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Master Degree Project in Innovation and Industrial Management

Food Waste from Swedish Grocery Stores

What can the grocery stores do to reduce it?

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Abstract

The problem with food waste has become more and more evident during recent years and a reduction of the waste would be one important step towards a more sustainable society. The purpose of this comparative study is to examine how some Swedish grocery stores handle their food waste and compare if there are any differences between the three main actors on the Swedish grocery store market; Coop, ICA, and Hemköp. The study will examine how the grocery stores handle their food waste today, what they do to reduce it and if anything hinders them from taking better care of the waste. Theoretical results indicate an improved infrastructure at the grocery stores can reduce the waste, which involves resources, activities and partners. It also shows an efficient supply chain is important and to reach more efficiency must the chain actors be able to handle uncertainties, collaborate and share information. But to know what needs to be done is one thing, to make it happen is another and to change old habits and routines can be difficult. Empirical findings demonstrate the grocery stores are very much dependant on their customers' behaviours and attitudes as well as the efficiency of the whole food supply chain when it comes to food waste reduction.

Keywords: Food waste, grocery stores, supply chain, groceries

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1. Introduction

1.1 Background

Large amounts of food are thrown away every day, food which could have been eaten if it had been handled in a different way. If the food waste could be reduced would it reduce the negative effect the food production has on the ecosystems which supports us (SEPA, 2014). A reduced food waste is one step towards a more sustainable development, in terms of economics, social issues and environmental impact. Even though a reduced food waste not automatically will mean a more sustainable development, is it at least one important contributor (Eriksson, 2015).

The food waste represents large economic values along the whole food supply chain (SEPA, 2014). A reduced waste of edible food is one of the least controversial ways to make the food supply chain more productive and could be used immediately to decrease the competition for natural resources (Nellemann et al., 2009). A reduced waste is also one way for the actors within the chain to save money and is less controversial than e.g. reducing meat consumption (Garnett, 2011). Food waste is a problem along the whole food supply chain but since more value is added for every step in the supply chain, the waste generates a bigger loss at the end of the chain when more sub processes have been involved (Eriksson & Strid, 2013; Strid et al., 2014). The potential economic benefits of a waste reduction are therefore higher in later stages of the value chain (SEPA, 2012).

The retail sector is not the largest contributor of food waste but the amounts are still high and its place is late in the food supply chain. Supermarkets also represent an important link between producers and consumers, with a potential impact over large parts of the food supply chain. This enables retailers to affect consumers' behaviours and attitudes through communication in order to increase their environmental awareness and also to choose suppliers and producers that fulfil their corporate responsibility. In Sweden, where the market is extremely concentrated and is completely dominated by only a few large companies, the retailers possesses a very powerful position with strong possibilities to reform the sector to become more sustainable. (Eriksson, 2012)

Food hygiene or biosecurity requirements increase at higher levels in the waste hierarchy (Eriksson, 2015). The groceries are sensitive and must be handled with care along the whole supply chain, otherwise will its durability be negatively affected and groceries more difficult to get sold. The food industry is controlled by strict rules to ensure the food hygiene and biosecurity but are also dependant on the customers' behaviours and attitudes. In the end is it the customer who decides what he or she wants to buy and most customers will only buy groceries of good quality. With a more efficient supply chain can more groceries keep a good quality for a longer time which can enable more groceries to be sold and the waste amounts to be reduced.

1.2 Objective

The objective with this study is to examine if Swedish grocery stores can reduce their food waste. This is a rather broad subject and I will therefore focus on the food companies' infrastructure, which means I will examine what they need to be able to reduce their waste and what obstacles there are for the stores today. With the help from the empirical findings and academic theory I hope to come up with some suggestions for how the grocery stores could work in order to take better care of their groceries and perhaps reduce their waste further. Hence, I am not trying to find the optimal way for the grocery stores to work, only to come up with some suggestions for how they could work which according to the literature I have used, can make the grocery stores to become more efficient in their work with food waste and possible could enable them to take better care of their waste.

1.3 Research question

With the problem description and objective mentioned above have I arrived to the following research question:

Can an improved infrastructure reduce the waste at Swedish grocery stores?

This question will be answered by examining how the grocery stores today works with their food waste and what they do to try and reduce it as well as examining how they work with the other actors in the food supply chain.

1.4 Delimitations

The aim of this study is not to study all grocery stores in Sweden and not to be able to generalise any results either. Therefore, and due to time and other resource constraints will only nine grocery stores in the Gothenburg area be examined. The study will examine the grocery stores' infrastructure, which means what resources they need to have, what activities they need to perform, and what partner they need to have to be able to reduce their waste. What will be examined is the grocery store managers' perception on the situation, any other employees will not be included in the study. Any comparisons between how the grocery stores from each company works compared to what their respective parent organisation say they should work will not be made either. The focus is instead to look at factors which appears to increase and reduce food waste at grocery stores as well as obstacles to reduce the waste and the factors will be identified from the perspective of each grocery store manager.

1.5 Thesis disposition

The next chapter will first give a background to the food waste issue by presenting some of what has been written within the field. The second part of the chapter will then go through some relevant academic theory which will be used in the later empirical study and analysis.
In chapter three will the methodology used for this study be described. Chapter four will present the empirical findings where grocery store managers have been interviewed. These findings will then be analysed in the fifth chapter and conclusions from the analysis will be presented in the sixth chapter. Here I will also present my recommendations for the grocery stores.

1.6 Word list

Best before- and expiration date - In Sweden are two types of dating on groceries used; “best before” and “expiration”. Best before dates tell within what period the producer can guarantee the quality of a grocery is high enough. The groceries are often of good quality for a longer period but after this date cannot the producer guarantee the grocery will be as good as it was right after it was produced. Grocery stores are allowed to sell groceries where the best before date has been passed, as long as it is good enough to be consumed. Groceries which has got a expiration date are on the other hand, not allowed to be sold after the date has been passed. Consuming a grocery where the expiration date has been passed could mean a health hazard. Sensitive groceries such as fresh fish and meat has this kind of dating. (SNFA, 2015)

Cold chain - Is a temperature-controlled supply chain, which if it is kept unbroken, will help to extend and ensure the durability of sensitive groceries such as fruits, vegetables and seafood (SNFA, 2006).

Grocery - Two types of groceries are mentioned in this study; perishables and dry groceries. Perishables are sensitive groceries which often needs to be consumed rather soon, such as fruit, vegetables, dairies, fish and meat. Dry groceries are instead groceries which can be stored in normal room temperature and for a long time before they have to be consumed, some examples are canned food and cereals.

Food waste - Can be defined in several ways. In Sweden are the terms unavoidable and unnecessary food waste used. Unavoidable food waste means food which cannot be saved due to health or safety reasons or because the damage on the product is too large. It also includes e.g. bones, egg shells and plum cores. Unnecessary food waste means food which could have been eaten. It can mean food with some damage which would have been difficult to get sold but could have e.g. been used as a ingredient by a grocery store’s own restaurant or donated to charity. (SEPA, 2015) In this thesis will food waste mean all food the stores have not been able to get sold, redistributed or used in any other way and instead have had to throw away.

2. Literature

The first part of this chapter will present what has been written about reasons for food waste from grocery stores, what actions that are proposed to reduce the waste, as well as what appears to hinder the grocery stores from reducing the waste. Each of these three parts is then divided into three parts where I have taken a look at the ordering process, the sales process and legislation regarding food. According to the literature does waste occur along the whole supply chain, from producers to customers. Even though the focus for this thesis is about waste from grocery stores should it be mentioned that some of the waste is also caused by other actors in the supply chain. The second part of this chapter will present some relevant academic theory and will show what the grocery stores need in order to improve their infrastructure, how the supply chain can become more efficient, and finally how the companies can implement a new strategy, if needed. The findings from the literature have been used as a base for the later empirical study.

2.1 Reasons for waste in grocery stores

2.1.1 The ordering process

The grocery stores are not allowed to sell food where the best before date has been passed but sometimes are groceries delivered late to the stores due to some kind of problem along the supply chain or forgotten in inventory which gives the stores a shorter time span to get the groceries sold (Mena & Whitehead, 2011). Some groceries must have short dates due to directives from the EU and the industry and some producers also set short dates due to the brand integrity. If a grocery would have an insufficient quality could it hurt the company brand (WRAP, 2012).

Some groceries are thrown because they haven't been sold due to demand changes. These changes are by the stores difficult to predict which often results in too many groceries being ordered. The demand changes can be caused by several reason such as what the weather is like or what season it is. Some food is more popular during certain times of the year but also if it is sunny or rainy can change what the customers prefer to buy a particular day. The demand is also affected by the offers of the week. One example is that a promotion of apples can lead to a reduced demand for oranges. Finally, can the general mood of the customers decide what they will buy. One day they prefer some types of food and other types the other day. While seasonal changes can be a bit easier to predict, other changes are much more difficult and since the stores do not want to risk to end up with less groceries than needed, the result is often that more groceries than what is needed is ordered. (Stenmarck et al., 2011)

Even if a store has been able to predict a decrease in demand for a certain grocery can it be difficult for them to order smaller quantities. The store could be bound through a contract to buy a certain amount of each grocery each week or has to pay a much higher price per item if they want to buy a smaller amount. The producer might also just be able to produce a certain amount and if the store wants to buy less one week the producer might end up with unsold groceries which would cause a loss if they cannot find another buyer for the remaining

groceries. (Rytterstedt et al., 2008) The producers want to produce as much as possible because they want to create economies of scale. The production processes are therefore designed to reach economies of scale which affects the flexibility negatively (Romsdal et al., 2011). At the same time does a larger range of groceries often mean more uncertainties of the demand which requires producers to be more flexible (Van der Vorst & Beulens, 2002).

A large part of the waste is due to groceries being damaged during transportation or have any other flaw when they arrive to the stores and are therefore returned by the stores. A whole package can be returned even if just one item in the package is damaged. The stores do not have time to investigate every single item and does not want to take any risks and are also allowed to return the whole package (Salhofer et al., 2008). Faulty deliveries, e.g. through miscommunication between a store and a supplier can also cause waste due to wrong groceries or wrong amount of groceries have been delivered to a store (Priefer et al., 2013).

Lack of knowledge among personnel is another cause to the waste. They might not know what groceries are in season, what is demanded or how much to order. The result could be more groceries ordered than what's demanded or groceries with a lower quality because they are not in season or because the personnel has bought the groceries with the lowest price without considering the quality. (Lagerberg Fogelberg, Vågström & Birgersson, 2011) The personnel might also not have enough knowledge about how to store and handle the groceries. Some groceries are more sensitive than others and when it comes to fruit and vegetables they prefer different temperatures and light (Andersson et al., 2010). Some fruits and vegetables, such as bananas and tomatoes, produces ethylene gas which makes other fruits and vegetables to ripen faster and should therefore be kept separated (Mattsson, 2014). One study by SP Technical Research Institute of Sweden showed that what stores with considerably little waste have in common is more knowledge about working procedures which can reduce the waste and that they also work more to reduce the waste (Lindbom et al., 2013).

The grocery stores are only one part of the food supply chain and one cause of waste is due to the bullwhip effect. The bullwhip effect mostly occurs in forecast controlled supply chains and occurs when the variance of orders is larger than the sales. The effects of the shifts in demand become bigger and bigger for every step upwards in the chain (Lee, Padmanabhan and Whang, 2004). According to Lee, Padmanabhan and Whang (2004) are there four sources which causes the Bullwhip effect; demand signal processing, the rationing game, order batching, and price variations. Demand signal processing is when past demand information is used to update forecasts. Rationing game is when retailers order more of a product when a supply shortage of the product at the producer is anticipated. Order batching refers to order patterns by retailers, it is easier for the producer if the retailer follows a pattern and order at the same time of the week every time instead of at various times. Finally, price variations refer to non-constant purchase prices of a product.

2.1.2 The sales process

A significant contributor to the waste is caused by the customers' behaviour and attitudes in the stores. They prefer to pick the groceries with the longest best before dates or the best

looking groceries which makes groceries with a shorter best before date or with any flaw to be unsold (Stenmarck et al., 2011). Especially when it comes to fruits and vegetables do the customers have certain expectations on how they should look like (Rytterstedt et al., 2008). Expectations on full shelves also forces the stores to have a larger amount of each grocery than what they will be able to sell. With a larger amount is there a higher risk for groceries with a shorter best before date to be missed and not recognized before the date has been passed. Overall, does the overflow of groceries lead to more unsold and more damaged groceries, especially when it comes to fruit and vegetables. (Andersson et al., 2010)

The customers also expect a wide range of groceries and many grocery varieties. The stores do not want to risk to lose any customers and therefore tries to meet the customer's expectations by having full shelves and a large variety of groceries (European Commission, 2009). Some groceries are thrown due to damage caused by personnel or customers e.g. dropping the grocery and groceries which should be stored in cold temperatures can be thrown if the cold chain has been broken in any way, e.g. if a customer has regretted to buy the grocery and left it somewhere else in the store where the temperature is higher (Rytterstedt et al., 2008).

Waste can also be caused through lack of knowledge by the customers. Their expectations about how a grocery should look like and how it really is supposed to look like can differ which leads to perfectly fine groceries being rejected and therefore thrown away by the store. One example is mushrooms which is at its best when it has started to become a bit dark on the outside. (Lagerberg Fogelberg et al., 2011) Furthermore are not all customers aware of the environmental problems the food waste is causing and some does not even care about it. Customers in a wealthy country as Sweden can also afford to throw away food. Simultaneously can the producers in wealthy countries choose to overproduce in order to meet the expected demand, which results in customers having a too large variety of groceries to choose from. (SEPA, 2013)

2.1.3 Legislation

There is plenty of legislation regarding food in Sweden. The legislation is for the protection of certain groceries or human health but the legislation can also cause waste. Some rules are decided by the Swedish National Food Agency (SNFA) and some are decided by the EU. Most of the rules are decided because of safety reasons such as limiting the risk of bacteria to be spread. One example is that stores in Sweden are not allowed to freeze meat with a short best before date. Just as some groceries are thrown due to certain customer preferences are some groceries thrown because the EU has decided how certain groceries should look like and if a grocery does not meet these requirements it shouldn't be sold. (Stuart, 2009)

Another problem is the lack of coherence of the legislation between different countries, some rules about food in some countries can contradict rules in other countries. Grocery stores in Sweden can have suppliers from different countries which complicates the businesses when rules and regulations regarding food are different in each country. If the stores do not know how to act can it hamper their attempts to reduce any waste (ETC/SCP, 2010).

Simultaneously seems the grocery stores to not get enough governmental support or unclear messages from policy makers when dealing with these issues. Therefore, is it not enough incentives for the grocery stores and the food industry to create any action plans on how to reduce the waste (Jones et al., 2008). Most of the waste is unintentional by the grocery stores but some is also accepted by the industry since it is often too expensive to become more sustainable (BIO Intelligence Service, 2011).

Furthermore, does also some rules decided by the industry contribute to the waste. All grocery stores within a chain can be forced by top management to always have some specific groceries in stock, regardless of the demand for them. As mentioned, are the grocery stores also allowed to return large amounts of groceries, such as if only one item in a package is of an insufficient quality. It is also common for the stores to have agreements with bread suppliers to return unsold bread for free which gives the grocery stores low incentives to get all the bread sold and reduce the waste. (Åhnberg & Strid, 2010)

2.2 Proposed actions to reduce the waste at grocery stores

2.2.1 The ordering process

In the literature are several suggestions mentioned about what the grocery stores can do to reduce their waste. The stores should increase the usage of computerized ordering systems to make the orders more accurate and efficient. Good orderliness in inventory and store is also important as well as trying to reduce the inventory because it would reduce the risk of damaged groceries or groceries being forgotten and not found until they are not good enough anymore or has passed its best before date. (Rytterstedt et al, 2008)

It is important to improve the communication and collaboration with the suppliers. It is not just up to each store to reduce the waste, if the stores shall be able to reduce their waste must the whole supply chain collaborate. One example is to keep the cold chain unbroken since if it is broken for a sensitive grocery, its durability will be severely impaired. The grocery stores are not responsible for the transports but can put pressure on the suppliers to improve in this field. With better communication and collaboration along the supply chain will the logistics be improved and therefore reduce the risk of faulty deliveries. It will also make the supply chain more adaptable and responsive which is preferable, for instance when it comes to demand changes. (Terry et al., 2011) The deliveries should also be more frequent and smaller since with larger deliveries comes a higher risk of damaged groceries or groceries to be forgotten in inventory (Mena & Whitehead, 2008). The grocery stores should plan the purchases together with the suppliers to reduce the risk of faulty deliveries, mostly buy what is in season and more thoroughly investigate what the customers really want and not purchase groceries which does not seem to be demanded. An increased communication with the customers will enable the stores to get more information about the customers' demand (Terry et al., 2011).

Finally, must the stores identify the root cause of the waste and sometimes it is not the stores which causes it but instead another actor within the supply chain. What causes the waste and where it becomes visible can be at different places along the supply chain and it can be

difficult for one actor to affect the other actors but more collaboration would make it at least a bit easier. (Lindbom et al., 2013)

2.2.2 The sales process

The stores should limit the number of promotions, such "3 for 2" and similar offers, because on the one hand, does these promotions lead to overproduction from the producers and the stores to take in more groceries than they will be able to sell (Priefer et al., 2013). On the other hand, can the customers become tempted to make use of the offers and therefore buy more than what they need which also will cause some waste (Brook Lyndhurst, 2011). But one type of promotion the stores should do more of is to promote groceries with a short best before date or promote fruit and vegetables which are in season or which have got some kind of flaw (Lipinski et al., 2013).

The grocery stores should further educate both personnel and customers about the importance of waste reduction since many are not even aware of what problems the waste is causing (Schrøder, 2013). The personnel should be educated in how they should handle the groceries but also be given good tools that can help them in their work, such as a standardised type of boxes for fruit (Wrap, 2010). The customers can be taught how to make better use of different groceries, e.g. through new recipes, but they can also be taught how some groceries really should look like (SEPA, 2014). With better communication between the stores and the customers can more groceries be bought before they become impossible to sell. Store managers should dare to not always meet the customers' requests to 100 % but instead sometimes let them accept an empty shelf at the end of the day when it is close to closing time or accept a somewhat smaller variety of groceries or groceries with some kind of flaw. The whole food industry must collaborate to change the customers' attitudes, behaviours and perceptions about groceries. The customers must be taught to accept groceries with a lower quality and to make use of groceries with flaws or that most groceries often can be used several days after the best before date has been passed. People have a certain perception on how groceries should look like and that has to change, otherwise will some groceries never be bought. (Stenmarck et al., 2011)

The grocery stores must also be better at handling groceries, especially fruit and vegetables. It must be treated with care so it does not get damaged and stored in right temperature and light (Hansen & Schakenda, 2012). Fruit and vegetables with any flaw can be trimmed to look more attractive or be used in the store's own restaurant, if it has one. The same goes for groceries with a short best before date (Lagerberg Fogelberg et al., 2011). Another option is to freeze groceries with a short best before date or sell them to a catering firm or a restaurant if the store does not have its own restaurant. Meat should always be sold as frozen instead of just cold since the meat in that case would stay good for a longer time and the stores should look over how labels are exposed on the packages so the customers focus more on how the grocery actually looks like rather than what best before date it has got (Brook Lyndhurst, 2011). If not frozen should meat be sold in vacuum packaging to stay good longer and food should be sold in smaller packages since many households are small and will therefore not be able to make use of the whole package before the quality of the grocery becomes insufficient.

Instead of minimizing packaging is it better to optimize packaging because to throw food creates more environmental damage than what a bit more packaging would do. Finally, should it be more information on each grocery about how to store it. (Williams & Wikström, 2011)

2.2.3 Legislation

In order to reduce the waste must the grocery stores measure the waste in some way, such as in weight, and be required to report it somewhere. That approach will give the stores themselves a chance to actually see how much waste they produce but it will also create an opportunity for authorities to see if some stores have more waste than others and then help those stores with larger amounts of waste (SEPA, 2013). A better control from authorities might show where the main causes of food waste in a supply chain are and one suggestion is also to put a tax on waste in order to increase the incentives for the grocery stores to reduce their waste (Lindbom et al., 2013). Other suggestions are to limit the possibility to return unsold groceries for free (Eriksson & Strid, 2013) and to improve work routines for the stores (Rytterstedt et al, 2008). The stores must be given incentives to reduce their waste, otherwise will little be changed and it must also be clearer responsibilities for the waste along the supply chain (Terry et al., 2011). To help the stores implement these changes must they be given more governmental support and clearer directives about what to do (Jones et al., 2008).

While some new rules are suggested to be implemented are others suggested to be modified or removed since they cause some waste. As mentioned, are there for instance strict rules when it comes to best before dates. One example is that grocery stores today are not allowed to freeze meat when it is close to its expiration date and sell it later one or even give it to charity. Another example is that the producers must put short dates on some groceries. One good example is eggs which in other countries can contain salmonella bacteria and are stored in regular room temperature. Swedish eggs do not have any salmonella bacteria and are often stored in cold temperatures and can therefore be kept good for a much longer time but because the rules are the same within the whole EU region when it comes to eggs, they must have the same short best before dates. (Stenmarck et al., 2011) It is also suggested to remove best before dates from staples because they will be good for many years and does not need any dates, the legislation about labels should be changed to make it easier for the customers to understand them (Priefer et al., 2013) and how the labels are exposed on the groceries should also be changed (Lipinski et al., 2013).

2.3 Obstacles against reducing the food waste

Despite many suggestions for how to reduce their waste are there also several obstacles for the grocery stores against implementing any of these proposed actions. One example is that many grocery stores want to give away more food to charity and the start of a food bank have been proposed but the difficulty lies in getting the right type of food to the right place, within a certain time. To freeze the groceries before donating them would increase the durability of the groceries but is as mentioned illegal to do today and it is not clear enough who will be responsible for the food (Stenmarck et al, 2011). To give away all waste to charity is a good way to make use of the waste but the overproduction in Sweden is greater than the need of food from charity. To only give away the waste to charity wouldn't be enough, there would

still be food left. Obviously, the best thing to do would be to get more groceries sold but if that is not possible are other alternatives needed. The waste could be turned to animal food or biofuel but that is not the optimal way of making use of the waste since cheaper alternatives for animal food and biofuel are available (Lindbom et al, 2013).
There is a will from the industry actors to reduce the waste but there are uncertainties regarding whether if there are enough incentives for everyone to act and questions about which actors that will take the winning and which will take the costs. There is a power imbalance between the suppliers and grocery stores, in favour for the latter, which makes it difficult for both parties to open up their businesses for each other. More knowledge among the grocery stores of what drives the costs at the suppliers has enabled them to negotiate shorter contracts and lower prices (Macklean, 2013). Therefore, has it been suggested to implement a third actor which could act as a mediator between them. The mediator could act as a filter so only necessary or conventional information can be transferred. But who should be this actor is unclear at the moment (Lindbom et al, 2013).

One of the main reasons why groceries are thrown today is because of its limited durability and there are several things which can be done in order to increase the durability of many groceries but it is not sure that will help. To decrease the temperature along the supply chain is one way but it is still a risk the cold chain will be broken somewhere along the chain. Heat treatment could extend the durability of a grocery but could also negatively affect the grocery's taste and nutrients. Another alternative is to add more additives such as salt, sugar or preservatives but that isn't requested by the consumers and dubious from a health perspective. Many consumers also prefer to pick groceries which are produced as recently as possible so a longer best before date on a grocery could instead make it more difficult to get sold. (Lindbom et al, 2013)

It is also difficult to change behaviours and attitudes among customers and personnel. The customers have expectations on full shelves and certain preferences on how the groceries should look like, which is difficult to change. The stores want to sell as much as possible and do not want to lose customers and therefore always tries to meet the customers' requests. Customers also get inspiration from travels and different media and want to try new types of food, simultaneously is the population of Sweden becoming more and more diversified. Altogether, it puts pressure on the grocery stores to have a larger variety of groceries and since it is often difficult to order small quantities, it results in more unsold groceries. (Stenmarck et al, 2011)

A tax on waste is probably not a solution either since where the cause of the waste and where it gets visible often are at different places along the supply chain. The wrong actor could therefore be punished for the waste and the actor who causes the waste is given no incentives to change its procedures (Lindbom et al, 2013). Another suggestion is to increase the price on food which would increase the value of the food and therefore reduce the willingness to throw away food. The problem is that even in a wealthy country as Sweden cannot all people afford more expensive food. (Stenmarck et al, 2011)

More research about how to reduce waste within the food industry is needed. Today is there for instance quite extensive research about processes and production going on within the field of automotive- and engineering industry but not in the food production industry and it is not possible to straight off apply the research from the engineering industry to the food industry. To be able to reduce the waste from the whole supply chain is more research about supply chain management needed. (Lindbom et al, 2013)

2.4 Summary of background literature

Table 1: Summary of background literature

Causes	
The ordering process	Difficult to predict demand Difficult to change orders Problem with deliveries
The sales process	Customer attitudes, behaviours and lack of knowledge
Legislation	Strict rules due to safety reasons Rules from the EU and the industry Lack of governmental support
Proposed actions	
The ordering process	More collaboration and information sharing in the chain Smaller and more frequent orders Better orderliness in inventory
The sales process	Limit "3 for 2" and similar offers Not always meet customer requests Educate customers More support to grocery stores More incentives for grocery stores to reduce their waste
Legislation	Measure all waste Limit possibility to return groceries for free Less strict best before dates Change EU-rules
Obstacles	Difficult to change customer behaviours Difficult to redistribute groceries Strict rules Sensitive groceries

2.5 Academic theory

As was seen in the previous section, is it possible for the grocery stores to reduce their waste by improving their infrastructure and this part will more specifically show what infrastructure management is about. The previous section also showed that waste occur along the whole supply chain but can be reduced with a more efficient supply chain and therefore are also some theory about supply chain optimisation included in this section. The final part will then be about change management since change is difficult. Even if the actors in the chain know how they should do to work more efficiently can it be difficult to implement this new strategy.

A typical business model for a company should show what the company has to offer, to whom, how they will provide it to the customer, and how they will finance it. As mentioned, is the purpose of this study to examine if an improved infrastructure for the grocery stores can reduce their food waste. Infrastructure management can be seen as the "how" in the business model. The value in this case is the extra amount of groceries the grocery stores can get sold, or consumed in any other way, instead of thrown away. According to Osterwalder (2004) does infrastructure management consist of three pillars which are all essential for a company to have to enable a value delivery to the customers. The first pillar is about capabilities and should define what resources the company needs. The second pillar should show what activities they need to perform and the last pillar what partners they need.

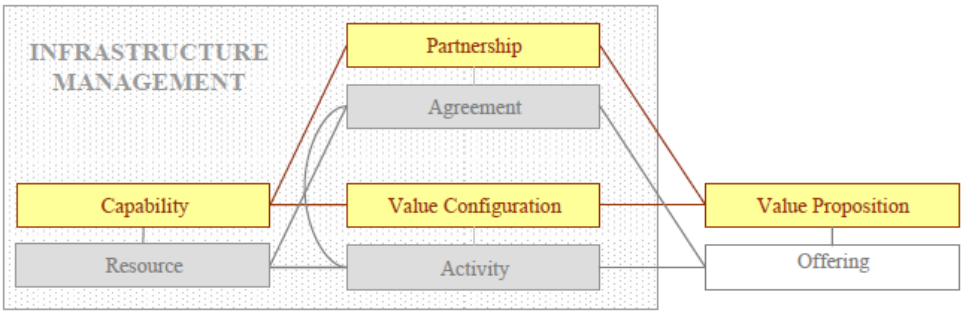

Figure 1: Infrastructure management (Osterwalder, 2004 p.79)

2.5.1 Capabilities

According to Wallin (2000) are capabilities repeatable patterns of actions in the use of assets to create, produce and/or offer products or services to the market. A company has to have certain capabilities in order to provide its value proposition. What the capabilities are depends on what assets and resources the company has got (Bagchi & Tulskie, 2000) and they can either be maintained in-house or outsourced. It is common to keep capabilities and resources which belongs to the company's core competencies in-house, and outsource those which does not (Hagel III & Singer, 2000). When a company outsources an activity it involves an outside actor which the company enters a partnership and signs an agreement with (Osterwalder, 2004). Resources can be divided into tangible and intangible assets and people-based skills. Tangible resources can be e.g. plants, equipment and cash reserves. Intangible resources can be e.g. patents, copyrights, reputation, brands and trade secrets while human resources are the people the company needs in order to create value with tangible and intangible resources. (Grant, 1991)

2.5.2 Value configuration

The second pillar relates to the main purpose of a company which is to create a value the customers are willing to pay for. The value is the outcome of a configuration of in-house and outsourced activities and processes and the value configuration shows all the activities necessary to create value for the customer and the link between them. Activities are the center of what a business does and are actions a company performs in order to create a market value and generate profits. The activities relate to owned or partner resources and are executed by an actor which can be either the company itself or one of the company's partners. (Osterwalder, 2004) The activities can be divided into primary and support activities. Primary activities are those which are involved in the creation of the value proposition and its marketing and delivery. Support activities are the underlying fundament which allows the primary activities to take place, those could be e.g. infrastructure, human resource management, technology development or procurement. (Porter, 1985)

2.5.3 Partnership network

The last pillar shows which parts of the activity configuration and which resources that are distributed among the firm's partners. Partnerships are voluntarily initiated cooperative arrangements between two or more independent companies to carry out an activity together, which are based on commonly negotiated terms and conditions and decided through an agreement (Osterwalder, 2004) and executed by coordinating the necessary skills and resources (Dussauge & Garrette, 1999), through exchange, sharing or co-development (Gulati & Singh, 1998).

The appearance of this type of networks has significantly enhanced the range of possible organisational arrangements for value creation (Gulati & Singh, 1998) and is a way for companies to create and enhance the competitive positions of the firms involved, in a highly competitive environment (Dussauge & Garrette, 1999). It can enable the companies to optimise its operations which can be done through e.g. outsourcing or by sharing infrastructure which lets a company to profit from its partner's resources which itself does not have but needs, such as specialised knowledge or a large network. By outsourcing non-core competencies can the company optimize its business by instead focusing on its core competencies. It can also enable the companies to share costs and therefore also risks, which is often desirable by companies in today's competitive landscape. (Osterwalder, 2004)

2.6 Supply chain optimisation

If the grocery stores have the resources they need, performs the activities they need to perform and collaborates with the partners they need to have, it can enable them to take better care of their food waste. It can mean to either get more groceries sold, make use of the groceries in the store's own kitchen, or to redistribute the groceries to charity. However, as seen from the literature are some reasons for occurrence of food waste in the grocery stores also caused by other actors in the supply chain. For instance, could the reason for waste to occur and where it becomes visible, be at different places along the chain. So even if the grocery stores improve their work with food waste reduction, will it still might not be enough since the stores also are dependent on the other actors in the chain.

As the background literature showed, can the quality of some groceries be insufficient when arriving to the stores, or become insufficient shortly after arrival, due to other actors in the chain. Therefore, have the stores much to win if the efficiency in the supply chain can be improved and below follows a description of how this efficiency can be improved. In short, it will tell that uncertainty often is an underlying cause of inefficiency in a supply chain and to reduce the uncertainty are information sharing and collaboration between the actors in the chain as well as good internal processes at each company, the keys to a better performance of a supply chain. A more efficient supply chain can help the grocery stores to better handle the food waste and in that way also reduce it.

2.6.1 Uncertainties

The real problem in managing and controlling complex networks is the uncertainty, which can be difficult to handle (Davis, 1993). The uncertainty can be shown in that a company might wonder what its customers will order, how many products which should be kept in stock and if the suppliers will deliver the requested goods on time and according to the demanded specifications (van der Vorst & Beulens, 2002). The more uncertainty related to a process, the more waste will there be in the process (Persson, 1995). The uncertainty pressures companies to create safety buffers in time, capacity or in inventory to prevent a bad chain performance. But the buffers will restrict the companies' operational performance and prevent competitive advantage (van der Vorst & Beulens, 2002).

Lee (2002) has created a framework for uncertainties. According to him are demand uncertainties linked to the predictability of demand for the product and distinguishes between functional and innovative products. Functional products are those which have long life cycles and therefore a more stable demand, basic clothing, oil, gas, household consumable items and basic food are some examples. Innovative products on the other hand, are products with shorter life cycles with high innovation and fashion contents and which means a much more unpredictable demand. High-end technology, fashion apparel and mass customized goods are some examples.

On the supply side can the supply process be either stable or evolving. A stable supply process is where the manufacturing process and the underlying technology are mature and well established. In evolving supply processes are the manufacturing process and the underlying technology still under early development and are rapidly changing which means the supply base may be limited in both size and experience. Stable supply processes often have low complexity, long-term supply contracts and are highly automated. In evolving supply processes, the manufacturing process often requires fine tuning and often experiences breakdowns which makes it less reliable. (Lee, 2002)

Figure 2 shows it is easier to manage supply chains in the left column than in the right column and also easier to manage those in the upper row than the ones in the lower row. To reduce the uncertainty in a supply chain and increase its performance, the uncertainty characteristics of a product should be moved from the right column to the left, or from the lower row to the upper one (figure 3).

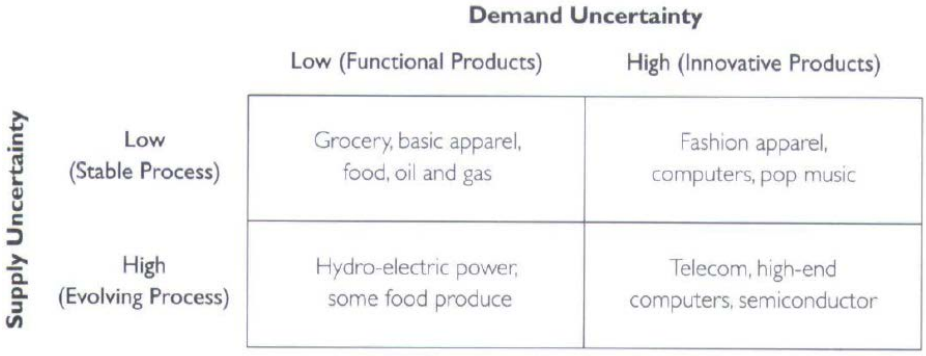

Figure 2: The uncertainty framework examples (Lee, 2002 p.108)

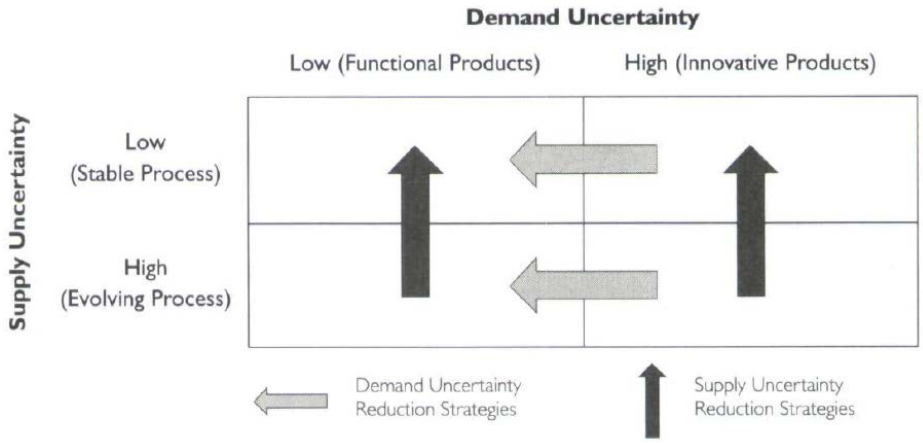

Figure 3: The uncertainty reduction strategies (Lee, 2002 p.109)

Even if the demand of a product at the end consumer is stable can still distortions of demand signals occur along the supply chain. These distortions can become bigger and bigger the longer up the chain you go, known as the earlier mentioned bullwhip effect. To reduce demand uncertainties are information sharing and tight coordination crucial. The more information about the demand that is shared and the better the collaboration is, the more control over the supply chain is possible to gain. The situation is similar for the supply side. The more information that is shared, the better and it involves all stages, from product development to mature end-of-life phases. The free exchange of information can help suppliers to get the products to the market in time and reduce the risk of overproduction to occur but also enable suppliers to modify products depending on customer requests. (Lee, 2002)

Then, depending on the characteristics of the supply chain can different strategies be used. When it comes to supply chains for functional products, such as basic food, the uncertainties regarding both demand and supply is present but often rather low. Therefore, is efficiency the key for this type of supply chains. Efficiency can be in either cost or information coordination and if the uncertainty regarding demand and supply is low should the companies improve the supply chain efficiency so the cost of providing the product to the customer can become as low as possible. Cost efficiency can be gained by productivity improvements, e.g. in the manufacturing process. It can also be gained by improving logistic systems, e.g. by reducing middle hands between the manufacturer and the end consumer. (Lee, 2002)

2.6.2 Information sharing

All actors within the chain need information about the environment and the current status of the chain in order to estimate the future status of the chain. To easier access information about the environment should an information exchange infrastructure be established in the chain by implementing real-time ICT systems and the actors should jointly define logistical chain objectives and chain performance indicators. When the needed infrastructure is established will it be possible for the actors to exchange demand, supply, inventory or work-in-process information. (van der Vorst & Beulens, 2002) With relevant and accurate information available can the actors consider both external and internal factors to make good decisions and they will be able to filter out the noise from explanatory variables. The actors will be able to extract knowledge from the shared information, knowledge which can be used to design and conduct better operations that are robust in performance. (Togar, Simatupang & Sridharan, 2002)

2.6.3 Collaboration

Although collaboration is based on a mutual objective is it a self-interested process where companies only participates if it is beneficial for them. Nevertheless, should the focus of a mutual objective be on the outcome and experience of joint offers to the end customer. By sharing resources and capabilities can the collaborators exploit profit-making opportunities they cannot create on their own. (Togar, Simatupang & Sridharan, 2002) The performance of the chain can be improved if the actors in a food supply chain improve the reliability of supply and production quantity and quality. This can be done by e.g. coordinating and redesign policies, change or reduce the number of parties involved or by re-allocating the roles of the actors and the related processes they perform (van der Vorst & Beulens, 2002).

According to Horvath (2001) are there many benefits for a supply chain and its actors with more collaboration. It can enable reduced inventory risks and costs as well as reductions in warehousing, distribution, and transportation costs. Over time will the actors be able to gain cost savings through improved productivity and streamlined business processes in procurement and purchasing, order fulfilment, accounts receivable and payable, and exception management. More collaboration can also enable shorter product delivery times, more efficient product development efforts and lower manufacturing costs. In the long term can more collaboration also enable improved customer responsiveness, increased flexibility for changing market conditions, improved customer service and satisfaction, increased customer retention, and more effective marketing.

2.6.4 Internal processes

For the actors in the chain to be able to share information and collaborate as well as to handle and make use of information they receive must they have efficient internal processes. The actors must be able to access, handle, analyse and store large amounts of information from the other actors and the environment as well as to provide the other actors with essential information. To manage this must they have a managing system with objective and corresponding performance indicators. (Horvath, 2001) The performance can be measured in e.g. in time, money or capacity utilization (Gunasekaran et al., 2004). With the information

they gather must they also be able to create models of future possible scenarios and test different strategies in order to estimate the impact of alternative actions. (Horvath, 2001)

2.7 Change management

If the actors in a supply chain discover that they need to change their working procedures in order to make the supply chain more efficient, they not just have to know what to change, they also have to know how to carry through the change. It could be difficult to design a new strategy but perhaps even more difficult to implement it into the organisation. While one part of the possible success for the new strategy depends on whether if it could be aligned with the company's overall business, another determinant is the employee's attitude towards the new strategy and whether they will accept and understand it or not. A change process can be designed and implemented in several ways, below follows a few suggestions on how this process can be done.

To successfully conduct a change process within an organisation, Kanter, Stein and Jick (1992) write it is important to first analyse the need for change in the organisation and create a vision and a common direction for the change. One must separate from the past and create a sense of urgency. A strong leader role must be supported and political sponsorship must be lined up. Then must a plan for the change process be created and enabling structures be developed. Good communication, involving all people in the organisation and to be honest is also important. Finally, should the change process be reinforced and institutionalised.

A similar approach is given by Kotter (2007) who suggests the first step should be to develop a vision and a strategy for the change process. A sense of urgency should be established and a guiding coalition be created. Broad-based actions should be empowered and the change process must be well communicated. The next step according to Kotter, is to anchoring the new approaches into the organisational culture which is similar to the previous authors directive about institutionalisation. But then Kotter also writes short term winnings are important since it could support the change process and act as an evidence of that it is working. Finally, should the gains then be consolidated before more change can be produced.

A third approach is given by Luecke (2003) which also has its similarities with what the other authors propose. Luecke writes it is important to first mobilise energy and commitment through joint identification of business problems and their solutions, which could be compared to the approach of analysing the need for change. Then, a shared vision of how to organise and manage for competitiveness should be created and the leadership needed for the change process should also be identified. Any success of the change should be institutionalised, which can be done through formal policies, systems, and structures. Similar to Kotter he then writes the focus should be on results and not on activities but also that the change should be started in the periphery and then let it be spread to other units without pushing it from the top. Finally, must the new strategies be monitored and adjusted in response to problems in the change process.

The above mentioned approaches for how to succeed with a change process is very similar to each other. The keys seem to be to first know what needs to be changed and what the change process should accomplish. To get the whole organisation to understand must a sense of urgency be created and a strong leader must be identified who can lead the change. A good plan for how to conduct the change process must be created and the plan must be well communicated to and well understood by the whole organisation. Otherwise will it be very difficult to succeed with the change process.

2.8 Summary of academic theory

The grocery stores can take better care of their food waste if they improve their infrastructure management. It means they must look at what resources they need to have, what activities they need to perform, and what partners they need to collaborate with, which can enable them to take better care of their food waste. But the grocery stores are also dependent on the other actors within the supply chain since much waste occurs because of inefficiency in the chain. To make the supply chain more efficient must all the actors within the chain share more information between themselves and collaborate but to be able to do that must they also have good internal processes. Then, when the actors know what they need to change, the new strategy must be implemented in some way. To successfully implement it, the purpose of the new strategy must be understood and accepted by all employees. To increase the likeliness of the strategy to be accepted, the employees must understand the urgency of having it implemented. Good communication and support from the managers is therefore important since many people doesn't like change.

Table 2: Summary of academic theory

Required for infrastructure	Capabilities (assets and resources) Value configuration (activities) Partnership network (actors to collaborate with)
Required for efficiency in supply chain	Be able to handle uncertainties Share information Collaborate Have good internal processes
Required for successful change management	Know what to change Have a strong leader Help everyone to understand the new strategy Communicate and support

3. Methodology

3.1 Research strategy

To be able to answer my research question have I used a qualitative research strategy. The qualitative approach helped me to gain a good understanding of the complex conditions surrounding the grocery stores and their handling of their food waste. Qualitative research is however highly dependent on how the researcher interprets the results and a potential drawback with this research strategy approach is the risk of bias. It is also difficult to generalise any results from a study like this but that has not been the aim with this study either. Instead of trying to generalise across organisations, I wanted to do a profound interpretation of how some Swedish grocery stores handles their food waste and see if anything hinders them from taking better care of their waste. The desire has been to come up with some suggestions for how the grocery stores could handle their food waste even better. Another and perhaps even better approach would have been to do a mixed study by combining qualitative and quantitative research but due to time constraints has that not been possibly. However, I still think I could extract enough data from the qualitative study to be able to answer my research question. (Bryman & Bell, 2011)

The approach for this study has mainly been inductive since I wanted to construct theory out of gathered data. But to some extent has the approach also been somewhat deductive since I had a theory which I wanted to test by collecting data. The main focus has been to understand a certain subject but also to some extent, to test theories. Induction also often entails some elements of deduction and in my study I made use of grounded theory which is a method that often has an iterative strategy where one moves back and forth between theory and data. (Bryman & Bell, 2011) During the study I reflected upon theory simultaneously as I was collecting data from the grocery stores.

3.2 Research design

The overall research design chosen for this study was a comparative study. When a comparative design is applied to a qualitative research strategy, it takes the form of a multiple-case study. The main argument in favour of the multiple-case study is that it improves theory building. By comparing two or more cases, the researcher is in a better position to establish the circumstances in which a theory will or will not hold. (Yin, 2003; Eisenhardt, 1989) The key to the comparative design is its ability to allow the distinguishing characteristics of two or more cases to act as a springboard for theoretical reflections about contrasting findings and the comparison may even in itself suggest concepts that are relevant to an emerging theory (Bryman & Bell, 2011). So instead of just studying one organisation, it enabled me to get a better overview of how food waste is taken care of in the food industry. With a comparative design have I been able to compare how the different organisations handle their food waste and spot some differences between them. If I had used a single case study approach and only had studied one organisation, had it been much more difficult to get a holistic view of the food waste issue within the food industry.

An analysis can also be done on different levels. If individuals, such as managers are being studied, the analysis is on an individual level. If one or several companies are being studied is the analysis instead on an organisational level (Bryman & Bell, 2011). Even though I have interviewed individual managers has the focus in this study been on organisations, more specifically three companies. Each manager has given me their interpretation of the situation for the store they are operating and the company they are working for. The interviews have I then used to get an understanding of the situation for each of the three companies. Therefore, has this analysis been on an organisational level.

3.3 Research method

To collect qualitative data have I primarily conducted interviews with a combination of both closed and open-ended questions. The combination enabled me to extract more information from the interviews. While the closed questions gave me answers to specific topics, did the open-ended questions also provide useful information since the managers could talk more freely. One advantage with semi-structured interviews is its iterative structure where it is possible to ask follow up questions and change the questions depending on the received answers during each interview, which makes the research more flexible. It enables the interviewer to get rather detailed answers from the interviewees which can contribute to give the researcher a better picture of the research topic. (Bryman & Bell, 2011; Saunders et al., 2007)

Before the interviews I constructed an interview guideline with questions that are based on the theoretical framework and which would help me to answer my research question. I wanted to examine the managers' view on their respective store's capabilities as well as their view on the performance of the overall supply chain. To make sure I would receive as much information as possible from the managers, the guideline had quite many questions. On beforehand I was not sure if all the questions would be relevant but I felt more questions would be better than fewer. The approach with open-ended questions enables the interviewer to ask different questions to the interviewees and ask further questions in response to the answers received and when it is relevant. The interviewer must however be careful and not ask leading questions as this could bias the interviewees' answers. (Bryman & Bell, 2011). I only gave certain examples to a question when the interviewee could not give me any longer answers, to make sure the manager had correctly understood the full meaning of the question.

I recorded the interviews and took notes while doing them. Right after the interviews I made detailed transcripts of what had been said to ensure a thorough assessment of the answers and to correct for natural limitations of my memory and all nine interviews were done face-to-face since that is considered to be a more trustful approach rather than doing the interviews over telephone (Bryman & Bell, 2011). The interviews took place in each store manager's office room or in a conference room in the store's office. They were all conducted in Swedish and they took between 40 to 60 minutes each. The selection of grocery stores to include in the study was made by choosing stores in the same chain segment, such as ICA supermarket or Coop Konsum stores. If I had chosen some very small stores and some really large stores, had

they been more difficult to compare since there is a risk that the size of a store can have an impact on its abilities to handle food waste.
There are also several ethical issues to deal with when conducting research. According to Diener and Crandall (1978) are there four areas to consider; whether there is harm to participants, whether there is a lack of informed consent, whether there is an invasion of privacy, and whether deception is involved. In this study are the managers and the grocery stores therefore anonymous. The managers and their stores has instead been named with a number, e.g. the managers from the three Coop stores are named manager C1, C2 and C3. Since the grocery stores are anonymous have I instead included the turnover and number of full time employees for each store, so the reader of this study can get a sense of the size of the stores.

Furthermore, when I booked each interview and right before each interview I presented who I was and explained the purpose of the interview. I knew it would be difficult to get the managers to reveal sensitive information which could have been useful for the study but by carefully explaining the purpose of the interviews I think I made the interviewees at least a bit more eager to reveal information than if they would not have known who I was or known the purpose of the interviews. The interviewees knew their answers would be made anonymous before included in the study and the interviewees were free to choose if they wanted to be interviewed or not. Through this approach I therefore think I have given enough attention to each these of four ethical issues.

3.4 Data collection

The data from my research has been collected from both primary and secondary data. The interviews, emails, phone calls and annual reports are considered primary data. The secondary data has been collected from books, academic journals, reports from authorities and the internet in general. (Bryman & Bell, 2011)

3.5 Data analysis

To analyse how the companies handle the food waste problem, I relied on grounded theory. Grounded theory mainly has two central features; it is concerned with the development of theory out of data and the approach is iterative which means the data collection and analysis proceed in tandem, repeatedly referring back to each other. This means theoretical reflections are done simultaneously as the examination and that it is possible to generate theory from the data throughout the research process. (Bryman & Bell, 2011) To enable this I took notes and made transcripts during or straight after the collection of data, e.g. during the semi-structured interviews. The interviews were also recorded so I could listen to them again and double-check information which enabled me to do detailed transcriptions.

3.6 Research quality

3.6.1 Reliability

Reliability, which means to what extent a study can be replicated, is a difficult criterion to meet in qualitative research since it is impossible to freeze a social setting (Bryman & Bell, 2011). This is also the case in my study but I have tried to increase the replicability by

providing documentation of my procedures, such as an interview guideline. I have also had a constant focus to try and minimise biases and false interpretations in the study. If other researchers would try to replicate my study, I believe they would come up with similar results if they choose to examine the same grocery stores and in the near future. However, since the grocery stores continuously work with the food waste issue will they probably have improved their food waste handling sometime in the future. So if the study is made later on will the results probably be more different to the results of my study. Then, are also the grocery stores in this study anonymous, so if anyone wants to replicate this study would I first have to reveal which grocery stores I have examined.

3.6.2 Validity

Validity expresses at what level a researcher is measuring what he or she is claiming to measure and is important in order to be able to generalise and apply the research in other cases but can be difficult to achieve in qualitative research (Bryman & Bell, 2011). To draw general conclusions has as mentioned, not been the aim with this study but two factors help to somewhat increase the validity of my study. First, the aim of the study was well defined which gave a clear direction for my research and secondly, the interviewees had all good insights in the specific topic I was studying. However, with only one researcher is it a risk for subjectivity since the conclusions are based on only one researcher's interpretation, a second researcher might have interpreted the results differently. (Bryman & Bell, 2011) To minimize this risk have I asked follow up questions to all managers and asked about details I first did not fully understand, to make sure I had understood the managers as correctly as possible.

4. Empirical findings

In the following empirical study have I examined how the grocery stores handle their food waste today. That means I have examined what they do to reduce it, what do they do with the groceries they cannot sell, if any other actor takes care of the remaining waste and if there is anything which hinders the grocery stores from further reducing their waste. I have also examined how the grocery stores work with the other actors in the chain and the stores adaptability to changing conditions as well as their possibilities to change an existing strategy and implement a new one.

This section will present what was retrieved from the nine interviews with grocery store managers from the three companies Coop, ICA and Hemköp. The grocery stores are all located within the Gothenburg area but will be anonymous in this study. I have selected stores within the same chain segment, such as ICA supermarket or Coop Konsum in order to make them easier to compare with each other. To give a good sense of their size will the stores turnover for 2015 as well as number of full time employees be presented. The waste amounts represent groceries the stores have not been able to sell but which instead have been either redistributed, used in their own kitchen, or thrown away. The empirical findings have been divided into headings similar to the ones in the theoretical framework to make it easy to follow and will then also be used in the following analysis.

Table 3: Information about the grocery stores

Grocery store	Abbreviation in text	Turnover 2015 (in million SEK)	Food waste in percent of annual turnover	Number of full time employees
Coop 1	C1	60	3	35
Coop 2	C2	47	1,5	20
Coop 3	C3	52	1,6	30
Hemköp 1	H1	63	2,2	25
Hemköp 2	H2	69	1,25	30
Hemköp 3	H3	160	0,9	40
ICA 1	I1	25	2,8	15
ICA 2	I2	65	2,6	32
ICA 3	I3	178	0,7	48

4.1 Coop

Coop was founded in 1899 and is a cooperative association which means it is owned by its members, the members are gathered in several regional and local association which owns the stores in their region. Together are there 32 associations, spread around Sweden and which together have 3,2 million members. The number of grocery stores is today 659. (Coop, 2016)

4.1.1 Infrastructure management pillar one - Capabilities

Capabilities defines what assets and resources a company has got. The manager for C1 says parts of the food waste handling is easy while other parts are a bit more difficult to handle. From each department in the store is there always someone responsible for going through all perishables, which is done twice a day. But the rest of the personnel has also a responsibility to check the groceries while they are working and remove groceries which does not look good anymore. It requires a lot of work to go through all groceries to be sure everything is good for the customers, a lot of groceries are very sensitive and therefore needs to be handled with extra care. But simultaneously does it belong to regular store routines to do this as Manager C1 said: "When every new personnel have learnt the routines it usually works well. More difficult is it to know how much to order. On the one hand, can it be difficult to know how much is requested and on the other hand, can the quality on the groceries vary which means the supply sometimes can be somewhat limited".

In the other two Coop stores they have one person from each department responsible and as in store one, it is different persons depending on who is working the actual day, but the store managers say it works well. "Since most of the personnel sometimes are responsible for going through all groceries they become used to it and therefore gets a routine to also check the groceries every day during their regular work", (Manager C2).

All stores use an automated ordering system which is connected to some groceries. The automated ordering system is connected to the store's inventory and orders new groceries when the amount of a certain grocery has reached a certain level. Since the system takes care of some orders does it save some time for the personnel. More groceries will perhaps be connected sometime in the future but according to the C1 and C3 managers are there some groceries which are difficult to connect to this system. They refer to some perishables such as meat which they rather order manually since they want to check the quality of the meat before they order anything and also consider what their customers might request during the coming days. The quality of the meat can vary and if it does not look good they order something else instead, which happens sometimes.

Each store in the chain is responsible for keeping the waste from the store on a low level but the stores can get help from the parent organisation if they want, which is exemplified by Manager C1; "There is a focus across the whole organisation on environmental issues such as the waste and the organisation really wants the stores to be as environmentally friendly as possible" (Manager C1). But the managers also mention the big costs the waste generates for the stores so the organisation does not really need to push the stores to reduce their waste because every store manager knows less waste most often means a better financial result and that it belongs to normal grocery store routines to have strategies for waste handling.

4.1.2 Infrastructure Management pillar two - Value configuration

The value configuration is about what activities a company has to do to be able to deliver value to the customer so in this case it is what the stores do to reduce their waste. Of the three stores are none of them privately owned but the managers are still free to set up their own

strategies. To increase the chances of getting everything sold they reduce the price on some groceries if they are close to its best before date or if they think a grocery soon will not look good anymore. The stores use different price reductions depending on what grocery it is and how the quality is, some groceries are given a 30 % reduction at first and sometimes more later on. More sensitive groceries, such as meat, are often reduced to 50 % strait away. The waste from each store is measured in both weight and in percent of the weekly turnover. The company has set up individual goals for each store and what they are depends on each store's own capabilities. All three stores in the study have a rather large proportion of perishables and have therefore a bit more waste than other stores with smaller proportions of perishables, so according to Manager C1; "It would therefore have been unfair to have the same goals for all stores in the chain".

4.1.3 Infrastructure Management pillar three - Partnership network

The partnership network shows if there are any other organisations which help a company to deliver value to the customers, i.e. provides competencies the company itself does not possess. In this case it is about whether any organisation helps the grocery stores to either reduce their waste or redistribute some of their waste. The three Coop stores all collaborates with the company Allwin which comes every weekday with a truck and collects groceries the stores haven't been able to sell, both perishables and dry groceries. The stores have had this collaboration for a bit more than three years and the managers think it works well. They do not have any similar partnerships and did not have any similar partnerships before Allwin. Manager C1 further explains; "What is best is of course if all groceries would be sold but since that is more or less impossible, it is good this type of organisation exists".

Allwin was founded in Gothenburg in 2010 by the foundation GE (Swedish abbreviation for shared responsibility), a foundation founded in 2006 by Simon Eisner. Allwin's business idea is to take care of groceries from grocery stores which they have not managed to get sold. These groceries are then redistributed to churches and other non-profit organisations which gives the groceries to people in need of them. To come and pick up groceries from a grocery store, Allwin charges a fee. Since Allwin takes care of some groceries it reduces the stores' waste which they otherwise have to pay for anyway so there is no any extra cost for the stores to let Allwin come and collect groceries. (Allwin, 2016)

4.1.4 Supply chain optimisation - Uncertainties

According to Davis (1993) and van der Vorst and Beulens (2002) are different types of uncertainties the main cause of inefficiency in a supply chain and the actors in the chain need to handle this uncertainty in a good way. The managers in the Coop stores use previous sales statistics if they are unsure about the demand of a certain grocery. They also look at statistics of similar groceries and statistics from a certain time period. The statistics is also used to spot trends and to see if they need to adjust the amounts for any grocery. If the same grocery is thrown every week must they manually change so the system in the future orders less of it. Manager C2 and C3 say they also usually have a feeling of the expected demand while manager C1 has not worked in the store for that many years so she has only started to know the store's customers and their demand. When it comes to new groceries, which can be a new

type of an existing grocery or a completely new grocery, all stores make an extra promotion for these groceries and provide the customers with suitable recipes to make them more willing to try them.

Any major supply uncertainties have not the managers experienced either and gave similar answers. Manager C3 said; “We are satisfied with the suppliers we have; we can get all those groceries we want to have in the store. The supply of some groceries depends on the season but it is natural to have less of those groceries if they are not in season”. However, Manager C1 and C2 said they only order if the quality seems to be good enough and otherwise orders a similar grocery instead, which happens sometimes. Manager C1 explained; “But this is not a big issue for us, I only want to sell good groceries to our customers and if we decide to not buy a certain grocery because of insufficient quality we explain that to our customers which I believe accept that”.

4.1.5 Supply chain optimisation - Information sharing

One of the cornerstones for an efficient supply chain is the sharing of information between the actors in the chain. The managers from Coop say the communication with the suppliers works well, since they can order as late as the day before they do not need to change orders and the suppliers are usually honest. This means the stores can call before and ask about the quality of certain groceries and is exemplified by Manager C3; “Even though the suppliers want to sell as much as possible they know they risk to lose a customer if they sell groceries with a lower quality than usual but to the same price”. The parent organisation also really pushes the stores to always report and complain when any problems occur because any deficiencies can then be spotted, which Manager C2 further explained; “The company and the whole industry has a strong focus on the environment and the waste is one part of the problem. But the waste is also a financial problem since it is costly to throw groceries and each store can save quite a lot by reducing its waste”. The managers say they understand this information is important for the parent organisation and have therefore implemented routines which they feel work well, where the personnel always should report if there are any problems with a delivery or if any other problem occurs.

4.1.6 Supply chain optimisation - Collaboration

For a supply chain to be efficient is it also important the actors in the chain collaborate with each other. The three Coop managers also think the collaboration with their suppliers works well, they order most groceries the day before so the stores can be rather flexible in their orders and only order what they really need. They all mention the importance of reporting and complaining to the supplier if any groceries delivered to the store are of insufficient quality because it is of great help for both the suppliers but also the company to see how the distribution works. Manager C2 said; “Through the complaints is it possible to see if anything needs to be improved, the company can decide if they need to change supplier and the supplier can see if they need to change any of its routines and improve in some way. The suppliers also often want feedback because they want to improve so they do not risk to lose any customers”.

All stores have rather many local suppliers and are somewhat free to choose their own suppliers because each supplier must first be approved by the organisation. It is to be sure the supplier is a good and responsible company and that everything is in order. The suppliers are audited to see e.g. that they pay tax for their workers and that their business is approved by the authorities. So if a store wants a certain supplier or if a company wants to become a supplier to a store, must the parent organisation first be contacted. None of the managers have had any problems with this, as Manager C3 explained; "It often takes a few weeks for a supplier to be approved by Coop but it is good they audit them because it is easier for us to trust them then".

4.1.7 Supply chain optimisation - Internal processes

To be able to collaborate and share information with the other actors in the supply chain must each store's internal processes also be working well. They must be able to handle and make use of information they get but also be willing to give away information. All three managers from the Coop stores are pleased with their stores internal processes. Manager C3 says if any strategy is not working they have to change because it is difficult to operate a store if the internal processes is not working. Manager C1 and C2 say it is a part of the job as a store manager to set up good strategies, each manager is responsible for the store to be functional and as Manager C2 said; "Without good strategies is it difficult to perform".

4.1.8 Change management

If any of the grocery stores would need a changed strategy to enable a better handling of the food waste can it be difficult for the managers to get this new strategy accepted so the managers were therefore asked about their opportunities to implement a new strategy for their store. The managers from Coop did not think it would be any problems for them to implement a new strategy in their store, the parent organisation allows them to set up their own strategies and they do not think the employees would have any problems to accept a new strategy either.

4.1.9 Obstacles

The managers were also asked if they think anything hinders them from further reducing the waste from their store or redistributing more groceries they have not managed to sell. Manager C1 says there are no obstacles for them, they have what they need to handle the waste. Manager C3 says there are no obstacles either but that it is a continuous work to try and reduce the waste. They also get some help from Allwin who has come up with suggestions on how the store can reduce their waste. Manager C2 said there are not many obstacles but they are very much controlled by the best before dates. "On the one hand, are we not allowed to sell anything where the best before date has been passed, even if the grocery still looks good. On the other hand, is it difficult to get groceries with a short best before date sold since customers tend to pick groceries with the longest dates. Some groceries can be sold if the price is reduced but some are still very difficult to get sold" (Manager C2).

4.2 Hemköp

Hemköp was founded in 1958 and is today a part of the Axfood Group. The number of grocery stores around Sweden is today 180 (Hemköp, 2016).

4.2.1 Infrastructure Management pillar one - Capabilities

All three store managers say they have enough capabilities to take care of the food waste. The personnel are well educated about how to reduce waste, there is not any specific person responsible for taking care of the waste or to reduce it. Each department in the stores is responsible for their own department, which means to reduce price on groceries with a short best before date or remove groceries which they know will not be sold due to its insufficient quality or any other reason.

All three stores have an automated ordering system which seems to be of the same type as Coop uses and the managers are very pleased with this system, which can be shown in what Manager H1 said;

"It is becoming more and more common for stores in this industry to have an automated ordering system because the benefits with it have been rather obvious. Not only does it save time for the personnel since they do not need to have full knowledge of what needs to be ordered. It also reduces the waste since no unnecessary orders are made and a reduction of the waste makes a huge financial difference for the stores".

According to manager H3 does the ordering system also generate waste reports so the stores can see if there are any differences between ordered and sold items which can be caused by e.g. theft or because some groceries had to be thrown by some reason. The waste reports help to give the stores better awareness of the amounts of waste.

4.2.2 Infrastructure Management pillar two - Value configuration

The stores are privately owned and they are free to implement their own strategies but if they need help they know they can get enough help from the organisation. Stores which are not privately owned are instead owned by the parent organisation and managers in those stores cannot implement their own strategies, they have to instead follow the parent organization's strategies. Manager H2 said they often look at how these centrally owned stores work because they often have very good strategies. He also mentioned that Hemköp has an environmental manager which previously has been a politician and has a strong environmental interest with good knowledge within the field and works very hard to improve environmental strategies for the stores. He explained;

"The organisation's work with environmental issues is of great value for the stores because it gives us good tools to work with. Discussions about the environment has become more frequent in both the society and in the industry. The industry knows a waste reduction will save a lot of money but also that it gives a better reputation among the customers if the company can show they work towards becoming more sustainable. Therefore, is good communication with the customers important" (Manager H2).

If a grocery is close to its best before date or has picked up any flaw, the stores reduces the price on it. H1 and H3 start with a 30 % reduction and after a while they either reduce it further to 50 % or throw the grocery if they feel it will not be sold. In store two they usually

reduce the price directly to 50 %. The stores try to get as much as possible sold but when it comes to fruit and vegetables is it difficult since most people do not buy groceries with some kind of flaw even if the price is reduced. H1 therefore throw quite large amounts of fruit and vegetables, which Manager H1 commented with; "I do not like it but that is how the situation is at the moment". H2 has its own kitchen where they can make use of much of the groceries they cannot get sold and therefore they do not throw that much groceries. The situation is similar in store three which also has its own kitchen. But regardless of amounts of waste, the three stores measure their waste in both weight and money and which is compared to other grocery stores within the chain but also to other grocery stores in the neighbourhood.

4.2.3 Infrastructure Management pillar three - Partnership network

H1 has no external partner which takes care of any food from the store. They have had discussions with Stadsmissionen but has not been able to close a deal with them. He explained;

"It was difficult for Stadsmissionen to handle perishables, especially refrigerated ones and it was difficult for us to know what groceries to put aside for them because it seemed like they wanted different types of groceries from time to time. Then, they also did not have the possibility to come and pick up groceries regularly due to insufficient amount of personnel" (Manager H1).

H2 have discussions with Allwin and will maybe start a partnership with them later on. Previously did they have a partnership with the non-profit organisation The rescue mission of Gothenburg. The manager explained that partnerships like these often works perfect for a month and then not at all. There are no problems for the store to let someone else come and take care of food from the store but it is more difficult for the other actor, especially if it is an organisation where people work on voluntarily basis. For it to work someone has to come to the store every day and pick up groceries which they did not manage to do in the long run. It was also difficult for them to handle perishables since those needed to be redistributed quickly before becoming inedible and difficult for them to handle refrigerated groceries since they did not have possibilities to keep all those groceries refrigerated until consumed. Manager H2 continued; "I know there are many stores which want to give away food to charity but it requires the partner organisation to have enough resources for it and since it requires quite extensive resources, is it difficult for non-profit organisations".

H3 sometimes collaborates with a cafe for homeless people which they give various groceries to. Sometimes they also collaborate with Stadsmissionen but they only want larger shipments of goods and for the moment the organisation collaborates with so many other actors so they do not need help from any more, they do not have resources to take care of more. Previously has the store also collaborated with a church located next to the store, which was easy to operate since it was so close. But at the moment the store does not collaborate with anyone and the store manager think it depends on the other actors and what capabilities they have, Manager H3 explained; "Even if we would deliver the groceries to the other actor must there

be someone there to take care of them and they must have good storage facilities for the groceries, which can be difficult for smaller actors to have".

4.2.4 Supply chain optimisation - Uncertainties

To handle demand uncertainties, the managers take help from previous sales statistics, such as what the automated ordering system generates. Each store has statistics for sales on both weekdays and weekends and statistics on all groceries, both those promoted through a campaign but also on all other groceries. For groceries which are not connected to the automated ordering system the managers use previous sales statistics, sales forecasts but also their own experience of the usual demand from their customers for certain groceries.

When it comes to new groceries has the industry decided to have certain time periods each year when new groceries can be introduced in the stores and which Manager H2 explained; "It makes it easier for us since we therefore are given enough time to prepare the store for the new grocery. It would have been too much work for us to handle if new groceries would be delivered during every month". The stores are given these groceries for free by the producer so there is not any risk for the stores and they are given plenty of information about how it should be stored and marketed to help the stores sell as much as possible of the new grocery.

The managers seldom have any major problems with suppliers and their supply, one reason according to the managers, is because the procurements are made by the parent organisation and which Manager H1 further explained; "Hemköp mostly manage to get the groceries we should have in our stores but I know they sometimes struggle to find fruit and vegetables with a sufficient quality. Many customers do not care of seasonal changes, they want access to all sorts of vegetables all year round and we want to meet their requests but that can sometimes be difficult".

4.2.5 Supply chain optimisation - Information sharing

The communication with suppliers and the parent organisation works well, according to the managers. They receive most information through the organisation's intranet where the stores can get relevant information quickly. Manager H1 explained that if there are any problems with a grocery, such as that the producer expects a grocery contains an ingredient it normally should not contain and which people can be allergic to, the producer or supplier are quick to inform the stores. In that case are all items of the grocery from that shipment stopped and the stores cannot sell it, the system makes it impossible to sell by making the barcode impossible to scan. The grocery is stopped until the producer knows for sure if it is something wrong with it or not. If it turns out to be anything wrong with a grocery, the producer wants all items back. All stores are through a contract forbidden to sell any stopped groceries, not even to a reduced price, said Manager H1.

The stores also receive other information through the intranet, such as expected problems with a delivery or directives or tips from the parent organisation. It can be information about a new grocery the stores soon will get and how they should handle and promote the grocery and where in the store to place it and which can be exemplified with what Manager H2 said;

“Hemköp is often quick to inform us if there is anything and the information we receive is mostly relevant and useful”.

4.2.6 Supply chain optimisation - Collaboration

Also the collaboration works well according to the managers. The automated ordering system takes care of a lot but they also have possibilities to change orders if it is not too close to delivery and since procurements are made centrally by the chain is it easier to put pressure on the suppliers to deliver what is requested. If local suppliers are used is it still the parent organisation who makes the procurements. The managers are pleased with the distribution and according to manager H2 has the whole industry improved during the last few years. As an example he mentions that the industry tries to make better use of animals. “From an economical and environmentally perspective is it good if more of the animals can be used. The discussions about the waste problem has increased in the society and the industry seems to see the problem as well and is working to reduce it” (Manager H2).

4.2.7 Supply chain optimisation - Internal processes

All three managers think their internal processes work well. The personnel know what to do and they have resources which helps them, such as the automated ordering system and statistics. Manager H1 and H3 say it sometimes is a bit of a struggle with the working schedules if many are sick but they usually manage to solve those type of problems. Manager H3 also mentions it requires a bit of work with new personnel but that it is not much of a problem since they learn the store’s routines quite fast.

4.2.8 Change management

None of the managers think it would be any problems to implement a new strategy. They do not have to get a permission from the parent organisation before and the employees would according to the managers, probably not have any problems to accept a new strategy either.

4.2.9 Obstacles

According to Manager H1 are there primarily two things which hinders the store from reducing their waste any further. He said the main issue is the customers’ behaviours and attitudes since they have certain expectations on how the groceries should look like and therefore only buys groceries without any flaw and they are not careful enough with the groceries which results in damages on them. The customers also prefer to pick the refrigerated groceries with the longest dates which means some is never sold. The manager ended by saying; “People in general, including you and me, must change behaviour before the waste can be further reduced” (Manager H1).

The second issue is about the difficulty to find a partner which can take care of the food the store cannot sell, previous attempts have only worked for some time and not for any longer and the partner has only been able to take care of some groceries. The manager said that if a partnership like this is going to work must the grocery stores know beforehand what groceries the partner can take and they must be able to take them every day because otherwise will it be too much for the stores to handle since the space in the stores often is very limited. But he

does not think there are any rules which hinders the store from taking better care of the waste, it is more about the partner's abilities. He said; “There are for instance strict rules when it comes to refrigerated groceries so the partner must also be able to store those groceries in cold temperatures until they are about to be consumed. For the stores is it not a problem but for the partner can it be more difficult, especially if it is a non-profit organisation with limited resources” (Manager H1).

Manager H3 do not think there are any rules which hinders the store, there are strict rules for especially refrigerated groceries but he also thinks that is needed since the quality is important. He would never give away any groceries if he cannot be 100 % sure those groceries are good enough and no one would risk to become sick from them. Therefore, the store does not give away any refrigerated groceries because they cannot be sure the other actor can handle those groceries properly. He explained; “Even if another organisation has taken the groceries I still think we have a responsibility for them” (Manager H3).

Manager H2 does not think anything hinders them from taking better care of their waste. They rarely have any waste, most groceries they have not managed to get sold do they make use of in the store’s own kitchen.

4.3 ICA

The foundation of ICA is from 1917 when the company AB Hakon Swenson was started but the company ICA was founded in 1938. The number of grocery stores in Sweden is today 1 306 (ICA Gruppen, 2016).

4.3.1 Infrastructure Management pillar one - Capabilities

In I1 they have one person responsible for perishables who three times per week goes through all groceries and sees if anything needs to be thrown or consumed within the next few days. Those groceries which are close to its best before date or soon will not look good enough anymore, do they reduce the price on and hope to get all items sold in time. According to the manager is it a simple task, it is just about to get a routine on it and they want a clean store with good orderliness. She continues; “It is about giving good service. It takes about three hours per week and it is the same person who is responsible for it and therefore has a good knowledge about the sensitivity of certain groceries. But the rest of the personnel are also educated for this duty so they can step in if the regular person is missing” (Manager I1).

In I2 they have two persons who together are responsible for going through all perishables every day to see the status on them. The manager says it is a routine task to go through all groceries, she wants a clean store and explains; “Since it is two persons responsible is it seldom any problems either since the other one can step in if one is missing but if both are missing can I myself or any other in the personnel step in since we also know what needs to be done” (Manager I2). Even though they try to get everything sold they still have to throw quite large amounts of groceries, especially perishables as they are very sensitive and when a grocery has picked up any flaw or is close to its best before date is it very difficult to get it sold, even to a reduced price. Then, in I3 is each department responsible for going through all

groceries regularly every day and sort out groceries or reduce the price on those which soon might be difficult to get sold. No particular person is responsible, all personnel working the actual day are responsible. The manager think it works well and a confirmation of it is that they rarely have any waste at all.

All three stores also have an automated ordering system which is connected to the inventory and seems to be of the same type as what Coop and Hemköp use. Not all groceries are connected to this system but for those that are, all three managers think it works fine, as Manager I1 explained; "It saves some time for us since we do not need to have full control over the inventory and the system also generates sales statistics so we can see if the orders need to be adjusted to be bigger or smaller". But there is also a daily routine for the personnel in the three stores to check if they need to order more of any grocery and the stores do stocktakings regularly.

The managers say they have good routines when it comes to handle the waste. They can get some help from the organisation if they need but according Manager I1 does it belong to just normal store routines to have strategies for this and there are also incentives for the stores to have it and explained;

"We want to have a clean store with good orderliness and only sell groceries we ourselves would choose to buy. We therefore try to get everything sold while the groceries look good and otherwise removes them from the shelves. It is also a large cost for any store to throw groceries and it is possible to affect the financial result rather much by reducing the waste".

4.3.2 Infrastructure Management pillar two - Value configuration

Just as the three Hemköp stores are the three ICA stores also privately owned and free to set up their own strategies, which the managers say works well. To increase the chances of getting everything sold, all stores reduce the price on groceries which the personnel expect soon will not look good or where the best before date is approaching. I2 reduce the price to 50 % on groceries which are two days from its best before date, I1 start with a 30 % reduction on some and groceries while they directly reduce to 50 % on some other groceries. I3 sometimes reduce the price to 50 % and sometimes to 30 %, depending on what type of grocery it is and how it looks like and according to Manager I3 do they usually manage to get everything sold and therefore rarely throw any groceries at all. The three stores do not sell any groceries which has passed its best before date and only good looking groceries.

The stores keep records on how much they sell of all groceries to see if they need to order more or less of a grocery. As Manager I2 explained; "If the same grocery is thrown every week it might be needed to order less of that grocery". Some of the statistics is generated from the automated ordering system which is of great help for the stores. The waste for each store is measured in percent every week and is compared to their previous statistics and with other stores of similar size, within the chain.

4.3.3 Infrastructure Management pillar three - Partnership network

I1 collaborates with a church whose personnel comes and takes groceries where the package is broken and sometimes some other groceries, such as fruits and vegetables. The church then distributes the groceries further to other people. The store has also discussed a partnership with Allwin but have not reached a deal yet and the store manager is unsure if it will be a deal. They also receive money from a company which comes and collects all their corrugated paper which otherwise would have gone down in the container for combustible material.

I2 collaborates with an organisation for people with drug problems whose personnel comes and takes some groceries the store has not been able to sell. Then, some individuals come to the store regularly and takes groceries which the store otherwise would have thrown in their compost. Those groceries become food for the individuals' wild boars. Previously, have the store had a similar collaboration with a farmer who received groceries to give to his pigs.

I3 does not collaborate with anyone because they rarely have any groceries to give away or throw because they manage to get everything sold instead. When they have any groceries they have not managed to get sold the amounts are too little to be worth redistribute to anyone, it can e.g. be a couple of fruits or a piece of bread. Then are sometimes some groceries damaged when they arrive to the store but those groceries are instead returned to the supplier and replaced with new ones.

4.3.4 Supply chain optimisation - Uncertainties

To predict the demand for certain groceries the managers use previous sales statistics which they can see far back in time with. All three managers have been at their respective store for several years and can therefore also use their own experience about the expected demand from their customers. Manager I1 says that even if most stores probably have their own strategies for issues like these is it possible to get help from the parent organisation. She explained;

"The organisation continuously comes up with new strategies which the stores are free to try and these strategies become better and better and we have previously tried some of them, but we only start to use any of them if we think it is much better than our existing strategy".

But the parent organisation cannot help when it comes to predicting customer demand for certain groceries because it does not have any knowledge about each local market so here is it instead up to each store manager to try and predict the demand. Then, are there also some groceries the stores must have in its supply, regardless of what the demand for these groceries might be in each store but according to the managers is this not a problem for them. Manager I2 said; "It is just groceries that are requested by our customers anyway, so it is not a problem for us".

None of the managers seem to have any bigger problems with the supply, which can be exemplified with what Manager I2 said; "The supply from our local suppliers can sometimes be a bit limited but in those cases we just buy from ICA instead and ICA usually have the

groceries we want to have". The other two managers also say they buy most groceries from ICA which most often can deliver what the stores want. Manager I1 says she always want enough supply of campaign groceries because otherwise will perhaps some customers be disappointed. She continued;

"It is sometimes a bit nervous with campaign groceries because you want to have enough supply of it and even if ICA usually has secured a really large supply of that grocery are you still a bit unsure if you have ordered enough and if you can order more during the week or if the supply will be empty then. So I rather order a bit too many than too few to be sure to have enough" (Manager I1).

4.3.5 Supply chain optimisation - Information sharing

The managers are pleased with the communication along the chain. They can change orders if it is not too close to delivery and they can order more if they need. They are also pleased with the automated ordering system which contributes by doing a lot of the work as well. Manager I3 explained; "Since we buy most of our groceries from ICA is there seldom any problems. For the stores to be successful is it required we receive groceries of good quality and on requested time and ICA has for several years worked quite a lot to deliver this to the stores" (Manager I3).

4.3.6 Supply chain optimisation - Collaboration

The managers also think the collaboration with suppliers works well. Since most groceries are procured through the parent organisation they do not collaborate with that many different suppliers. The stores only have some local suppliers and if a partnership with a local supplier has not worked well have they just switched to another one. The managers do not think it is so difficult to switch to another supplier, because if the partnership does not work are they more or less forced to switch in any case. They can buy all groceries they need from the parent organisation but can also choose local suppliers if they want. As Manager I1 said; "The customers seem to like groceries produced nearby so we try to find local suppliers but if we cannot find anyone can we just buy from the parent organisation instead. We can actually use this to put pressure on our local suppliers if there sometime would be any problems since we then can threaten to buy from ICA instead" (Manager I1).

4.3.7 Supply chain optimisation - Internal processes

The managers think they have good internal processes. Manager I1 said it is normal procedures to have good control over your operations since it would not work if you do not have clear routines for everything. Manager I3 said the same and that the stores have good assisting tools for the daily work, such as the ordering system and statistics. Manager I2 said that if a store has any troubles to handle certain issues is it up to the manager to fix it but he or she can still get support from the parent organisation if needed because the store cannot function if everything is not in order.

4.3.8 Change management

The managers do not think it would be any problems for them to implement a new strategy since they are free to set up their own strategies and the employees would according to the managers, probably not have any problems to accept a new strategy either.

4.3.9 Obstacles

Manager I1 requested smarter physical solutions so they can store more groceries before redistributing them, now they have to throw groceries which can be redistributed if no one can come and pick them up quickly enough because of the store's limited storage facilities. She also wants better solutions for those groceries they have to throw. Instead of one compost and a container would it be good with something else. Now they throw all groceries which cannot be throw in the compost, in the container. A better solution would be if they could sort the waste and have different bins for different types of waste and a compactor which would create more space. But now they do not have enough room for any other solution.

While manager I1 does not think there are any rules which hinders them from taking care of more waste, manager I2 mentioned rules as their main obstacle. They would like to redistribute more groceries but there are strict rules which hinders them from redistributing many perishables. Instead, they have to throw large amounts of meat, dairies, fruits and vegetables. Bread is easier to redistribute since it is not that sensitive. However, the store manager understands the rules must be strict since the risk for bacteria is high in many groceries. The manager explained;

"The issue is that we must be able to guarantee the groceries are 100 % safe and as long as the groceries are within the store is it rather easy. But the same is required for an organisation which would come and take care of these groceries and it is not sure they have the required resources to make that promise. They must be able to store all these groceries in cold temperatures until they finally are consumed and not all organisations have these capabilities" (Manager I2).

Manager I3 does not think there are any obstacles, with good routines and a focus to get everything sold is it rather easy, he said. But he understands the conditions are different for different stores. For their store is it easy to handle the waste since they rarely have any but for other stores can it be more difficult. He mentions that they for instance do not have any own production, all their groceries are delivered to them. Other stores which e.g. grind their own meat often have more waste.

4.4 Table 4: Summary of empirical findings

	Coop	Hemköp	ICA
Capabilities	- Automated ordering system - Knowledge	- Automated ordering system - Knowledge	- Automated ordering system - Knowledge
Value configuration	- Routines - Reduce price	- Routines - Reduce price	- Routines - Reduce price

	- Measure and compare	- Measure and compare	- Measure and compare
Partnership network	- Allwin	- Non-profit org. - Churches	- Non-profit org. - Churches - Animal owners
Uncertainties	- Statistics - Experience - Good relationship with suppliers	- Statistics - Experience - Good relationship with suppliers	- Statistics - Experience - Good relationship with suppliers
Information sharing	- Enough info from both suppliers and parent org. - Info from auto. ord. system. - Can order the day before - Must report all problems	- Enough info from both suppliers and parent org. - Can change orders if not too close to delivery - Should report problems	- Enough info from both suppliers and parent org. - Can change orders if not too close to delivery - Should report problems
Collaboration	- Managers say it works well - Suppliers must be audited - Stores make the procurements	- Managers say it works well - Parent org. makes procurements	- Managers say it works well - Most procurements are made from parent org.
Internal processes	- Managers said it works well	- Managers said it works well	- Managers said it works well
Change management	- Free to set up own strategies and employees would not mind - Difficult to change customer behaviours	- Free to set up own strategies and employees would not mind - Difficult to change customer behaviours	- Free to set up own strategies and employees would not mind Difficult to change customer behaviours
Obstacles	- Best before dates	- Customer behaviours - Food safety - Partners' capabilities	- Customer behaviours - Partners' capabilities - Limited storage possibilities for waste

5. Analysis

The purpose of this chapter is to compare and analyse the theoretical framework to the empirical findings. The chapter follows a similar structure as the theoretical framework and the empirical findings; for each company will first the grocery stores infrastructure be examined followed by how they work with the other actors in the chain. Then, will the managers' abilities to implement a new strategy and any eventual obstacles against reducing the waste, be examined.

5.1 Capabilities

All nine stores seem to have good capabilities to handle the groceries in a good way. All managers were very pleased with the automated ordering system which saved time for the personnel and generated useful statistics. According to the managers did it also reduce the waste, even for perishables but this can be questioned since the system cannot know the actual quality on all groceries. In the Coop stores they order some perishables manually since they want to see the quality of the groceries first which seems as a good strategy since the quality can differ from time to time and to order groceries of a lover quality may lead to more waste. In the other stores the system ordered as soon as the inventory reached a certain level and did not pay attention to quality.

Most of the personnel seem to have good knowledge about how to handle the groceries and have routines to regularly check the status on all groceries and take necessary actions when needed. There were no major differences between the strategy for each company, but a bit more between each store. In the Coop stores are one or several from each department responsible. In the Hemköp stores are each department responsible but no specific person at each department and in the ICA stores it varied from one or several individuals responsible to each department in one store. There was however no connection with how this strategy looked like and if the stores had larger or smaller amounts of waste. For instance, had I1, one person responsible while in H1 and C1 were each department responsible but they all had quite large amounts of waste, according to the managers. To go through all groceries is apparently important but not how many persons in each store which has this responsibility. It seems logical to let the responsibility lie on all personnel instead of one particular person since that person sometimes might be missing. However, it requires all personnel to actually perform this task and not just thinking someone else will do it. A further issue is if the personnel sometime would work under time pressure and if they in that case would do this task as thoroughly as usual.

According to Hagel and Singer III (2000) should a company keep core-competencies in-house and to let the personnel go through all groceries is a good strategy since they know their store well and how groceries should be handled but also how sensitive some groceries are. To also let a system make some orders is preferred by the managers and one good reason can be because it saves time for the personnel. However, the system should not handle all groceries since it cannot know the quality of the groceries and might therefore sometimes order

groceries with an insufficient quality. When it comes to redistribution of groceries, the stores have good competencies to store and handle the groceries but not to redistribute them so this task should still be done by an outside actor. The difficulty lies in finding a partner which has these capabilities.

5.2 Value configuration

The value created for the customers are generated from the activities the company performs (Osterwalder, 2004). To get as much groceries as possible sold, all stores reduce the price on groceries which needs to be consumed soon. In the three Coop stores as well as in I1 and I3 the reductions vary depending on what type of grocery it is and the actual quality, some is given a 30 % reduction at first and others 50 %. H1 and H3 starts with 30 % on all groceries and maybe reduces further later on while H2 usually reduces to 50 % strait away. I2 reduces to 50 % on all groceries which has two days to the best before date. The strategies are similar between the stores but none of the companies seem to have a unique strategy. Any connections between type of strategy and amount of waste cannot be seen either. One could suspect a store which reduces to 50 % straight away would get more items sold and therefore have less waste but there were no clear evidences of that in this study.

More important than how much to reduce the price seems to be to put in a lot of time and effort to get everything sold and to know the stores' customers. Personnel with good experience probably knows quite well what they need to do to get the groceries sold. However, not all personnel have this experience and maybe even more important, it would be very expensive for the stores to reduce too many groceries to 50 %. But since the price reductions makes more groceries to be sold it should be continued and the managers said they keep records on all waste to see if they need to order less of anything which is wise. It should give them more experience and better knowledge about how much to order which can increase the chances of getting more groceries sold to regular prices. But to also have its own kitchen seems like a good strategy, according to manager H1 and H2 is their store's kitchen one of the main reasons why they seldom have any waste at all since they there can make use of the groceries they have not managed to get sold. The kitchen is a good way for the stores to still generate some profits from these groceries.

All stores also measure their waste. The ICA stores compare their waste to other stores of similar size within the chain while the Hemköp stores also compare to other grocery stores nearby. Even though stores from different companies are operated differently it might be good for each store to also compare with stores from other companies since it might give new hints on how the store is performing. In Coop they have individual goals for each store which seems like a good idea as well, it gives the stores more incentives to improve since the goals are reachable for each store. But no matter how the stores measure their waste, it should at least be measured since it gives them better awareness of the amounts and which also was mentioned as important in the literature. But the stores probably have good awareness of this issue, among many customers is it obviously worse. To increase the awareness among the customers about how much waste each store has got, they should show their customers this. One example could be to have a sign at the entrance, showing the amounts of waste for the

previous week and give the customers tips on how they can contribute to reduce the waste. However, one question is how much of this responsibility there should be on the grocery stores, perhaps it is better with more unified campaigns lead by the store's parent organisation or the industry.

5.3 Partnership network

It would be difficult for the grocery stores themselves to redistribute all groceries they have not been able to sell and as Gulati and Singh (1998) and Osterwalder (2004) writes can a company through a partnership get access to assets itself does not possess but needs to deliver value. In this case can partners for the grocery stores redistribute more of the groceries they have not been able to sell. The three Coop stores all collaborates with the company Allwin which comes every day and picks up groceries which they redistribute to churches and other non-profit organisations. The managers all seem to be very pleased with this collaboration since Allwin can take care of most of the groceries they have not managed to sell and also helps them to further reduce their waste. Two of the stores also have small amounts of waste, according to their respective manager. The amounts are however not too small since it is still enough to be worth picking up by Allwin but it is at least good most of the groceries are redistributed instead of thrown.

H1 and H2 have had discussions with Allwin but have not been able to close a deal but H2 and H3 have had partnerships with various non-profit organisations previously which has worked for a while. The three managers all mention the difficulties for the other partner. It is not difficult for the stores to have a partnership like this but it requires quite extensive capabilities and resources from the partner which it often does not have, especially not non-profit organisations. That is one difference with Allwin whose business idea is to pick up groceries from the stores for a fee. The stores which have not been able to start a relationship with Allwin should perhaps consider to have their own kitchen instead since it as mentioned, seems to be another good way to reduce most of the waste amounts.

None of the ICA stores collaborates with Allwin and only one have discussed a partnership with them. I3 does not collaborate with anyone since they rarely have any waste at all. I1 and I2 have partners which comes regularly and pick up some groceries but the stores still had quite large amounts of waste. I2 also collaborated with individuals who received groceries to give to their animals. This is on the one hand, a good strategy since the groceries then becomes consumed but I can understand if the managers do not want to take this too far since it could lead to less sales if some people expects to be able to regularly come and pick up groceries for free, even though these groceries were for animals.

I1 and I2's partners seem to have somewhat limited capabilities to handle larger amounts of groceries and mostly fruit, vegetables and dry groceries. It is the same issue as the managers from Hemköp talked about, it is difficult for the other partners to take care of the groceries, especially if it is a non-profit organisation. If the grocery stores cannot sell or make use of all their groceries is it essential someone can take care of them and the idea to partner with non-profit organisations is good since they can make use of the groceries in a good way but in that

case must their capabilities and resources be strengthened. Allwin seems to be a better option since they have better capabilities to take care of the waste. As mentioned is it only the Coop stores which collaborates with Allwin at the moment and two of the stores in this study also have small amounts of waste.

5.4 Uncertainties

According to Davis (1993) is uncertainty the main issue for organisations when it comes to handle networks and the more uncertainty there is, the more waste will there also be in the process (Persson, 1995). The stores seem to have good strategies to handle demand uncertainties, they all use previous sales statistics and the automated ordering system, which according to the managers, is of great help. Most of the managers also used their experience to predict the demand. Even though the stores can get some help from their parent organisation, it cannot help to predict the demand on the local markets which is instead up to each store. This requires a new manager to have either worked in the store before becoming manager for it, that he or she can get help from the other personnel which has better knowledge about the expected demand or that the store has got extensive sales statistics. The managers in this study also said they were satisfied with the assisting tools they have in order to handle demand uncertainties.

Only the Coop store managers mentioned that they do extra promotions for new groceries, with recipes and extra marketing. The other managers said they only promotes new groceries as the producer wants them to promote it, which usually is through bigger signs and sometimes special placement in the store. One of the managers from Hemköp said the industry has a strategy to only release new groceries at certain time periods which can be good since it makes it easier for the stores to handle these new groceries so they can put more resources on other tasks. However, the stores can also return all unsold items of the new groceries to the producer for free. When grocery stores can return groceries for free, it gives them low incentives to get everything sold which was mentioned in the literature and even if it is unclear what the producer does with the returned items one can expect this approach generates some waste. It should also be mentioned that all the stores in this study are also allowed to return all unsold bread to the producers which gives them low incentives to get all bread sold.

The uncertainty for the supply is apparently very low among the managers. They all rely on their suppliers and their parent organisations seems to work hard to put pressure on the suppliers to perform and deliver. Even though the managers said they can affect the suppliers this sounds easier to do if the store has a direct contact with the supplier. Several stores instead reported to the parent organisation and since these are very large organisations, there might be a risk some complains gets lost somewhere in the organisation and never reaches the supplier. However, since none of the managers had experienced any problems with this I assume it works rather well.

More uncertainty for the stores can be seen when it comes to partners for the waste. The store managers from Hemköp and ICA all say their store have capabilities for a partnership like this

but that it is difficult to find a reliable partner which they can work with over a longer time period. Especially non-profit organisations are difficult since they, according to the managers, often have very limited resources to handle the waste. The Coop managers on the other hand, did not have this problem since they thrusted Allwin to be able to handle the waste. This would also confirm what Lee (2002) proposed as one of two good strategies for supply chains dealing with functional food, which was to improve logistical systems. A reliable partner with good capabilities to take care of and redistribute the groceries can then reduce the logistical problems the redistribution of food waste generates. If the grocery stores want someone to come and take care of their waste is it wise to take help from Allwin or a similar organisation if available, rather than non-profit organisations because of the non-profit organisations' often limited abilities.

5.5 Information sharing

All managers say they receive enough information from their suppliers and the parent organisation. The managers from Hemköp and ICA say they can change orders if it is not too close to delivery and that their suppliers are quick to inform them if there are any problems. The managers from Coop also say their suppliers are quick to inform when necessary but also that the stores can order as late as the day before which could be one reason why it seldom are any problem with deliveries. Manager I1 said the automated ordering system helps a lot since it gives a lot of information, such as sales statistics. When asked about it, the other managers also confirmed that the automated ordering system gives them lots of useful information. The system assists the managers in the decision making when it comes to designing better operations, which Togar, Simatupang and Sridharan (2002) also wrote the supply chain actors should be able to do.

However, to be able to reduce any bullwhip effects must also the stores be able to inform the suppliers quickly and there is a risk this takes too much time if the information needs to go through the parent organisation first. On the other hand, can it be easier to coordinate the information if it goes through the parent organisation. It can be too much for the suppliers to handle if each store would report individually and as long as all important information reaches the right receives in time can the bullwhip effects be better controlled. But even if it appears to work well, it could be a good idea to investigate if the communication can be even further improved, such as improving the ICT-systems. It can be one way to further improve the logistics between suppliers and grocery stores which can help to reduce the waste. But I can understand if the stores or the suppliers do not want to reveal too much information about their business, as with any other company. As an example did not all the managers want to reveal their store's exact waste amounts, instead I had to go through the parent organisation to get all figures. But the more information the stores and the other actors in the chain can give to each other, the easier it gets for all the actors to also handle demand and supply uncertainties.

The managers from the Coop stores talked about how important the parent organisation say it is the stores report and complains if there are any problems, such as with the deliveries from suppliers. The managers from the other stores, when asked about it, just said they should do it

but not that it was any major pressure from the parent organisation to do this. The managers from Coop said the parent organisation wants to know about all problems because then it is much easier for them to improve the supply chain. This is understandable since it is easier to take care of a problem if it is visualised and probably easier for a grocery store to work proactively with waste reduction if their parent organisation also has a strong focus on it. It gives each store good incentives to work more with these issues if they know their organisation listens to them and shows they want to help the stores.

ICT-systems, which van der Vorst and Beulens (2002) requested, seems to be used by the suppliers, the grocery stores and their parent organisations. But to enable more waste to be redistributed would it be good if the organisations which should take care of the food waste from the stores also could have a system like this. In that case could they receive information from the stores what groceries they can come and collect and when. But again, for non-profit organisations can this be difficult to finance and they will most likely need help to finance a system like this.

5.6 Collaboration

All managers are pleased with the collaboration with suppliers and the parent organisation but to audit the suppliers as in Coop is a good idea. As the Coop managers say is this probably one reason why there seldom are any problem with their suppliers since they know they can trust them. Pressure is perhaps not the best way to treat a relationship but at the same time do the suppliers know they have to perform if they want to keep their contract. It is therefore easy for the stores to collaborate with them and as van der Vorst and Beulens (2002) wrote, more collaboration improves the reliability of supply and production quantity and quality.

The managers from Hemköp said the automated ordering system does a lot of the work and the procurements are made by the parent organisation so it is not that much work for the stores. When procurements are made by the parent organisation it makes it easier to put pressure on the suppliers to perform well. However, there must still be a link between the supplier and the stores since it is the stores which receives the groceries. Collaboration can be a bit more difficult if there are more parties involved. The managers said it seldom were any problem with this but the automated ordering system cannot report any problems so the stores cannot rely too much on it. Neither can they be totally sure the parent organisation can solve all eventual problems for them.

The ICA stores buy most of their groceries from the parent organisation which can be good since it can be easier to collaborate with people within the same organisation. If the stores can rely on their parent organisation to always have the groceries they want, can it also make the supply chain more reliable. In all cases mentioned above has the parent organisation a central role but this study has not shown which option is best for the stores. To let the stores do the procurements from the suppliers gives them much freedom, to let them buy from the parent organisation can reduce the supply uncertainties and if the parent organisation does the procurements will it be easier to put pressure on the suppliers to perform. It will also reduce the number of parties involved as van der Vorst and Beulens (2002) wrote. Which option to

use is probably not that important. What is important is that the ones responsible for the procurements are able to do good procurements and good collaboration with the suppliers is certainly required for it. As Horvath (2001) wrote can better collaboration enable shorter product delivery times and cost savings through streamlined business processes, which could help to reduce the food waste for the grocery stores.
But if the parent organisations want a reduction of the waste from the grocery stores should they perhaps also collaborate more with the stores and give them more help to reduce the waste further. If the parent organisations cannot reduce the waste further but do not want the stores to throw large amounts of groceries should they perhaps instead help more when it comes to redistributing waste since this seems to be difficult if the task is up for a non-profit organisation to handle. Another option is to let the producers be responsible for the groceries even when the groceries are not possible to sell anymore. It would probably reduce the amounts of waste but could be difficult for the producers to accomplish.

5.7 Internal processes

When it comes to collaboration as well as sharing and handling of information was it not possible to see any differences between the three companies. All managers at least said they have good internal processes but it is also understandable if they do have it since it would be difficult to operate a store if the internal processes do not work well. Presumably have the stores, privately owned or not, somewhat of a pressure from the parent organisation to work well and deliver what is expected by them and the parent organisation can probably step in and help if a manager sometime would be in need of it.

As Gunasekaran et al. (2004) wrote must performance be measured and the extracted information should be used to predict future scenarios (Horvath, 2001). The stores use budgets, they measure their waste and compare it with other stores and they use sales statistics to forecast future demand so this is similar to what the theory suggests. But the stores with larger amounts of waste should perhaps also check if they can do something more to get more groceries sold. If they are not already doing it, they should study grocery stores with small amounts of waste and try to learn from them. Even if the conditions is different for different stores must they do something in order to reduce their waste and inspiration from others can be helpful.

Furthermore, cannot the grocery stores use any information to predict if their food waste partners will be able to take care of their waste in the near future and the partners do not seem to have any system which can tell them any actual waste amounts at the stores either. If non-profit organisations shall be able to take care of the waste, would they need a system where they could see what groceries they can pick up from each store and how large the quantities are. In that case would they more easily be able to mobilize their limited resources and maybe be able to take care of more groceries. But an improved ICT system would as mentioned, be difficult for non-profit organisations to finance and if the grocery stores parent organisation shall help to finance a system like this, will they probably be sure the non-profit organisation then also can perform the task well enough.

5.8 Change management

In case the stores need to change its strategy to enable a better handling of the waste, the managers were asked about their possibilities to implement a new strategy for their respective store. All managers said it would not be any problem for them, they are allowed by the parent organisation to set up their own strategies and they did not think their employees would have anything against a new strategy either. As the interviews showed, are the main hinders against waste reduction and redistribution, the customers' behaviour and the partner organisations' abilities. A new strategy should therefore include also these issues which can be quite challenging for the stores. But as mentioned, is this probably a more suitable task for the parent organisations and the rest of the industry rather than for individual grocery stores. When it comes to changing the customers' behaviour must the parent organisations and the industry first create a vision as Luecke (2003) proposes and then create a sense of urgency and communicate the change vision as Kotter (1996) and Kanter, Stein and Jick (1992) proposes. They also write a strong leader is required for this change to be successful and the food companies all have someone responsible for sustainability and environmental issues and perhaps should this person be responsible for this change process, but with good support from the organisation. If the customers are going to change its behaviour must they be informed why they should do it and how they can benefit from it, otherwise will most people probably just continue as usual.

Then, when it comes to partners for the waste redistribution should the companies start a partnership with Allwin but it is probably difficult for Allwin to help all grocery stores and the industry should therefore either help Allwin or a similar company. If a non-profit organisation shall be able to do this task must it be given even more support because of their limited resources. However, the efforts from the industry to change customers' behaviour might also empower people at non-profit organisation to work more, which would make it easier for those organisations to take care of some more groceries. But of course, the main focus for the food companies should not be to enable a better redistribution of food waste, it should be to get more groceries sold.

5.9 Obstacles

Not all managers felt there were any obstacles for them to handle the food waste but of the ones who did, the obstacles were similar to what was seen from the literature. Manager C2 said they were very much controlled by the best before dates. Because of safety reasons are the stores not allowed to sell or redistribute anything which has passed its best before date, even if the grocery still looks good. Allwin can therefore just take groceries which are close to its best before date. As what also was seen in the literature does some people request a change in these rules and it would be good to investigate if the rules could be changed for some groceries, without compromising safety.

Manager H2 mentioned food safety as an obstacle for them. Not that rules in particular was the issue but that all partners in the supply chain must be able to guarantee the food is safe. Several managers said their store has good capabilities to handle the groceries but not the partner which is supposed to redistribute the groceries. Refrigerated groceries are very

sensitive which makes it difficult to redistribute them since the cold chain must be unbroken until the groceries are consumed. If a non-profit organisation or any other organisation with limited resources shall be able to take care of these groceries must they therefore be given good support.

One manager said the store had limited storage facilities for groceries they have not been able to sell so if they are going to be redistributed, someone has to come and pick them up quickly. Better communication with the other partner, perhaps through an improved ICT system, is therefore required. But as mentioned, it also requires the other partner to have enough resources to handle these groceries and at the moment it seems like only Allwin has what is required to redistribute the groceries in a safe and efficient way.

Finally, several managers mentioned customer behaviours as a cause since they prefer to pick groceries with the longest time to its best before date and only groceries without any flaws. From the literature was this seen as one of the major causes of waste from the grocery stores but not all managers had any major problems with this. According to manager H3 is it possible for all stores to reduce their waste, it just depends on how much focus the store puts on waste reduction. Maybe he is right, but what clearly is needed is more information to the customers about waste amounts, its causes and the problems it brings. The whole food industry should continue to work with this and put more resources on information campaigns. The grocery stores need help to educate the customers and their respective parent organisation and the food industry should provide the grocery stores with more tools to help them with this issue.

6. Conclusion

The objective of this thesis was to examine how some Swedish grocery stores handle their food waste. That has included to examine how the stores today handle their waste, what they do to try and reduce it and what obstacles there are for them from reducing it further. The aim has been to get a better understanding of the food waste issue at Swedish grocery stores, rather than trying to generalise any findings.

My research question was:

Can an improved infrastructure reduce the waste at Swedish grocery stores?

The infrastructure part of a business model should define what resources the grocery stores need to have, what activities they need to perform, and what partners they need to have to be able to generate a value the customers are willing to pay for. The value in this case is the extra amount of food the stores can get sold or consumed in any other way, instead of thrown away. The stores in this study seem to have rather good capabilities to get as much groceries as possible sold. Some examples are that they get help from an automated ordering system and reduce the price on groceries which by some reason are difficult to get sold. What they cannot fully manage are the customers. Since the customers' behaviour is one of the main causes for waste at the grocery stores does the stores need to do more to get the customers more aware about the food waste problem and make them more willing to also buy groceries with any flaw or with a short date. They should also try to make them accept to not always have access to all types of groceries and instead help them to buy more of what is in season. The stores should also try and dare to let the customers accept some shelves in the stores to be empty at the end of the day. With a changed behaviour from the customers will it be easier for the grocery stores to reduce their waste but the stores would need much support from their respective parent organisation and the industry which should do more information campaigns about the food waste issue. Most of the responsibility should be put on the parent organisations and the rest of the industry actors rather than on individual grocery stores.

When it comes to groceries the stores have not been able to get sold they should either make use of them in the store's own kitchen if it has one, or let a partner organisation take care of the groceries. In this case it seems much better to partner with Allwin rather than non-profit organisations since Allwin seems to have much better capabilities to take care of all sorts of groceries, even perishables. The main focus for the grocery stores and their parent organisation should of course be to get as many groceries sold as possible since it is costly for the companies to throw or give away groceries or to sell them to a reduced price. To redistribute groceries is not part of the food companies core business but even with a further reduced waste from the stores, there might still be some waste left at some stores and from an environmentally and economical perspective would it be good if also these groceries could be consumed. It would be one way for the companies to show their customers that they care about sustainability which could boost the companies' image. If they want to redistribute

more groceries should they then, as mentioned, let the company Allwin take care of this. It is more likely a partnership with any non-profit organisation would need much support from the grocery store or its parent organisation but they should not put too much resources on this since it is not part of their core business to redistribute groceries.

A more efficient supply chain could also help the grocery stores to reduce their food waste and when it comes to handle uncertainties as well as to collaborate and share information with the other actors in the chain, this seems to work rather well. However, what the managers said during the interviews indicated that there could still sometimes be some problems with for instance orders or deliveries. To share even more information would be beneficial for the chain actors as it could make the supply chain even more responsive to external changes but I can understand if the companies do not want to reveal too much information about their business. If they cannot share more information could instead a faster production or a reduction of middle hands help since the groceries then could be delivered faster to the stores, which could improve the groceries durability and the production and distribution to become cheaper.

Finally, when it comes to implementing a new strategy, the managers were all certain it would not be any problem for them since the parent organisation allows them to design their own strategies and the employees would not mind a new strategy. But again, the main issue is the customers and their behaviour and even if the industry today already works with this issue seems more efforts to be needed. Some customers are aware of the food waste problem today but not everyone and the industry needs to do more if they want to reduce the waste any further. New tools such as better ordering or communication systems can perhaps help some but not too much as long as the customers continue to behave as usual.

6.1 Future research

Since this thesis only has studied how a few grocery stores handle their food waste would it be interesting to examine other grocery stores which might reveal more information about this issue. In that case could probably more clear links be spotted of what causes food waste and what needs to be done in order to reduce it. The stores in this study work in rather similar ways. Should it be up to each store to design their own strategy or is it better if the parent organisation or the industry designs a strategy for how the grocery stores should handle the food waste? Furthermore, could it be good with studies which could compare how the food companies say they work with food waste with how they actually work with it. COOP, Hemköp and ICA all write they work a lot with sustainability but more studies which could confirm this would be interesting to see.

If differences between stores matter is another aspect to study. Is it easier for larger or smaller grocery stores to have small amounts of waste? A larger store handles larger quantities of groceries but has on the other hand, perhaps also better capabilities to handle any waste. Another interesting inquiry is socio-graphic aspects. Does what type of customers a store has got also affect what amounts of waste it has got?

More research about how much a more efficient supply chain can reduce the waste would also be needed. How much could new ICT systems or more collaboration along the chain help in reducing the waste at the grocery stores? How much can a changed customer behaviour help to reduce the waste? The behaviours were one of the main causes of waste but will it be enough to reduce the waste to almost zero? The efficiency in the chain can certainly be improved but in what way should it be done? Any improvements can be costly and the actors will probably not put in too much effort unless they know how much they could benefit from it.

Other alternatives for the waste is another thing which needs to be examined further. What is best from an economical perspective to do with the waste and what is best from an environmental perspective? Some waste is today used as biofuel, is that better than trying to redistribute it to charity?

Finally, would it be good with more quantitative studies about the food waste issue. It would certainly be beneficial with some quantitative studies on the above mentioned issues since numbers sometimes can give clearer evidences than words. For instance, might some people change its behaviour when they hear about what environmental effects the food waste causes while others might not react before they hear what costs it generates. With more exact figures of how much the waste costs may it also be easier for the industry to seek financial support from the government to solve this issue.

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8. Appendices

Appendix A: The interview guideline

How many full time employees do you have?

How do you handle your groceries today? What routines do you have?

Do you do anything to reduce the food waste?

Do you measure the food waste in any way and if so, how do you make use of it?

Do you collaborate with anyone which comes and takes care of any of your food waste?

What resources do you need to handle the food waste?

Is there anything which hinders you from reducing the food waste any further?

How does the collaboration between the chain actors work today?

Do you share much information with the other actors in the chain?

How do you think the performance of the chain is today?

What, if anything, does the parent organisation or the industry do today to improve the performance of the chain?

Do you think you receive enough information from the parent organisation and the suppliers? In what way?

How do you today handle uncertainties regarding supply and demand?

What kind of assisting systems or tools do you have to help you and the rest of the personnel in the daily work?

How much support can you get from the parent organisation? How much responsibility is put on you?

Can you choose your own strategies for the store or are those decided centrally? Can you choose your own suppliers?

What are your possibilities to implement a new strategy? How do you think it would be received by your employees?

Appendix B: Information about the interviews

Table 5: Information about the interviews

Grocery store	Respondent position	Location	Date	Type	Duration	Language
Coop 1	Store manager	Gothenburg	16.03.30	Face-to-face	40 minutes	Swedish
Coop 2	Store manager	Gothenburg	16.04.05	Face-to-face	45 minutes	Swedish
Coop 3	Store manager	Gothenburg	16.04.11	Face-to-face	50 minutes	Swedish
Hemköp 1	Store manager	Gothenburg	16.03.22	Face-to-face	60 minutes	Swedish
Hemköp 2	Store manager	Gothenburg	16.03.23	Face-to-face	50 minutes	Swedish
Hemköp 3	Store manager	Gothenburg	16.04.12	Face-to-face	45 minutes	Swedish
ICA 1	Store manager	Gothenburg	16.03.15	Face-to-face	45 minutes	Swedish
ICA 2	Store manager	Gothenburg	16.04.07	Face-to-face	40 minutes	Swedish
ICA 3	Store manager	Gothenburg	16.04.14	Face-to-face	40 minutes	Swedish