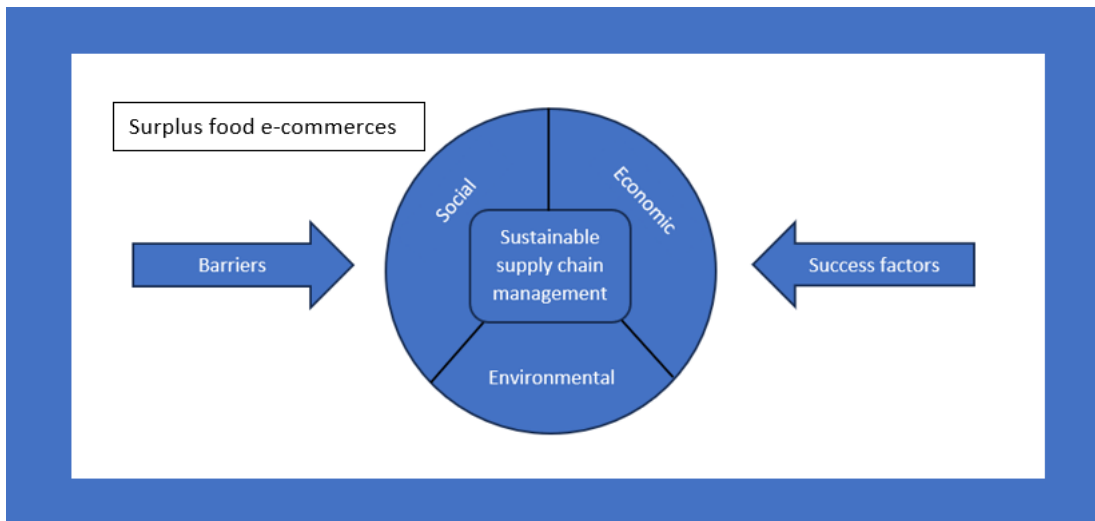


Figure 1. Conceptual framework.

### 1.5 Definitions/key concepts

**E-commerce** (electronic commerce) means the exchange of goods and services and the transmission of funds and data on the internet. It is essential for the e-commerce that it relies on digital platforms such as websites, apps, and social media. (Jolaoso & Main 2023)

**Surplus food e-commerce** (sometimes also food waste e-commerce) refers to addressing the critical issue of food waste in the concept of sales of surplus food that would otherwise become food waste. This includes digital platform, online distribution, logistical networks, sourcing, and other critical components to redirect this food that is under a threat of becoming waste, to the consumer. The food sold in the e-commerce platform can include food that has past the best before date, has been produced too much, has a faulty appearance or packaging, or is out of season. The entire surplus food e-commerce business includes typically collaboration with different stakeholders such as producers, retailers, importers, consumers, and distributors. The platforms are identifying, collecting, and finally redistributing the food through online webstores or mobile applications. This allows the consumer an access to more affordable or sometimes free food and a possibility to help reducing food waste.

**Sustainability** – One of the most widely used definitions of sustainability was presented in the Brundtland Report as follows: “Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability

of future generations to meet their own needs.” (World Commission on Environment and Development 1987). This phrase assumes that long-term view and commitment is needed in order to achieve sustainability (Reddy and Thomson 2015). It is also notable that sustainability is not a synonym to sustainable development. Where sustainability refers to a long-term goal to achieve sustainability (World Commission on Environment and Development 1987), **sustainable development**, on the other hand, refers to the continuous development according to the sustainability dimensions (economic, social, and environmental) (Goodland 1995), and to “qualitative and quantitative improvement and growth (Daly 1990). Therefore, in summary can be noted that sustainability refers to the goal whereas sustainable development refers to the processes related to it.

**Sustainable supply chain management (SSCM)** is defined as management of material, information, capital flows, and cooperation between the numerous participants inside the supply chain combined with the dimensions of sustainable development, which are economic, environmental, and social (Seuring, S. & Müller, M. 2008).

**Trible Bottom Line (TBL)** is a framework in sustainability that presents it as a result of three different dimensions that are economic, environmental, and social. (Elkington 1999)

## 1.6 Limitations

Even the study is aiming to give new and valuable information on the sustainable supply chain management in food surplus e-commerce, there are some key limitations that could possibly have an effect on the application of the findings. It is notable that this study focuses on the e-commerce of surplus food. However, this e-commerce usually includes also handling other types of surpluses such as non-food. This study focuses only on that type of e-commerce and products. Therefore, e-commerce of e.g., surplus of restaurant meals or individual kitchens are beyond this study. Moreover, other types of e-commerce are also beyond this study, and it is notable that due to the special characteristics of this field, the findings in this study may not be applicable on any other e-commerce.

According to Nosratabadi, Mosavi & Lakner (2020), the food supply chain is divided into five stages: 1. Production, 2. Processing, 3. Suppliers, 4. Retailers, and 5. Customers. The focus in this study is between the number 3 (suppliers) and number 4 (retailers), meaning

the supply from the suppliers to the case company. Therefore, upstream processes of food production as well as distribution to the consumers and after-use processes are beyond this study. This is since many suppliers of the case company vary depending on the supply of the surplus food. Therefore, it can be difficult and complex to analyse the upstream processes when there are only few regular suppliers.

The study also concentrates on a specific geographic region, Nordic countries. It is also notable that the industry is rather new, and it is changing a lot. This dynamic nature can lead to evolvement of the industry, regulation, or technologies beyond the scope of the study in a short period of time.

## 1.7 Research methodology

This chapter explains the research methodology and data collection plan used in this research. The research will be carried out as a mixed methods study, meaning that the study will utilize both qualitative and quantitative data. Qualitative data will be gathered with semi-structured interviews inside the company in its purchasing and sustainability departments. Quantitative data will be gathered with surveys sent for the suppliers. This way, the study aims to gain a clear understanding of the sustainability of the supply chain in this company to further create conclusions regarding the entire surplus food e-commerce field.

## 2 E-commerce

E-commerce or electronic commerce means the exchange of goods and services as well as the transmission of funds and data, taking place mostly on the internet. It is essential for the e-commerce that it relies on digital platforms such as websites, apps, and social media. (Jolaoso & Main 2023) In addition to selling and buying, e-commerce also includes different processes in the firm value chain such as invoicing, payment systems, customer service, promotion etc. (Vaithianathan 2010). Lee (2001) suggests that e-commerce is a disruptive innovation due to the way it has revolutionized traditional commerce. According to Yamin & Sinkovics (2006) one of the most important factors in e-commerce is its ability to reach large numbers of people quickly and cost-effectively. They also add that this does not require any specific geographical location, instead, e-commerce has lowered the barriers in this regard.

### 2.1 E-commerce business models

The main business models in e-commerce include business-to-business or B2B (electronic exchange of products or services between businesses), business-to-consumer or B2C (businesses selling products or services to consumers), direct-to-consumer or D2C (manufacturer or producers sells the product or service directly to consumers), consumer-to-consumer or C2C (electronic exchange of products or services between consumers e.g. online auctions), consumer-to-business or C2B (consumers make products and services for businesses to purchase e.g. platforms where media, photographs, and other content is sold), business-to-administration or B2A (electronic exchange of products or services from businesses to government bodies), consumer-to-administration or C2A (electronic exchange of products or services between consumers and government bodies e.g. taxes, health services, and other payments), and mobile commerce or m-commerce (mobile shopping, banking, and payments using mobile devices). (Hashemi-Pour 2024)

## 2.2 Benefits and disadvantages

E-commerce includes various benefits but also some disadvantages. E-commerce sites are available around the clock (apart from maintenance and updates) to anyone with access to the internet. They don't rely on fixed open hours or physical locations, which gives them freedom and access to reach more customers than would ever be possible with brick-and-mortar businesses. This gives even small businesses an opportunity to reach international markets. E-commerce shopping is also generally quicker as one is not slowed down by crowds. Transactions usually take no longer than a few clicks. E-commerce has also increased the selection and catalogues of businesses (e.g. Amazon). This has not made it more difficult for customers to look for specific products, on the other hand, on an e-commerce site it is generally much easier thanks to easy accessibility and different features. Moreover, e-commerce businesses have less costs than brick-and-mortar businesses, although they need to pay for shipping and storage. Despite that, e-commerce tends to have lower costs that can reflect on lower product costs as well. One of the most precious benefits today, however, is data. E-commerce businesses can track visitors and learn from the data and use it to be more successful. Some disadvantages exist on e-commerce as well. These include limited customer service and product experience. Moreover, e-commerce transactions include waiting time between the transaction and receiving the product. On top of this, security is a threat on e-commerce platforms for both the businesses and the consumers. (Hashemi-Pour 2024) According to Cavusgil, Knight & Riesenberger (2012, 79) the main benefits of e-commerce include productivity, lower costs, customer value, sales opportunities, and the flow of information. They add that the benefits that consumers can have from e-commerce, include comparing products and prices easier and quicker and saving time. One of the biggest challenges that has emerged for e-commerce is supply chain and logistics (Bonifield, Cole & Schultz 2010). Bruschi & Stuber (2013) note, however, that most customers do not expect to receive the delivery the same day, although, deliveries with this pace will increase its share in future. What customers do expect at the moment, however, is sustainability, cost efficiency, and new products and services (Erber, Klaus & Voigt 2001).

### 2.3 E-commerce strategy

According to Petre, Minocha & Roberts (2006) success factors of e-commerce include integrated operations, marketing, customer service, online store management, information technology, logistics and financial services. Storbacka (2011) suggests that operations are becoming more solution-oriented instead of just trying to sell a product. According to Ulaga & Reinartz (2011) both, the customers, and the suppliers are aiming to a setting where the supplier has created a solution that suits the customer's needs and creates benefits, despite the fact that their perspectives and interests can be very different. Storbacka (2011) adds that the creation processes of customer and supplier sides are complex and different. Moreover, their strategy should rely more on solution-orientation, where all the different functions of a business are trying to reach this (Storbacka 2011). Prahalad & Hamel (1990) argue that developing a competitive strategy requires the awareness of the core competences of a business. They add that core competences are difficult to imitate, they contribute to how customers perceive their products and services and that way to the likelihood of meeting customer expectations, and they are applicable across markets. With core competences, it is possible to invent or enter new markets, focus on customer needs, increase innovativeness, or create products and services that customers have not known they need. (Prahalad & Hamel 1990)

Nemcova and Dvorak (2011) suggest that the main factors of a successful e-commerce strategy include strengths, weaknesses, opportunities, threats, competition, partners, business objectives, and risks. It is also important to utilize technology, have flexible marketing and communication, and high productivity to maintain a competitive edge. On top of this, these markets tend to evolve and change on a quick pace, making employee training and information very important factors. Customer expectations are also increasing while this happens, and they want faster shipping and better products and services. (Nemcova & Dvorak 2011) As the market and customers are rapidly changing, innovativeness is important in e-commerce businesses. For example, the supply chain has changed in terms of supply and demand relationship, as customers can see right away if something is out of stock, and on the other hand the supplier or the e-commerce business can use customer data to better understand buying behaviour. However, it is important to have integrated information structures that can decrease the "bullwhip effect" (sudden

changes in demand correspond to inaccuracy and fluctuation in supply) and improve supply chain synergy. Moreover, on the managerial level, the entire organization with all its functions must have a clear understanding of the objectives and work closely together towards them. (Yin Ou & Perng 2014)

### 3 Sustainable supply chain management

Supply chain management has become a critical part of any company. With effective supply chain management, it is possible to optimize processes in production and delivery. (Morana 2013, 16-19) According to Harland (2002) supply chain management consists of four different levels: supply policy, supply strategy, supply management, and supply operations. In the core of the supply management levels is supply policy, which shows the direction for other levels (figure 2). This sets the basic rules and conditions for purchasing and it can include different types of policies such as environmental or social. Supply strategy comes after supply policy, setting more detailed directions on supply issues with different kinds of strategies such as risk management strategy or relationship strategy. Supply management covers different supply activities that are managed through planning and control. This can include supplier development or budget management. Finally, the outermost level in the figure 1; supply operations, consists of more operational day-to-day actions, and they are guided by all the inner levels.

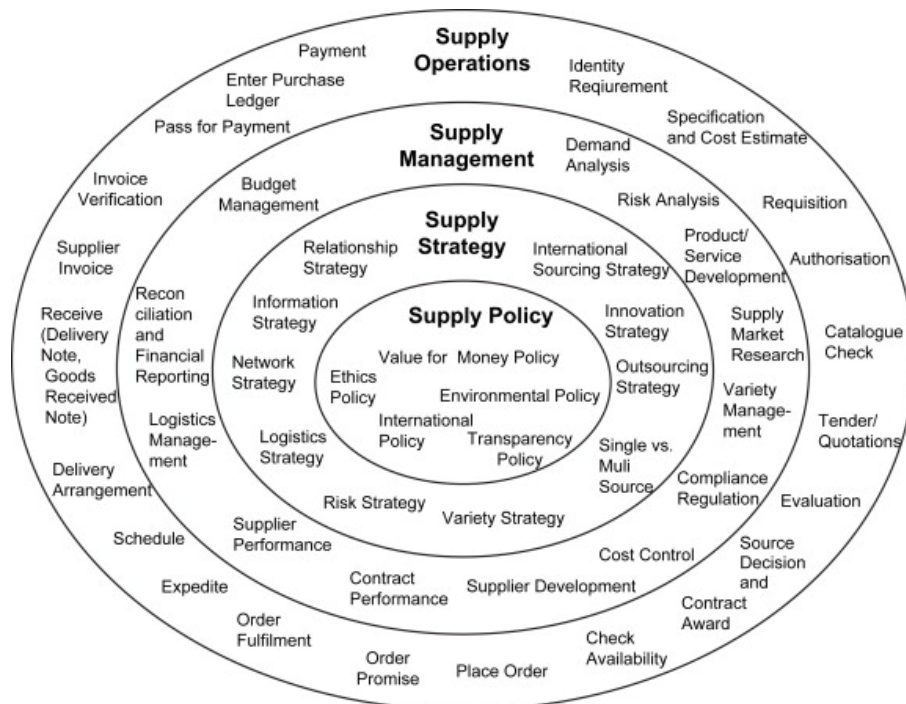


Figure 2. Four levels of supply management (Koplin, Seuring & Mesterhamn 2007 adapted from Harland 2002).

Supply chain optimization does not end in economic viewpoint today but has rather extended to environmental and social aspects as well (Morana 2013, 16-19). Global awareness of environmental issues has led to the ever-growing significance of sustainable supply chain management (Geng, Mansouri, Aktas 2017). Sustainable supply chain management is defined as management of material, information, capital flows, and cooperation between the numerous participants inside the supply chain combined with the dimensions of sustainable development, which are economic, environmental, and social (Seuring & Müller 2008). This definition emphasizes the relationship of supply chain management and sustainable development. According to Carter & Rogers (2008) SSCM relates to the strategic, transparent integration and achieving of social, environmental, and economic goals in interorganizational processes in order to improve economic performance in the firm and its supply chain. The definition of Carter & Rogers (2008) aligns well with the triple bottom line as it highlights the importance of all three dimensions (social, environmental, and economic). Morana (2013, 20-21) on the other hand, defines SSCM as a kind of combination of Seuring & Müller (2008) and Carter & Rogers (2008): SSCM is management of material, information, capital, people, and intelligence flows with environmental, social, and economic purpose, including inter-organizational connections, with a goal to increase performance in the company and its supply chain.



Figure 3. Sustainable supply chain management (Seuring & Müller 2008; Carter & Rogers 2008; Morana 2013, 20-21)

So, as the definition goes, the goal of SSCM is to increase performance inside the company and especially its supply chain, creating value for it in its entirety (Morana 2013, 20-21).

Today, the effect of SSCM is a widely studied topic as accomplishing the goals to increase performance would make sustainability itself a powerful driver towards more sustainable supply chains. Some studies suggest a positive relationship between performance and SSCM, whereas others suggest the opposite or even no relationship at all. Kirchoff & Falasca (2022) suggest that there is a significant relationship between performance and SSCM. According to Le, Nguyen & Cheng (2021) this relationship is also positive and they further state out that sustainability collaboration in particular increases the SSCM performance, which in turn contributes to all three dimension and their performance: economic, environmental, and social. On the other hand, Tamayo-Torres, Gutierrez-Gutierrez & Ruiz-Moreno (2019) suggest that it is not necessarily the case that environmental practices and policies have an effect on market value of the company and organizational policies that aim to improve social practices actually decrease the company market value. Xiao, Wilhelm, van der Vaart & van Donk (2019) also concluded that there is a negative relationship between SSCM practices and firm performance. Agyabeng-Mensah, Afum & Ahenkorah (2020) suggest that this relationship remains uncertain pointing out that in order to achieve actual benefits and performance improvement, it would require much more efforts in terms of sustainable energy, recycling, sustainable transportation and distribution, sustainable warehousing and green product packaging.

So, there are a lot of studies with different conclusions on the topic which makes it a very controversial subject. Wang, Zhu, Feng & Feng (2023) admit in their meta-analysis that SSCM practices can be a potential burden for companies, although they also seem to have a positive effect in firm performance and innovativeness, especially if those practices are downstream SSCM practices. A meta-analysis of Qorri, Gashi & Kraslawski (2020) also conclude that SSCM practices have a positive effect on all firm performance, whether it was environmental, operational, economic, or aggregated performance. A similar type of approach was used by Golicic & Smith (2013) as they concluded environmental SCM practices to have a positive effect on three kinds of firm performance: market-based, operational-based, and accounting-based. According to these meta-analyses, as SSCM practices increase firm performance, it could be seen as a driving force for companies. However, there are other drivers as well.

According to Saeed & Kersten (2019) drivers can be divided into internal and external ones. They further suggest that driving forces towards sustainable practices include legislation

(external), finance (external), internal business processes (internal), customers (external), as well as social and environmental drivers (external), although they point out the uncertainty whether the concern of management is really about environment or rather more about legislation, customer pressure or social activism. On the other hand, Sajjad, Eweje & Tappin (2020) found that the key drivers for SSCM implementation include ethical values of managers (internal) and management commitment (internal). This would indicate that as the ethical values of managers are a key driver, they would not only act upon legislation, customer pressure or social activism as Saeed & Kersten (2019) suggest.

Interestingly, there is also growing amount of research on managers' and directors' personal characteristics and their effect on sustainability. According to Brough, Wilkie, Ma, Isaac & Gal (2016) gender stereotypes can have an impact on sustainable consumption behaviours and eco-friendliness can even be seen as more feminine affecting men's attitudes and behaviours when it comes to sustainability initiatives in work environment. Hunter, Hatch & Johnson (2004) suggest that there may also be variation in genders across nationalities when it comes to environmental behaviour. Another significant factor is professional background. Henry, Buyl & Jansen (2019) emphasize this particularly in top management suggesting that diverse professional background (expertise in environmental, social, and economic aspects) can further accelerate sustainability in the company due to the deepened understanding of those topics, whereas lack of those topics can limit the company's ability to do so. Lewis, Walls & Dowell (2014) has focused their research on the education level and degrees, suggesting that the higher the level of education, the higher the probability of greater transparency and environmental reporting. This would indicate that higher degree can result in more positive view on sustainability, therefore, the significance of investing in the education of the managers could potentially lead to more awareness in sustainability and result in more sustainability inside the organization. (Lewis, Walls & Dowell 2014)

Sajjad, Eweje & Tappin (2020) suggest that internal drivers would include cost reduction, operational efficiency, and risk management whereas external drivers include customer expectations and reputation management. De Meyer, Cattrysse, Rasinmäki & Van Orshoven (2014) suggest that economic, environmental, and social concerns lead and affect the decision-making process in the supply chain. Tay, Abd Rahman, Aziz & Sidek (2015) further divide the internal and external drivers to categories, where internal ones are divided into 1. people issues, 2. strategic issues, and 3. functional issues. Under the people issues,

they list top management commitment, employee involvement, and culture as driving forces. Under strategic issues they list company strategy and supply strategy alignment, SSCM strategy, competitive advantage, and risk management. Functional issues consist of purchasing and supply capabilities and CSR practices. When it comes to external drivers, they are divided into 1. government (policies and regulations), 2. competitors, 3. customers, 4. suppliers (collaborations), 5. investors (pressure), and 6. NGOs (influence of NGO). (Tay et al. 2015) Large & Gimenez Thomsen (2011) have a little different setup, and they suggest drivers of green supply management to include green supplier assessment, green collaborations with suppliers, strategic involvement of purchasing department, environmental commitment of the company, and environmental capabilities of the purchasing department.

Table 3. Internal and external drivers for SSCM implementation.

<b>INTERNAL DRIVERS</b>	<b>REFERENCE</b>	<b>EXTERNAL DRIVERS</b>	<b>REFERENCE</b>
CSR activities.	Tay et al. (2015).	Customers.	Saeed & Kersten (2019), Sajjad, Eweje & Tappin (2020), Tay et al. (2015).
Employee involvement or sustainable culture inside the company.	Large & Gimenez Thomsen (2011), Tay et al. (2015).	Competitive advantage.	Tay et al. (2015).
Ethical values of managers	Sajjad, Eweje & Tappin (2020).	Competitors.	Tay et al. (2015).
Finances or cost reductions.	De Meyer et al. (2014), Saeed & Kersten (2019), Sajjad, Eweje & Tappin (2020).	Environmental and social drivers.	De Meyer et al. (2014), Large & Gimenez Thomsen (2011), Saeed & Kersten (2019).
Internal business processes.	Saeed & Kersten (2019).	Government (policies, legislation, regulations).	Saeed & Kersten (2019), Tay et al. (2015).
Management commitment.	Sajjad, Eweje & Tappin (2020), Tay et al. (2015).	Reputation management.	Sajjad, Eweje & Tappin (2020).
Operational efficiency.	Sajjad, Eweje & Tappin (2020).	Stakeholders.	Tay et al. (2015).
Risk management.	Sajjad, Eweje & Tappin (2020) & Tay et al. (2015).	Suppliers.	Large & Gimenez Thomsen (2011), Tay et al. (2015).
Strategy.	Tay et al. (2015).	Supply and purchasing capabilities.	Large & Gimenez Thomsen (2011), Tay et al. (2015).

### 3.1 Food supply chains

Food supply chains are very complex chains that can include multiple challenges related to large number of stakeholders or perishable nature of products, making this sort of supply chains very different from others (Mithun Ali, Muktadir, Kabir, Chakma, Rumi & Islam 2019). They are also very related to sustainability and for instance the sustainable development goals of the United Nations such as zero hunger (SDG02), good health and well-being (SDG03), clean water and sanitation (SDG06), responsible consumption and production (SDG12), and climate action (SDG13) (Thomé, Cappellesso, Ramos & Duarte 2021). The way the food supply chains affect the environment are e.g. food waste (Parfitt, Barthel & MacNaughton 2010), emissions (Aung & Chang 2010), as well as many social and ethical issues (Hartmann 2011). According to Leonard (2019) almost 50% of the total food waste occurs in the supply chain in Europe (23% in the production phase, 12% in handling and storage, 5% in processing, and 9% in distribution and market).

All activities from the production of the food to the consumer are part of the food supply chain (Tan, Hai, Popp & Oláh 2022). The stages of the chain are usually divided into five stages: 1. Production, 2. Processing, 3. Suppliers, 4. Retailers, and 5. Customers (Nosratabadi, Mosavi & Lakner 2020). Out of these stages, first three are seen as upstream stages, whereas the last two are seen as downstream stages. They further add that the ultimate goal of the food supply chain is to refine raw materials into a product that satisfies the final user's needs. However, in addition to these stages, there are multiple other stakeholders affecting the food supply chain as well. According to Yadav, Singh, Gunasekaran, Raut & Narkhede (2022) they include government, non-government organizations as well as different shareholders. Yadav et al. (2022) also suggest that the food supply chain consists of three flows: produce flow, finance flow, and information flow. Produce flow moves from the upstream stages from producers all the way to the downstream stages to the customers. Finance flow, on the other hand, moves from the downstream stages from the customers to the upstream stages to the producers. Finally, information is produced by all the actors in the supply chain. Customers produce information about demand that moves upstream all the way to the distributors, whereas producers produce information about supply that moves downstream all the way to the distributors. (Yadav et al. 2022)

Earlier, food supply chains have been shorter and the actors in it have been operating more independently (Bourlakis & Weightman 2004, 1). Today, however, they have become interconnected chains that incorporate multiple processes and relationships. Today, it is also very difficult to achieve and maintain performance individually without these complex chains. (Folkerts & Koehorst 1997)

### 3.2 Triple bottom line

One of the most important frameworks in sustainability is the triple bottom line (TBL). According to Elkington (1999) TBL consists of three dimensions which are economic, environmental, and social and creating long-term value on all these dimensions, contributes to sustainability. The economic dimension can refer to the ability to decrease costs of purchased materials, energy consumption, waste treatment, waste discharge or fines for environmental accidents (Zhu, Sarkis & Lai 2008). The environmental dimension refers to the ability to reduce pollution, waste, hazardous substances, and environmental accidents. And finally, the social dimension refers to the ability of the companies to also build stronger relationships with the surrounding society by e.g. reducing public risk and increasing worker safety by minimizing pollutants and hazardous substances. (Çankaya & Sezen, 2019)

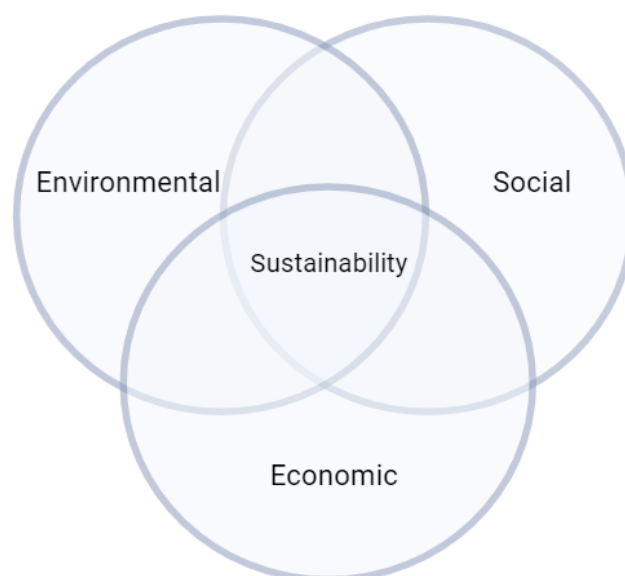


Figure 4. Triple Bottom Line (Elkington 1999).

As can be seen from the definitions of sustainable supply chain management, TBL is a well-recognized concept. All the above-mentioned definitions point out the significance of environmental, social, and economic dimensions. According to Savitz & Weber (2013, 5) a sustainable business should be able to measure, document, and report a positive return on invest not only on economic bottom line, but also on environmental and social as well as the benefits for stakeholders according to the same dimensions. Savitz & Weber (2013, 5) also point out that a company that contributes to TBL increases its profitability as well as stakeholder value. As TBL is so deeply rooted in the definition of SSCM, one could say that this assumption is also supported by the findings of studies that suggest that SSCM practices increase firm performance on multiple contexts, those discussed above. Gimenez, Sierra and Rodon (2012) also support this statement by suggesting that financial gains can be made in the process. Teixeira, Moraes, Stefanelli, de Oliveira, Teixeira & de Souza Freitas (2020) even suggest that integrating sustainability or the concept of TBL is necessary for long-term performance of a company. However, the benefits of TBL do not end here. According to Goel (2010) there are seven important benefits for any organization that follows from adopting the TBL into everyday business:

1. Sustainable governance and ethics systems throughout the organization.
2. A corporate culture driven by values throughout the organization.
3. Risk management with management systems and performance monitoring.
4. Improved communication with stakeholders.
5. More attractive place to work with the sustainable values and emphasis on the long-term existence of the organization.
6. Benchmarking of performance inside industries and across them.
7. Increased market value.

The TBL also holds certain characteristics. According to it, companies are not only accountable to the shareholders but instead to all the stakeholders, widening the accountability to concern the entire organization and with whom it is dealing. This also means that the organization is committed to engaging stakeholders, whether internal or

external. Transparency is another important subject in the TBL, and it does not only affect the financial side of the organization but instead the full list of activities and practices. When it comes to strategy, it is crucial that the entire spectrum of the TBL is included, i.e., not only the economic area. Finally, the measuring and reporting that comes along with transparency, is critical, and collection, analyzing, verification, and reporting of economic, environmental, and social performance must exist. (Goel 2010)

The relationship between the dimensions of the TBL is sometimes not quite clear (Littig & Griebler 2005). Brown, Dillard & Marshall (2006) point out that environment would provide the context for social systems, whereas social systems would further provide the context for economic systems. Reddy & Thompson (2016) suggest therefore that where economy is a part of society, society is a part of environment. Van der Vorst, Grafe-Buckens & Sheate (1999) further point out that economic sustainability is dependent on social and environmental sustainability, whereas social sustainability is dependent on environmental sustainability.

### 3.2.1 Environmental dimension

“What we need is a rapid and deep change in how we do business, generate power, build cities and feed the world. The last decade has shown that we have the tools to tackle the climate crisis. We can save lives and property, breathe less polluted air, access cleaner water and protect biodiversity.” (Guterres 2019) When we speak of environmental dimension of the TBL, we are speaking of global warming, climate change, and different pollutions such as air, land, and water pollution (Gopalakrishnan, Yusuf, Musa, Abubakar & Ambursa 2012). The environmental sustainability in the TBL inside the companies includes energy consumption and its origin, resources and materials used, emissions, waste management, land use, and pollution (Goel 2010; Çankaya & Sezen 2019). According to Walls, Phan & Berrone (2011) environmental sustainability means business practices and strategies decrease the negative impact of a company to the environment including reduced energy consumption and waste, ecological resources, and environmental management systems. They suggest that in practice this could be done with products, processes, and policies. On top of that, Andersen, Skjoett-Larsen & Lindgreen (2009) suggest that in order to actually contribute to environmental sustainability, products of the company must be restructured and

values inside the organization need realigning with environmental awareness with environmental programs, recycling, waste management as well as aligning with regulatory requirements.

Whiteman, Walker & Perego (2012) use planetary boundaries in explaining the ecological dimension of corporate sustainability. Planetary boundaries is a framework that explains the processes behind the stability and resilience of the system on planet earth and it includes “climate change, ocean acidification, stratospheric ozone depletion, interference with the global phosphorus and nitrogen cycles, rate of biodiversity loss, global freshwater use, land-system change, aerosol loading, chemical pollution” (Rockström, Steffen, Noone, Persson, Chapin, Lambin, Lenton, Scheffer, Folke, Schellnhuber, Nykvist, De Wit, Hughes, van der Leeuw, Rodhe, Sörlin, Snyder, Costanza, Svedin, Falkenmark, Karlberg, Corell, Fabry, Hansen, Walker, Liverman, Richardson, Crutzen, Foley 2009).

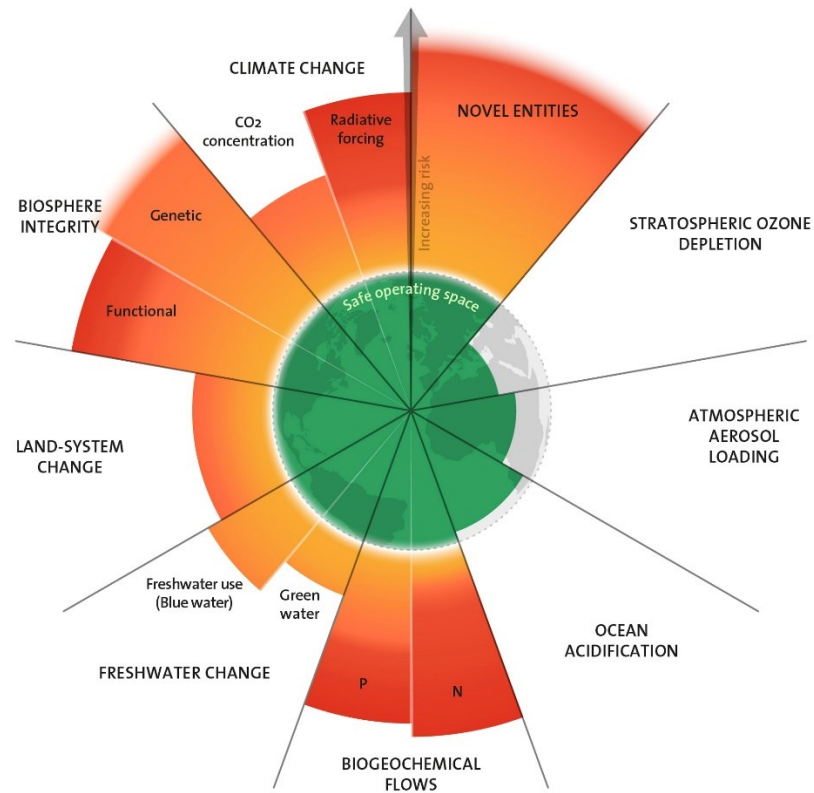


Figure 5. The 2023 update to the planetary boundaries. (Stockholm Resilience Centre, Stockholm University. Based on Richardson, K., Steffen, W., Lucht, W., Bendtsen, J., Cornell, S., E., Donges, J., F., Drüke, M., Fetzer, I., Bala, G., von Bloh, W., Feulner, G., Fiedler, S., Gerten, D., Gleeson, T., Hofmann, M., Huiskamp, W., Kummu, M., Mohan, C., Nogués-Bravo, D., Petri, S., Porkka, M., Rahmstorf, S., Schaphoff, S., Thonicke, K., Tobian, A., Virkki, V., Wang-Erlandsson, L., Weber, L., & Rockström, J. (2023).

Whiteman, Walker & Perego (2012) suggest that in order to ensure the viability of businesses, the planetary boundaries framework should be integrated into strategic planning of companies which would result in increased sustainability, smaller ecological footprint, and contributing to global sustainability and environmental goals.

### 3.2.2 Social dimension

The social sustainability is perhaps the least studied topic out of the three dimensions in the TBL and it is also less used than the other two. Moreover, there are less tools and indicators

for it. This is the case even though the social sustainability gives a good overview on how the company values its employees and stakeholders and its impact on the society and this reflects to the success of the business in long-term. (Butnariu & Avasilcai 2015)

The dimension of social sustainability is built on ideas that include equity, accessibility, participation, empowerment, sharing, institutional stability, and cultural identity (Basiago 1998). It refers to interaction between a company or an organization and the community surrounding it, including employees and their relations, health, wage policy and their relationship to the living costs, safety, community involvement, customer satisfaction, rights, and non-discrimination (Goel 2010). Çankaya & Sezen (2019) emphasize the relationship between the organization and the society and suggest the actions or practices to include reducing public risks and increasing safety with decreasing pollutant or dangerous substances. In a bigger picture, it is all about “wellbeing of communities, organizations, and people” (Saunila, Ukko & Rantala 2018). It is also closely related to companies’ competition of productivity, respecting the environment, and socio-economic actions. The same time, companies should respect human capital development, create jobs, and improve health and safety. One of the biggest challenges in this dimension, however, is finding a good balance between factors like individual human needs, societal needs, economic well-being, and the capacity of nature. (Khan, Dewan & Chowdhury 2016). Assessment in social sustainability means investigating the positive and negative social effects of industries or businesses (Ahmad, Wong & Rajoo 2019).

Table 4. Social sustainability indicators.

INDICATORS (EMPLOYEES)	REFERENCE	INDICATORS (SOCIETY)	REFERENCE	INDICATORS (CUSTOMERS)	REFERENCE
Salary	Chen & Holden 2017; Goel 2010	Local employment or employment creation	Chen & Holden 2017	Customer satisfaction	Goel 2010
Working hours	Chen & Holden 2017; Hauschild, Dreyer & Jørgensen 2008	Contributions to economic development	Chen & Holden 2017	Health and safety	Çankaya & Sezen 2019; Chen & Holden 2017; Guthrie, Cuganesan & Ward 2008
Health and safety	Çankaya & Sezen 2019; Guthrie, Cuganesan & Ward 2008; Khan, Dewan & Chowdhury 2016	Community involvement or development	Chen & Holden 2017; Goel 2010; Guthrie, Cuganesan & Ward 2008; Hauschild, Dreyer & Jørgensen 2008	Allergies	Guthrie, Cuganesan & Ward 2008
Training and career development	Chen & Holden 2017; Guthrie, Cuganesan & Ward 2008	Cultural heritage and identity	Basiago 1998; Chen & Holden 2017 Guthrie, Cuganesan & Ward 2008	Cultural considerations	Guthrie, Cuganesan & Ward 2008
Equal opportunities	Basiago 1998; Guthrie, Cuganesan & Ward 2008; Hauschild, Dreyer & Jørgensen 2008	Health and safety	Çankaya & Sezen 2019; Chen & Holden 2017; Khan, Dewan & Chowdhury 2016	Labeling (sources, low fat, calories, nutrients etc.)	Guthrie, Cuganesan & Ward 2008
Social security	Chen & Holden 2017				
Working conditions	Chen & Holden 2017				
Workload	Zhang & Haapala 2015				
Employee satisfaction	Zhang & Haapala 2015				

### 3.2.3 Economic dimension

“The planet can sustain an ecology without an economy. It cannot sustain an economy without an ecology.” (Thomson & Reddy 2016). As this quote already hints, the economic sustainability is very closely linked to the environmental and social dimensions of the TBL (Reddy and Thomson 2015). The environment can develop but it cannot grow, whereas economy can grow but if it exceeds the environment, that economic growth becomes unsustainable (Daly 1990). Today, the economic dimension of sustainability has been left into the shade of the environmental dimension (Ahmad, Wong & Rajoo 2019). There can be several reasons for this, but according to Kim, Kim & Lee (2013) they could include issues of discount rates, estimations of future costs, and not quite understanding what the nature of connected cost categories are. Ahmad, Wong & Rajoo (2019) add to this that there is a difficulty to access reliable economic data as well as inconsistency when it comes to using economic indicators and other ways of measuring it.

Gopalakrishnan et al. (2012) suggest that the economic dimension of the TBL includes getting an edge on the competitors and sustaining it by using sustainability. According to Goel (2010) the economic sustainability addresses the issues that companies report in their financial reports including the value and location of outsourced goods and services, the ratio of market capitalisation to book value, investments (e.g., human capital and research and development), salaries, benefits, and community development. Zhu, Sarkis & Lai (2008) propose that the economic dimension refers to the ability to reduce costs in different areas such as energy, waste, materials etc. Sheth, Sethia & Srinivas (2011) have divided the economic sustainability dimension into two aspects. The first one is conventional financial performance that includes e.g., cost reductions, while the other one is the interests of external stakeholders e.g. improving economic welfare or living standards. Slaper & Hall (2011) propose that regular economic factors such as turnover, costs, profits or tax payments are taken into account when measuring economic sustainability. Ahmad, Wong & Rajoo (2019) also note that the economic dimension is often related to the economic equality between generations.

One way to implement economic sustainability together is with the principles of circular economy. According to Kircherr, Reike & Hekkert (2017), circular economy means an economic system replacing the current linear system with the concept of “reducing,

alternatively reusing, recycling and recovering materials in production/distribution and consumption processes”. The target of this is to create environmental quality, social equity, and economic wealth for the sake of both current generations and future generations. Just as in the TBL, all the three dimensions are also in this framework very closely connected to each other. When it comes to economic benefits, European Parliament (2024) suggests that the circular economy could increase competitiveness, innovation, economic growth, and the number of jobs. Figure 1 introduces these four R:s (reducing, reusing, recycling, and recovering) instead as an extended version of nine R:s by Potting, Hekkert, Worrel & Hanemaaijer (2017). It presents different strategies according to their circularity.

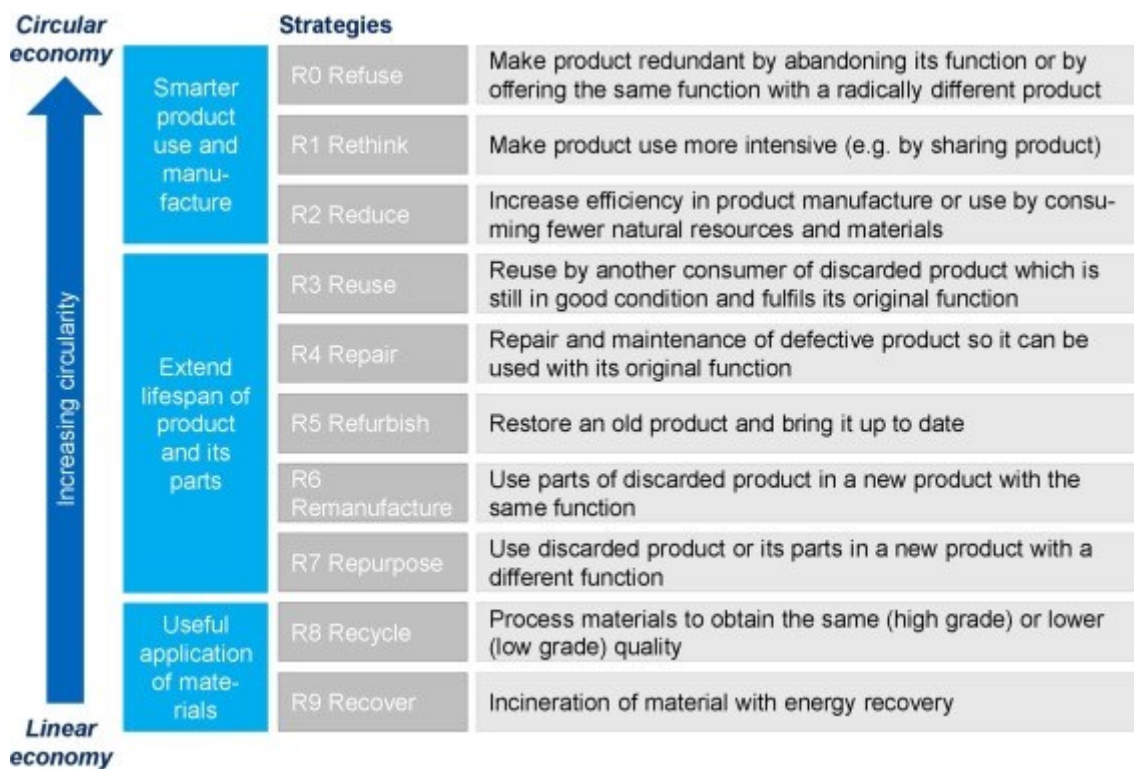


Figure 6. The 9R Framework. (Kircherr, Reike & Hekkert 2017 adapted from Potting, Hekkert, Worrell, Hanemaaijer 2017)

## 4 Barriers of sustainable supply chain management

Barriers of SSCM are factors that are interfering with it and preventing integrating sustainable practices into the supply chain (Ansari & Kant 2017). One way to divide or categorize barriers is starting with defining whether they are internal to the organization or external to the organization (Rauer & Kaufmann 2015).

### 4.1 Internal barriers

Internal barriers refer to barriers coming from within the organization (Tay, Abd Rahman, Aziz & Sidek 2015). According to Sajjad, Eweje & Tappin (2020), internal barriers are high in number and can include factors like concerns about costs, strategic/structural barriers, and behavioral/psychological barriers. They have also categorized these internal barriers into four categories as follows: 1. Cost concerns, 2. Strategic and structural barriers, and 3. Behavioral and psychological obstacles. Seuring & Müller (2008) have identified similar main barriers which can also act as categories: 1. Costs, 2. Coordination complexity/effort, and 3. insufficient communication.

#### 4.1.1 Costs as a barrier

Giunipero, Hooker & Denslow (2012) are suggesting cost concerns to be one of the main barriers to SSCM, however, this is mostly the fact only on the short-term view. Moreover, they add that there is also the difficulty of measuring ROI as well as internal cost reduction expectations, making sustainability investments even more complex and cost concerns more essential. On the other hand, cost reductions are also a driving force behind SSCM (De Meyer et al. 2014; Saeed & Kersten 2019; Sajjad, Eweje & Tappin 2020), so it is clear that there is no consensus whether SSCM is saving costs or increasing them, although it is clear that the subject is complex and have multiple factors affecting it.

Min & Galle (2001) together with Walker, Sisto & McBain (2008) suggest that SSCM costs are high and prevent many companies from proceeding with SSCM. This is true especially with small and medium sized companies (Hervani & Helms 2005; Walker, Di Sisto &

McBain 2008). Walker, Di Sisto & McBain (2008) add to that that this is mostly since small and medium sized companies have less resources available. Porter & Van de Linde (1995) suggest that costs are a barrier especially if the idea about sustainability or ecology is dualistic (economy versus ecology). Brammer & Walker (2011) have also identified costs as a major barrier, although they point out that companies may only perceive costs as a barrier. Nidumolu, Prahalad, Rangaswami (2009) suggest this concern is true and point out that companies are genuinely concerned that environmental initiatives and becoming more sustainable will increase their costs without short-term benefits, meaning that it is seen more as a long-term investment. Giunipero, Hooker & Denslow (2012) also suggest that companies still tend to highlight economic factors over social and environmental and try to do more with less especially when in a recession. Based on this, they further suggest that the overall economic situation affects how companies view sustainability efforts. On top of the costs being a barrier, different resources, or lack of them can also act as a barrier and this can include people and time. (Morali & Searcy 2013)

#### 4.1.2 Strategic and structural barriers

Sustainability strategies alongside proper risk management seem to be drivers for SSCM (Sajjad, Eweje & Tappin 2020; Tay et al. 2015). Therefore, it can be concluded that the lack of them are clearly barriers for SSCM.

Berns et al. (2009) have identified the main challenges of why companies are struggling with sustainability. Firstly, planning and predicting investments in the long term is seen exceedingly difficult. Traditional economic frameworks and models of forecasting investments can be shorter in timeframe, whereas forecasting sustainability investments can sometimes require exceeding even generations. And the way this works with the short-term requirements of investors and stakeholders can sometimes be uncertain. Secondly, estimating the effects of sustainability investments in the entire organization and its surroundings is difficult and includes numerous factors, which can be impossible to consider. Thirdly, the business environment can be prone to a lot of change and uncertainty. Legislation can change annually, and different trends affect customers and their preferences. Planning sustainability under this much uncertainty can be difficult and inaccurate. Finally, the execution of sustainability is also far from simple. It requires overcoming skepticism on

the company-level, organizing the sustainability agenda in the entire company so that it remains permanent, and keeping track of and report the sustainability initiatives. (Berns et al. 2009) Seuring & Müller (2008) suggest that the barrier can rise from inside the company in form of complexity of coordination.

#### 4.1.3 Behavioral and psychological barriers

Sajjad, Eweje & Tappin (2020) and Tay et al. (2015). have both identified ethical values of managers and management commitment as the driving forces behind organization SSCM implication. This would indicate that the lack of the ethical values of managers and management commitment could be barriers. Moreover, Large & Gimenez Thomsen (2011) and Tay et al. (2015) have identified employee involvement and sustainability culture inside an organization as SSCM drivers, therefore this would indicate that the opposite of these drivers (lack of employee involvement and sustainability culture) could be seen as barriers. According to Berns et al. (2009) this is the case at least when it comes to top management involvement and support. They also name some possible reasons for this. One is that the managers and people in leadership positions do not understand the concept or definition of sustainability. According to their research, many managers even hope for better frameworks for sustainability. This, in turn, affects the measuring of sustainability initiatives. How can one assume to know how to measure something they do not quite understand? It is also notable that the lack of top management support and involvement does not always mean their lack of ethical values. Instead, most managers throughout the industries share the common goal and understanding that sustainability is necessary, but they fail to understand what it is, where their organization is related to it, where they should head towards, and how. (Berns et al. 2009) However, the lack of top management support can also signal that some people just simply have a different view on sustainability (Fineman 1997). Unfortunately, this can result in greenwash, where a company does not really contribute to sustainability but only advertises it does (Greer and Bruno 1996).

Giunipero, Hooker & Denslow (2012) are also suggesting that lack of consensus on higher manager levels such as CEO level can be a barrier for SSCM. Especially managers that are careful with risks, may be a barrier, because of the investments and costs that SSCM requires e.g. in capabilities, equipment, or training. This is due to the agency-theory as managers can

have conflicting goals with shareholders. (Aguilera, Alberto Aragón-Correa & Tashman 2021) However, is the real barrier here then the costs of SSCM adoption which seems to be the driving force behind the unwillingness of the managers to bring the sustainability attempts forward although it seems to require the certain characteristic type of a manager (risk-averse)? Walker, Di Sisto & McBain (2008) are additionally suggesting that it not only the highest manager level that can be a barrier, but instead also the middle management can act that way. Preuss & Walker (2011) conclude that top management has a lot of power in this sense and can either drive or hinder sustainability.

## 4.2 External barriers

Businesses are constantly facing external threats to their supply chain in terms of globalization, market complexity, uncertain demand, as well as competition and focusing only on what is going on inside the company is not enough. These growing challenges combined with the concept of sustainability have created multiple barriers that companies are encountering when trying to make the supply chain sustainable. (Ansari & Kant 2017) According to Sajjad, Eweje & Tappin (2020), external barriers can include issues with supply and/or demand, legislation, lack of public awareness, standards, or cultural issues. They have also categorized external barriers into four different categories including 1. supply-side barriers (supplier-related issues), 2. demand-side barriers (customer-related issues), 3. government regulation/legislation, and 4. other barriers.

### 4.2.1 Supplier-related barriers

Suppliers can be a driving force for SSCM (Large & Gimenez Thomsen 2011; Tay et al. 2015). However, Walker, Sisto & McBain (2008) also suggest that they can be the opposite, and in fact, one of the major barriers to SSCM if the suppliers are resistant to sustainability. Wycherley (1995) found out that one of the main challenges concerns confidentialities. According to Touboulic & Walker (2015) the buyer and suppliers may have different time frames for sustainable development, creating a conflict between their goals. Walker, Sisto & McBain (2008) suggest that companies in the supply chain can be very hesitant to share any information in fear of someone exposing or exploiting it. Due to this, they add that trust in

the supply chain is necessary and critical, as otherwise, companies might decide not to attend sustainability projects in fear of their sustainability situation being exposed to the public. Touboulis & Walker (2015) suggest that trust can also become an issue in case of supplier not trusting in the sustainability agenda of the buyer. Moreover, Koplin, Seuring & Mesterharm (2007) suggest that the fear of losing some of the main partners in the supply chain can also act as a barrier to SSCM. Seuring & Müller (2008) suggest, on the other hand, that communication or lack of it can be a big barrier inside the supply chain. Touboulis & Walker (2015) address this issue and say that lack of informal communication, two-way cooperation as well as information sharing between competing suppliers can come in the way of SSCM.

Veleva, Hart, Greiner & Crumbley (2003) point out another viewpoint related to the supply chain. They conclude that one of the main barriers to SSCM is actually the lack of data. Their research shows that companies are measuring things like their own eco-efficiency and performance but not so much environmental impact, supply chain or life cycle impact, or carrying capacity. They use the Lowell Center Indicator Hierarchy (Figure 6.) that was developed by researchers at the Lowell Center for Sustainable Production at the University of Massachusetts Lowell. Hierarchy has 5 levels for categorizing different sustainability indicators. (Veleva et al. 2003) Green color indicates the levels that are in use in many companies, yellow color the levels that are in use in some companies, and red color the levels that are mostly not in use at all.

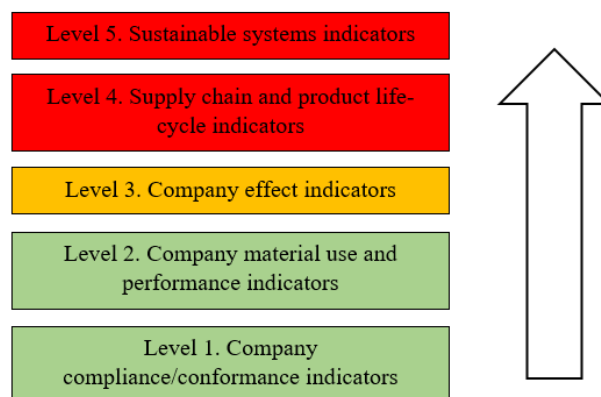


Figure 7. Lowell Center Indicator Hierarchy (adapted from Veleva et al. 2003; Greiner 2001a; Greiner 2001b).

Level 1 refers to ways of measuring that indicate whether a facility is following standards, acts, and regulations and such indicators can include fines paid. Level 2 means material use and performance indicators that can include e.g. emissions, energy use, by-products, eco-efficiency rate, or waste. Level 3 extends the measuring outside the company and aims to measure effects of a company or facility on the environment. This can be done e.g., by calculating different emissions such as CO<sub>2</sub>. Level 4 continues to extend the measuring to supply chain, distribution, and disposal. The aim of these indicators is to measure the product's life cycle. Finally, level 5 refers to sustainable systems and tries to measure the company's role in the larger framework of a sustainable society. The indicators at this level are measuring the impact of the company on the entire system. (Veleva et al. 2003)

Morali & Searcy (2013) have also suggested that measuring sustainability efforts is difficult. According to Pullman, Maloni & Carter (2009) it is also very difficult to estimate them. On top of that, they note that most of the indicators only measure one dimension of the TBL. This is also true with the lower levels of Lowell Center Indicator Hierarchy, although, the higher levels are also applicable on other aspects of sustainability as well. (Morali & Searcy 2013) Grosvold, Hojmosse & Roehrich (2014) suggest that while companies are very committed to measuring and monitoring, the reason that it is still causing issues is that supply chains are multi-level chains with various stakeholders, meaning that it requires efforts from all of them and across their systems. Toubolic & Walker (2015) suggest that this kind of misalignment with the systems and technology can create a significant barrier. They have also concluded that from the buyer's side, there is already a lack of visibility beyond the first tiers of the supply chain. This only proves that measuring and monitoring becomes extremely difficult to operate in the entire chain. They further suggest that there is also a lack of ways to govern and manage sustainability, especially informally inside the supply chain. They highlight the word "informally" as according to them, a clear definition of formal and informal in regard of communication can be made, and sustainability is often only addressed in the formal way of communication. Formal in this context refers to meetings whereas informal is more of the general conversations between individuals. Where sustainability is addressed in formal communication, informal communication, on the other hand, consists mostly of the commercial side of the relationship. This can potentially make sustainability communication very general rather than individualized exchange of information, leaving a lot of room for questions and misunderstandings. (Toubolic & Walker 2015)

Sajjad, Eweje & Tappin (2020) have also identified lack of supplier ability as one crucial barrier, as not every supplier has the ability to comply with the sustainability requirements. Moreover, suppliers might be willing to put all the extra costs of sustainable products for the buyer, and not contribute themselves. This creates a barrier for the purchasing organization, due to excessively high costs, further indicating the significance of the costs in sustainability. (Sajjad, Eweje & Tappin 2020) Touboulic & Walker (2015) address this issue by indicating the existence of “inequity of pain and gain sharing”. Moreover, regarding the costs, smaller suppliers can also lack the resources to acquire certain certifications that a buying organization requires (Grosvold, Hoejmosse & Roehrich 2014). Lee & Klassen (2008) suggest that especially small and medium sized suppliers can face issues with resources to implement sustainability. This could potentially decrease the number of available suppliers for a buying organization. According to Touboulic & Walker (2015) this is true, and the buying organization can suffer from the lack of suitable suppliers. They also suggest that barriers can also arise from the lack of resources to invest in sustainability or sustainable technology. Moreover, they add that organizations may not have the required skills to address sustainability issues. Morali & Searcy (2013) also suggest that on top of the supplier ability, suppliers can also react very negatively to a purchasing company implementing their risk management in the form of auditing. Many suppliers even see this as harassment, and this can especially be the case when the supplier is from another continent than the purchaser. Transparency of the information alongside data gathering are also pain points in this regard. (Morali & Searcy 2013)

#### 4.2.2 Customer-related barriers

Saeed & Kersten (2019), Sajjad, Eweje & Tappin (2020), and Tay et al. (2015) have all identified customers as a driver for SSCM. However, it is not that black and white, as several customer-related barriers can also be identified. Sajjad, Eweje & Tappin (2020) have moreover identified lack of customer interest as one barrier for sustainability. On top of this, it also seems that customers do hope for sustainable products, although they are seldom prepared to pay extra for that. So even if a customer has a preference for sustainability and sustainable products, this is not always visible in their buying behavior. There is a lot of competition in the marketplace and the lowest price seems to be the factor driving most of the customers to a purchase. Sajjad, Eweje & Tappin (2020) However, Smith (2012)

disagrees with the unwillingness of customers to pay extra for sustainable products and services and suggests that customers have actually started to act so.

#### 4.2.3 Legislation barriers

Governmental policies, regulations and legislation can be a driver for an organization when that is driving their initiatives with SSCM (Saeed & Kersten 2019; Tay et al. 2015). However, it can also go other way around and act as a barrier (Sajjad, Eweje & Tappin 2020; Walker, Di Sisto & McBain 2008). Porter & Van de Linde (1995) suggest that legislation can limit the innovativeness of companies if done poorly. According to Walker, Di Sisto & McBain (2008), instead of legislation being a barrier to SSCM, some companies can even view it as an actual threat due to its changing nature. Giunipero, Hooker, Denslow (2012) suggest that the fact that legislation and regulations are barriers comes mainly from the differences in legislation between areas. According to Nidumolu, Prahalad & Rangaswami (2009) the reason that compliance is so difficult and complex, is that the regulations vary by country, region, or city. Koplin, Seuring & Mesterharm (2007) agree on this claim and also point out that each continent or area also have their own acceptable standards. This can lead to issues in cooperation with the suppliers, which can operate in different areas of the world. Restrictions, rules, or requirements placed on them can sometimes yield negative reactions amongst them. Different areas also have vastly different issues regarding sustainability as circumstances vary greatly. (Koplin, Seuring & Mesterharm 2007)

#### 4.2.4 Other barriers

Giunipero, Hooker & Denslow (2012) suggest that external shareholders can be a barrier as satisfying them in terms of profit and simultaneously committing to long-term sustainability goals can be a burden. Seuring & Müller (2008) also point out that shareholders can also include environmental and social pressure groups. There can also be multiple barriers that are specific to the industries that companies are operating on (Walker, Di Sisto & McBain 2008). They point out that for example various kinds of market and competitions conditions can affect the barriers to sustainability or SSCM, meaning that an oligopoly or monopoly can have very different barriers than a more competitive market. There can also be industry-

specific criteria or preferences for purchasing, and Walker, Di Sisto & McBain (2008) point out an example from a public company where purchasing decisions are affected very strongly by doctors and their preferences, decreasing the significance of sustainable factors. (Walker, Di Sisto & McBain 2008)

## 5 Success factors of sustainable supply chain management

There are multiple ways that companies can address sustainability and succeed in it. It is crucial to understand the big picture before diving into the success factors, meaning the driving forces behind sustainability implementations as well as barriers for SSCM. Very usually barriers and success factors can actually be the opposites. Moreover, drivers and success factors can be similar, even though there is a slight difference, as driver is the initial force that initiates the process towards sustainability or sustainable process, whereas success factor is the element contributing to the successful implementation of it.

To prove the interconnectedness of the SSCM drivers, barriers, and success factors, an example should be presented. Sustainability strategy is one driver for SSCM (Sajjad, Eweje & Tappin 2020; Tay et al. 2015). This indicates that lack of it, could be seen as a barrier. Moreover, Kumar, Singh & Shankar (2015) have identified better sustainability strategies as a critical success factor for SSCM. Management commitment has also been identified as a SSCM driver (Sajjad, Eweje & Tappin 2020; Tay et al. 2015). Berns et al. (2009) have identified management commitment as a SSCM barrier. Prasad et al. (2018), on the other hand, suggest management commitment to be a success factor. This does not mean that these claims conflict with one another, but instead, it only emphasizes the interconnectedness of all these different factors affecting SSCM and sustainability in general.

### 5.1 Internal success factors

Internal success factors refer to success factors that arise from within the organization. These can include aspects such as resources (McGaughey & Ajasa 2001), employee involvement (Walker, Sisto & McBain 2008), or top management commitment (Prasad et al. 2018).

#### 5.1.1 Resources and strategy as a success factor

Giunipero, Hooker & Denslow (2012) have suggested costs to be one of the main barriers for SSCM. Goes without saying that sustainable initiatives require resources, and they have high costs and may prevent especially smaller companies from adopting them (Min & Galle

2001; Hervani & Helms 2005; Walker, Di Sisto & McBain 2008). However, Giunipero, Hooker & Denslow (2012) suggest that cost concerns are more of a short-term concern, and adapting sustainability as a long-term strategy in companies, can be a solution to this. They further add that in long-term, sustainability is cost-effective and very beneficial. Luthra, Garg & Haleem (2015) have therefore identified strategic planning as one of the critical success factors for SSCM. Sarkis (2003) further suggest that as technology, customer behavior, supply chain, stakeholders, and competitors are in a constant change, proper strategic planning ensures the success of SSCM. According to Gunasekaran, McNeil, McGaughey & Ajasa (2001) resources devoted specifically to supply chain can also act as a critical success factor. On the other hand, Olugu, Wong & Shaharoun (2010) highlight the resource efficiency as a critical success factor. They are not in conflict, however, but instead only highlight the crucial importance of resources, and even if a company has a lot of resources in it SSCM, this doesn't decrease the significance of resource efficiency.

#### 5.1.2 Employees as a success factor

Toke, Gupta & Dandekar (2012) suggest that workplace management is necessary for SSCM. Trowbridge (2002) lists protecting from injuries and other health and safety issues as practical means to address workplace management. Workplace management can lead to higher morale amongst employees and make success of sustainability more likely to occur (Muduli & Barve 2013a). Walker, Sisto & McBain (2008) call for the involvement of employees as well as their training education to be critical success factors. Prasad et al. (2018) share this view and suggest that education and involvement of the employees must be properly planned. They add, however, that this requires the managers to be aware of the significance of these factors. Zhu, Sarkis & Lai (2013) emphasize the significance of human resources management in sustainability and SSCM, especially regarding improvements in information and processes. With the help of different incentives or rewards, companies can direct the behaviour of employees (Zhu, Sarkis, Cordeiro & Lai 2008). Tornatzky & Fleischer (1990) also point out the significance of hiring and suggest that even hiring skilled people can increase the hiring costs, it can have a huge impact on sustainability.

### 5.1.3 Management as a success factor

Top management commitment has been identified as one critical success factor for SSCM and sustainability (Prasad et al. 2018; Kumar, Singh & Shankar 2015). According to Govindan, Kannan, Mathiyazhagan, Jabbour & Jabbour (2013) sustainable supply chain definitely requires support from the management. According to Min & Galle (2001) it is particularly necessary to the initial stages of sustainable implementation in order to allocate different resources to implement concepts and strategy. Seuring and Müller (2008) also suggest that a fully involved top management is a huge help in achieving those resources. This is an important note as different resources such as financial resources, people, and time are amongst the main barriers of SSCM (Morali & Searcy 2013). This shows one potential way to overcome that barrier. According to Luthra, Garg & Haleem (2015) managers also need to be aware of the benefits and opportunities that sustainability contributes to. Kumar et al. (2023) also highlight the knowledge of circular supply chains to be a critical success factor.

### 5.1.4 Technology as a success factor

Chan, He & Wang (2012) identify the significance of the technology. They say that for example information technology and different systems related to it, could help to optimize the supply chain regarding resources, communication, and cooperation. According to Tseng, Wu & Nguyen (2011) information technology and firm performance have a strong relationship and they also note that information technology is required for successful SSCM. Sarkis & Zhu (2008) add that information technology is also a requirement for many other aspects of the business in terms of sustainability such as sustainable marketing or design.

It is not only information or communication technology that is required, but in fact all kinds of technological advancement and upgrading can be of use. Andic, Yurt & Baltacıoglu (2012) call out the technological development to be one of the crucial reasons for the advancement of global economy and finding solutions to ecological problems. Muduli & Barve (2013b) approve the environmental aspect of modern technologies and suggest this to aid e.g., by reducing pollution. Simpson & Samson (2008) also point out the cost-

effectiveness alongside the sustainability boost of new technologies and both can be used to solve multiple issues in the supply chain and production phase.

## 5.2 External success factors

As sustainable supply chain yields a lot of benefits, leaders and managers who understand that and identify themselves as experienced and passionate with sustainability, can drive this change forward. They have also pointed out external realities that are gaining more and more importance and relevance today:

1. Price level is growing in volatility and companies that optimize and prioritize sustainability, will be less prone to the negative effects of these swings.
2. Various stakeholders are also realizing to gain an understanding of the importance of sustainability and therefore putting more pressure on it.
3. Governments and legislation are changing more favourable towards sustainability and sustainable companies are less prone to the negative effects of regulatory changes.
4. Evaluation of the companies is based more and more on sustainability and that way affecting external investments.
5. Pioneers of sustainability can benefit from competitive advantage and grow their lead compared to their competitors.

When the top management and employees in leading positions understand these realities, it allows a company to succeed in sustainability and benefit from it. (Berns, Townend, Khayat, Balagopal, Reeves, Hopkins, & Kruschwitz 2009)

### 5.2.1 Communication as a success factor

Seuring & Müller (2008) suggest that communication outside the company borders, management systems, training of employees, integration to the company policy, and finally monitoring, evaluation, reporting, and sanctions can act as success factors to SSCM. Communication can also yield results and better sustainability both inside the company and

within its stakeholders. Training and education is another factor that will also act as a proactive means that also benefits other companies inside the supply chain. They have also suggested communication to be a barrier, meaning that companies need certain kinds of communication (open and proper) in order to make it a success factor. Management systems can also be a crucial factor, and they mention ISO 14001 and SA 8000 as examples. (Seuring & Müller 2008) Del Brío & Junquera (2003) suggest that communication across industries can also be a beneficial form of communication together with exchanging innovative solutions and different means to better organizational culture. Kuo, Hsu, Huang & Gong (2013) list these kinds of communication (especially sharing information regarding environmental impact and data) as key success factors to SSCM. Olugu, Wong & Shaharoun (2010) also highlight the significance of transparency in company processes, as this kind of communication can aid in the success of sustainability.

### 5.2.2 Customers as a success factor

Products and services should be designed to meet the requirements and expectations set by their customers in order to achieve a sustainable solution (Zhu, Sarkis & Lai 2008). Ageron, Gunasekaran & Spalanzani (2012) point out that understanding opportunities and benefits of addressing especially environmental issues can yield new customers as well as economic benefits and advantages in competition. Today, the pressure from the customers and society is growing when it comes to sustainability (Fleury & Davies 2012). Luthra, Garg & Haleem (2015) call for societal issues as one of the critical success factors. And where this is rising from, is the heightened awareness of society and customers (Fleury & Davies 2012). Luthra, Garg & Haleem (2015) address this claim and list customer awareness as one of the critical success factors to SSCM. According to Gunasekaran & Spalanzani (2012) heightened customer awareness may push the companies for more sustainability. Hanna, Newman & Johnson (2000) suggest organizations act more sustainably when customers are buying products or services because of their sustainability. Smith (2012), on the other hand, already made the assumption that customers are actually generally willing to pay more for greener products and services. Sajjad, Eweje & Tappin (2020) are not suggesting the same, and actually say that customers are saying they expect more sustainability from the companies but would not be willing to see this change in the price they pay, indicating that there is a conflict between what they say and how they act. Nevertheless, Luthra, Garg & Haleem

(2015) list the support from the customers as one of the critical success factors for SSCM. This indicates that the existence of the support from the customers is apt to increase the likelihood of success of sustainability.

Beverungen, Knackstedt & Müller (2008) emphasize that it is important to maintain high customer loyalty. Wittstruck & Teuteberg (2012) name customer loyalty as a success factor for SSCM alongside corporate image and transparency. They suggest that higher customer loyalty means higher revenue and liquidity in the future. Together with the corporate image, customer loyalty has a potential connection to customer retention and differentiation compared to competitors as well as heightened employee satisfaction. Transparency of the processes particularly, on the other hand, affects the economic, social, and ecological success. They point out, however, that these factors, in addition to being success factors, are also objectives and driving forces behind implementing SSCM; things that the companies are aiming at with these types of practices. (Wittstruck & Teuteberg 2012)

### 5.2.3 Suppliers as a success factor

Suppliers can be a driver (Large & Gimenez Thomsen 2011; Tay et al. 2015), a barrier (Walker, Sisto & McBain 2008), as well as a success factor for SSCM (Luthra, Garg & Haleem 2015). Luthra, Garg & Haleem (2015) add that it is no longer enough to only focus the improvements inside an organization, but increased competition requires companies to improve the entire supply chain. According to Agarwal & Vijayvargy (2012) the significance of sustainable suppliers is ever growing and might be the biggest strength for SSCM, whereas the other end, suppliers that are less sustainable, might be the amongst the biggest weaknesses. Towill (2015) suggests that strengthening cooperation with suppliers is definitely a success factor. However, Winkler (2010) points out that remarkably close cooperation with the suppliers is needed in order to avoid issues. This is supported by the assumption that suppliers can be a barrier to SSCM due to different sustainability goals (Touboulic & Walker 2015), confidentiality issues (Wycherley 1995), lack of communication (Seuring & Müller (2008), lack of supplier abilities (Sajjad, Eweje & Tappin 2020), or lack of resources (Grosvold, Hoejmose & Roehrich 2014). These issues or barriers could potentially be overcome with closer cooperation with the suppliers. Kumar et al. (2023) suggest that close coordination and collaboration in the supply chain are a critical

success factor to SSCM. Muduli, Govindan, Barve, Kannan & Geng (2013) are even suggesting rewards or incentives to be used with suppliers for better sustainability regulation and promotion. This kind of motivation of suppliers can be seen as a success factor to SSCM (Luthra, Garg & Haleem 2015). Moreover, it is also important to maintain an open relationship with the suppliers. According to Eltayeb & Zailani (2009) technology transfer with the suppliers can aid in sustainable goals. Olugu, Wong & Shaharoun (2010), on the other hand, note that supplier satisfaction is a success factor to SSCM and further suggest that the difference between what suppliers expect of the sustainability efforts and what is implemented, should be as little as possible.

On top of the training and education inside an organization, it is also important inside the supply chain across the organization borders. According to Lambros, Ketikidis & Baresel-Bofinger (2011) the individuals operating inside the supply chain must have a proper awareness of sustainability. Rao & Holt (2005) suggest that this will contribute to successful SSCM. Additionally, this will help in suppliers contributing and getting involved in SSCM implementation (Kumar, Luthra & Haleem 2013). Suppliers that are contributing and supporting in SSCM implementation, also seem to have positive relations together with each other (Testa & Iraldo 2010).

#### 5.2.4 Legislation as a success factor

Legislation is a strong driver for SSCM (Saeed & Kersten 2019; Tay et al. 2015) According to Prasad et al. (2018) legislative compliances is also one of the success factors for SSCM. Wu, Ding & Chen (2012) suggest that legislation pushes the companies to implement very specific sustainability practices. Moreover, there are this day multiple international as well as national treaties and agreements regarding sustainability. Luthra, Garg & Haleem (2015) point out that these regulations serve companies as guidelines and support their success in sustainability.

## 6 Research method

This research utilizes both the qualitative and quantitative data. The difference between these two is as follows:

Table 5. Distinctions between quantitative and qualitative data. (Saunders 2016, 569)

<b>Quantitative research</b>	<b>Qualitative research</b>
Based on meanings obtained from numbers	Based on meaning obtained from words and images
Numerical and standardized data	Non-standardized data that needs to be categorized
Diagrams and statistics	Conceptualization

Firstly, the viewpoint of the suppliers will be gathered using quantitative data gathering in the form of survey. This survey was sent to most of the suppliers of Company A. This will give us an external viewpoint on the SSCM providing data that can be used in the gathering of qualitative data through interviews. These interviews will be carried out in both supply department, and sustainability department. This way, two different perspectives can be considered. Finally, all this data will be combined and compared together.

### 6.1 Mixed methods

Mixed methods means a research method where quantitative data is combined with qualitative data. This can be challenging since both of these methods have very different features. This study will use the convergent design, which means that the qualitative and quantitative data will be gathered and analysed separately, after which they can be combined and compared to each other. Quantitative data can tell us more about trends and correlations, whereas qualitative data can give us a deeper and more individual perspective. With this method, the topic can be accessed from both quantitative and qualitative perspective and combining them can give us a bigger picture of the subject. (Creswell 2015)

## 6.1 Quantitative data

Quantitative research method is based on describing and interpreting something based on statistics and numbers. Key elements in a quantitative study are causes and effects, categorizing, comparing, and explaining phenomena based on numerical data. The method includes various analyzing methods. (University of Jyväskylä 2024)

This research utilizes a questionnaire method, where the same questions are being asked in the same order. According to Saunders (2016, 439) questionnaires are one of the most widely used data collection methods in survey strategy. However, the reliability and response rate are largely affected by the design of the questionnaire. Individual questions must be carefully prepared, presentation of the questions must be clear as well as the purpose of the questionnaire, and finally delivery and return must be carefully planned and executed. (Saunders 2016, 439) Robson (2011) adds that the questions must be the kind in nature that they are all understood the same way by the recipients. For this reason, questionnaires are usually used in descriptive or explanatory research. Descriptive research like attitude and opinion questionnaires or organizational practices will help in identifying and describing variability in the phenomenon studied whereas explanatory research help to identify and describe relationships between variables in cause-and-effect relationships. (Saunders 2016, 439)

Questionnaires can be used as the only data collection method, but it is usually mixed with something else. A questionnaire can, for instance, identify opinions and attitudes, mixed with in-depth interviews that try to further understand and explain them. There are also several types of questionnaires. A self-completed questionnaire is completed by the respondent on the internet for instance. Interviewer-completed questionnaires can be recorded by the interviewer. Face-to-face questionnaires, on the other hand, mean that the respondents and the interviewer meet in person, and the interviewer asks the questions then. (Saunders 2016, 439-440)

Questionnaires include distinct types of data variables. In terms of relationships, there are dependent variables (changes in response to changes in other variables), independent variables (causes changes in dependent variables), mediating variables (the link between dependent and independent variables that transmits the effect of an independent variable to a dependent variable), and moderating variables (affects the relationship between

independent variables and dependent variables). Data variables can also be either demographic variables (characteristics like age, gender, education, occupation etc.), attitudes and opinions variables (how the respondents feel, or think is true or false and can be influenced by the context of questions), and behavior and event variables (what have people done or what has happened or will happen). (Saunders 2016, 444-445)

What is important in the design of a questionnaire is reliability as well as validity. Internal or measurement validity refers to the questionnaire measuring what the researcher has decided to measure. Content validity, on the other hand, refers to the questionnaire containing questions that are relevant and essential. Criterion-related or predictive validity means the ability of the results to make predictions. On top of a research or questionnaire be valid, it must also be reliable to be considered as successful research. The term reliability in this context refers to consistency; will it create consistent findings with different conditions e.g., with different samples, interviewers etc. (Saunders 2016, 449-451)

## 6.2 Qualitative data

The qualitative research method is based on earlier studies and theories about the subject, as well as empirical materials and the conclusions and reasoning of the author itself. Empirical material can be collected with interviews or literal sources. The aim of the qualitative study is not to approve a hypothesis, but instead to create one. (Saaranen-Kauppinen & Puusniekka 2006) The most usual way to collect the empirical material in a qualitative study is through interviews. The idea in that is usually to find out the motives and thoughts of a interviewee on a particular subject with questions. (Eskola & Suoranta 1998, 86–87)

This research utilizes the semi-structured interview method. This means that the interviewer has a list of themes and questions, but the interviews do not follow a strict structure. Instead, the use of these themes and questions can vary. The semi-structured interview method is especially used in interpretivist perspective. (Saunders 2016, 391-394) According to Eriksson & Kovalainen (2008) interpretivist and constructionist philosophy in qualitative research means emphasis on subjectiveness and shared meanings and it tries to investigate how individuals or groups interpret social events and settings. The starting point of interpretivism is the assumption that we can understand the world through language and shared meanings (Eriksson & Kovalainen 2008). Semi-structured interviews also give the

researcher an opportunity to let the interviewee explain their view in more detail. This is an important aspect especially in the interpretivist philosophy, as then it can be more important to understand the interviewee's interpretations and thoughts in more detail. This kind of 'probing' can also lead to situations where the interviewee leads the discussion to a topic that was not originally planned. However, in many cases this can help the researcher to address the research questions and objectives. (Saunders 2016, 394)

## 7 Results

In this chapter the results of the study are presented focusing first on the supplier survey and then on the interviews in the purchasing department and sustainability department.

### 7.1 Survey analysis

The survey was sent to 327 suppliers of Company A. Suppliers represented their Nordic market. 44 suppliers filled in the survey, giving a reply rate of 13,5 %. The survey questions can be found in the appendixes of this study.

#### 7.1.1 Demographics

The first section of the survey regarded the demographics of the respondents' companies. For anonymity reasons, demographics of the respondents themselves were not asked. Half of the respondents replied that Sweden is their company's country of headquarters. 16 % said it's Finland, and 25 % Denmark. 9 % commented that it's some other country.

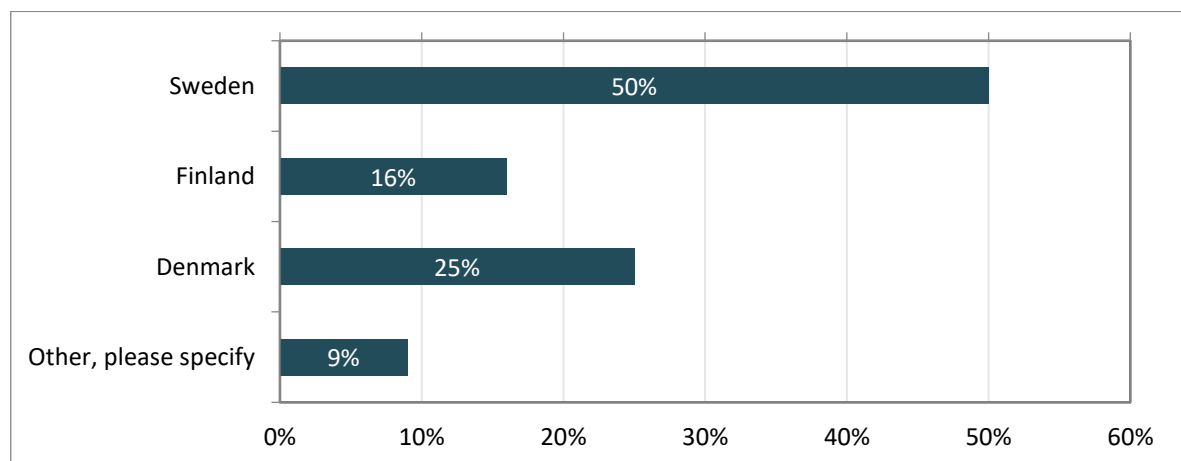


Figure 8. Country of HQ of the supplier companies.

When it comes to the amount of employees in the company, alternatives were 1-10, 11-50, 51-100, 101-500, 501-1000, and over 1000. Most of the companies had 1-100 employees and the replies distributed quite evenly between these alternatives. Additionally, a significant portion (21 %) of the companies had more than 501 employees (9 % had 501-1000 and 12 % had over 1000). This means that the survey results will represent views and insights of very different sized companies.

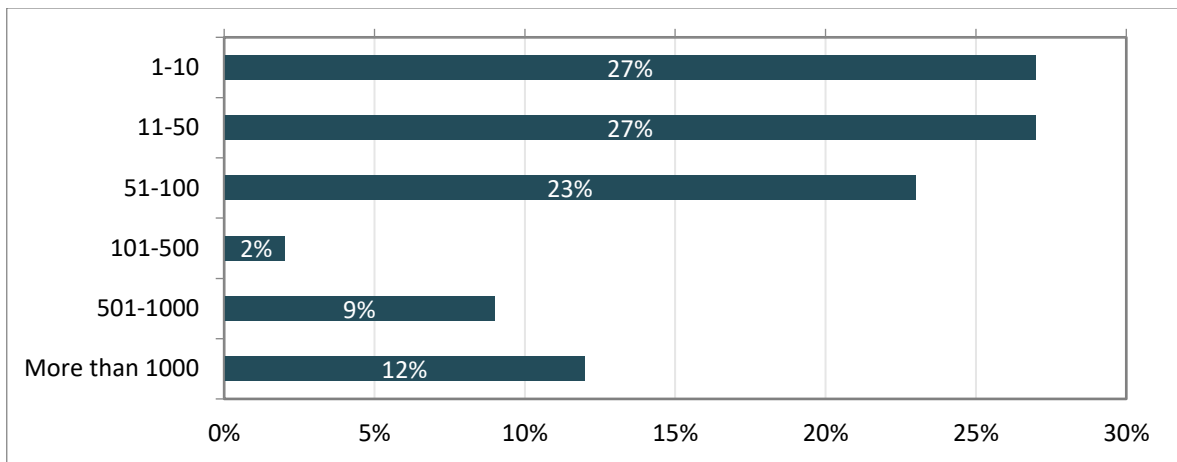


Figure 9. The amount of employees in the supplier companies.

The next two questions aimed at finding out the supplier's nature of the business. Company A is purchasing from very different companies such as manufacturers, retailers, distributors etc. Majority of the respondents represented a manufacturing company (52 %). 23 % represented a distribution company, 11 % a retail company, and 9 % a trader company. These companies also dealt with very different products. A majority of them (61 %) dealt with food products. Snacks and confectionery was another large category, and 48 % of the companies dealt with those. Rest of the categories were smaller, below 20 %, such as drinks (18 %), health and wellness (18 %), household goods (16 %), personal care (14 %), home and lifestyle (11 %), and pet supplies (7 %).

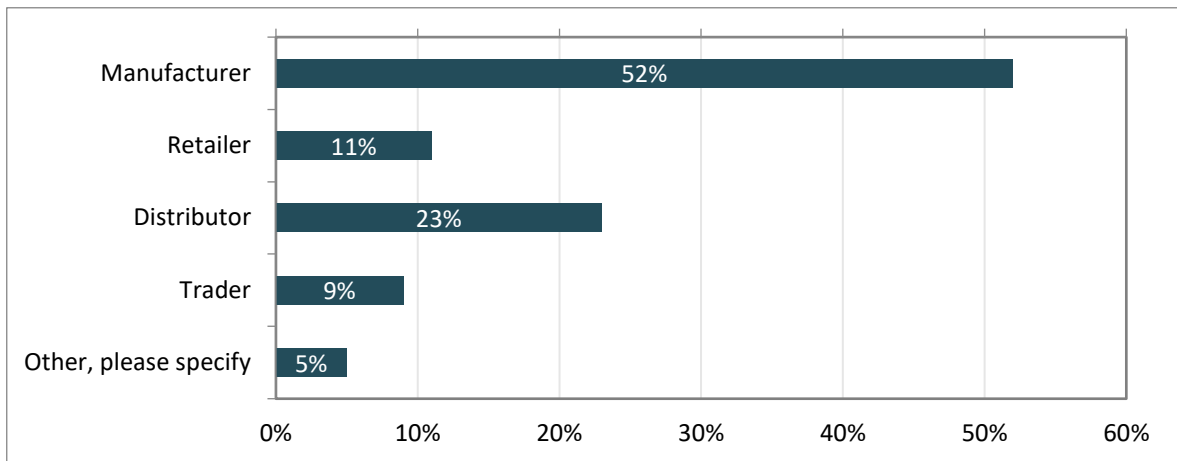


Figure 10. Industry sectors best describing the supplier companies.

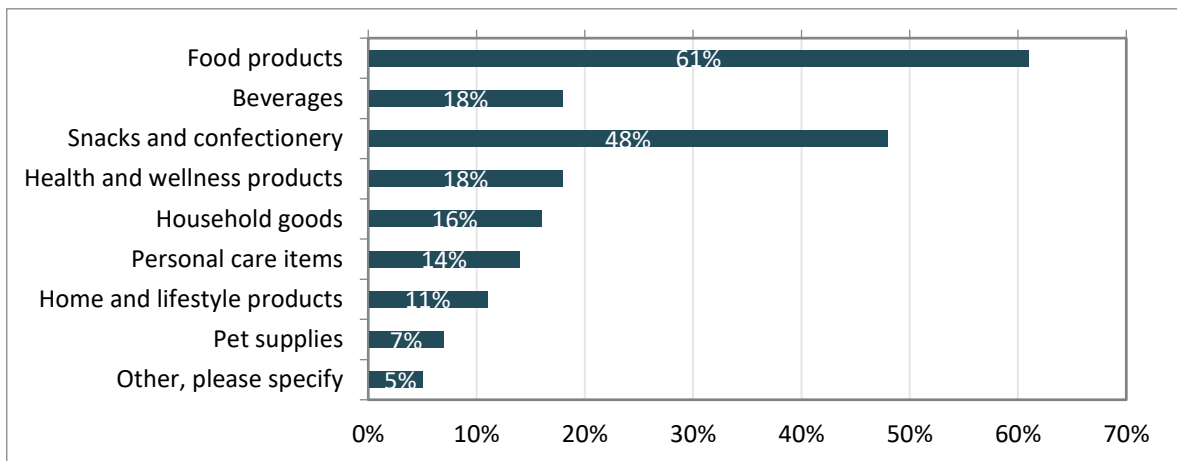


Figure 11. Types of products that the suppliers deal with.

When it comes to how long the companies have been in operation, most (30 %) had been over 60 years in operation. 25 % had been in operation for 6-15 years whereas 20 % had been for 16-30. Only 11 % had been in operation for less than 5 years.

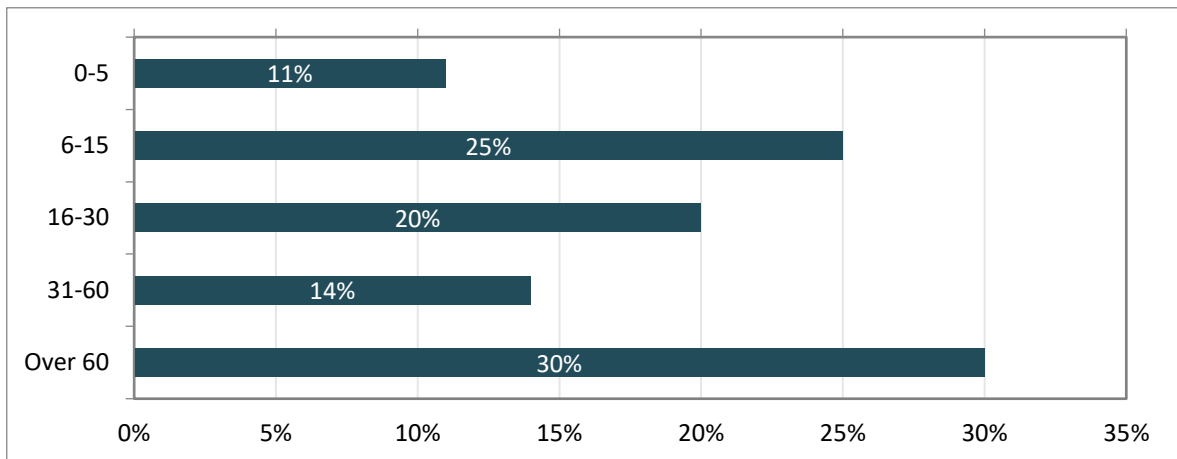


Figure 12. The amount of years that the suppliers have been in operation.

Annual revenues of the companies were also very different. 23 % had a revenue of 5,000,000-10,000,000 EUR and similarly 23 % had a revenue of 10,000,000-50,000,000 EUR. 11 % had a revenue less than 500,000 EUR, 9 % 500,000-1,000,000 EUR, and 11 % 1,000,000-5,000,000 EUR. 16 % replied that their revenue is over 100,000,000 EUR, which was the largest category in this question.

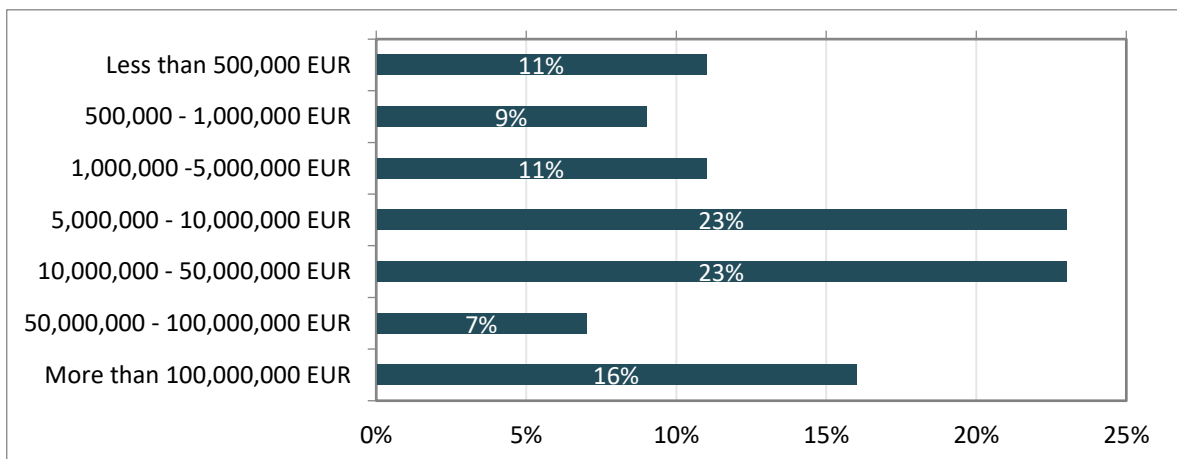


Figure 13. Approximate annual revenues of the suppliers.

Demographics section showed that the suppliers of Company A represent very different companies when it comes to size, revenue, products, and the nature of the company. This is important since these factors can affect greatly on their insights and views on SSCM.

### 7.1.2 Relationship between the suppliers and Company A

The next section focused on the relationship between the suppliers and Company A. The first question was “how important is Company A to you as a customer?”. Most of the companies (41 %) thought that Company A is moderately important to them as a customer. 14 % thought that Company A is very important, whereas 20 % commented it to be important. Only 5 % thought that Company A isn’t important for them as a customer, and 20 % said it to be slightly important. This means that the majority of the companies settle in somewhere between important and slightly important, whereas minority of them settled in the extreme ends.

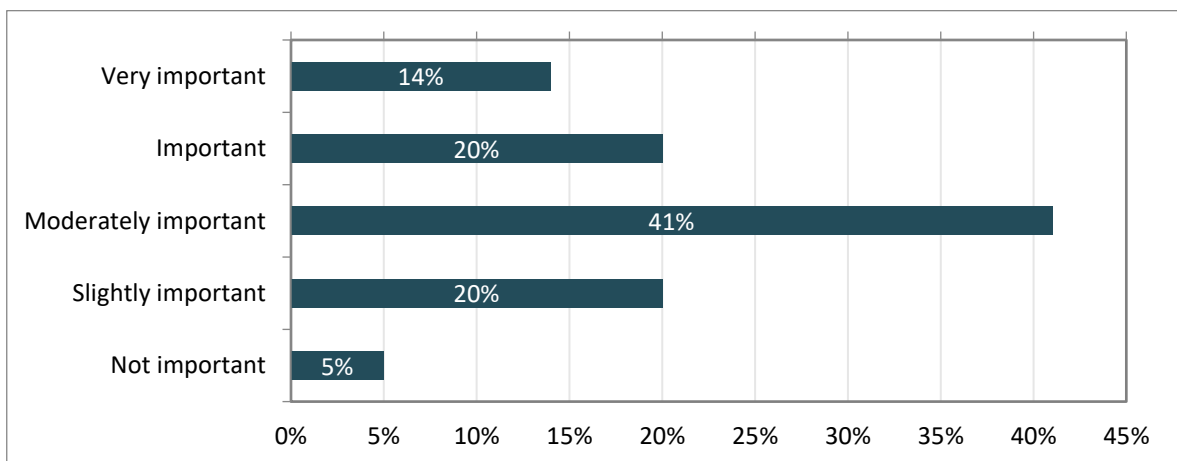


Figure 14. The survey question “How important is Company A as a customer to you?”

The next question was a little bit similar, but this time the question layout was different so that the question aimed at finding out how the respondents and their companies consider the relationship with Company A. In this question, the focus of the replies was more on the positive end of the reply options. 39 % thought that the relationship with Company A is very important and 32 % thought it’s important. According to 18 %, the relationship was viewed as moderately important. Only 11 % thought it’s only slightly important and no one considered it as not important at all. This means that even the companies wouldn’t think that Company A is that significant as a customer, they still view the relationship with it important.

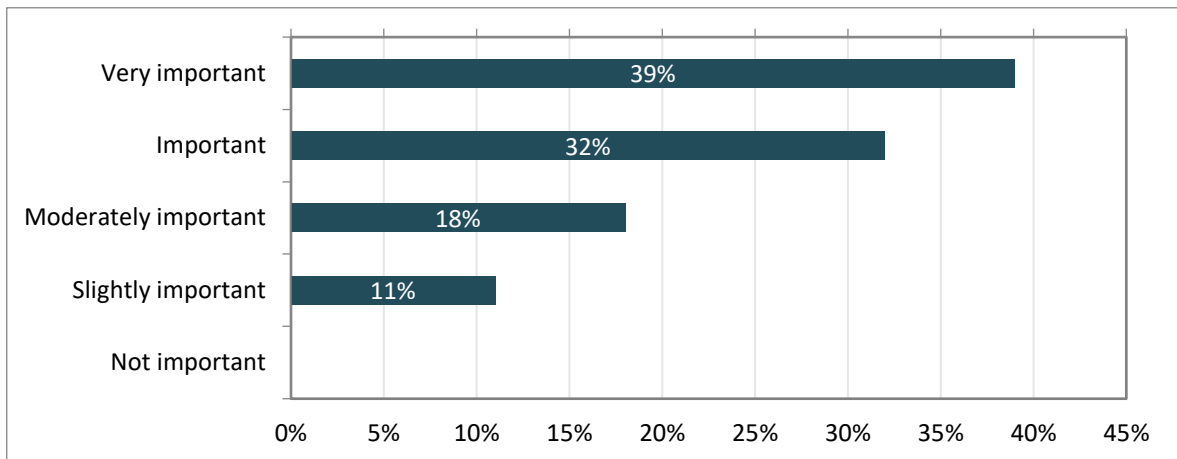


Figure 15. The survey question “How important do you consider the relationship with Company A?”

The significance of sustainability in these relationships was addressed next with a question “How important do you consider sustainability within your partnership with Company A?”. The replies indicated that most of the suppliers thought that sustainability is an important aspect in the partnership. 36 % replied it’s very important, whereas 39 % that it’s important. Moderately important had also a large reply percentage with 21 %. Only 2 % thought it’s slightly important and also 2 % considered it as not important.

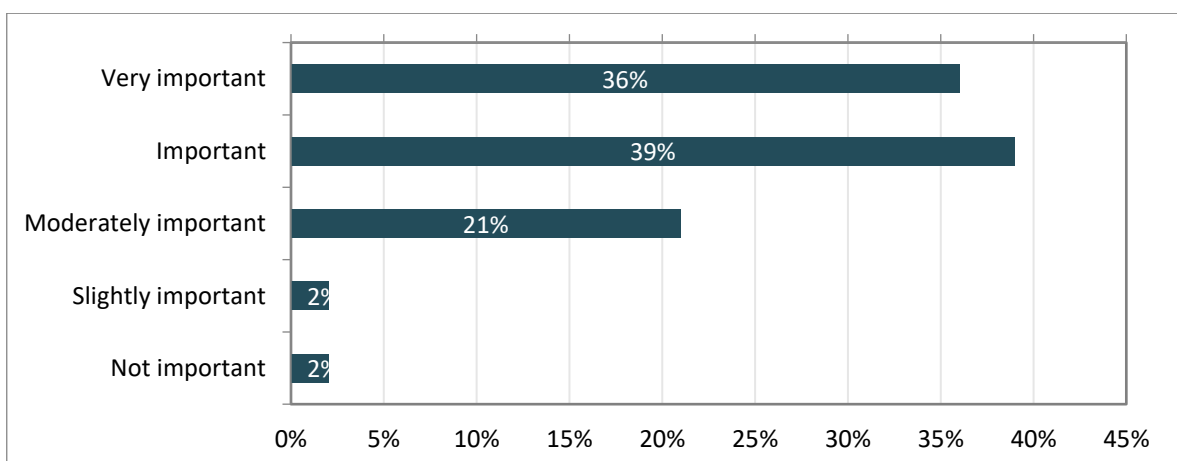


Figure 16. The survey question “How important do you consider sustainability within your partnership with Company A?”

Next, the focus of saving surplus food from being wasted was addressed. 36 % thought that that is the significant focus in the business with Company A, 27 % reported it to be a notable focus and 23 % that it's a moderate focus. Only 5 % thought it's not a focus at all and 9 % replied it's only a minor focus. This reveals that the focus is mostly on saving surplus food from being wasted, although with some of the companies the relationship with Company A does not solely lean on this. This was expected as not all products purchased by Company A are so called "saved" products. Alongside their regular catalogue, it also contains complementary products.

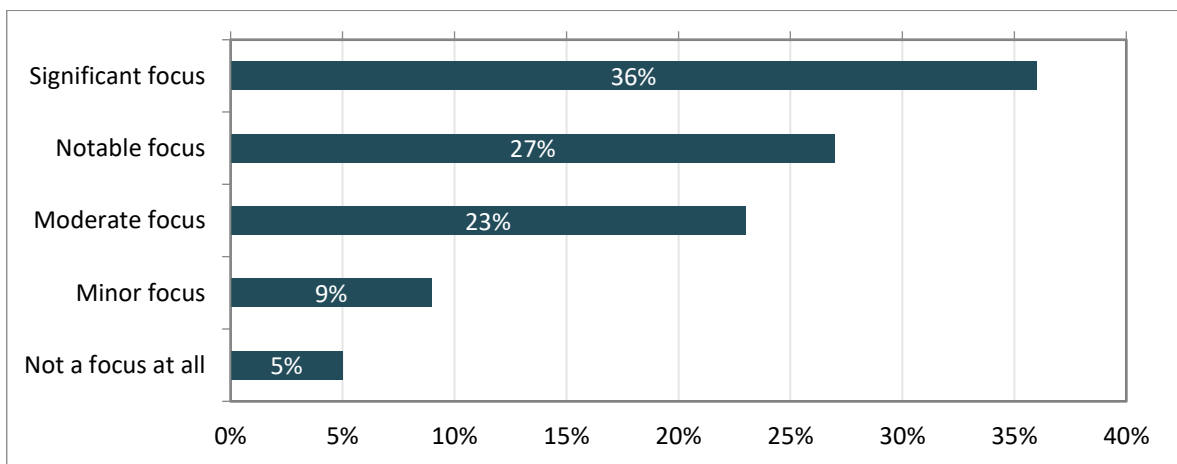


Figure 17. The survey question "How much does your business with Company A focus on saving surplus food from being wasted?"

Suppliers' views on Company A's commitment to sustainability in the supply chain was also addressed. Results were very positive, and no supplier thought that the commitment is low (one or two, on a scale of 1-5). Some suppliers (14 %) did say that they don't know, but 34 % gave the grade 5, 32 % the grade 4, and 20 % the grade 3. It is clear that Company A is aiming at the highest possible sustainability rate in its supply chain, but these results are still very positive. Their suppliers clearly recognize their commitment.

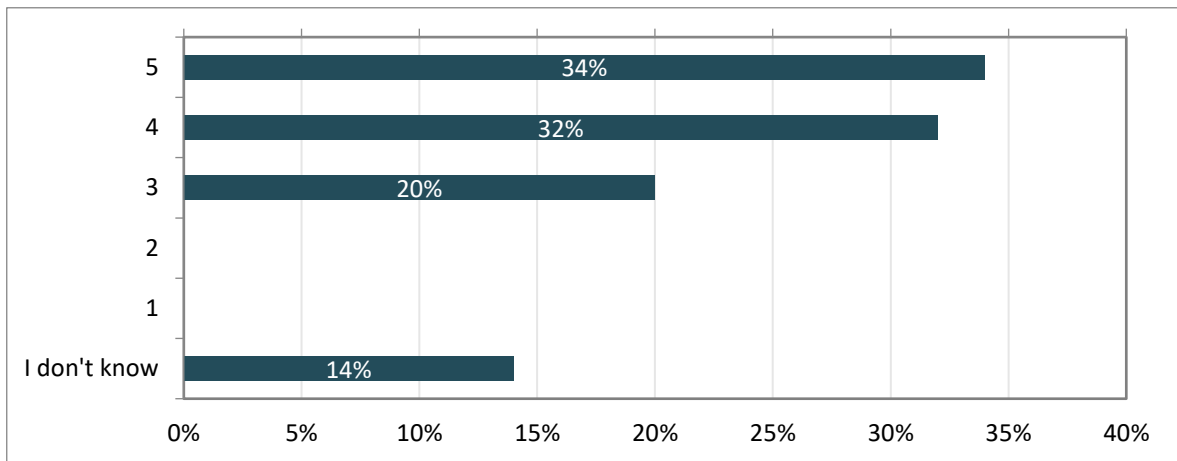


Figure 18. The survey question “How would you rate Company A's commitment to sustainability in its supply chain? (5 = high commitment, 1 = low commitment)”

Suppliers were also asked what their other options in handling surplus food are besides selling it to Company A. This was an open question and most recipients had something to comment on this. Most had some other options such as few other surplus food stores, retailers, existing customers, but the amount of options was not abundant. Moreover, many companies commented that their only other options are to donate it or throw it away. These answers give a lot of insight on how different suppliers can handle their surplus food and understanding this is crucial when fighting food waste.

The perceived benefits and disadvantages of selling food waste to Company A was also discussed. This was an open question, where the suppliers reported benefits to include cutting the costs of loss, saving time, resources, and energy, selling products that could otherwise be very difficult to sell, more positive brand image, saving food, easiness, cooperation, and sustainability. Some suppliers saw cutting the costs of loss and avoiding losses as a benefit, but some suppliers also perceived it as a disadvantage, as there is often no profit for the supplier. Some suppliers also thought that the volumes that Company A purchases are decent size for their needs, but some suppliers also commented that it is a disadvantage that Company A don't always have the capacity to purchase. Extra workload was also viewed as a drawback as these products are often not handled through regular flow.

Suppliers were also asked if they can suggest any other ways that Company A or them could contribute to sustainability more in the relationship. There were not as many comments on

this as in the earlier open questions, and some also commented that they don't know or don't see any other options to contribute more to sustainability. However, few topics that emerged, were purchasing of suppliers' private labels or cooperating with their private labels, sticking more to the original idea of surplus food e-commerce, have possibilities for products that require cold chain, faster decisions on offers, electric transportation, and invest more time and effort on product information in the web store in regards to products texts and photos. These are very concrete ideas on how to contribute more to sustainability and indicates that even the suppliers view Company A as a sustainable partner, there are also more aspects to become even more sustainable.

### 7.1.3 Suppliers' sustainability

The extent of the suppliers' sustainability departments' involvement in the business with Company A was addressed. The majority (52 %) reported that their sustainability department is not involved in any way. And only 4 % reported that they are very involved and 14 % that they're involved. Moderately involved was the reply of 23 % of the respondents, whereas 7 % said they're slightly involved. This is an interesting finding, indicating that the involvement of the suppliers' sustainability departments is very small.

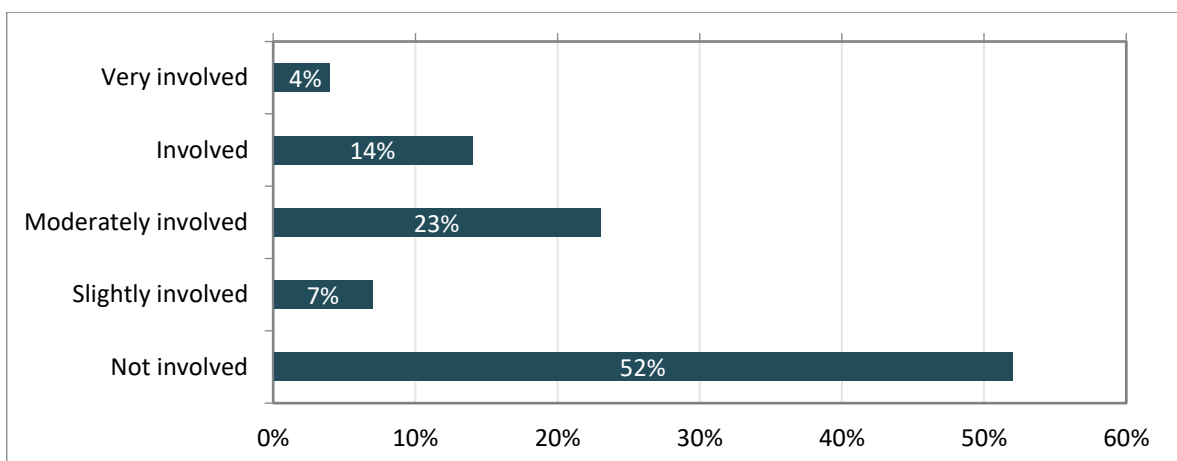


Figure 19. The survey question “Is your sustainability department involved in the collaboration with Company A?”

The suppliers were also asked how important they consider the food waste a sustainability concern for their companies. Almost a majority of them replied that it's very important (48 %). 21 % replied that it's important and 20 % that it's moderately important. Only 9 % thought it's slightly important and a tiny portion of 2 % said that it holds no importance for them. This clearly indicates that the suppliers mostly recognize food waste as a sustainability concern for their companies. Although, it must be noted that not all suppliers deal with food waste, which may have had an effect on their answers.

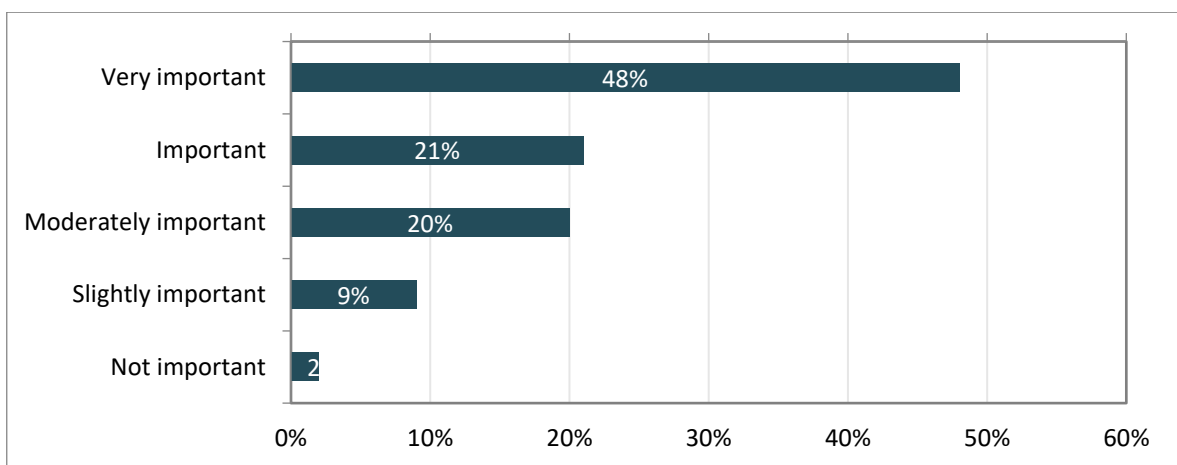


Figure 20. The survey question “How would you rate the importance of food waste as a strategic sustainability concern for your company?”

The next question aimed to dig deeper into the previous question, looking at how laws and regulations in waste management have impacted on the significance of food waste in their companies. Most of the respondents settled in the middle of the scale replying that it has had a moderate effect (30 %). Least of them replied that the effect would have been very significant (9 %). 23 % replied that it has had a significant effect. And finally, a lot of suppliers thought that it has either had a slight effect (18 %) or no effect at all (20 %). It was expected that not all suppliers would see laws and regulations specifically in waste management as the cause of increasing significance of food waste, and these results confirm that. Still the majority of them considered them to have at least a moderate impact on it.

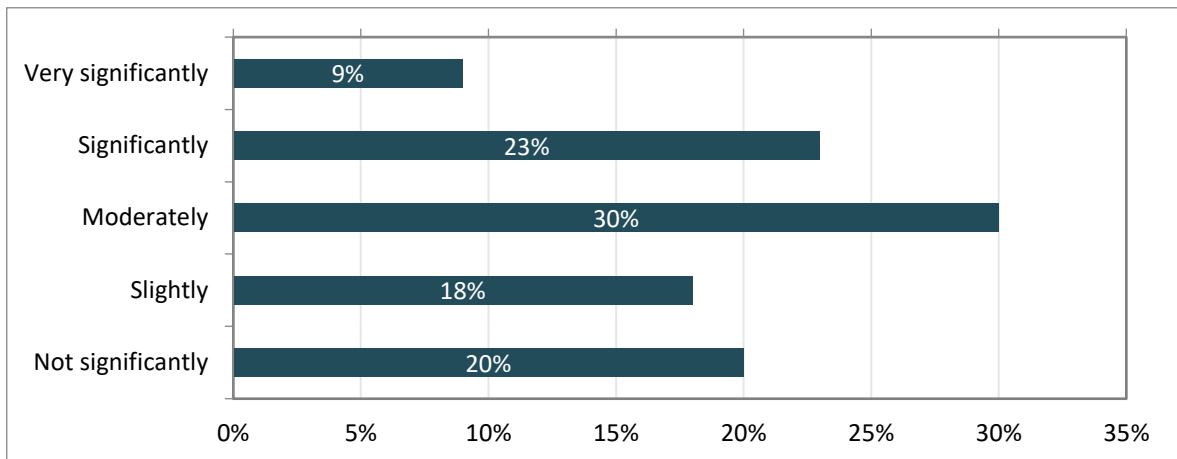


Figure 21. The survey question “To what extent have laws and regulations in waste management, such as the EU Waste Framework Directive, increased the significance of food waste as a sustainability concern in your company?”

Suppliers were also asked how much food waste they generate on a weekly basis. Unfortunately, majority of them (52 %) could not tell, what this number is. However, 32 % replied that it's less than 100 kg per week. 5 % replied it's 100-500 kg, 5 % that it's 500-1000 kg, and 4 % that it's 1000-5000 kg. No supplier replied it to be more than 5000 kg. What this result indicates, is that there are still huge amounts of food waste generated by Company A's suppliers even though these companies are cooperating with companies such as Company A, who aims to decrease the amount of food waste.

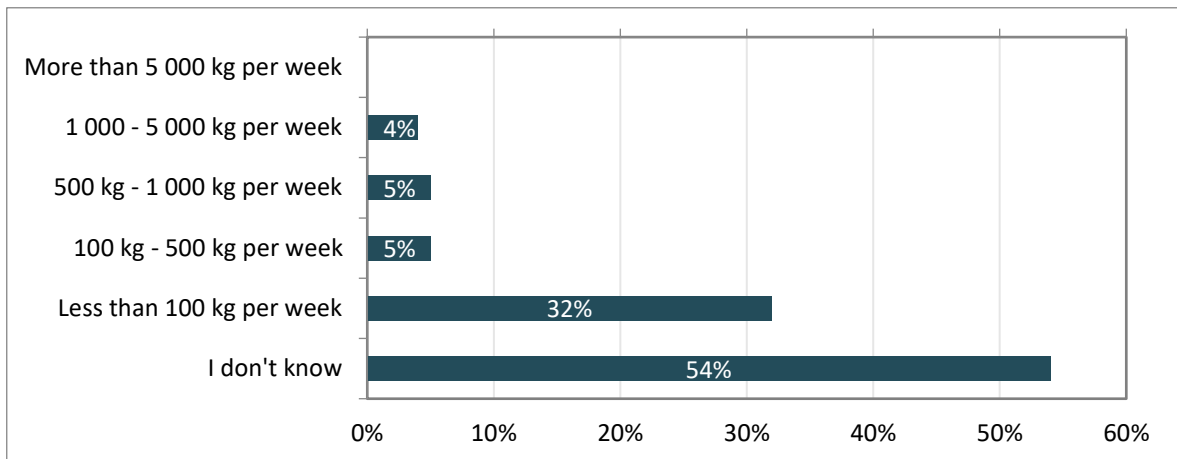


Figure 22. The survey question “What is the approximate amount of food waste generated by your company?”

#### 7.1.4 Barriers of sustainable supply chain management

Next, the barriers to SSCM were addressed. The suppliers were asked specifically what factors they consider to be the barriers that they face in their efforts to reduce food waste and/or sell surplus food. The reason for this is that the relationship between Company A and its suppliers relies on this and asking for barriers to sustainable supply chain management, would maybe not have been as concrete and understandable question. Therefore, the question was modified to focus on the special characteristics of the relationship between Company A and its numerous suppliers.

Firstly, the internal barriers were addressed. The respondents had a number of different possible factors, out of which some were not recognized as internal barriers at all. These included the difficulty in understanding the importance of saving surplus food, risks associated with saving surplus food, insufficient abilities and skills, absence of sustainability-oriented culture within the company, and internal resistance to change. It is interesting to see that the suppliers don't seem to see saving surplus food as a very risky function. Furthermore, they also seem to recognize the significance and importance of saving surplus food very well. Even the suppliers don't seem to have that much their sustainability departments involved in the business with Company A, the suppliers still don't consider lack of abilities and skills as a barrier for them. Finally, neither do the suppliers report on lack of sustainability-orientation inside the company nor internal resistance to change.

The factors that were mostly recognized were limited time available (34 %) and lack of profitability (32 %). Moreover, 34 % replied that they don't recognize any internal barriers. 14 % recognized inadequate long-term planning, 11 % lack of financial resources, 11 % inadequate storage or handling facilities, and 9 % lack of performance metrics. The factors that were least recognized were the lack of management commitment and /or support (7 %), insufficient personnel (5 %), lack of appropriate technology (5 %), and challenges in internal sustainability communication related to surplus food or food waste (2 %). Some also recognized some other internal barrier than the ones listed. The included technical system errors and difficulty to forecast customer demand.

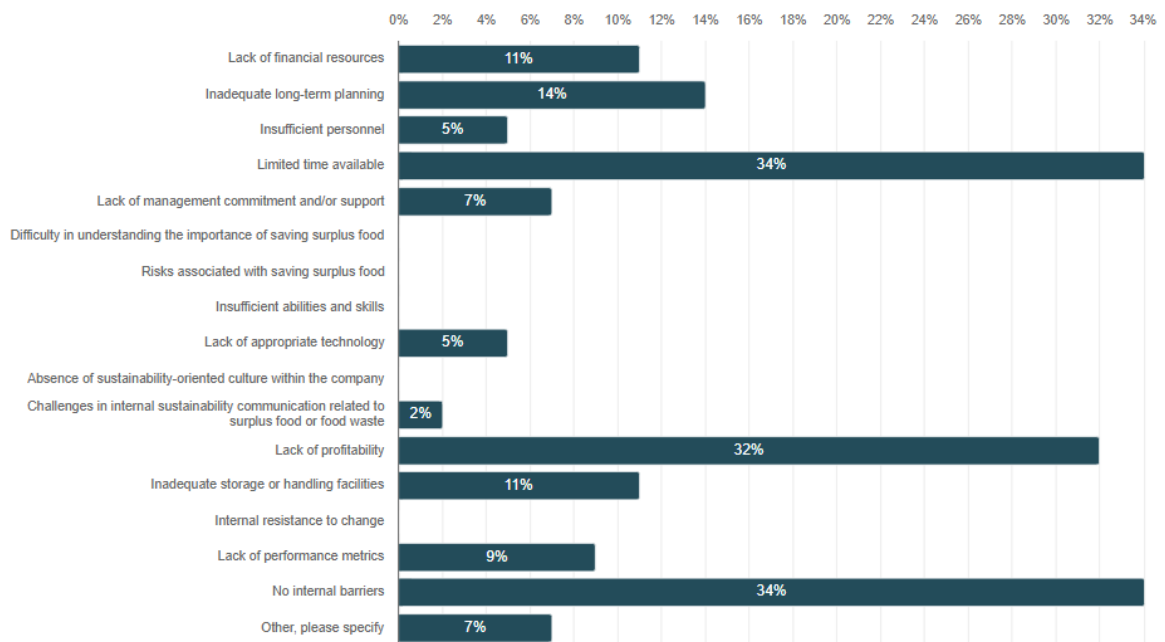


Figure 23. The main internal barriers or challenges that Company A's suppliers face in efforts to reduce food waste and/or sell surplus food.

Secondly, the external barriers were addressed. Just like in internal barriers, in regards to external barriers, a large part didn't recognize any barriers (30 %). Here also, a few barriers emerged to be well recognized, whereas some others not so much. Costs was the most recognized barriers (32 %). Moreover, supply chain complexity was well recognized too (30 %) alongside difficulty to sell surplus food (25 %). Especially costs and difficulty to sell surplus food, could already be expected to have high percentages, as in the earlier

questions they had emerged to be clear concerns for suppliers. The only factor not recognized by anyone was the resistance from Company A towards food waste reduction. However, in regards to Company A as a external barrier, some suppliers thought that reluctance from Company A to share the costs of food waste reduction was an external barrier for them (9 %). This had already emerged earlier, when suppliers commented that selling to Company A is not always profitable. The less recognized factors included challenges of measuring the impact of food waste reduction initiatives (11 %), consumer behavior (11 %), difficulty in sharing data related to food waste or surplus food (7 %), external risks (7 %), lack of external sustainability communication (2 %), lack of external stakeholder engagement (2 %), and cultural factors (2 %). Even 11 % commented some other barrier than the ones listed, and these included e.g. the risk of bad experiences of consumers.

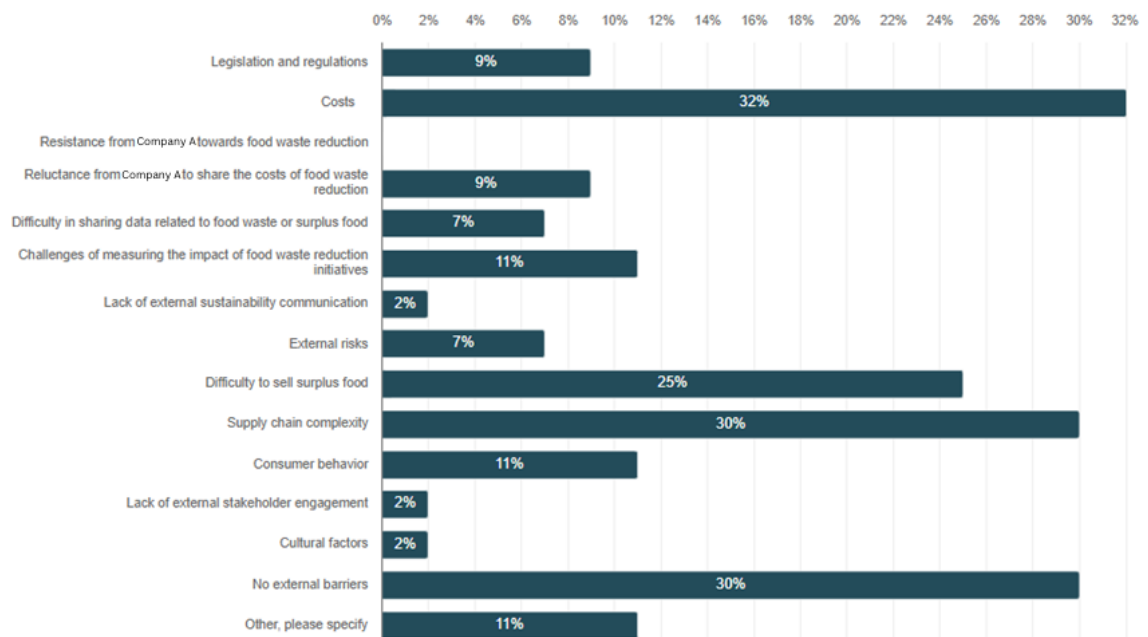


Figure 24. The main external barriers or challenges that Company A's suppliers face in efforts to reduce food waste and/or sell surplus food.

In regards to barriers and challenges, the suppliers were also asked how could Company A better help in them and contributing more to overcome the challenges. This was clearly a difficult question for suppliers to reflect on, as not many replies were left. Some ideas

included closer cooperation, and better data sharing and measurement tools or a common portal to track data.

#### 7.1.5 Success factors of sustainable supply chain management

Just like in the barriers and challenges, the suppliers were again asked specifically, what are key success factors they consider to exist and help in their efforts to reduce food waste and/or sell surplus food.

Firstly, the internal success factors were addressed. It seems that here less suppliers recognized no factors at all than with the barriers. Also, the replies divided more evenly, and there were more factors that were recognized by large portion of the suppliers. Only 14 % recognized no internal success factors in comparison with the 34 % who recognized no internal barriers, and 30 % who recognized no external barriers. The most recognized factor was culture of sustainability with 30 %. Other highly recognized factors were time allocation (27 %), financial resources (23 %), personnel availability (23 %), involvement of employees (20 %), management commitment and/or support (20 %), sustainability knowledge (18 %), and data management and analytics (16 %). Less recognized factors were internal sustainability communication (9 %), training and education (5 %), technology (5 %), performance measuring and monitoring (5 %), innovation and creativity (6 %), and incentives and/or rewards (2 %). A few other factors were also recognized such as routines that are continuously maintained and complied, and individual motivation.

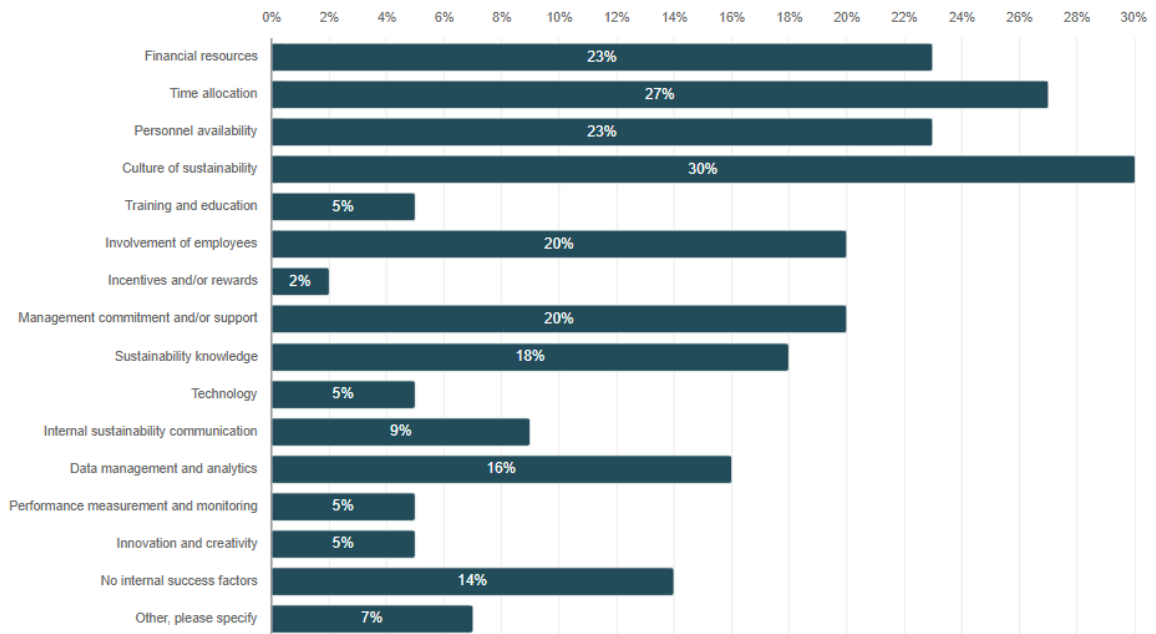


Figure 25. The main internal success factors that contribute to Company A's suppliers' ability to save food waste and/or sell surplus food

Secondly, the external success factors were addressed. What was clearly the most recognized external success factor, was close cooperation with Company A (34 %). 23 % couldn't recognize any factor. Other well recognized factors were consumer demand for sustainable products (23 %), Company A's commitment to food waste reduction initiatives (18 %), financial incentives or subsidies (14 %), societal awareness of sustainability (11 %), external sustainability communication (11 %), and information exchange (11 %). The less recognized factors were industry collaboration (7 %), technology exchange (5 %), and legislation and regulations supporting food waste reduction (5 %). 11 % replied some other factor and these included the possibility to sell short shelf life products directly to stores, and forecasting.

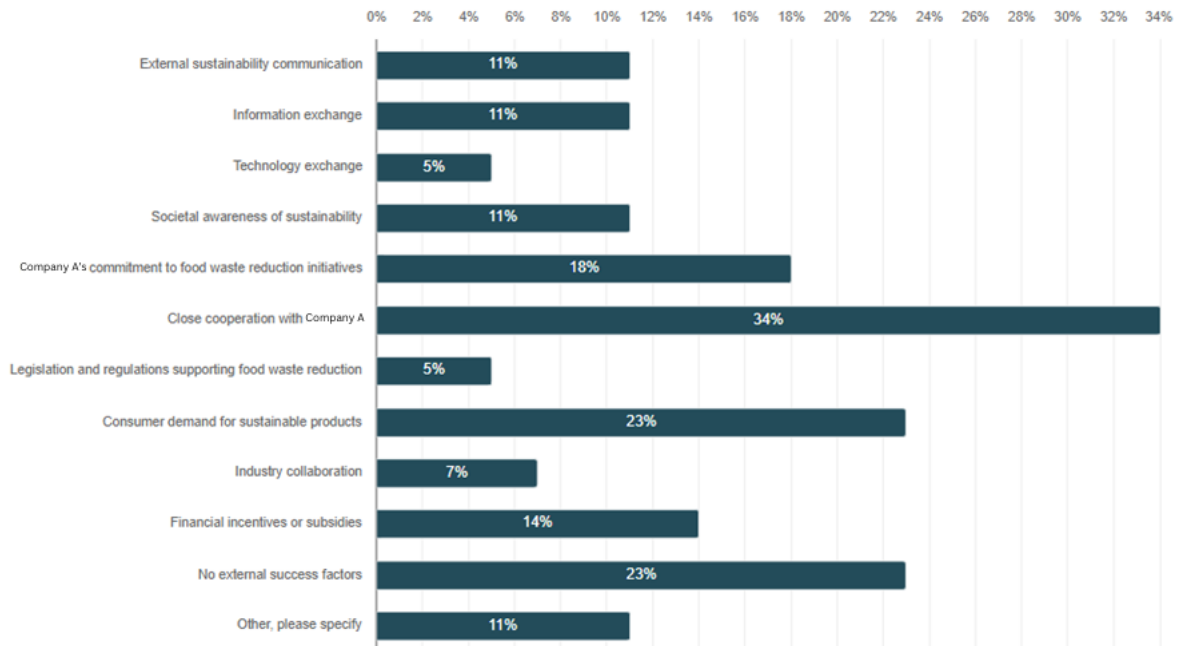


Figure 26. The main external success factors that contribute to Company A's suppliers' ability to save food waste and/or sell surplus food

#### 7.1.6 Future aspirations

Finally, the suppliers were asked a few open questions regarding the future aspects and feedback. First question was “Could the partnership between you and Company A become more sustainable in your opinion? If yes, how?”. Some suppliers thought that the partnership could become more sustainable but couldn't tell how exactly. Some suppliers, on the other hand, said that it could not become more sustainable, although they were also unsure how. The most concrete ideas suppliers provided included were expanding to other types of products too, for example ones that require cool chain (this was already emphasized earlier), and the possibility to further communicate the food and products saved by Company A on supplier's communication channels. Furthermore, suppliers commented that this could benefit both, Company A and suppliers on top of sustainability.

Next question focused on the suppliers' future sustainability goals or aspirations in relation to the partnership between Company A and its suppliers. Some suppliers commented they don't have any specific future goals in relation to the partnership or that they would like to

continue the partnership as it is. Once again, the need for selling products that require cool chain, emerged. Many suppliers also emphasized that their ultimate goal is to reduce food waste and surplus food, and further commented that also decrease the amount of goods sold to Company A because of this. Other aspects addressed included to have more data available in future, and increase the communication about the relationship with Company A.

## 7.2 Correlations between the questions in the supplier survey

In this chapter, the statistically significant correlations will be introduced. Some statistically significant correlations have been left unmentioned for the reason that they were expected, obvious or do not add value to the study.

### 7.2.1 Location of the headquarter

First question “in which country is your company headquartered?” revealed one weak correlation (-0.31) that was statistically significant, and that was with the question “How would you rate Company A's commitment to sustainability in its supply chain? (5 = high commitment, 1 = low commitment)”. Here it seems that the Danish suppliers were slightly more negative when rating Company A’s commitment to sustainability.

### 7.2.2 The amount of employees

It seems that the grade how suppliers would rate Company A’s commitment to sustainability in its supply chain can also be explained with the amount of employees in the supplier firm, although this correlation is also quite weak (0.36). Here, larger companies by employer count, had more issues even answering the question as a lot of them replied they don’t know, and smaller companies viewed Company A’s commitment to sustainability in a slightly more positive light. Moreover, the employer count of the company also seems to influence the involvement of the supplier’s sustainability department with the business with Company A. The smaller the employer count, the more the sustainability department seems to be involved. This was a moderate correlation with a highly statistical significance.

Finally, the employer count also had a weak but statistically significant correlation with the main external barriers. Companies with all amounts of employees found costs as a key barrier. What stood out amongst the larger companies, were supply chain complexity, difficulty to sell surplus food, challenges of measuring the impact of food waste, and reluctance from Company A to share the costs of food waste reduction. It is interesting that especially larger companies suffer from difficulties to sell surplus food, although it is understandable if the amount of surplus food is higher. This could also be the reason why it is more complicated to measure the impact of food waste then and why they would prefer Company A to share more the costs of food waste reduction. However, the difficulty to sell surplus food was also recognized in many smaller companies. On top of that, not many barriers stood out, apart from costs. No external barriers was also a popular respond for smaller companies.

### 7.2.3 Types of products that the suppliers deal with

The types of products that the suppliers deal with had an impact on several other questions. The importance of food waste as a strategic sustainability concern was considered slightly less important amongst the suppliers that are dealing with non-food products (the correlation was moderate at 0.4 and statistically highly significant). In terms of the focus on saving surplus food from becoming food waste, it seems that out of food products, suppliers that dealt with snacks and confectionery or health and wellness products, had a slightly smaller focus on that within their business with Company A, compared to suppliers that dealt mostly with food products or drinks. The correlation was here moderate as well at the value of 0.48 and statistically extremely significant. With the question “How would you rate Company A's commitment to sustainability in its supply chain? (5 = high commitment, 1 = low commitment)” there was a weak correlation at the value of -0.32. Here it seems that the supplier dealing mostly with snacks and confectionery viewed Company A's commitment slightly more positively, whereas supplier dealing mostly with home and lifestyle products slightly more negatively.

#### 7.2.4 The age of the supplier firm

The age of the supplier firm revealed one weak correlation with statistical significance (0.37). This was again in the question of how the suppliers would rate Company A's commitment to sustainability in its supply chain. The suppliers who had been the longest time in operation seemed to have slightly more negative view on that than the suppliers who had been a shorter time in operation.

#### 7.2.5 The revenue of the supplier

The revenue of the supplier revealed one weak correlation with statistical significance at the value of 0.37. Quite expectedly this was with the question "Is your sustainability department involved in the collaboration with Company A?", since a correlation between employee count and this question was already earlier discovered. It makes sense that this metric that is also measuring the size of the supplier firm, has this correlation as well. In this case there was a lot of diversion, but it seems that the sustainability departments of companies with less revenue, are slightly more involved in the business with Company A.

#### 7.2.6 Questions about the relationships between the suppliers and Company A

The questions regarding the relationships between the suppliers and Company A (question numbers from 7 to 13) held multiple correlations, both moderate and weaker ones, but only the moderate ones are discussed here. First of them (question number 7) which was "How important is Company A as a customer to you?" had moderate correlations with questions "How important do you consider the relationship with Company A?" which was 0.62, and "How important do you consider sustainability within your partnership with Company A?" which was 0.5. Both correlations were positive where more importance given estimated more importance in the other two questions as well. Moreover, out of these three questions "How important do you consider sustainability within your partnership with Company A?" had a positive correlation with the question "How much does your business with Company A focus on saving surplus food from being wasted?". The correlation was 0.56 and the more important the suppliers considered sustainability within the partnership with Company A,

the more their business with Company A also focused on saving surplus food from being wasted.

Between the questions “How much does your business with Company A focus on saving surplus food from being wasted?” and “How would you rate the importance of food waste as a strategic sustainability concern for your company?”, there was a moderate correlation with extremely high statistical significance of 0.6, and between the questions “How much does your business with Company A focus on saving surplus food from being wasted?” and “To what extent have laws and regulations in waste management, such as the EU Waste Framework Directive, increased the significance of food waste as a sustainability concern in your company?” the correlation was 0.42 with highly statistical significance. The more the business between Company A and its supplier focused on saving surplus food from being wasted, the more that supplier valued the importance of food waste a strategic sustainability concern, and the more laws and regulation in waste management had also increased that importance. Finally, the questions “How would you rate the importance of food waste as a strategic sustainability concern for your company?” and “To what extent have laws and regulations in waste management, such as the EU Waste Framework Directive, increased the significance of food waste as a sustainability concern in your company?” had also a moderate positive correlation of 0.52 with extremely high significance. This means that the more important the supplier saw the food waste as a strategic sustainability concern for their company, the more they also perceived that laws and regulations in waste management had impacted that.

### 7.3 The interview with the purchasing department

The aim of the interview with the purchasing department was to gain a more practical understanding of purchasing and supply chain. The interview questions can be found from the appendixes of this study. However, since the interview method is semi-structured, these lists of questions were only serving as a basis for the interview, but the actual structure was not strict and the questions varied.

### 7.3.1 Sourcing process

The first theme of this interview was the sourcing process. The interviewee was asked to describe the typical process of sourcing at Company A. The interviewee explained that Company A has an existing base of suppliers, where some of the suppliers are sending offers on a regular basis. Another way of getting offers is to reach out to the supplier base or entirely new suppliers, trying to get them in Company A's supplier base. Company A is also working actively with category management, where each category has its own manager who makes sure that Company A has items in that specific category. If there are gaps, the category manager needs to take action to fill in those gaps, for instance by reaching out to potential suppliers. Following the offers, purchasers would analyze whether the offer is meeting the requirements in terms of e.g. margin, customer discount (the discount that Company A is selling the product with, compared to other stores that sell similar products), and stock turnover. The negotiation phase is usually very quick, usually maximum of a couple of days. There are a few basic principles when negotiating on the purchases regarding quantity, BBDs, and brand. Company A aims to purchase larger quantities with lower price since selling larger quantities takes a longer period of time, increasing the risk of the product expiring. But this is where the BBD (best before date) is concerned, since the shorter the BBD is the less there is usually time to sell the product. According to the web store of Company A (2023), some products can have already expired BBDs, but they are still edible or good to use. However, this can have an impact on the sales price, expired products tend to be cheaper. On top of quantity and BBD, purchasers also pay attention to the brand, where it is clear that since customers are willing to pay more for premium brands, Company A is also willing to pay more for those. In terms of entirely new suppliers, Company A is also looking into expanding their existing categories and looking for new opportunities. The interviewee mentioned non-food categories as one example, since they have recognized the amount of surplus in that area. When it comes to supplier criteria, the main criterion is the fact that the product that they are purchasing, is surplus. This is not always the case, since Company A is also purchasing regular products that are not surplus, but the majority of the products they purchase, are surplus products. This is seen as an act of sustainability itself, therefore there are not very specific criteria beyond that. However, those cases where the product is not surplus, Company A aims to ensure that there is a sustainability agenda at the supplier's end. On top of that they have a risk assessment process that they conduct with

their suppliers. Moreover, they also have a code of conduct that their suppliers must approve and comply with.

### 7.3.2 Unique characteristics of purchasing surplus

Another important theme was the unique characteristics of purchasing surplus. Compared to other companies purchasing similar products, there is a difference whether the products are surplus or not. First clear distinction is the nature of supplier criteria that was discussed above. While other companies often have specific criteria for their suppliers, at Company A the situation is different, since the main goal is to purchase surplus and create sustainability through that. The interviewee also highlighted that the purchasing process at Company A is very fast paced but also irregular meaning that while a lot of retailers, for instance, decide which kind of assortment they want to have and at what quantities. At Company A, this is not the case, since the nature of surplus is very different, and cannot always be predicted. This means that the assortment varies a lot from time to time depending on what is available at any given moment. Another clear distinction is that for Company A's suppliers, the business with them is not the suppliers' core business. It is not desired to have large quantities of surplus and the interviewee highlights that in an ideal world, there would not be any surplus for Company A to purchase. However, the amount of surplus is enormous, and when Company A's suppliers come to that situation, they want to get rid of it as soon as possible, since it is very expensive for companies to have it. This is why Company A offers them a quick way to get rid of it, and moreover, they always try to purchase the entire quantity, making it a convenient solution for the supplier. Otherwise, it could be very time consuming and expensive to get rid of it. Price is also another distinction since Company A is not capable of paying the full price of products that are surplus. In supplier's point of view, the trade-off is price, but they get a quick and convenient way to decrease their food waste.

### 7.3.3 Supplier cooperation

Most of Company A's suppliers have an ultimate goal of zero waste. For them, Company A is their partner when trying to achieve this goal. This extends even beyond the business between Company A and its suppliers to topics such as external sustainability

communication and marketing, where both sides may communicate their joint efforts to prevent food waste from taking place and how they are both contributing to this goal. The value of this kind of cooperation is on top of reducing food waste and therefore costs, also the marketing and communication side, where both brands are seen in a more sustainable way by consumers, when the joint efforts and cooperation are being communicated externally.

#### 7.3.4 Challenges within supply chain in terms of sustainability

For Company A, sustainability in the supply chain and purchasing means the act of purchasing surplus as this is an act to fight against food waste. So, the question about challenges of SSCM is for them more like the question of why can they not purchase more of surplus than they currently do. One reason to this is increasing competition. Today, consumers are trying to look for cheaper prices when it comes to food. Meanwhile, the surplus is a huge issue, and therefore, many other companies have also started to act upon that issue. For example, many other retail chains have their own ways of getting rid of the surplus, but just like at Company A, they are also selling it with more affordable prices to the consumers. This is a clear external threat to Company A that the company has identified. The interviewee points out, however, that this increased competition on this field is actually a good thing, since this way the total food waste may decrease drastically from the current amount in future. However, increased competition and awareness of food waste has also started to decrease the amount of surplus food, the exact thing that is the core business for Company A. The fact that this trend may continue in future, is a threat for Company A's supply. The interviewee points out an interesting question, whether there will be any surplus in the future to purchase, although they feel that most likely the amount of surplus will not decrease to nothing. This is also leading Company A to consider different supply options in future, such as different types of suppliers like retailers and also different geographical areas outside Nordic countries. One clear challenge related to purchasing more surplus concerns the nature of the product, meaning that Company A is not always capable of purchasing the entire quantities that the suppliers are offering since it's such a product that can be more difficult to sell, or it's a product that just doesn't have that large demand amongst Company A's customers, especially within the given time limit before the product expires. Solving this challenge is difficult for them, since Company A does not want to create any food waste

themselves, and the interviewee sees that if they are purchasing more than they can sell, that could eventually lead to the generation of food waste just moving from the supplier to Company A, which is not solving the issue of food waste, but only changing the location that happens. However, there are some agreements made with some suppliers that Company A can receive 100 % of their surplus, but only at given fixed price determined by the BBD. There are also certain requirements within these agreements for instance regarding the quantities.

#### 7.3.5 Purchasing surplus as a success factor

For Company A the main factor that is making their purchasing sustainable, is the fact that they are mostly purchasing surplus. However, not all their purchased items are surplus, and the interviewee highlighted that in these cases they are trying to purchase products that are otherwise sustainable especially within non-food categories. This can mean products made from recycled materials or with lower carbon footprints. Company A is also measuring their sustainability and impact with the amount of saved food, which is also shared with their suppliers. They are also converting these numbers into CO<sub>2</sub>e to closer measure their impact.

#### 7.3.6 Future aspirations of the purchasing department

The interviewee sees that in future Company A wants to continue to grow and expand their business. It is also important to grow to different markets and areas that have more surplus and consider what can a surplus food e-commerce be in the future apart from saving food. Could it include some other aspects as well? This is important to consider since Company A is recognizing that the amount of surplus can decrease in future. The interviewee also points out that Company A's role could extend from its suppliers to become an active partner also with communities and even decision makers to have more impact and work towards the goal of zero waste.

## 7.4 The interview with the sustainability department

The second interview was conducted at the sustainability department. This aimed at understanding the sustainability side a little bit deeper. These interview questions can also be found from the appendixes of this study.

### 7.4.1 Sustainability department's involvement in the purchasing process

The interviewee tells that the sustainability department is not very involved in the purchasing process of saved food or non-food other than with code of conduct. However, with Company A's private label, they are more involved. On top of the code of conduct and human rights policy, they are also involved with the collection of transparency data, where they collect data from the entire value chain of all their current label products. With this data they can track the raw ingredients to their origin and they use it to conduct their life cycle assessments. Sustainability department is also paying attention to the origin countries of Company A's private label products and requiring certain certifications if they see it them necessary. Moreover, they are also supporting the purchasing team with knowledge and expertise on sustainability issues.

The interviewee is also asked what they feel about the fact that most of Company A's suppliers don't have their sustainability departments involved in the business with Company A. This is a thing that could deepen the partnerships and especially have possibilities in terms of sustainability communication.

### 7.4.2 Sustainability challenges

One of the main challenges that Company A is facing is related to their goal and mission. They are actively trying to fight food waste and decrease the amount of it amongst their suppliers but on the other hand, if they succeed to do it, their own supply is going to be smaller, creating a paradoxical situation where working towards their goal is actually working against them. Company A's business is also relying on the affordable surplus food but if they are trying to expand to different kinds of products that are not surplus, but still trying to retain the low price, it's not working anymore as well. The interviewee says that is

one of the biggest challenges that they need to consider how that could be solved or the balance found. Moreover, it can be challenging in terms of sustainability, when the purchasing process is so fast paced. There is usually very little time to negotiate and accept the offer and that can decrease the emphasis on sustainability. The interviewee also noted that sustainability itself is a challenge as it is so complex thing that has many different aspects. At Company A, the idea is that purchasing surplus food is an act of sustainability and the interviewee agrees with that, but also raises a question, if that is enough and argues that sustainability is not solely a yes or no question.

#### 7.4.3 Sustainability goals

The interviewee highlighted that Company A is contributing to sustainability in terms of saved food. Therefore, they do not have any actual sustainability goals in terms of purchasing or supply chain. There are also not any sustainability programs or initiatives there, other than in terms of private label in the form of code of conduct, human rights policy, and transparency data. However, the interviewee pointed out that there will most likely be those in the future when they have conducted the CSRD (the corporate sustainability reporting directive by European Union) and the materiality analysis (a process to identify significant ESG issues). Situation is the same in terms of sustainability measuring and monitoring, other than what was mentioned above (e.g. the amount of saved food or CO<sub>2</sub>e). However, sustainability department is trying to identify opportunities and risks especially in terms of private label products.

#### 7.4.4 Contributions to sustainability

The interviewee pointed out important contributions regarding social sustainability. Firstly, they are cooperating with local food banks that are giving food away to people in need. Company A is working together with them to donate food to them. Secondly, another important partnership includes a NGO that is fighting against hunger on a global scale. Thirdly, Company A is cooperating with an organization that is offering jobs to people with disabilities. Finally, Company A employees are granted two days annually to work in a volunteer project of their choice such as in the local communities. Moreover, Company A's

sustainability department has also started to communicate internally about various sustainability issues through seminars with external speakers. Walker, Sisto & McBain (2008) suggest that training and education of the employees in terms of sustainability is very effective and can drive the success of sustainability in the supply chain. Therefore, these kinds of seminars are a good initiative to try to educate employees, and more of that could be planned.

#### 7.4.5 Future aspirations of sustainability department

The perspective of the sustainability department is directed towards future sustainability goals when discussing about future. One thing that rises is Company A's non-saved assortment and especially the healthiness of the products that Company A is selling as well as the proportion of organic products in the catalogue. This has also an impact on social sustainability and must be considered in future in terms of strategy and sustainability goals. Another topic that the interviewee sees could be improved is the diversity of the company.

## 8 Discussion

The aim of this chapter is to further analyze the findings as well as compare them with the previous research that was introduced in the theory chapter of this thesis.

According to the interview, the sourcing and supply process at Company A seems to differ a lot from many other similar companies, in the context of both other e-commerce businesses and stores that sell food products. Just like these, Company A does have an existing base of suppliers, but they are continuously looking for other options to fill in their needs in different categories. Since their stocks in different products usually sell out without replenishment available, they need to fill those gaps other ways. The possible solution to this is similar products or brands, but also other types of products that fall under the same category. Another clear difference is the price that Company A is paying for their purchases. Usually, it is much lower than what they would pay for a similar product that is not surplus. Moreover, the purchasing process is very high paced and therefore very different. Usually when a company is purchasing or negotiating on a purchase, they have time to prepare it and negotiate, whereas at Company A, there is almost always an urgency to finish the negotiation as soon as possible. It is not urgent only for Company A but also for the suppliers, since every day they have this surplus, is costing them money. On the other side of the table, every day Company A does not have this product in their warehouse ready to be shipped for customers, the risk of unprofitability increases. Even though Company A is well adapted to this tempo with their purchasing department structured in a way that works efficiently, there are also clear uncertainties and downsides. When the tempo is so high and there is so little time to seal the deals, the emphasis on sustainability can decrease greatly. However, Company A relies on the fact that purchasing surplus is sustainable in itself. This may disregard all the other aspects of sustainability, and this seems to be a concern that Company A's sustainability department has noticed. However, Company A's suppliers do not share this view, as they generally think that Company A's commitment to sustainability is high and generally there were no concerns in terms of that, although some of them did think that the relationship between them and Company A could become more sustainable. Most of the suppliers don't have their sustainability departments involved in partnerships, and this was a concern that was raised mainly by Company A's sustainability department. Therefore, the

involvement of the sustainability departments of the suppliers could provide ways and solutions on how to create this business as well as the partnerships more sustainable.

The reliability of reviewing of Company A's commitment to sustainability by its suppliers can be questioned though. It is possible that the suppliers' opinions can be biased towards giving a more favorable rating of Company A's commitment to sustainability, especially, since the reviewers are not professionals in sustainability. Therefore, perhaps their view on sustainability in this context, is similar to Company A's purchasing department's, emphasizing the act of purchasing surplus, but possibly ignoring some other aspects of sustainability. Despite this bias, these opinions can still hold significant value for several reasons. Firstly, they are working very closely with Company A and its purchasers and they have a good external understanding of Company A's operations and practices. Secondly, they have a strong understanding of supply chain (possibly even sustainable supply chains) and the relationship between a purchaser and a seller. Thirdly, they witness many aspects of Company A's commitment to sustainability such as efforts in reducing waste and optimizing logistics which are critical aspects of sustainability. Fourthly, many companies including many of these suppliers are already having great effort to make their business more sustainable and often they have their own sustainability standards, practices, and goals. Finally, many of these aspects are only visible to the employees of the supplier company that are directly dealing with Company A.

On top of fast pace and focus on surplus products, another clear characteristic of surplus food e-commerce concerns BBDs (best before dates). Company A's purchasers are highly concerned about those, since in case the time before expiration is short and Company A has paid too much for it, the product can quickly become unprofitable. This is also one of the reasons why time is such a central thing in Company A's purchasing. In case Company A encounters issues when selling a product at their webstore, and the product's BBD expires, they usually must continue selling the product with lower price, and this is when the purchasing price becomes critical. In case the margin is already low, it will become even lower at this point, perhaps even negative. To prevent this, they are also looking closely at the brands when purchasing and trying to have some premium brands in their catalogue as well, as the risk of those becoming unprofitable is somewhat lower, at least in terms of the interest from customers towards those brands. Supplier criteria, however, is not that critical, and this is where this kind of business is also making a difference. Moreover, what makes

the position of Company A interesting, is the fact that the business with Company A is not a core business for Company A's suppliers. This is also backed up with the survey results, where many suppliers do not consider Company A as a very important customer for them, even if they perceive the business itself important and sustainable.

For Company A sustainability in their supply chain revolves around their capacity to purchase surplus beyond their current levels, driven by their commitment to reduce food waste and save food. However, this presents a potential barrier for them. The theory of sustainable supply chain suggests that the difficulty of defining and measuring sustainability is one barrier (Berns et al. 2009). Company A's limited measuring of sustainability as well as the lack of sustainability goals might reflect a limited understanding of sustainability in a supply chain. Sustainability is a very wide topic, and a focus on only one aspect of it, may overlook the others. Company A's sustainability department rightly pointed out the complexity of sustainability. Despite that, however, saving food undeniably has several benefits in terms of sustainability and it can be considered as the core of sustainability at Company A. However, lack of sustainability planning can have some negative effects on overall sustainability. According to Berns et al. (2009), sustainability planning in the long-term is difficult and it requires overcoming skepticism on the company-level, organizing the sustainability agenda in the entire company, and keep track of and report the sustainability initiatives. Since sustainability goals and initiatives in terms of purchasing and supply chain, are limited at Company A, this can be a potential barrier at Company A for SSCM. To address this potential barrier, Company A could benefit from developing a wider and more comprehensive sustainability strategy. This could involve sustainability goals that are clear and measurable, covering multiple aspects of sustainability. Through this, it would become easier to identify key areas and issues where improvements could be made. By leveraging measuring, data, and analytics, a better understanding of sustainability performance would be gained.

Several barriers to SSCM at Company A emerged, both internal and external. Firstly, the external barriers include increased competition and therefore decreased amount of surplus to purchase. Many retail chains, for instance, have started to act on this issue by coming up with their own ways of decreasing food waste. However, even this can be seen as a barrier to sustainability at Company A, it can actually be considered a positive barrier, as was pointed out in the interviews, since this is decreasing the amount of food waste which is

Company A's mission. This points out an issue for Company A, since this means that they actually have to compete for sustainability. If saving food from becoming food waste is the core of sustainability, this means that if competitors are attempting or even manage to capture a portion of Company A's supply, the total amount of saved food by Company A decreases, therefore affecting their overall sustainability. This makes saving food from becoming food waste a complex sustainability action as sustainability should be something that is accessible by all companies and organizations through their actions. This immediately raises the question whether they should also invest in some solid sustainability practices that are more grounded in their business. This also pressures them to invest in innovativeness and to find ways to differentiate. Another external barrier includes the nature of the surplus, meaning what kind of product is in question. Company A cannot impact on what kind of products are there that are under the threat of becoming waste. This highlights the significance of flexibility and adaptability. And as these products can sometimes be something that can be more difficult to sell, especially in high quantities, this creates a barrier for Company A to purchase that surplus. Moreover, the price or costs can also act as a barrier to purchase surplus in some cases, since Company A's purchasers are emphasizing costs when they're purchasing, and suppliers are not always willing to go as low as Company A's profitability would require. On the other side of the table, some suppliers even recognized this as an external barrier for them, saying that Company A's reluctance to share the costs of sustainability is a barrier for them. Sajjad, Eweje & Tappin (2020) discuss about this, indicating that some suppliers may put all the additional costs of sustainability to the purchasing side that makes it a difficult situation for the purchasing side since the purchasing price is higher. This is not exactly the case in this situation, but it describes the situation well if stretched to extremes. There is often a disagreement between the supplier and purchaser about the additional costs and distributing them. These topics also highlight the significance of transparent and collaborative partnerships that would help in forecasting, planning, sharing costs and benefits, and to create a more resilient and sustainable supply chain.

Another potential barrier to sustainability at Company A is the paradox regarding their mission. Their goal is to decrease food waste globally, but achieving this goal is actually also decreasing their main supply. Therefore, their mission at the moment can practically work against them. This is also identified at Company A widely and they have a strong drive to overcome that in the future. A situation like this calls for a strategic reevaluation of their mission and long-term targets and goals. They could consider diversifying their business into

different kinds of products or even services. There is an enormous amount of expertise in terms of food waste and surplus in this company and on this field in general and that could be utilized in a form of services such as consulting or new types of partnerships and services. They would still stay true to their mission statement, but also generate new revenue streams.

The survey with suppliers pointed out more barriers, where key internal barriers included limited time available and lack of profitability. This can mean that sustainability is still not prioritized in many companies, even though many of the suppliers mentioned it as their key sustainability concern. It can also mean that companies are struggling to provide sufficient resources for these practices for some other reasons. A possible reason could be the fact that it is not profitable, or at least not seen as profitable. Meanwhile, the suppliers also see the business with Company A effective in cutting costs, implicating that this could be a good way to fight against the profitability issue of sustainability. This is also suggested by the theory, as costs is one of the major barriers (Sajjad, Eweje & Tappin 2020; Giunipero, Hooker & Denslow 2012; Min & Galle 2001; Walker, Sisto & McBain 2008; Brammer & Walker 2011), but also the main drivers behind sustainability, since it is possible to cut costs that way (De Meyer et al. 2014; Saeed & Kersten 2019; Sajjad, Eweje & Tappin 2020). This issue may not be limited to Company A's suppliers, but Company A might actually even itself face similar challenges. While Company A's primary act of sustainability is purchasing surplus, their measuring of sustainability is limited. The lack of sustainability metrics and measuring can suggest a potential gap in their resources and strategic planning. This could be due to their belief that sustainability is expensive, making them hesitant to invest beyond their current practices.

The external barriers for suppliers, on the other hand, included costs, difficulty to sell surplus food, and supply chain complexity. Even Company A sees that the amount of surplus food is decreasing, many suppliers are still struggling with the issue of getting rid of their surplus. However, it is possible that these suppliers include the exact products, brands, or higher prices, that Company A is struggling to handle. This calls for proactiveness and close partnerships with suppliers to gain insights into the types of surplus products available and develop targeted marketing campaigns to promote these items to customers.

As discussed before, Company A perceives their key success factor of SSCM to be the fact that they are purchasing surplus. However, the sustainability department raised some other topics too, especially in terms of social sustainability. They are committed to making no food

waste themselves, meaning that they will donate their own surplus to food banks and people in need. Company A is also cooperating with different organizations to contribute to social sustainability and letting their employees work for volunteer projects twice a year. Therefore, Company A has committed to sustainability also through community involvement. Moreover, there is also active internal sustainability communication at Company A to increase the sustainability culture inside the company. Additionally, even Company A has limited measuring and tracking of sustainability in the supply chain, they are measuring the amount of saved food, and also sharing that with their suppliers. Walker, Sisto & McBain (2008) have suggested that there can be hesitance to sharing any information inside the supply chain and also highlighted that the trust is necessary. Furthermore, Kuo, Hsu, Huang & Gong (2013) have identified sharing data regarding environmental impact, as a critical success factor for SSCM. Therefore, this kind of openness and trust between Company A and its suppliers can yield very positive results in terms of SSCM in the future. However, Veleva, Hart, Greiner & Crumbley (2003) have also identified lack of data as a major barrier to SSCM, suggesting that many companies are measuring things like their own eco-efficiency and performance, but not so much environmental impact, supply chain or life cycle impact, or carrying capacity. Their framework could act as something that could help Company A improve their sustainability measuring.

In the survey, a lot of success factors emerged, both internal and external. The main internal success factors were culture of sustainability, time allocation, personnel availability, financial resources, involvement of employees, and management commitment and/or support. These are also well recognized factors in literature. Walker, Sisto & McBain (2008) talk about the involvement of employees as a critical success factor of SSCM, whereas Prasad et al. (2018), and Kumar, Singh & Shankar (2015) about the involvement of top management as a success factor. According to Morali & Searcy (2013), the lack of financial resources, people and time can act as a barrier, and having those assets act as a success factor, on the other hand. The main external success factors included close cooperation with Company A and consumer demand for sustainable products. Close cooperation has also been identified as a good way to fight food waste at Company A, since most suppliers share the goal with Company A to decrease the amount of food waste. Moreover, Towill (2015) is suggesting that close cooperation between the supplier and customer is a success factor for SSCM. In terms of demand for sustainable products, Fleury & Davies (2012) have identified heightened awareness of sustainability amongst customers, and Luthra, Garg & Haleem

(2015) further suggest that this is a critical success factor for SSCM. However, Sajjad, Eweje & Tappin (2020) suggest that customers do hope for sustainable products, although they are seldom prepared to pay extra for that. This is, on the other hand, supporting what the purchasing department of Company A talked about the general trend that consumers are looking for more affordable products, but on the same time, also more sustainable products.

## 9 Conclusions

This chapter aims to synthesize the findings of this thesis and answers to the research questions. The first sub-research question was:

*“What are the characteristics of supply chain management in surplus food e-commerce?”*

The research was able to discover multiple special characteristics of a surplus food e-commerce. The sourcing and supply process is very different in this kind of business, compared to both typical e-commerce and also other businesses selling food products. The sourcing process is very fast and quick in a surplus food e-commerce due to the nature of surplus. There is a both sided urgency; the supplier wants to get rid of the surplus as it is costing them money, and the surplus food e-commerce wants to make the purchase quickly, since the closer the product is getting to the expiring of the BBD, the more risks it is going to have for their business in terms of profitability. Moreover, the purchaser is not paying the whole price for the surplus, and often it is more about cutting the costs for the supplier than making a profit. Surplus food e-commerce is also very different in terms of the relationship between the purchaser and the supplier, since surplus food e-commerce is not the core business for the suppliers. It is not advantageous for the suppliers to have surplus in the first place; therefore, they are trying to avoid it and through that, trying to avoid doing the business with surplus food e-commerce. However, it is unrealistic to avoid that completely, since almost every company is creating surplus or waste in some form. This is the reason why the supplier relationships may not always be consistent, but a business purchasing surplus, may be purchasing from many different suppliers depending on who is offering surplus at any given time. This leads to the varying assortment of surplus food e-commerce, and it can be difficult to maintain a perfect catalogue. The concept of sustainability is also very different in a surplus food e-commerce: The main contribution being the purchasing of surplus. In many other industries, sustainability has a lot more different aspects and ways to contribute to it. There is also usually a lot more different supplier criteria in different industries when companies are purchasing more consistently from different suppliers.

However, when purchasing surplus, there is often very little supplier criteria, as the main criterion is the fact that the supplier has surplus available.

*What are the main barriers to achieving sustainability in the supply chain of surplus food e-commerce?*

Multiple barriers in achieving sustainability in the supply chain of surplus food e-commerce emerged, both internal and external. One of the characteristics of surplus food e-commerce seems to be the concept of sustainability, but this can also act as an internal barrier. Focus on only one aspect of sustainability may overlook the others, and result in a situation where every other aspect of sustainability is disregarded. As saving food waste and surplus is important and contributing to sustainability, it is also important to find new ways to contribute to sustainability and aiming to achieve overall sustainability on many different levels and aspects. This is evident in the sustainability goals as well. In case a company is solely relying on one aspect of sustainability, there might be very little sustainability goals, and this can potentially act as an internal barrier to SSCM. Surplus food e-commerce seems to also have concerns with profitability. The lack of profitability can prevent some companies from engaging with companies that are purchasing surplus since it may not be as profitable for the supplier. Moreover, as sustainability requires time and effort, limited time can be a major barrier.

In terms of external barriers, the nature of surplus as well as costs can act as barriers to SSCM. The costs of surplus products can be too high, and the surplus can include those kinds of products that are not popular amongst consumers, or the amount of surplus can simply be too enormous to be sold in an adequate time. On the other hand, the costs of selling the surplus can be too low for suppliers and they may suffer from difficulties selling the surplus. Competition and further the decrease of surplus can also act as challenges to this field of business that can further add up to costs.

*What are the key success factors in implementing sustainable supply chain management in surplus food e-commerce?*

The main contributor to sustainable supply chain management in surplus food e-commerce seems to be the purchasing of surplus since that has an enormous environmental impact. Internal sustainability communication is also very effective success factor that can, in a form of education, training, and other communication, boost the involvement and expertise of employees. As sustainability requires time, personnel, and financial resources, those emerged as success factors as well. Furthermore, involvement of employees and management commitment and/or support are seen as success factors. In terms of external success factors, community involvement, sharing data and openness and trust in the supply chain, close cooperation, and consumer demand for sustainable products are success factors to SSCM.

According to the results, there seems to be certain points of interest that companies working within surplus food e-commerce should consider in their business. This field is rather new and there are not many companies that are selling surplus food as their main business. Therefore, an assumption can be made, that other companies working on this field are also quite young and have similar characteristics. One of them concerns data and measuring, where the focus can easily be on the amount of food or other surplus items saved by purchasing surplus. This could be extended to other sustainability metrics such as logistics and packaging sustainability, resource efficiency, social impact, biodiversity impact, or broader life cycle assessment. According to the supplier survey, many suppliers also mentioned that they do have other options to handle their surplus as well besides selling it to Company A. This could also be considered in the sustainability measuring and when measuring the amount of food waste saved. Currently, the assumption is that purchasing the surplus food saves that food and also the CO<sub>2</sub>e emissions that have been generated when manufacturing it (otherwise those emissions would have been for nothing). However, if the suppliers have other options for their surplus food as well, this can give an inaccurate image. Therefore, this measuring could be made more accurate, e.g. in a form of adjustment factor that calculates the likelihood of the surplus food becoming food waste in case it is not purchased by Company A. The sustainability at Company A is also relying heavily on reducing food waste by purchasing surplus food and other aspects of sustainability could be

involved more in the business. Social sustainability could be developed further, carbon footprint could be reduced, or different circular economy initiatives could be developed. Other sustainability initiatives could also be created, and their impact and success could be measured. Company A currently has initiatives in social sustainability in the form of giving employees days off from work to participate in a volunteer work. This sort of activity could also be measured, and the employees could further be encouraged to take part in it. Moreover, educating employees and managers in terms of sustainability could show positive results in many areas and create more sustainability initiatives in other business areas as well. These aspects could also be involved in the sustainability goals and developed through that. The supplier survey also showed that most of the suppliers don't have their sustainability department involved in the business of selling surplus to a surplus food e-commerce business like Company A. This could deepen the partnerships and generate a lot of new ideas and initiatives in the field of sustainability. Company A could even try to motivate the suppliers to bring their sustainability departments into the cooperation.

As the purchasing process of a surplus food e-commerce is high-paced and this can be at the cost of sustainability, sustainability could be involved more in this process. Strategies could be implemented to balance this urgency and have certain processes to ensure sustainability always when possible. Setting up sustainability criteria for the suppliers could be an option, but it could also limit the possible surplus purchased. Therefore, another option could be to rank the suppliers based on sustainability criteria. This ranking could then further affect the terms and conditions of the purchasing process in a way that it benefits the more sustainable suppliers. Since there is a high concern of BBDs in this field, different methods could be looked at to extend the shelf-life or better manage the inventory to reduce some of the pressure associated with BBDs. This could be done especially with better optimization in both logistics and purchasing as well as in sales. Solutions could include inventory management systems, different pricing models and data analytics, and AI tools. New technologies in this area should also be continuously scouted.

Since this field is new and the competition is also increasing, it is important to innovate new ways to source surplus in future. This could include different categories such as products that require cold chain or whole new markets to supply from, such as other European countries. In this situation, creating supplier relationships in countries that do not yet have

competition for surplus products, could help to find the products that customers are looking for the most.

### 9.1 Future research

This research indicated a lot of possibilities in this area to research further in future. This topic is not widely studied, and therefore, further research is needed. Further research should be conducted with a larger amount of different surplus food e-commerce businesses to get a wider understanding of the industry and its future. The core idea of this kind of business (surplus food e-commerce) could also be studied: does this kind of business reduce the overall food waste? Since suppliers are having more and more businesses competing for their surplus food, can this lead to a situation where the price of surplus increases and it becomes profitable to sell surplus food from e.g. a manufacturer to a surplus food e-commerce business and how would that affect the business? And can this have an impact on the perspective on food waste, where companies don't see a need to actually try to decrease the amount of surplus food, since they know that they can sell it anyways? Moreover, research could be focused on different departments or sustainability culture inside a surplus food e-commerce business. The involvement of sustainability departments in the partnership could also be studied further to answer the question, whether that could help to make the business more sustainable and what kind of impact it could have generally. Additionally, since this study only focused on the purchasing of surplus food, focusing on the relationship between a surplus food e-commerce and its suppliers, the research could be extended to other phases of the supply chain as well, covering areas like logistics, manufacturing, or delivery. Moreover, it could also cover more the customer point of view and aim to understand their reasons to buy these kinds of products or not to buy them.

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# Appendices

## Appendix 1. Survey questions

1. In which country is your company headquartered?
  - a. Sweden
  - b. Finland
  - c. Denmark
  - d. Other, please specify
  
2. How many employees does your company have?
  - a. 1-10
  - b. 11-50
  - c. 51-100
  - d. 101-500
  - e. 501-1000
  - f. More than 1000
  
3. Which industry sector best describes your company's primary business activity?
  - a. Manufacturer
  - b. Retailer
  - c. Distributor
  - d. Trader
  - e. Other, please specify
  
4. What types of products does your company deal with?
  - a. Food products

- b. Beverages
- c. Snacks and confectionery
- d. Health and wellness products
- e. Household goods
- f. Personal care items
- g. Home and lifestyle products
- h. Pet supplies
- i. Other, please specify

5. How many years have your company been in operation?

- a. 0-5
- b. 6-15
- c. 16-30
- d. 31-60
- e. Over 60

6. What is the approximate annual revenue of your company?

- a. Less than 500,000 EUR
- b. 500,000 - 1,000,000 EUR
- c. 1,000,000 -5,000,000 EUR
- d. 5,000,000 - 10,000,000 EUR
- e. 10,000,000 - 50,000,000
- f. EUR 50,000,000 - 100,000,000
- g. EUR More than 100,000,000 EUR

7. How important is Company A as a customer to you?

- a. Very important

- b. Important
- c. Moderately important
- d. Slightly important
- e. Not important

8. How important do you consider the relationship with Company A?

- a. Very important
- b. Important
- c. Moderately important
- d. Slightly important
- e. Not important

9. How important do you consider sustainability within your partnership with Company A?

- a. Very important
- b. Important
- c. Moderately important
- d. Slightly important
- e. Not important

10. How much does your business with Company A focus on saving surplus food from being wasted?

- a. Significant focus
- b. Notable focus
- c. Moderate focus
- d. Minor focus
- e. Not a focus at all

11. How would you rate the importance of food waste as a strategic sustainability concern for your company?
- Very important
  - Important
  - Moderately important
  - Slightly important
  - Not important
12. To what extent have laws and regulations in waste management, such as the EU Waste Framework Directive, increased the significance of food waste as a sustainability concern in your company?
- Very significantly
  - Significantly
  - Moderately
  - Slightly
  - Not significantly
13. Is your sustainability department involved in the collaboration with Company A?
- Very involved
  - Involved
  - Moderately involved
  - Slightly involved
  - Not involved
14. What alternative options do you have for handling surplus food, besides selling it to Company A?
15. How would you rate Company A's commitment to sustainability in its supply chain? (5 = high commitment, 1 = low commitment)

- a. 5
- b. 4
- c. 3
- d. 2
- e. 1
- f. I don't know

16. What are the perceived benefits and drawbacks of selling surplus food to Company A?

17. Can you name any other ways that you and/or Company A could contribute more to sustainability within your partnership?

18. What is the approximate amount of food waste generated by your company? \*

- a. More than 5 000 kg per week
- b. 1 000 - 5 000 kg per week
- c. 500 kg - 1 000 kg per week
- d. 100 kg - 500 kg per week
- e. Less than 100 kg per week
- f. I don't know

19. What are the main internal barriers or challenges your company faces in efforts to reduce food waste and/or sell surplus food?

- a. Lack of financial resources
- b. Inadequate long-term planning
- c. Insufficient personnel
- d. Limited time available
- e. Lack of management commitment and/or support

- f. Difficulty in understanding the importance of saving surplus food
- g. Risks associated with saving surplus food
- h. Insufficient abilities and skills
- i. Lack of appropriate technology
- j. Absence of sustainability-oriented culture within the company
- k. Challenges in internal sustainability communication related to surplus food or food waste
- l. Lack of profitability Inadequate storage or handling facilities  
Internal resistance to change
- m. Lack of performance metrics
- n. No internal barriers
- o. Other, please specify

20. What are the main external barriers or challenges your company faces in efforts to reduce food waste and/or sell surplus food?

- a. Legislation and regulations
- b. Costs
- c. Resistance from Company A towards food waste reduction
- d. Reluctance from Company A to share the costs of food waste reduction
- e. Difficulty in sharing data related to food waste or surplus food
- f. Challenges of measuring the impact of food waste reduction initiatives
- g. Lack of external sustainability communication
- h. External risks
- i. Difficulty to sell surplus food

- j. Supply chain complexity
- k. Consumer behavior
- l. Lack of external stakeholder engagement
- m. Cultural factors
- n. No external barriers
- o. Other, please specify

21. How could Company A better support you to address sustainability challenges?

22. What are the key internal success factors that contribute to your company's ability to save food waste and/or sell surplus food?

- a. Financial resources
- b. Time allocation
- c. Personnel availability
- d. Culture of sustainability
- e. Training and education
- f. Involvement of employees
- g. Incentives and/or rewards
- h. Management commitment and/or support
- i. Sustainability knowledge
- j. Technology
- k. Internal sustainability communication
- l. Data management and analytics
- m. Performance measurement and monitoring
- n. Innovation and creativity

o. No internal success factors

p. Other, please specify

23. What are the key external success factors that contribute to your company's ability to save food waste and/or sell surplus food?

a. External sustainability communication

b. Information exchange

c. Technology exchange

d. Societal awareness of sustainability

e. Company A's commitment to food waste reduction initiatives

f. Close cooperation with Company A

g. Legislation and regulations supporting food waste reduction

h. Consumer demand for sustainable products

i. Industry collaboration

j. Financial incentives or subsidies

k. No external success factors

l. Other, please specify

24. Could the partnership between you and Company A become more sustainable in your opinion? If yes, how?

25. What are your company's future sustainability goals or aspirations specifically in relation to your partnership with Company A?

26. . Is there any additional feedback or comments you would like to provide regarding sustainability practices within your partnership with Company A?

27. Is there any additional feedback or comments you would like to provide regarding the survey?

Appendix 2. Correlations between the survey questions.

	1	2	3	4	5	6	7	8	9	10	11	12	13	15	18	19	20	22	23
1	1	0	0.25	-0.18	-0.13	-0.12	0.07	0	0.14	0.03	0.02	0.08	0.03	0.31	-0.19	-0.18	0.1	-0.27	-0.31
2	0	1	-0.31	-0.1	0.65	0.72	0.02	0.04	0.07	-0.15	-0.16	-0.15	0.4	0.36	0.27	-0.28	-0.18	-0.04	0.03
3	0.25	-0.31	1	0.23	-0.21	-0.28	-0.01	0.05	-0.08	0.03	0.13	0.12	-0.22	-0.14	-0.11	0.21	0.2	0.06	-0.19
4	-0.18	-0.1	0.23	1	-0.02	-0.05	0.06	0.23	0.03	0.4	0.48	0.34	-0.03	-0.32	0.21	0.17	0.11	0.02	0.25
5	-0.13	0.65	-0.21	-0.02	1	0.61	0.06	0.08	0.06	-0.17	-0.16	-0.25	0.27	0.37	0.14	-0.23	-0.25	0.01	0.17
6	-0.12	0.72	-0.28	-0.05	0.61	1	0.11	0.13	0.06	-0.09	-0.05	-0.25	0.37	0.16	0.03	-0.24	-0.23	0.02	-0.12
7	0.07	0.02	-0.01	0.06	0.06	0.11	1	0.62	0.5	0.23	0.07	-0.06	0.32	0.17	-0.16	0.01	-0.03	-0.07	0.29
8	0	0.04	0.05	0.23	0.08	0.13	0.62	1	0.61	0.35	0.32	0.21	0.38	0.08	-0.05	-0.04	-0.12	-0.07	0.25
9	0.14	0.07	-0.08	0.03	0.06	0.06	0.5	0.61	1	0.56	0.35	0.18	0.43	0.18	-0.06	0.02	-0.05	0.13	0.36
10	0.03	-0.15	0.03	0.4	-0.17	-0.09	0.23	0.35	0.56	1	0.6	0.42	0.33	0.03	0.09	0.01	0.08	0.33	0.26
11	0.02	-0.16	0.13	0.48	-0.16	-0.05	0.07	0.32	0.35	0.6	1	0.52	0.19	-0.11	0.06	0.09	0.23	0.18	0.26
12	0.08	-0.15	0.12	0.34	-0.25	-0.25	-0.06	0.21	0.18	0.42	0.52	1	0.05	0.16	0.2	0.05	0.06	0.1	0.37
13	0.03	0.4	-0.22	-0.03	0.27	0.37	0.32	0.38	0.43	0.33	0.19	0.05	1	0.34	0.12	0.08	-0.03	0.19	0.16
15	0.31	0.36	-0.14	-0.32	0.37	0.16	0.17	0.08	0.18	0.03	-0.11	0.16	0.34	1	0.15	-0.09	0.04	-0.11	-0.04
18	-0.19	0.27	-0.11	0.21	0.14	0.03	-0.16	-0.05	-0.06	0.09	0.06	0.2	0.12	0.15	1	0	0.17	0.1	0.22
19	-0.18	-0.28	0.21	0.17	-0.23	-0.24	0.01	-0.04	0.02	0.01	0.09	0.05	0.08	-0.09	0	1	0.37	0.37	0.07
20	0.1	-0.18	0.2	0.11	-0.25	-0.23	-0.03	-0.12	-0.05	0.08	0.23	0.06	-0.03	0.04	0.17	0.37	1	0.34	0.04
22	-0.27	-0.04	0.06	0.02	0.01	0.02	-0.07	-0.07	0.13	0.33	0.18	0.1	0.19	-0.11	0.1	0.37	0.34	1	0.32
23	-0.31	0.03	-0.19	0.25	0.17	-0.12	0.29	0.25	0.36	0.26	0.26	0.37	0.16	-0.04	0.22	0.07	0.04	0.32	1

Appendix 3. The interview questions (purchasing department).

1. Practices

a. Sourcing Process:

Could you describe the typical process of sourcing surplus food products at Company A?

Is there a specific criteria you use to select suppliers? Is sustainability prioritized in this selection process?

b. Characteristics of Surplus Purchasing:

What unique characteristics come with purchasing surplus food, in terms of both purchasing and supply? How does your purchasing process differ from companies that source regular food products?

c. Sustainability Practices:

Are there specific supply chain practices that promote sustainability at Company A?

## 2. Supplier Relationships

### a. Cooperation with Suppliers:

What kind of cooperation do you have with your suppliers, beyond just purchasing from them?

Are there any joint initiatives or programs aimed at promoting sustainability with your suppliers?

## 3. Challenges

### a. Sustainability Challenges:

What are the main challenges Company A faces in maintaining sustainability within the supply chain?

Do you recognize any challenges in purchasing that concern specifically the nature of surplus food or food waste?

What are the key barriers to purchasing more surplus food than you purchase now?

### b. Addressing Challenges:

Are there specific strategies or actions being taken to overcome these challenges?

## 4. Success Factors

### a. Contributing Practices and Strategies:

What specific practices and strategies contribute to the sustainability of Company A's supply chain?

### b. Success Factors and Measurement:

Are there any metrics or methods in place to measure the sustainability of your supply chain?

5. Future Directions

a. Improving Sustainability:

How do you envision Company A becoming more sustainable in terms of supply chain and purchasing in the future?

Appendix 4. The interview questions (sustainability department).

1. Involvement in Supply and Purchasing

a. Department Involvement:

How is the sustainability department involved in the supply and purchasing processes at Company A?

2. Strategy

a. Promoting Sustainability:

What are the main challenges Company A faces in maintaining sustainability within the supply chain?

What are the key sustainability goals and objectives, particularly in relation to the supply chain?

Are there any specific programs or initiatives aimed at promoting sustainability within the supply chain?

3. Monitoring and Evaluation

a. Progress Monitoring:

Does Company A monitor and evaluate its progress towards achieving sustainability goals within the supply chain?

4. Continuous Improvement

a. Opportunities for Improvement:

How does the sustainability department identify opportunities for improvement, innovation, or optimization in sustainable supply chain management?

5. Success Factors

a. Contributing Practices and Strategies:

What specific practices and strategies contribute to the sustainability of Company A's supply chain from the sustainability department's perspective?

6. Future Directions

a. Improving Sustainability:

How do you envision Company A becoming more sustainable in terms of supply chain and purchasing in the future?

b. What are Company A's long-term sustainability goals for its supply chain?