The Paradox of Food Waste and Food Insecurity
Exploring Donation and Redistribution of Surplus Food through a Multi-Level Perspective

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Master of Science Thesis

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Abstract

Around one million tonne of food is annually wasted in Sweden, of which 100,000 tonne of surplus food is wasted in the retail sector. Even if redistribution of surplus food is the second most preferable option to reduce food waste according to the food waste hierarchy, only 5% of surplus food in retail is donated. At the same time, food insecurity is a global as well as a Swedish concern. In 2017, 6% of the Swedish population had a low-income standard, and food banks are currently reporting an increasing demand for food support. The goal of the study was to investigate surplus food donations from grocery stores to food banks as an approach to address the paradox of food waste and food insecurity. It was done by identifying challenges and potential lock-in factors, and by analysing practices and success factors to identify potential best-practices. The study was a qualitative case study and used the sustainability transition framework ‘multi-level perspective’ (MLP) for analysis. The study took part in a collaboration project to produce a handbook for surplus food donations in retail, which aims to guide actors in retail how to reduce avoidable food waste by increasing donations.

The results showed that there are some basic conditions that are needed for surplus food donations to take place in a safe way. These can be fulfilled in diverse ways, which have been analysed together with success factors and learnings from the literature to give examples of ‘good enough’ practices and best practises. This division of ‘good enough and ‘best’ was made to address that small, volunteer-led food banks and larger, more experienced ones have quite different opportunities and challenges. Grocery stores also seem to face various practical, economic, and managerial challenges to donating their surplus. The analysis of the challenges showed some potential lock-in factors that contribute to obstructing surplus food donations to be an integrated part of the food regime. These lock-in factors are mainly related to the devaluation of ecological and social costs of food waste and the low political priority, thereby sustaining a lack of funding, and a ‘waste as a resource’-thinking. Even if there are several potential lock-ins that might need to be ‘unlocked’ for surplus food donations to be a part of a radical transition to a more sustainable food system, there are still several of the ‘good enough’- and best practices that can be implemented to incrementally improve the resource efficiency of the current food system. Surplus food donations may, however, be a key component in the transition towards a sustainable food system.

Keywords

Surplus food, food waste, food insecurity, donation, redistribution, systems thinking, multi-level perspective.
Sammanfattning


Resultaten visade att det finns vissa grundläggande förutsättningar som generellt sett behöver uppfyllas för att donationer av överskottsmat ska fungera. Dessa kan uppfyllas på olika sätt, dessa tillvägagångssätt har analyserats tillsammans med framgångsfaktorer och lärdomar från litteraturen för att ge exempel på "bra" praxis och bästa praxis. Denna uppdelnings gjordes för att det framkom att mindre, volontärledda matbanker och större, mer erfarna matbanker har olika möjligheter och utmaningar. Livsmedelsbutiker möter också olika praktiska, ekonomiska och administrativa utmaningar när det gäller att donera sitt överskott. Analysen av utmaningarna visade några potentiella inlåsningsfaktorer som bidrar till att hindra donationer av överskottsmat från att vara en integrerad del i den nuvarande livsmedels-"regimen". Dessa inlåsningsfaktorer är främst relaterade till att ekologiska och sociala kostnader för matsvinn ofta bortses ifrån, och den låga prioriteringen på den politiska dagordningen. Därmed kvarstår brist på finansiering och ett "avfall som en resurs"-tänk. Även om det finns flera potentiella inläsnings som kan behöva "läsas upp" för att donationer av överskottsmat ska vara en del av en radikal omställning till ett mer hållbart livsmedelssystem, så finns det även flera bra- och bästa praxis som kan genomföras ändå, för att stegvis förbättra resurseffektiviteten i det nuvarande livsmedelssystemet. Donation av överskottsmat kan dock vara en nyckelkomponent i omställningen till ett hållbart livsmedelssystem.

Nyckelord

Överskottsmat, matsvinn, matfattigdom, donation, omfördelning, systemtänk
Acknowledgments

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Table of contents

Abstract ........................................................................................................................................... i
Keywords ........................................................................................................................................ i
Sammanfattning ........................................................................................................................... ii
Nyckelord ........................................................................................................................................ ii
Acknowledgments ....................................................................................................................... iii
Table of contents ......................................................................................................................... v
List of Figures ............................................................................................................................... vii
List of Tables ................................................................................................................................... ix
List of acronyms and abbreviations ........................................................................................... xi
1 Introduction ............................................................................................................................... 1
  1.1 Background ........................................................................................................................... 1
  1.2 Purpose .................................................................................................................................. 2
  1.3 Aim & Objectives ................................................................................................................ 2
  1.4 Problem Statement ............................................................................................................. 2
  1.5 Delimitations ....................................................................................................................... 3
2 Methodology ............................................................................................................................... 5
  2.1 Research Approach .............................................................................................................. 5
  2.2 Research Design .................................................................................................................. 6
    2.2.1 Unit of analysis ............................................................................................................... 6
    2.2.2 Collaboration Partner and Study Site ........................................................................... 6
    2.2.3 Data collection method ............................................................................................... 6
    2.2.4 Sampling .................................................................................................................... 7
    2.2.5 Research Process ......................................................................................................... 7
  2.3 Data Analysis ......................................................................................................................... 9
  2.4 Limitations of the Method and Trustworthiness of the Data ............................................. 10
  2.5 Theoretical Framework ....................................................................................................... 10
3 Literature review ......................................................................................................................... 13
  3.1 The History of Surplus Food ................................................................................................. 13
    3.1.1 The Revolutions that Shaped the Current Food System ......................................... 13
    3.1.2 The Contemporary Food Regime ................................................................................ 14
    3.1.3 Landscape Developments Pressuring the Food Regime ......................................... 17
  3.2 The Paradoxical Issues of Food Waste and Food Insecurity ............................................. 17
    3.2.1 Food Waste ............................................................................................................. 18
    3.2.2 Food Insecurity and Inequality ............................................................................... 19
  3.3 Efforts and Obstacles to Reduce Food Waste and Food Insecurity ................................. 20
    3.3.1 Surplus Food Donation ............................................................................................. 21
    3.3.2 Food Waste Reduction Efforts Decreasing the Surplus in Grocery Stores ........... 22
    3.3.3 Obstacles to Surplus Food Donations ..................................................................... 23
4 Results and Analysis .................................................................................................................. 25
  4.1 Basic Conditions for Surplus Food Donations ................................................................. 25
    4.1.1 Food banks .............................................................................................................. 26
    4.1.2 Grocery stores ......................................................................................................... 26
  4.2 Surplus Food Donation Practices ....................................................................................... 27
  4.3 Success Factors .................................................................................................................... 29
List of Figures

Figure 1 - Focus of the study ................................................................................................................3
Figure 2 - How inductive reasoning was used, adapted from Bhandari (2020) ....................... 5
Figure 3 - Research Process .................................................................................................................. 8
Figure 4 - Summary of multi-level perspective .................................................................................... 11
Figure 5 - Multi-level perspective on socio-technical transitions, adapted from Geels (2009). .................................................................................................................... 12
Figure 6 - Historical timeline .............................................................................................................. 14
Figure 7 - Overview of the food system ................................................................................................ 15
Figure 8 - Summary of characteristics of the contemporary food regime ........................................ 16
Figure 9 - Food and drink material hierarchy, adapted from Swedish Food Agency (2023) .... 19
Figure 10 - Basic conditions for surplus food donations ................................................................. 25
Figure 11 - Experienced success factors ............................................................................................. 29
Figure 12 - Challenges to surplus food donations ............................................................................. 31
Figure 13 - Surplus food donations in MLP ....................................................................................... 34
Figure 14 - Lock-ins and challenges .................................................................................................... 37
Figure 15 - Summary of challenges to surplus food donations ......................................................... 38
Figure 16 - Potential regime lock-ins obstructing surplus food donation and redistribution
to be a regime practice ..................................................................................................................... 39
Figure 17 - How ‘good enough’- and best practices are defined ....................................................... 41
Figure 18 - ‘Good enough’- and best practices at food banks ............................................................. 42
Figure 19 - ‘Good enough’- and best practices in grocery stores ...................................................... 43
List of Tables

Table 1 - Summary of interviews.................................................................9
Table 2 – Practical obstacles to surplus food donations, results from (Ejnarsson and Bengtsson Ekström, 2020) .................................................................23
Table 3 - Summary of surplus food donation practices at food banks .................27
Table 4 - Summary of surplus food donation practices in grocery stores ..............28
Table 5 - Summary of challenges to surplus food donations in literature ..............52
## List of acronyms and abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>API</td>
<td>Application programming interface</td>
</tr>
<tr>
<td>IVL</td>
<td>IVL Swedish Environmental Research Institute</td>
</tr>
<tr>
<td>MLP</td>
<td>Multi-level perspective</td>
</tr>
<tr>
<td>RSS</td>
<td>Riksföreningen Sveriges Stadsmissioner (National organisation of Sweden’s City missions)</td>
</tr>
<tr>
<td>SAMS</td>
<td>Samarbete för minskat matsvinn (collaboration for reduced avoidable food waste)</td>
</tr>
<tr>
<td>SDG</td>
<td>Sustainable Development Goals</td>
</tr>
</tbody>
</table>
1 Introduction

1.1 Background

Currently, half of the habitable land on earth is already used for agriculture, and with a growing global population estimated to reach 9.7 billion in 2050, the demand for food is often projected to increase by up to 70% (Roser and Rodés-Guirao, 2013). It is estimated that one third of the food produced is lost or wasted, corresponding to 1.3 billion tonnes annually – a waste of resources, land, and labour. In 2021 the agricultural sector emitted 14% of the total GHG-emissions in Sweden (Swedish Environmental Protection Agency, 2023a). However, that is estimated to correspond only to 40% of emissions related to national food consumption (SLU, 2022). Food waste and losses also impact the supply chains by lowering incomes for farmers, rising costs for consumers, and reducing accessibility to food. The reason for the waste to arise varies depending on local circumstances, but in middle- and high-income countries most waste tend to occur in the distribution and consumption stages, yet there are significant data uncertainties regarding this (The World Bank, 2023).

The environmental impacts of food losses and waste also increase along the supply chain, as transportation, storage, packaging, and processing are added and thereby further increasing the resource and economic costs. Developing strategies that promote reduction of food loss and waste is crucial to reduce the environmental impacts and improve global food security (Mattsson et al., 2018). Food waste is also a significant challenge to reach the global sustainable development goals (SDGs) in 2030, in particular, target 2.1 to eradicate hunger and target 12.3 to halve per capita global food waste and losses (UN, 2023a, 2023b). Even if sufficient food is produced to feed the global population, two billion people lack access to enough food to meet their calorific and nutritional needs (FAO, 2020). Most of the global hunger occur in the Global South, while the largest share of food losses and waste occur in the Global North. However, food insecurity is present in high-income and welfare states, such as Sweden, as well. Income gaps and the number of people that are at risk of relative poverty are increasing, with 6% of the Swedish population in 2017 having a low-income standard (SCB, 2017). At the same time thousands of tonnes of food and produce is wasted or lost annually along the supply chain.

To tackle the paradox of food waste and food insecurity, donation of surplus food has been identified as a potential key to alleviate both issues (Thapa Karki et al., 2021). According to the food waste hierarchy, prevention of surplus food to avoid waste is the most preferable option, while redistribution of surplus food for human consumption is regarded as the second-best option (see Figure 9). Currently, the surplus often ends up as waste that is either composted, incinerated, or sent to landfill which are among the least preferable options (European Commission, 2020; Sundin et al., 2022a).
1.2 Purpose

This thesis will explore the interaction between grocery stores and food banks to increase the knowledge of how the donations of surplus food can be enhanced to reduce food waste and offer food to people in need. Therefore, challenges, success factors and practices in both grocery stores and charity organisations will be investigated to gather key areas that could improve the efficiency of surplus food donations. IVL Swedish Environmental Research Institute (later referred to as IVL) and the charity organisation Riksföreningen Sveriges Stadsmissioner (RSS) is currently leading a project that aims to produce a handbook for surplus food donations and reduced food waste in retail. The handbook intends to cover practical knowledge of how surplus food donations can work more efficiently and raise awareness about surplus food donations, both for waste reduction and food support (IVL, 2022). This thesis will be a part of that project and will, by using qualitative methods, further investigate the challenges of surplus food donations in Sweden.

1.3 Aim & Objectives

The aim of this study is to investigate surplus food donations from grocery stores to food banks, as an approach to address the paradox of food waste and food insecurity. To address this aim, the following objectives have been identified:

➢ To map challenges at organisational-, industry-, institutional- and societal levels that prevent surplus food donations and reinforce food waste practices, to locate potential lock-ins for intervention.

➢ To assess the interactions and collaboration between grocery stores and food banks for handling donations, to identify best-practices that could increase surplus food donations.

1.4 Problem Statement

At least one million tonne of food is wasted in Sweden annually. Of that at least around 100,000 tonnes of edible food in retail is estimated to be wasted every year in Sweden, of which only 5% is donated (IVL, 2022; Swedish Environmental Protection Agency, 2023b). Food waste in retail corresponds to a relatively small share of food waste and losses along the food supply chain (Swedish Environmental Protection Agency, 2023a), but with the intermediary position of the retail between production and consumption, food waste and losses can easily be shifted to other stages in the supply chain. Even if the volumes are relatively small, donation of surplus food is already a relatively widespread practice in retail. However, national guidelines are lacking in Sweden, leading to loosely managed operations and large local variations (Rosenlund et al., 2020).

Currently, there is a research gap in understanding the challenges and possibilities to increase surplus food donations from grocery stores in Sweden, to reduce food waste and support people in need.
There is also a knowledge gap about the operational practices in the interaction between grocery stores and food banks necessary for surplus food donations to be viable. To address this, the following questions will be investigated in this study:

➢ What are the challenges to reduce food waste in grocery stores through donations of surplus food?
➢ What are the practices in the interaction between grocery stores and food banks that enhance efficient operations and thereby increase donations of surplus food?

1.5 Delimitations

As displayed in Figure 1, the focus of the study is on the distribution stage, concentrating on grocery stores in the retail sector. The study also touches upon how practices in grocery stores relate to food waste flows in primary production, processing, and consumption stages, but it is not the primary focus. For the empirical data collection, practices in grocery stores and at food banks, and more specifically, also the interactions between them will be investigated as highlighted in Figure 1.
2 Methodology

This chapter describes the methodology, methods and theoretical framework that were used to answer the research questions and pursue the aim and objectives of this study.

2.1 Research Approach

The research approach to this study was a qualitative approach using inductive reasoning. Qualitative research is used to understand concepts and experiences by collection of in-depth insights. Qualitative approaches tend to be flexible and focus on meaning and richness rather than statistical verified connections. Causations are often complex and paradox, and reducing the complexity of reality to simple causations is not the task of qualitative studies. Rather, it is about unpacking, observing and analysing society (Alvehus, 2019; Bhandari, 2020). A qualitative research approach was chosen because employees in grocery stores and at food banks have experience of challenges and practices that are crucial to the scope of this study.

Inductive reasoning is a logical approach that develop general conclusions from observations and pattern development, going from specific to general (Bhandari, 2020). Since the study focusing on the experiences of the people working with surplus food donations, these observations were the foundation to search for patterns and draw general conclusions, see Figure 2. The idea was that by understanding some interactions between grocery stores and food banks in-depth, the knowledge could be used to develop general guidelines, applicable to the same type of actors in other locations in Sweden.

![Figure 2 - How inductive reasoning was used, adapted from Bhandari (2020)](image)

The overall research paradigm of this thesis was to explore the topic of surplus food donations through the lens of systems thinking. Systems thinking is a holistic approach, that describes the causality and interrelations both within a system, and from outside a system (System Dynamics Society, 2023). A system must consist of elements, interconnections, and a function or purpose – making it something more than a collection of parts (Meadows, 2009). Investigating surplus food donations through systems
thinking allowed to analyse the practice as an element of the food system, rather than an isolated logistical problem.

### 2.2 Research Design

The methodological choice for this study was to do an exploratory case study. A case study is a suitable research design for gaining specific, in-depth knowledge about real-life topics. It is appropriate to explore different aspects of a research problem and find key characteristics of the case (McCombes, 2019).

#### 2.2.1 Unit of analysis

The unit of analysis of this study was the practice of surplus food donations. The actors involved in this practice, in this specific study, were grocery stores and food banks. The effects that their roles, actions, collaboration, and interaction have, in the practice of surplus food donations, were analysed.

#### 2.2.2 Collaboration Partner and Study Site

This study was conducted in collaboration with IVL, as a part of an ongoing Vinnova-funded project run by IVL and RSS in collaboration with Willys, Stockfinner and Frigoscandia. The goal of the project is to publish a handbook for surplus food donations and reduced avoidable food waste in the retail sector (IVL, 2022). One of the work packages include the focus on surplus food donations from grocery stores, which is the scope of this thesis. The scope of the project is on a national level in Sweden, and the primary data collection was done mainly in mid-sized cities in the proximity of Stockholm. As this study is a part of the larger project described, it was possible to access statistics from RSS of quantities of donated food to their different local food banks, as well as the results of a survey to all stores of one grocery store chain and qualitative data from interviews with the same chain. This information has been used both in the sampling process (see 2.2. Sampling) and as complementary secondary data.

#### 2.2.3 Data collection method

Interviews were chosen as method for the empirical data collection as it is suitable to gain in-depth insights and was the preferred method within the scope of the project. It was chosen to do unstructured interviews, to increase the flexibility to adapt the focus to the most relevant concerns of the interviewees, encouraging a relaxed conversation to promote a comfortable atmosphere of sharing true experiences (George, 2022). This was suitable due to the exploratory nature of the research questions, as well as prior insights from the survey and data collection by other participants in the project.

After the interviews were summarised and analysed, all interview participants from the primary data collection and the data collection performed by another project member, as well as other actors working in the network of SAMS (Samarbete för minskat matsvinn) were invited to participate in a
feedback webinar. In the webinar, the preliminary results of the study were presented, and participants were given the opportunity to comment or add new inputs.

2.2.4 Sampling

Purposive sampling was used as the sampling technique, in which interviewees are selected due to the desirable characteristics that can result in information-rich cases, but with a substantial risk of research biases. There are different methods of purposive sampling, and for this study a combination of maximum variation sampling and expert sampling was chosen to have both variation, and cover insights with limited resource. Maximum variation sampling, or heterogenous sampling is used to capture a wide range of perspectives. Expert sampling, is used when the research requires a high level of knowledge about a particular topic (Nikolopoulou, 2022a). The choice of this combination was to gain a broad, but detailed, understanding of the practice of surplus food donations in Sweden.

One grocery store chain was excluded in the selection, as that chain had already been surveyed and interviewed within the project. Firstly, two larger food banks run by Stadsmissionen were identified, based on the knowledge from RSS that they receive donations mainly from grocery stores. One of the founders of the non-profit organisation Ätbart and the recently launched Swedish Foodbank Network, was identified as an expert with in-depth insights about surplus food donations from grocery stores and small, mainly volunteer-led, food banks. The second phase of interviews focused on maximum variation sampling of grocery stores. Based on donation data from RSS, a few grocery stores that donate to the interviewed food banks were selected by varied store sizes, chains, and various levels of donation flows. It was also decided to complement the information from the expert interview, with an interview with a small food bank.

2.2.5 Research Process

Several of the steps of the research process were iterative, as illustrated by the double pointed arrows in Figure 3. This section is describing how these steps were performed.
1. **Problem definition and project planning**

Defining the problem and planning the empirical study was done in collaboration with the industrial adviser at IVL. Research questions and objectives have been revised throughout the project.

2. **Literature review**

Published and peer-reviewed articles have been the main source of information, which were found by searching in the Web of Science database as well as in Google Scholar. Documents, reports and statistics from national and regional authorities and organisations have also been used, mainly to describe the current state or when scientific papers have been lacking.

3. **Selection of Theoretical Framework**

The theoretical framework, multi-level perspective (MLP), see more in 2.3 Theoretical Framework, was used throughout the entire study, to organise literature findings, preparing interviews, presenting empirical findings, and analysing results.

4. **Interview Design**

The structure of the interviews was largely inspired by MLP and an adaptation of how Unruh (2000) analyses challenges and lock-ins on different levels was made. Challenges and practices were investigated on an organisational (within organisations), industry (in between actors), institutional (governmental and political decisions) and societal (behaviours and attitudes) levels. The main questions were 1) “How does the donation process work today?”, 2) “What are the obstacles and challenges?”, 3) “What works well, and how does that work?”. Questions regarding drivers to surplus food donations in grocery stores were also asked, as well as future wishes for improvements, see more in Appendix A.

5. **Interviews**
In the first phase of the interviews two larger food banks and the expert were interviewed. In the second phase of interviews some of the identified grocery stores that donate to the bigger food banks were interviewed, and a smaller food bank. In Table 1 the details of the interviews are described as well as the code that is used later when referring to the interviews.

<table>
<thead>
<tr>
<th>Code</th>
<th>Actor</th>
<th>Function</th>
<th>Date</th>
<th>Place</th>
<th>Documentation</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>Expert</td>
<td>Founder of Ätbart</td>
<td>2023-02-16</td>
<td>Online</td>
<td>Recording</td>
<td>1h 15 min</td>
</tr>
<tr>
<td>LFB1</td>
<td>Large Food Bank 1</td>
<td>3 participants: Manager, employee, work trainer</td>
<td>2023-02-28</td>
<td>Visit</td>
<td>Recording</td>
<td>1h</td>
</tr>
<tr>
<td>LFB2</td>
<td>Large Food Bank 2</td>
<td>Manager</td>
<td>2023-03-03</td>
<td>Visit</td>
<td>Recording</td>
<td>50 min</td>
</tr>
<tr>
<td>GS1</td>
<td>Grocery Store 1</td>
<td>Store manager</td>
<td>2023-03-15</td>
<td>Phone</td>
<td>Recording</td>
<td>30 min</td>
</tr>
<tr>
<td>GS2</td>
<td>Grocery Store 2</td>
<td>Store manager</td>
<td>2023-04-05</td>
<td>Phone</td>
<td>Recording</td>
<td>25 min</td>
</tr>
<tr>
<td>SFB1</td>
<td>Small Food Bank</td>
<td>Volunteer</td>
<td>2023-04-06</td>
<td>Online</td>
<td>Recording</td>
<td>45 min</td>
</tr>
</tbody>
</table>

6. *Empirical data analysis*

The data analysis method is described in 2.3 *Data Analysis*.

7. *Feedback iteration*

Interviewees and participants of SAMS were invited to a 45 min webinar to have the opportunity to comment and give feedback on the results. A summary of basic conditions, obstacles, consequences of obstacles and success factors that have been mentioned in interviews were presented. Further, the preliminary analysis of potential best-practices was presented.

8. *Data analysis*

After receiving feedback about the interpretation of collected data, the results were summarised. Primary data were later combined with the results of the literature review for analysing and answering the research questions. See more in 2.3 *Data Analysis*.

2.3 *Data Analysis*

To analyse the collected primary data, thematic analysis was chosen as the data analysis method. Thematic analysis is used to interpret patterns and meanings in the data, by examining which topics are brought up repeatedly and what is being emphasised (Caulfield, 2019). Thematic analysis is relatively flexible and can be performed in diverse ways, for this study the process was as follows:

1. Organising collected data into the pre-determined categories for the interview.
2. Coding information into five categories: basic conditions, challenges, consequences of obstacles, practices, and success factors.

3. Merging the coded information together to have the summarised results of three main types of actors: small food banks, large food banks, and grocery stores.

4. Comparing the merged coded information to conclude general results, and merge and present the five categories of coded information in a more generalised way.

5. The challenges were gathered and compared with literature and analysed to identify potential lock-in factors. Using the adaptation of how Unruh (2000) analyses lock-ins on different levels to sort challenges, as described in Interview Design.

6. The combination of gathered basic conditions for surplus food donations to function in a sound way, together with experienced success factors and practices, were analysed together with literature to define best practices as well as ‘good enough’ practices.

2.4 Limitations of the Method and Trustworthiness of the Data

There are some well-known disadvantages of qualitative research, such as unreliability due to human factors that affect the data, subjectivity due to the researcher’s central role in interpreting the data (Bhandari, 2020). To tackle the unreliability, the feedback iteration webinar was one method to allow for feedback once again after the interpretation of the results, to draw attention to potential misunderstandings and confirm the results. The trustworthiness of the data was recognised by the feedback iteration, involvement of experts in the field in the project, and carefully selected interviewees without any known biases. In qualitative research of individual cases, the results should be able to extend to similar cases, which is known as transferability. To achieve that, it is important to reach a point of information saturation to cover important themes to account for all aspects of the studied phenomenon (Nikolopoulou, 2022b). To increase the transferability, it was chosen after the first interview phase to interview a small food bank, as it was clear that smaller and larger food banks operate under different circumstances. A grocery store donating to a smaller food bank was also identified to raise the transferability but could, however, not be scheduled. The perspective of that actor was covered in the expert interview and by input from another project participant that had interviewed a grocery store donating to a smaller food bank.

2.5 Theoretical Framework

As case studies focus more on details, they should relate to theory in the field to avoid being an isolated example. One way is to incorporate a concept, to guide the analysis and interpretation of the findings (McCombes, 2019). I chose to use multi-level perspective (MLP), which is a sustainability transition framework for socio-technical systems. As there are both ongoing changes in the efforts to reduce food
waste, and handle surplus food, as well as changing socio-economic trends, it was a suitable framework to enable systems thinking and investigate the role of surplus food donations in systemic sustainability transitions.

To address current and escalating environmental issues, major changes of societal functions are needed, which include technologies as well as e.g., consumer practices, policies, business models, infrastructure, cultural practices, and norms. (El Bilali, 2019) shows that MLP has been applied in research to analyse sustainability transitions in agriculture and food systems. It has been particularly useful to gain deeper understanding of the long-term processes with institutional complexity that food systems transformation and poverty reduction have (ibid). MLP highlights that socio-technical transitions are driven by multiple actors involved in multiple activities in the context of institutions and culture (Geels, 2019; Leeuwis et al., 2021). To organise the complexity of reality and change, MLP describes transitions through interactions between three analytical levels: Landscape, regimes, and niches, as summarised in Figure 4.

![Figure 4 - Summary of multi-level perspective](image)

The socio-technical landscape is the dynamic, external events and trends that put pressure on the current regime and creates new openings for change. These are often described as either gradual, such as climate change, or sudden in the form of a shock, such as the Covid-19 pandemic. The socio-technical regime refers to the current system, including for example policies, industry, technology, economics, culture, and science. The stability of the contemporary system depends on these different domains of society, and the activities of social groups to be coordinated in a way to reproduce the socio-technical regime over time. Regimes are rarely transformed drastically, and rather tend to change incrementally (El Bilali, 2019; Leeuwis et al., 2021). Innovation in regimes is mostly incremental due to various lock-ins, such as techno-economic lock-ins, social lock-ins and institutional and political lock-ins (Geels, 2019). Niches on the other hand are contexts where innovation can take place, in protection from the dominant regime. Niches are in that way essential to provide seeds for systemic changes, where more radical ideas and technologies can be tested and matured (Leeuwis et al., 2021). Pressures from the
landscape on the regime creates windows of opportunity for niche innovations to break through, which can trigger the regime to change, which is visualised in Figure 5 (Geels, 2019).

Food regime analysis was introduced already in the 1980s by Friedmann and McMichael, to analyse the contribution of food in capital accumulation. Aiming for a system’s perspective of agriculture and food, it explored how production, distribution and consumption of food are interconnected in the capitalist system (Jakobsen, 2021). The concept of the food regime brings a structure to analyse the role of agriculture and food in the capitalist historical landscape and the central role food has in societal transformation and relations of power (McMichael, 2009). Food regime analysis can therefore be seen as a parallel, but a similar and overlapping concept to MLP when analysing sustainability transitions in the food sector.

MLP was used in this study to investigate how history has shaped the current food regime and how landscape pressures and niches constantly interact to transform how food is produced, processed, distributed, consumed, and wasted. Using MLP provided a coherent structure to the literature review and empirical data collection to investigate challenges to analyse related regime lock-ins, and mapping requirements and practices occurring in the niches for surplus food donations under the influence of landscape pressures. The practice of surplus food donations itself was also analysed to explore if it can be seen as either an incremental or radical innovation, or an already existing element of the contemporary food regime.
3 Literature review

The following chapter presents relevant topics and significant literature findings for the study, with a system’s perspective organised by using the MLP framework. The first section provides an overview of the contemporary food regime and some of the historical events that shaped it, as well as the current landscape pressures. The second section describes the issues of food waste and food insecurity, and the third section describes efforts that have been taken to reduce both.

3.1 The History of Surplus Food

This section focuses on understanding the historical development of the food regime up to the contemporary, describing the current food system and summarising landscape pressures.

3.1.1 The Revolutions that Shaped the Current Food System

The food systems throughout human history have gone through uncountable transformations. Since the neolithic revolution, societies have always strived for food security and stability by tackling the inherent uncertainties of agriculture; farmers for their subsistence, and institutions of power to remain and avoid social unrest (Gille, 2012). Major shifts in the socio-technical landscape started to take place during the ‘long’ sixteenth century (1450–1640) along with the rise of capitalism and the impending industrial revolution. This was driven by various technological innovations in agriculture, often described as ‘the second agricultural revolution,’ leading to profound increases in agricultural output. The capitalist agricultural model transformed land into monocultures, generating accumulation of capital and quantities of surplus food enough to feed the industrial workers in the cities. Initially this led to stable grain prices in Western Europe, but market mechanisms pushed down prices, productivity fell due to soil exhaustion and prices rose again, causing instability and bread riots all over Europe and the colonies – most famously the French revolution (Patel and Moore, 2017).

Eventually the British Empire and other colonial powers expanded the capitalist agricultural model to create massive plantations in colonised territories, able to cheaply produce food for the growing number of European industrial workers, at the cost of people and nature in other places. Despite price fluctuations, food started to become cheaper in the capitalist system, as more calories could be produced per labour hour (Patel and Moore, 2017). Nonetheless, the industrial revolution and the coming medical revolution around the turn of the twentieth century, allowed the human population to skyrocket. Concerns about feeding the rapidly increasing population led to exploring how to increase the agricultural productivity even more. The inventions of inorganic fertilizers and chemical pesticides, and usage of irrigation systems increased crop yields in the 1950s. Along with the development of certain high-yield crop types, this is often referred to as the Green Revolution. These intensive farming methods, often called conventional farming, has come with high environmental costs such as pollution, erosion and exhaustion of nature (Wright and Boorse, 2014, p. 203).
Societal and technological changes, leading up to numerous revolutions, have had a significant impact on how food is produced, distributed, and consumed today. These, seen in overview in Figure 6, are just a few transformations that together have shaped the present system. Yet, despite 10,000 years have passed since our ancestors started to farm the land, the goal of stability and food security that they strived for remains unachieved. However, to produce enough agricultural output to feed the world population is no longer the only issue – but a system with market mechanisms leading to waste and uneven distribution has also been added.

3.1.2 The Contemporary Food Regime

The historical transformations the food system has gone through, by landscape pressures and numerous socio-technical innovations, has formed the contemporary food regime. The term food system is often used to describe the web of activities from field to plate (University of Oxford, 2023), while the food regime includes not only the activities, but also the characteristics and societal context. McMichael (2009) describes the current regime as a ‘corporate food regime’, arguing that corporate capital subordinate nations, consumers, and producers and cause dispossession of smallholders. Some scholars call it a ‘neoliberal food regime’, stressing the development of further economic liberalisation, integration of transnational capital and weakening of national agricultural regulations (Pechlaner and Otero, 2010), while others argue that we are in the midst of a transitional period (Jakobsen, 2021). Whereas, for example Gille (2013), rather stress the consequences of the food system, calling it a ‘food waste regime’. Figure 7 shows a simplified overview of the food system, including the terminology for waste flows depending on what type of waste and in which stage it occurs. Figure 7 also places surplus food and avoidable food waste in the larger food system context.
Unharvested crops or animals that are wasted are called \textit{pre-harvest losses}, as plants prior to harvesting are not counted as food according to the EU definition (Eriksson, 2015). \textit{Food losses} are foods that are not consumed by humans, even though it was intended. \textit{Food waste} is food that has become waste, which is either avoidable (could have been eaten), and some is ‘unavoidable’ such as peels, bones and coffee grounds (Swedish Board of Agriculture, 2021a). \textit{Surplus food} refers to food that is edible and safe but excluded in retail and not sold to or consumed by the intended customers (Thapa Karki et al., 2021). In some recent literature (e.g. Franco et al. (2022) and Sundin et al. (2021)) the idea of \textit{metabolic waste}, more explicitly excess food intake, is brought up as an underestimated source of climate impacts and also regarded as a type of waste.

\textbf{Primary production and Processing}

Conventional farming is the dominant food production system today. It is characterised by high-yielding crops, planted in monocultures at large-scale farms. Pesticides, inorganic fertilizers, irrigation are used in the crop fields and specialised, fossil fuel-driven machinery for tilling, sowing, managing, and harvesting the crops. Despite being very productive and saving millions from starvation, the environmental consequences have been detrimental (Wright and Boorse, 2014, pp. 309–335). Along with increased industrialisation, the number of workers in the food industry is decreasing, while the size of farms is increasing (Ritchie and Roser, 2022). The same trend can be seen in Sweden, since 1990 the number of agricultural business have decreased by 39%, and the only type of farms that have increased
in number are those larger than 100 hectares (Swedish Board of Agriculture, 2021b). Even if 96% of the companies in the Swedish throughout the food industry are considered small-scale by EU-definitions (less than 50 employees), most of the output originates in the big companies. The Swedish food industry has become largely globalised, as the majority of the businesses are owned by foreign companies or part of multi-national groups (Swedish Board of Agriculture, 2012).

Distribution
The distribution of food has undergone tremendous transitions in the past century, with cheaper and more accessible freight, as well as ground-breaking innovations for storage and packaging, paving the way for the modern supermarkets. Food supply chains are today intertwined in advanced logistics and regulated by different standards for food safety, quality, norms, and contracts (Gille, 2012; Patel and Moore, 2017). The market concentration in food distribution is very high in Sweden – the three largest players in the Swedish food market, ICA, Coop, and Axfood, account for 90% of the annual turnover and 85% of sales, whereas the market leader ICA accounts for close to 50% of the market. (Swedish Board of Agriculture, 2012).

Consumption
Food prices have been managed through trade agreements, technological development, and economic subsidies. The prices of processed foods have, however, risen far less than for fresh produce. Increased meat consumption has been central in the global transformation of diets since the 1970s, enabled by large-scale factory production of meat. Environmental, social, and ethical costs, often in the Global South, are largely dismissed, which contributes to the relatively low price for middle class consumers (Patel and Moore, 2017). Despite inequalities in affordability, food has become cheaper. While meat consumption has almost doubled, Swedish households spend 5% less of their total consumption expenses on food now compared to the 1970s (Swedish Board of Agriculture, 2017).

Figure 8 - Summary of characteristics of the contemporary food regime
The contemporary food regime is characterised by the traits of the food system and the various stages in the supply chain, which are summarised in Figure 8. Understanding the present food regime allow for comprehension of what type of characteristics that might be central to challenge, for a transition to a more sustainable food system.

3.1.3 Landscape Developments Pressuring the Food Regime

There are currently several environmental, social, and economic factors that put pressure on the contemporary food regime, which in the MLP framework are described as landscape developments. Some can be described as gradual pressures in the food regime, such as climate change, environmental degradation as well as changing diets, living standards, and consumption patterns (Leeuwis et al., 2021). The environment is under increasing anthropogenic pressures, from local ecological degradation, pollution, and exhaustion, and on a planetary scale from climate change (Rockström et al., 2009). The unsustainable farming practices which are the foundation of the current food regime have also been major drivers to the climate change and ecosystem loss that today is threatening the food regime to proceed (Ritchie et al., 2022). At the same time, knowledge about climate change and environmental degradation has increased and become more widespread. As mentioned in 3.1.2, the consumption norms and demand has changed along with increased living standards, which has put pressure on the food system to provide more resource intensive food, aggravating the environmental pressures even more.

Landscape pressures can also be of more sudden character, such as wars, diseases and economic events, which can result in an immediate crisis, but with long-term effects (Leeuwis et al., 2021). For example, the covid-19 pandemic, the war in Ukraine, and the current economic situation connected to these crises, with effects of inflation, increased interest rates and skyrocketing fuel and fertiliser prices have also affected the food system dramatically. With more expensive food, the food insecurity has increased globally (World Food Programme, 2022). In Sweden, food prices have increased by 20,5% on average in one year (SCB, 2023). At the same time, the number of people living in relative poverty, with a low-income standard is at a record high. The income gaps are widening and welfare support is weakening, and more people are worried about the increasing food prices (Riksföreningen Sveriges Stadsmissioner, 2022).

3.2 The Paradoxical Issues of Food Waste and Food Insecurity

Two of the consequences, or arguably characteristics, of the current food regime are the issues of food waste and food insecurity, which are paradoxical problems. This section is exploring food waste generation, the food waste hierarchy, and the current situation of food insecurity and inequality in Sweden.
3.2.1 Food Waste

In Sweden in 2021, 0.9 million tonnes of solid food (86 kg/person) and 190,000 tonnes of liquid food (18 kg/person), excluding food losses in production, was estimated to have been wasted in Sweden. Of the solid food waste, 59 kg/person was wasted in households, and 26% (15 kg/person) of that was estimated to have been avoidable (Swedish Environmental Protection Agency, 2023b). The food waste in retail also decreased between 2020 and 2021, from 100 tonnes to 91 tonnes, while the sales were at unchanged levels (Swedish Environmental Protection Agency, 2023c, 2023b). In May 2022, The Swedish Food Agency (2022) sent out a survey to gather data about changing consumption patterns due to the increased food prices, showing that 40% of the responders more frequently use their senses to judge if the food is still edible, as well as taking better care of leftover than before. Over 50% also state that they buy more or much more price-cut food items, compare prices, choose low price brands, buy more seasonal and plan their purchases more carefully (Swedish Food Agency, 2022). Consumers are more often targeted for food waste reduction efforts, which could be a result of that the waste generally seem to be higher in the consumption stage than in processing and distribution (Eriksson, 2015).

Food is wasted due to several reasons along the supply chain. In the retail sector, some examples of waste causes are to constantly have filled shelves, broken cold chains or inaccurate storing, packaging issues, shelf life or expiration dates, or related to the grocery store’s revenue, routines, and consumer demand (Rosenlund et al., 2020). According to the Food and Drink Material Hierarchy (Figure 9), which is widely accepted and used both in Sweden and the EU, prevention of losses and avoidable food waste and redistribution surplus are the most favourable options (Swedish Food Agency, 2023a). Landfilling of food waste is illegal in Sweden, and most waste is instead incinerated for energy recovery or sent to anaerobic digestion for biogas production. However, producing biogas from food waste only cut around 10% of the emissions in the lifecycle of surplus food production, therefore it should be considered as waste and a non-preferable option (Johansson, 2021). The type of food that is most discarded is fresh fruit and vegetables, which accounts for one third of all food waste in grocery stores in terms of weight. Around 17% of the waste mass is dairy, 15% bread and 16% meat (Swedish Environmental Protection Agency, 2023c). However, in terms of e.g., carbon footprint, the relative importance of meat waste increases, while fruit and vegetables decreases, as animal products generally have a larger environmental impact per kg than vegetables (Eriksson, 2015; Swedish Food Agency, 2018).
Even if the retail sector is not statistically the largest contributor of food waste, the amount of avoidable waste relative to unavoidable waste is high. As the link between producers and consumers, the retail also has considerable influence both upstream and downstream. With very high market concentration in Sweden, retailers are particularly important and could be feasible targets for implementation of food waste measures (Eriksson, 2015). The later in the supply chain the food is wasted, the more economic value and resources have also been added, contributing to a higher level of resource waste in retail than in primary production. Therefore, the retail sector plays a significant role to reduce its own waste, and adopt strategies to support consumers to purchase food consciously (Eriksson, 2015; Sundin et al., 2022a).

3.2.2 Food Insecurity and Inequality

During the past years, food insecurity among an increasingly more diverse group of poor – from homeless, marginalised people with drug- and/or alcohol addiction problems to people with low incomes, families, and retirees – has risen (Sandberg et al., 2022). Food insecurity, also referred to as food poverty, can be defined as insufficient financial means to sustain a nutritionally satisfactory and socially acceptable diet (BDA, 2023). In the same survey as mentioned in 3.2.1, it also showed that around 25% of the respondents stated that they buy less fresh fruit and vegetables, and less meat due to the higher prices. However, people with low income are the ones mostly affected, and many have stopped buying fresh fruit and vegetables completely. From a public health perspective it is concerning...
that food prices are increasingly affecting the possibilities for people with small economic marginals to have a healthy diet (Swedish Food Agency, 2022).

Redistribution of surplus food has increased in Sweden, but it is difficult to determine if it is because of greater needs due to lowered economic welfare support, pandemic related consequences, and migration; or because there are more organisations focusing on redistributing surplus food. It is, however, clear that the need for food support has increased, especially during the past year with rising food prices and costs of living (Riksföreningen Sveriges Stadsmissioner, 2022; Sandberg et al., 2022; Sundin et al., 2023). Lunde Dinesen et al. (2018) also states that the need for food is larger than the available surplus at the food banks. This indicates that municipal and governmental institutions increasingly fail to support socio-economic weak groups. With civil society and private initiatives managing and addressing the issues of food insecurity, there is also a risk that public welfare that should cover food costs, could eventually weaken. Since the redistribution of food is not handled by public authorities, it is also difficult to have a holistic approach, and coordination, documentation and statistics can be lacking – hindering the understanding of the scale and causes to the needs (Sandberg et al., 2022). Studies also show that often only a limited number of people affected by food insecurity seek help at food banks, due to stigmatisation (Johansson, 2021).

For the recipients, the distribution of surplus food means that their basic needs can be met, which can seem like a win-win situation, but in paradox, it can also reduce the receiver’s autonomy and potentially reduce other type of long-term solutions to poverty. Food donations are bound to focus only on one parameter, while monetary resources could address the issues with socio-economic weakness holistically. There is a lack of scientific evidence that civil surplus food distribution could be effective to intervene poverty in a larger scale. Surplus food distribution is often considered as short-term support, as it lacks the possibility to intervene the root causes to poverty in the long-term (Sandberg et al., 2022; Sundin et al., 2023). However, social redistribution centres also provide a social context and support, which could be vital for some people (Lunde Dinesen et al., 2018). Currently, there is a lack of Swedish research addressing socio-economically weak people’s own experiences of buying or receiving surplus food. Surplus food redistribution is, nonetheless, a cross-cutting phenomena – and it is important to understand its potential position in addressing both food insecurity and reducing the environmental burdens of food waste (Sandberg et al., 2022).

3.3 Efforts and Obstacles to Reduce Food Waste and Food Insecurity

This chapter goes through surplus food donations both as a practice to address food waste and food insecurity, as well as other preventive and redistribution efforts to reduce food waste in grocery stores. Lastly, it goes through the challenges identified in literature that sustain the food waste practices in grocery stores and prevent surplus food donations.
3.3.1 Surplus Food Donation

Surplus food donation is both a practice to minimise food waste and to potentially ease food insecurity. Donation of surplus food might not solely solve the problems of either of the issues, but it could act as a short-term relief to food insecurity and a complementary practice to reduce avoidable food waste in retail (Sundin et al., 2022a). The surplus that is normally donated could be unsold seasonal items, items with broken packaging or short best-before dates (Sandberg et al., 2022). The food is normally donated to a food bank from wholesale, grocery stores and producers and should otherwise have been thrown away. From there, there are generally three major ways to further redistribute the donated food – through subsidised sales at social supermarkets, packed food bags, and soup kitchens (Karlsson, 2019; Lunde Dinesen et al., 2018; Sundin et al., 2022a). There are anonymous food redistribution efforts such as public fridges, where it is free for anyone to pick up or donate food, which could potentially reach a wider audience. Another benefit is also that it can include surplus from household, while the major drawback is the lack of food safety control (Johansson, 2021).

At social supermarkets, people that can show that they have a low income, usually below a certain level, can become members and buy the food to a substantially reduced price. In Sweden, the first social supermarket opened in a suburb of Stockholm in 2015. Between 2021 and 2022, Stadsmissionen in Stockholm and Räddningsmissionen in Gothenburg went from a total of three social supermarkets to seven, with thousands of active members. At Stadsmissionen it is also required to have a low income to qualify to receive the food bags (Sandberg et al., 2022). The larger food banks in Sweden are mainly run by established charity organisations such as Stadsmissionen, Hela Människan, Frälsningsarmén, Food2CHANGE and Räddningsmissionen. There are also smaller local actors, as well as the company Allwin that redistribute food to churches and other charities (Lunde Dinesen et al., 2018; Pettersson, 2015; Sandberg et al., 2022). Food donations has largely been a short-term solution to alleviate food insecurity and reduce food waste driven by the civil society. However, Sandberg et al., (2022) argues that redistribution of surplus food is developing to become more institutionalised and normalised. This could potentially lead towards a society where people are directed away from the primary market to the second-hand food market and become dependent on civil charity.

A recent life cycle analysis case study by Sundin et al. (2022b) showed that redistribution of surplus food by donation of food bags is beneficial from an environmental, social, and economic perspective. Donations of food bags showed a decreased climate impact by -0.42kg CO₂e per kg of surplus, which was better than both redistribution to soup kitchens (-0.27kg CO₂e) and anaerobic digestion (0.22kg CO₂e) (Sundin et al., 2023, 2022b). However, they saw a negative rebound effect in terms of environmental benefit by the receivers getting more money left to spend on other things, while that was one of the prominent social advantages. Both the macro- and micronutrient profile of the food bags were of decent quality, within dietary recommendations. They also concluded that around 80% of the donated food were consumed, indicating high acceptancy from the receivers, which is crucial to have any
environmental or social benefits at all. The economic net benefits of food bag donation showed a generation of around 1.5 million SEK, despite being dependent on volunteers and private and public economic support (ibid).

There are many social non-profit organisations that redistribute surplus food, mostly in a small and local scale. Lunde Dinesen et al. (2018) argues that there is a need for developing more resource-effective distribution to increase the volumes to cover the needs. One example is to establish central warehouses connected to a national logistical system. That would require larger investments but could be more cost-effective in the long run and reduce the food waste as well as reach people in need (ibid). Lunde Dinesen et al. (2018) also mention the increased need for developing the routines for traceability and suitable digital support systems, as well as using digital self-monitoring programs for e.g., hygiene- or temperature routines when the organisations scale up. Also, as more organisations are redistributing surplus food, there could be great benefits in establishing networks to share knowledge and experiences to ensure safe and effective redistribution (ibid).

3.3.2 Food Waste Reduction Efforts Decreasing the Surplus in Grocery Stores

Grocery stores have several different strategies other than surplus food donations to adopt to reduce their food waste. There are national efforts to reduce food waste, to fulfil the SDG 12.3 to halve global food waste by 2030, and the action plan was formulated by the Swedish Food Agency, the Swedish Board of Agriculture, and the Swedish Environmental Protection Agency by request from the government (Swedish Food Agency, 2018). In 2020 Samarbete för minskat matsvinn (SAMS) which is a voluntary agreement between actors in the food supply chain, was launched as a part of the governmental efforts to reduce food waste. There are similar initiatives both in the UK (WRAP) and Norway (Matvett), which have been successful in reducing the waste throughout the entire value chain (IVL, 2023).

According to the food waste hierarchy (see Figure 9), prevention is the most favourable option. Grocery stores can for example use digital tools to keep track of expiration dates and manage the stock, reduce storage temperatures to prolong shelf-life, use food saving apps to sell items at a reduced price, or sell items at a reduced price in store to reduce the food waste in store (Ejnarsson and Bengtsson Ekström, 2020; Eriksson, 2015; Eriksson and Strid, 2013; Swedish Environmental Protection Agency, 2021). Price reductions can, however, have negative impacts on food waste in households. In 2021 the Swedish Food Agency performed a study investigating if interventions in supermarkets could reduce the household food waste, often referred to as ‘nudging’. Based on insights in behavioural science, they compared four different discount displays for fresh vegetables. The results demonstrated that grocery stores can nudge their consumers to make more conscious decisions, and not buy more than needed. Simple discounts instead of a quantity discount, at the same price per item, showed to contribute to overall reduced food waste (Gravert et al., 2021).
3.3.3 Obstacles to Surplus Food Donations

In the early 2000s when large-scale food waste management was planned in Sweden, food donation was not considered as an alternative, as the narrative of ‘waste as a resource’ was dominant in the EU at the time (Johansson, 2021; Sundin et al., 2023). Composting, anaerobic digestion and incineration were the evaluated alternatives, and the focus was on nutrient recycling. When the objectives were revised again in 2012, the focus was shifted to recover energy, and biogas production from anaerobic digestion became a priority to facilitate renewable energy targets. The target for the share of food waste that should go to biogas production has increased from 40% in 2012 to 75% in 2021. In 2013 the Swedish Environmental Protection Agency reported that redistribution of surplus food lacks capacity to tackle food waste, as the generation exceeds the needs, which is contradictory to other studies (e.g., Lunde Dinesen et al. (2018)). They also reported that it is cheaper and saves time to discard food, and put less demand on food safety and logistics, smaller communities potentially lack volunteers, as well as large losses in the redistribution weakens the cost-effectiveness and that there is a lack of reliable distributors (Eriksson and Strid, 2013; Johansson, 2021).

Today, donation of surplus food is, however, a relatively widespread practice in retail, but with lacking national guidelines it is loosely managed. The logistics of donations must be adequate to assure that what is distributed reaches the end goal – to be eaten (Rosenlund et al., 2020). There are two angles to obstacles that prevent surplus food donations at an organisational level, the obstacles in the grocery stores and the obstacles at the food banks that redistribute the surplus food. Ejnarsson and Bengtsson Ekström (2020) investigated internal and external barriers to food waste reduction in retail, from the perspective of the retailers where donations were studied as one of waste management options for surplus food. In table 2, the result of their study is summarised, here focusing on barriers in grocery stores and at food banks.

Table 2 – Practical obstacles to surplus food donations, results from (Ejnarsson and Bengtsson Ekström, 2020)

<table>
<thead>
<tr>
<th>Practical obstacles to surplus food donations</th>
<th>Grocery Stores</th>
<th>Food Banks</th>
<th>Common</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage capacity</td>
<td>Traceability</td>
<td>Mismatch of pick-up times</td>
<td></td>
</tr>
<tr>
<td>Find collaborations</td>
<td>Cold-chain requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administration</td>
<td>Transportation logistics</td>
<td></td>
<td></td>
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<tr>
<td>Ensuring serious actors</td>
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</tbody>
</table>

Johansson (2021) argues that even if there are obstacles to efficient surplus food donations, obstacles are not a reason to give other alternatives higher political priority, as for example biogas production initially also came with numerous challenges. There is no conflict for surplus food donation...
and anaerobic digestion of food waste to coexist, as avoidable food waste could be redistributed, and unavoidable food waste could be used for biogas production. Yet, current policies mainly focus on environmental and economic perspectives, and lack socio-ethical dimensions (ibid). Sundin et al. (2023) argues that there is currently no incentive for retailers to donate the surplus food. Lack of economic incentives and the low economic value of food compared to labour costs, has been identified as prominent barriers for surplus food donations, as well as lacking strategies and fiscal incentives (such as tax deductions) to increase the extent of donation and align with the waste hierarchy (Sundin et al., 2023, 2022b). An overview of the identified challenges in the literature, sorted in organisational, industry, institutional and societal level can be found in Appendix B.
4 Results and Analysis

This chapter firstly goes through the results from the interviews and other complementary data collected in the project, divided into four categories: 1) The basic conditions for donations of surplus food, 2) practices, and 3) success factors for donations, to map which practices that enhance efficient operations and potentially could be best practices; and 4) challenges to donations to map what obstructs the reduction of food waste in grocery stores through surplus food donations. A summary of with who, when and where the interviews took place is listed in Table 1 (see in 2.2.5). GS1 donates to LFB1 and GS2 donates to LFB2, while the expert (E1) has been working with the logistics in between SFB1 and grocery stores, as well as several similar collaborations. There are some ‘quotes’ presented to highlight certain impressions, but they are not direct quotes as they are freely translated and rather summarise the essence. The last section is focusing on analysing the role of surplus food donations in the food system through the lens of MLP, to address the paradox of food waste and food insecurity.

4.1 Basic Conditions for Surplus Food Donations

During the data analysis process, it was clear that to be able to identify best-practices, the first step was to summarise what the basic conditions are for the operation of surplus food donations to function in a safe way, visualised in Figure 10. The basic conditions are identified based on information about the operations given in interviews and information in donation contracts. The mutual basic conditions for surplus food donations, were identified as having an agreement or contract and effective communication. All interviewees mentioned effective communication as the foundation of the collaboration.

“Good relationships are essential” (LFB1).

Figure 10 - Basic conditions for surplus food donations
4.1.1 Food banks

Venue & Vehicle

LFB1, LFB2 and SFB1 stressed the necessity of having a functional venue, with at least some refrigerators and a space large enough for sorting the food, as well as for cleaning to keep the space hygienic. Regarding vehicles, the minimum was described as to have some type of cold box to transport the food from the store to the food bank.

Funding & Staff

Neither funding nor staff were topics explored in depth. Funding was mentioned by E1 and LFB2 in the perspective of doing certain investments, such as trucks or changing venue. LFB2 described that it was a challenge to invest in a refrigerated truck but said that it could be solvable by sponsor collaborations. LFB1 mentioned that their previous municipality funding had been discontinued to prioritise other projects, but this was not stopping the operation to continue. In the feedback webinar, one participant nevertheless stressed the importance to secure long-term funding and to have a plan for the economy of the organisation, to be prepared to maintain the basic conditions. LFB1, LFB2 and SFB1 mentioned the necessity of having staff that both knows of the routines, and are engaged, in sum “the right” people in the right place.

“We do not want anyone to feel obliged to help at the food bank, we want to make sure that the people who are doing this are enthusiastic about it” (SFB1).

Routines

The basic routines identified were collection of donated food at grocery stores, sorting at the venue, packing food bags, and handing out to the recipients. Throughout this process, the cold chain must be as intact as possible. It was organised in numerous ways at the food banks, with varied number of staff or volunteers, but the different responsibilities were determined. It was also mentioned by LFB1 to have a system taking the integrity of the recipients into consideration. Traceability seems to be interpreted in different ways, but as it is a requirement by EU legislation (European Commission, 2017), it is included as a basic condition. At LFB1 and LFB2 the traceability routine was mentioned as an integrated part of the sorting routine, as they scanned what they received to the venue.

4.1.2 Grocery stores

Storage and Staff

Both GS1 and GS2 mentioned that a central part of donations to function was to have a dedicated space with the right conditions to place the surplus, and that there are staff with responsibility for the handling. The storage place should allow for easy pick-up and be clearly defined from non-donated items that might be stored close-by.
To donate the surplus food GS1 and GS2 mentioned the routines of sorting out donatable food, placing it in the storage, and making sure the food bank staff can pick it up. In their contracts, and by food safety regulations (Swedish Food Agency, 2023b) the responsibility for traceability is transferred to the food bank after donation. The grocery stores scan and weigh the items sorted out for donations, which is a part of their routines to keep track of stocks and fulfil their traceability responsibilities.

4.2 Surplus Food Donation Practices

The described basic conditions above are functioning in slightly diverse ways in the different interviewed food banks and grocery stores. These practices are summarised in Table 3 to provide an overview. The E1 interview did not focus on specific routines, so that will be covered in later sections.

Table 3 - Summary of surplus food donation practices at food banks

<table>
<thead>
<tr>
<th>Basic condition</th>
<th>Small Food Bank 1</th>
<th>Large Food Bank 1</th>
<th>Large Food Bank 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Venue</strong></td>
<td>Large space in basement of local church</td>
<td>Smaller facility with cold room and kitchen</td>
<td>Large facility with cold room, and storage</td>
</tr>
<tr>
<td><strong>Vehicle</strong></td>
<td>Private cars, cold boxes</td>
<td>Small, refrigerated truck</td>
<td>Van with cold boxes</td>
</tr>
<tr>
<td><strong>Funding</strong></td>
<td>Part of church</td>
<td>Part of charity, recently lost municipal funding</td>
<td>Part of charity</td>
</tr>
<tr>
<td><strong>Staff</strong></td>
<td>Volunteers</td>
<td>Employees, work training</td>
<td>Employees, work training, volunteers</td>
</tr>
</tbody>
</table>

**Routines**

<table>
<thead>
<tr>
<th></th>
<th>Small Food Bank 1</th>
<th>Large Food Bank 1</th>
<th>Large Food Bank 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collection</strong></td>
<td>Twice a week</td>
<td>Every day, in-store</td>
<td>Twice a day, in- and outside store</td>
</tr>
<tr>
<td><strong>Hand-out</strong></td>
<td>Twice a week. Larger families receive two bags</td>
<td>Every day, individual time slots. Larger families receive two bags</td>
<td>Everyday 14-15pm. Larger families receive two bags</td>
</tr>
<tr>
<td><strong>Sorting</strong></td>
<td>Discard inedible, follow informal guidelines</td>
<td>Discard inedible, repack broken packages, follow determined guidelines</td>
<td>Discard inedible, repack broken packages, follow determined guidelines</td>
</tr>
<tr>
<td><strong>Packing</strong></td>
<td>Packed based on preferences</td>
<td>Fresh foods prepacked, rest with recipient</td>
<td>Packed based on preferences in reusable bags</td>
</tr>
<tr>
<td><strong>Traceability</strong></td>
<td>No routine*</td>
<td>Scan &amp; weight, report statistics</td>
<td>Scan &amp; weight, report statistics</td>
</tr>
<tr>
<td><strong>Cold chain</strong></td>
<td>Cold boxes, refrigerators</td>
<td>Refrigerated truck, cold room, refrigerators</td>
<td>Cold boxes, cold room, refrigerators</td>
</tr>
<tr>
<td><strong>Integrity</strong></td>
<td>Printed lists of recipients with only first names</td>
<td>Printed lists of recipients with only first names</td>
<td>Printed lists of recipients with only first names</td>
</tr>
<tr>
<td><strong>Responsibility</strong></td>
<td>Volunteers shifting roles, e.g., heavy lifting</td>
<td>Manager + other roles</td>
<td>Manager + other roles</td>
</tr>
</tbody>
</table>

* Some of the grocery stores donating to SF1 send emails when there is a product alert. If it would be relevant to SFB1 (never happened), they could inform all recipients by phone instantly.
Table 3 summaries how the basic conditions are being met or function at the food banks. As it turned out there are quite a lot of differences between the larger food banks, which in this case are more established organisations with employees, and smaller food banks which are volunteer based. What is not covered in this summary are some of the things that were mentioned in interviews that could potentially enhance the work at the food banks. For example, LFB1 mentioned that they have had good responses when they have visited grocery stores and informed about their social work and see potential to communicate more broadly about their work to increase the societal awareness about surplus food redistribution. LFB2 also had several ideas on how to develop their practices further to have a more holistic approach to food insecurity and health, for example, organising cooking events, support with budget planning and focus on receiving more legumes as a protein source.

*Table 4* summaries how the basic conditions are being met or function at the interviewed grocery stores, as well as a summary of the input from the project (see more about the project in 2.2.2 Collaboration Partner and Study Site). This other data collection, which is referred to as ODC1, is shared material and raw data from four interviews and a national survey with one large, Swedish grocery store chain, as well as some complementary donation statistics from RSS.

### Table 4 - Summary of surplus food donation practices in grocery stores

<table>
<thead>
<tr>
<th></th>
<th>Grocery Store 1</th>
<th>Grocery Store 2</th>
<th>Other data collection (ODC1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Storage</strong></td>
<td>In dedicated area</td>
<td>In dedicated area</td>
<td>In dedicated area, with specific crates</td>
</tr>
<tr>
<td><strong>Staff</strong></td>
<td>Permanent staff + hourly staff</td>
<td>No new staff the past 3 years</td>
<td>Permanent staff + hourly staff</td>
</tr>
<tr>
<td><strong>Routines</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sorting of donatable items</strong></td>
<td>In daily routines, no extra time</td>
<td>In daily routines, no extra time</td>
<td>In daily routines, no extra time</td>
</tr>
<tr>
<td><strong>Pick-up</strong></td>
<td>Receive call and let them in, every day</td>
<td>Receive call and let them in, every day</td>
<td>Both in- and outside store, varying interval</td>
</tr>
<tr>
<td><strong>Traceability</strong></td>
<td>Scan + responsibility transferred to food bank</td>
<td>Scan + responsibility transferred to food bank</td>
<td>Scan + responsibility transferred to food bank</td>
</tr>
<tr>
<td><strong>Responsibility</strong></td>
<td>Only permanent staff</td>
<td>Everyone</td>
<td>Varying, new learn by following colleague</td>
</tr>
</tbody>
</table>

Regarding communication between the food banks and the grocery stores, it is a widespread practice to call before arrival, but according to LFB1 and LFB2 some grocery stores prefer not to receive phone calls. LFB1 has regular meetings, around 1-2 times per year with the grocery stores that donate to them to exchange feedback and discuss potential improvements. LFB1 and LFB2 have written contracts with the grocery stores where certain requirements are specified. The type of contracts can vary, for example, the grocery store chain interviewed in ODC1 has their own contracts, while in some cases the food banks formulate the contract. SFB1 has a written contract with one grocery store, while two others have oral agreements. To improve the collaboration regarding traceability, E1 mentioned that it would be useful
if the grocery store would print lists of donated items. A further enhancement would be, to have a system with an API that food banks could use to integrate the data in their own system, but that would require collaborative efforts and funding. Currently, all three food banks mostly collaborate with grocery stores, but all of them also had smaller collaborations wholesales and/or producers. They all stressed that to increase the amount, get more variation and have a more stable inflow, those type of collaborations should be extended.

4.3 Success Factors

Factors that facilitate the donation of surplus food from the store to the food bank, and eventually the redistribution to recipients, are gathered here as success factors. General success factors for collaborations that work well seem to overall be communication, clarity, and knowledge and understanding of food safety. Looking more in detail at experienced success factors, see Figure 11, all interviewees mentioned in diverse ways that building good relationships and communication is the key to well-working collaborations. A more subtle observation, but also something that was consistently mentioned was the shared interest and engagement to help people and together reducing the waste of resources, which could be regarded as a success factor and driver.

“It feels like a matter of course – it does not feel right to throw away fully edible food. It feels good to know that the surplus goes to a good cause” (GS2).

![Figure 11 - Experienced success factors](image)

There are probably several of the success factors that apply to all actors, which did not come up clearly in the interviews, and are thereby not visualised here. For example, the competence about food safety is a standard necessity at grocery stores and was therefore not specifically explored.
4.3.1 Food banks

LFB1 and LFB2 mentioned that efficient and smooth pick-ups, are success factors for some of the collaborations that they experience work well. LFB2 mentioned to have a functional venue, as they used to have a too small venue before, and now experiencing much improvement of the operations. LFB1 also mentioned how a cold room and kitchen facilities in their venue has been especially useful to smooth operation and to reduce the secondary waste. All food banks touch upon that their constant learning-by-doing and thereby continuously developing the routines, has paid off. In relation to the learning-by-doing, the knowledge as well as professional competence about food safety was highlighted by all food banks as effective and important in daily operations, to take safe decisions quickly.

4.3.2 Grocery stores

GS1 and GS2 as well as the other interviewees in ODC1 stated that when sorting surplus food for donations is incorporated into the daily routines, it barely takes any extra time at all. In GS1 and GS2 pick-ups occur every day, which seems to be successful as both are happy with the collaboration. GS2 also mentions that it is necessary for them that the food bank picks up the food, as they do not have any possibilities to be delivering. The donation contracts are clear at both GS1 and GS2, which contributes to the efficiency.

4.4 Challenges to donations

When gathering the information about the challenges of donations, at both food banks and grocery stores, the consequences of these challenges were also frequently mentioned. Therefore, both the challenges and the consequences of these are summarised in Figure 12. There were some differences in what was mentioned in literature but could not be confirmed in the empirical data collection, or even showed opposite results. For example, as mentioned in 3.3.3. Obstacles to surplus food donations that throwing away the food at grocery stores saves time, while results from both GS1, GS2 and the ODC1 survey showed that donations normally barely take any extra time. It was also mentioned in 3.3.3. Obstacles to surplus food donations that challenges to donations are large losses during the redistribution and a lack of volunteers, which could not be confirmed in the interviews. LFB2 and SFB1 had collaborations with others to take care of any eventual non picked up food bags, and LFB1 had a kitchen to prepare meals of any left-over items. Food considered to have gone bad would follow the same waste treatment as if it were wasted at the store. Regarding the lack of volunteers, it was not something that could be noticed at these food banks. However, according to E1 it could vary depending on local circumstances.
4.4.1 Food banks

Regarding smaller food banks, many of the challenges E1 and SFB1 mention appear to be related to having limited resources in various forms, such as time for pick-up and packing, facilities, dependency on volunteers, or economic means to make investments. Which in turn leads to the inability to collect more surplus and pack more food bags, even if the demand is increasing. E1 mentions that mismatching schedules could sometimes also contribute to obstructing donations. Both SFB1 and E1 mention that with lacking resources and capacity, there is more known surplus than what is possible to manage. SFB1 use normal passenger cars for pick-ups, which sometimes lead to going back and forth several times, E1 also mentions that vehicles are often too small for the surplus food that would be picked up – which in turn can lead to bad ergonomics and heavy lifts.

According to E1, traceability could be a challenge for all food banks without a digital scanning system, and there is also a lack of awareness and knowledge of to what extent the current regulations apply to them. According to the EU legislation, food banks that are operating regularly are responsible for traceability, the obligations vary depending on if the organisation is a redistributor (to other organisations) or a charity (donating or selling at a reduced price directly to consumers), but they are always obligated to at least document the name of the supplier, their address and an indication of which products have been delivered (European Commission, 2017). E1 also mentions how time consuming it is to follow the traceability routines manually if all inventory should be written down. It is even more
challenging because of the limited time the volunteers have, while also sustaining the cold chain simultaneously without a cold room for storage. SFB1 and other small food banks E1 had worked with were unsure about their obligations, and LFB2 had a grocery store ending their donation contract due to perceiving not being able to ensure the traceability, even though LFB2 has a digital traceability tool. The confusion about how the EU legislation should be interpreted is therefore leading both to inability to ensure that the legislation is followed, as well as increased avoidable food waste in fear of not following the legislation correctly. SFB1 states that also other food safety regulations can be difficult to be aware of or interpret correctly. However, all participants express a positive attitude towards current food safety regulations, but E1 express that there are challenges to spread knowledge of how compliance works in practice.

“Earlier we used to cut off the bad part of for example a cucumber and then pack the edible part, but the food safety controller informed us that we were not allowed to do so. If we receive something that is partly bad today, we throw the whole thing away” (SFB1).

For the larger food banks, on the other hand, the practicalities generally work well, but there are challenges to find more collaborations with grocery stores, or potentially wholesale. This leads to difficulties to scale up and meet the needs. Apart from that, the challenges are often concerning misunderstandings in communication. For example, LFB1 mentioned that they sometimes receive non-alcoholic beer or energy drinks, which they do not donate, and that sometimes they have picked up the wrong crates when it was not marked clearly. LFB1 and LFB2 also said that sometimes they receive fruit and vegetables that are in fact inedible. LFB1 had experienced that they have been in dialogue with a grocery store to increase for example the donations of meat products, knowing that a lot is thrown away, but without improvement. Why this occurs, is unknown to them, and the grocery store was reached out to participate in this study, but unsuccessfully. All three food banks have indicated that sometimes the understanding of their conditions and possibilities seem to not fully reach the staff at the grocery stores and could be a reason to that these events occur.

4.4.2 Grocery stores

For the grocery stores, which in the case of this study already have donation collaborations, several of the ‘obstacles’ are in fact other efforts to reduce the food waste, which was expressed by both GS1 and GS2 as well as in ODC1. There are conflicting interests with reducing waste by price reduction and prevention by order and stock management, which seems to be more economically profitable than donations. As grocery stores are profit-driven businesses, other waste reduction options have a higher priority, which both the GS1 and GS2 store manager expressed conflicting feelings about, as they know the donations help people in need, but other options are better to prioritise for their business.
Interviewees in ODC1 also mentioned that customers appreciate price reduction shelves. On the contrary, some interviewees in ODC1 mentioned that price reductions can be time consuming, while sorting out for donations is faster. However, the cost of the extra time spent on price reductions is not measured and could therefore not be evaluated if it is a cost-effective practice or not.

As already mentioned, one grocery store had discontinued their donations with LFB2 due to uncertainty about the traceability responsibilities, which highlighted the importance of clear contracts or agreements. E1 also mentioned that it could be challenging for some grocery stores that might lack storage space to collaborate with food banks run by volunteers where pick-up times cannot be adapted to their sorting time. One interviewee in ODC1 expressed that sometimes they get large quantities of surplus, but the food banks may not be able to take care of sudden large quantities, and then the grocery store lacks other options than wasting. The statistics in ODC1 also show that it varies which and how much of the product categories are donated, depending on the store. It was also mentioned in dialogue and by E1 that it could be due to lack of information sharing and varying routines between departments in the store. Interviewees in ODC1 highlighted that there is no general guide for how donations should be managed in practice within the grocery store chain. Both the grocery stores and food banks mentioned that currently in-store cooked food cannot be donated due to food safety. In GS2 surplus food that is about to expire is, however, often used in their own cooking. The planning of how to reduce ‘secondary’ waste as cooked food is not well explored or investigated.

4.5 The Role of Surplus Food Donations Through a Multi-Level Perspective

The larger aim of this study was to investigate surplus food donations from grocery stores to food banks, as an approach to address the paradox of food waste and food insecurity. Both food waste and food insecurity can be seen as results of the current food regime, in interaction with landscape pressures as visualised in Figure 13. If the waste hierarchy (see Figure 9) would be followed strictly and be applied in society, donations of surplus food would be a natural part of the food system. As presented both in the literature review and the results of this study, the current situation of surplus food donation is far from being an incorporated practice in the food industry.
Even if the concept of surplus food donations is might not an innovation per se, the action of donating and redistributing surplus food is a grassroots action that is driven by the civil society (Karlsson, 2019; Lunde Dinesen et al., 2018; Sandberg et al., 2022). Much of the operation takes place outside what could be viewed as the mainstream system, whereas I would argue that the practice of donating and redistributing surplus food in Sweden is a niche development and not a part of the contemporary food regime. However, the scale seems to be expanding with an increase in the number of recipients (LFB1; LFB2; SFB1; E1) and the management of several food banks in Sweden are becoming more formalised (Sandberg et al., 2022), indicating increased maturity. Unfortunately, the increase of redistribution of surplus food seems to not be driven by efforts to reduce avoidable food waste, but rather by the increased need of food support in socio-economically weak groups (Riksföreningen Sveriges Stadsmissioner, 2022; Sandberg et al., 2022; Sundin et al., 2023). The socio-economic developments, with weakened, or uneven, welfare as well as the recent increases of food prices (SCB, 2023) can through the lens of MLP be seen as contributing to opening ‘windows of opportunity’ for niches to break through to the regime, as visualised in Figure 13. Other landscape developments (see more in 3.1.3 Landscape Developments Pressuring the Food Regime) also influences the current regime to change. Along with economic pressures, such as the rising fuel and fertiliser prices as well as impending climate- and environmental pressures on food production, efficient usage of resources is becoming even more necessary, potentially inevitable.
For surplus food donation and redistribution to become a mature and incorporated part of the food system I would argue that it must become more formalised, with sufficient economic funding, political priority, and knowledge. As surplus food donation is a response to deal with the consequences of the current food regime and overall societal development, it is in a way an incremental innovation to improve, but not radically change, the food system. However, it does have the character of a radical innovation as the idea of it challenges the ecological, social, and economic unsustainable practices of the contemporary regime. The suggested ‘good enough’- and best practices can promote surplus food donations to be more mature, but the changes are still more incremental, as they can mostly occur in the current food regime.

However, surplus food donations may alleviate the issues of food waste and food insecurity but may not solve them if the current food regime is intact. In my opinion, surplus food donation is neither a solution to a logistical problem nor a win-win logistical solution to a cross-cutting challenge. It may, however, be a key component in the transition towards a sustainable food system. I would argue that surplus food donations and redistribution is representing an idea of treating food as a valuable resource and providing food for free or at a reduced price to people who may need it. As niche developments may plant seeds for systemic changes (Leeuwis et al., 2021), surplus food donation and redistribution give an example of how the idea of food as a valuable resource and a basic right could be realised in practice.

With the global SDG target 2.1 to eradicate hunger and target 12.3 to halve per capita global food waste and losses (UN, 2023a, 2023b), it might not seem like a radical idea. However, I would argue that radical changes are needed to reach these goals. It is discussed later in 5.1 Challenges and Potential Lock-ins to Donation of Surplus Food and visualised in Figure 13, there are numerous challenges and potential lock-in factors that are obstructing surplus food donations from grocery stores to food banks to occur, and some of these would need both political and behavioural changes to be ‘unlocked’. Additionally, the avoidable food waste from retail is only a fraction of the total avoidable food waste (Swedish Environmental Protection Agency, 2023b). To reduce food waste along the entire food supply chain and eradicate hunger, there are various actions to focus on other than donation and redistribution of surplus food. Nonetheless, in a sustainable food regime, surplus food donations could have a potential crucial role to avoid avoidable food waste, as surplus might always occur due to the difficulty to plan agricultural output, logistics and demand to the level of detail that there is no surplus at all.
5 Discussion

This chapter connects and discusses the empirical results of this study with previous studies and literature on the topic. The first section addresses the challenges to reduce food waste in grocery stores through donations of surplus food. The second section addresses the practices in the interaction between grocery stores and food banks that enhance efficient operations and thereby increase donations of surplus food. Lastly, some limitations of the study are discussed.

5.1 Challenges and Potential Lock-ins to Donation of Surplus Food

There are many challenges to surplus food donations, which occur simultaneously on various levels. To address the first research question “What are the challenges to reduce food waste in grocery stores through donations of surplus food?” I have merged the challenges that prevent surplus food donations and reinforce food waste practices found in literature and from empirical data together. I have divided them into four different levels, which is an adaptation of how Unruh (2000) analyses lock-ins in socio-technical systems. Unruh (2000) structures the analysis by various levels, to emphasise the varying character of the obstacles, e.g., that technological lock-ins can occur both on an organisational and institutional level. The same idea has been adapted to emphasise that the challenges to surplus food donations occur at various levels among different actors, as visualised in Figure 14. Consequently, the challenges are sorted by an organisational level for challenges within the organisations; an industry level for challenges in between the actors or generally in food distribution; an institutional level for challenges related to governmental decisions; and a societal level for challenges related to behaviours.

These challenges could partially be present due to lock-ins in the contemporary food regime. As explained in 2.6 Theoretical Framework, innovation of current regime practices is often incremental due to lock-ins, while more radical changes often mature in niches and eventually challenge the regime. To break through, various lock-ins such as techno-economic lock-ins, social lock-ins and institutional and political lock-ins need to be ‘unlocked’ (Geels, 2019). I choose to identify potential lock-in factors preventing surplus food donation and redistribution to be a regime practice, to increase the understanding of the underlying causes to the current challenges. There are no indications in this study or in literature that surplus food donations suffer from inherently technical challenges in Sweden;
logistics and storage technologies are already well developed, and convenient traceability tools exist to follow regulations, but are not accessible. Therefore, I have adjusted Geels (2019) ‘techno-economic’ lock-ins to simply ‘economic’ lock-ins.

5.1.1 Identified Challenges

The challenges to surplus food donations found in the empirical results and literature review are summarised in Figure 15, however, organisational- and industry level challenges that were only found in literature was excluded due to contradictory, and potentially outdated results (see more in 4.4 Challenges to donations and Appendix B). In Figure 15 I have marked which I recognise, according to my interpretation, as more major obstacles and which are more minor challenges, to highlight which seem to have more, or less, impact on surplus food management.

Figure 15 - Summary of challenges to surplus food donations

As the empirical study was focusing on the interaction between grocery stores and food banks when food is donated, most of the empirical results highlight organisational- and industry level challenges. At an organisational level, the major concerns could be summarised as a lack of resources, mainly at food banks (LFB1; LFB2; SFB1; E1), which was also to a large extent in line with results from Ejnarsson and Bengtsson Ekström (2020). The lack of resources also has effects on the possibilities to comply with regulations and food safety and limits the possibilities of taking care of all the surplus (E1). The retail- and food distribution industry is a dispersed network of actors with varying degrees of economic incentives (Rosenlund et al., 2020; Sundin et al., 2023; E1) with different interpretations of regulations (Lunde Dinesen et al., 2018; E1). As the empirical results showed that donations of surplus food occur mainly based on local civic engagement and the engagement of individual store managers to do good, the variation in routines and practices are naturally diverse. Differences in practices may not be something negative, but the lack of institutional strategies, guidelines and fiscal incentives (Rosenlund et al., 2020; Sandberg et al., 2022; Sundin et al., 2023; E1) and priority to other waste treatment options (Johansson, 2021), may increase the challenges at an organisational- and industry
level. At a societal level, challenges may include a lack of awareness of surplus food donation and redistribution and the potential ecological, social, and economic benefits it can have (Sandberg et al., 2022) and stigmatisation around consuming surplus food (Johansson, 2021). These challenges could also be connected to the institutional obstacles as well as the dispersed and local character of surplus food donation and redistribution.

5.1.2 Potential Lock-in Factors

To analyse these challenges and the underlying causes to them, I have gathered in Figure 16 what I perceive to be potential lock-in factors to surplus food donations. This analysis is my interpretation of the empirical results and literature findings that I perceive to contribute to obstructing compliance with the waste hierarchy (prioritising donations) and thereby delaying the transition to an ecologically, socially, and economically sustainable food system.

Concerning the economic lock-ins, this study shows that donating food barely takes any extra time at the grocery stores (GS1, GS2, ODC1), while previously the extra time needed has been identified as an obstacle (Eriksson and Strid, 2013). This might be due to a large variation, or misconceptions among researchers or store managers without experience of donations, perceiving that discarding the food is the ‘cheapest and fastest’ option. The study, however, showed that selling products at a reduced price could potentially even cost more in terms of working hours to mark the items, than what is later earned (ODC1). The cost-effectiveness of food donations highly underexplored, and potentially vary (Sundin et al., 2023; ODC1). Therefore, strategies for donations might vary depending on the value of the product. This challenge of labour costs and the unclarity of economic incentives (Sundin et al., 2023; GS1; GS2; ODC1) indicate that there may be issues with the pricing versus the costs for labour. Grocery stores and other actors throughout the supply chain are operating in silos, as private, profit-driven companies. This vertical market structure making it hard to collaborate and reach economic and environmental gains on a larger scale. With small marginals of time and resources to operate within, I would argue that the current food market conditions together with fiscal policies lacking ability to enforce economic incentives are contributing to locking-in wasteful practices.
One institutional and political lock-in could be that there is a continuous devaluation of ecological and social costs in the food system (Patel and Moore, 2017), with unclear directives of where the responsibility to follow the food waste hierarchy lies. This may lead to the lack of a holistic approach to food and agricultural resource use, and the lack of funding to reduce food waste and losses, as well as the lack of institutional efforts to redistribute surplus (Rosenlund et al., 2020; Sandberg et al., 2022; Sundin et al., 2023). Furthermore, there are some issues with assuring that regulations are correctly interpreted (E1; LFB2; SFB1). Currently there are no guidelines, funding or supporting organ to assist actors in complying with the regulations (E1). However, that is potentially changing as the Swedish Food Bank Network project aims to be a supporting organ food banks to assist with, for example, regulation compliance (Åtbart, 2022; E1). Nonetheless, the current lack of support for regulation compliance is potentially causing both organisational challenges, as well as reinforcing the dispersity of donation and redistribution. The ‘waste as a resource’ thinking has also contributed to promoting less favourable waste treatment options for avoidable food waste, and weakening economic incentives for donations (Johansson, 2021), even if that was not the intention. When it is potentially more profitable to produce, process and distribute food that end up in a biogas plant, than redistributing it for consumption, there are clearly systemic problems.

Many consumers know that best-before dates are guidelines and that the food is still edible after ‘expiration,’ but these items are rarely sold at ‘normal’ grocery stores. For example, both GS1, GS2 and the grocery stores in ODC1 choose to not sell items that has passed the expiration date. The reasons grocery stores are not selling them could vary, one reason could be because they want to donate (GS1; GS2). The knowledge about grocery store strategies and consumer attitudes towards surplus food is, however, underexplored and might have changed since the food prices have increased dramatically. Nevertheless, current statistics shows that most food waste occurs in households (Swedish Environmental Protection Agency, 2023b), indicating that the consumers can afford to waste food. Especially in the Global North, food has become more abundant and accessible since the green revolution and the rise of supermarkets, becoming a resource with low value compared with the labour costs to produce, process, and distribute the food (Patel and Moore, 2017). The low value-mindset could be a contributor to promoting a food system focusing on economic efficiency wasteful of natural resources and unequal in accessibility, which could obstruct incentives to increase donations. If that food was instead not bought, retailers could firstly adjust order volumes, sending signals upstream to produce less or export more/import less, and the surplus that still arises could be donated. This mindset could, however, be changing due to the increases in food prices, with indications that consumers at least experience themselves to plan their purchases more carefully (Swedish Food Agency, 2022).
5.2 ‘Good Enough’ and Best Practices

To address the second research question “What are the practices in the interaction between grocery stores and food banks that enhance efficient operations and thereby increase donations of surplus food?”, the interactions between grocery stores and food banks for handling donations are assessed, to identify ‘good enough’- and best-practices that could potentially increase surplus food donations. These practices have been identified as a combination of the basic conditions, current practices and success factors described in the empirical results and findings from the literature review, as well as from dialogue in the project, as visualised in Figure 17.

![Figure 17 - How ‘good enough’- and best practices are defined.](image)

The possibilities for improvements are largely influenced by limited resources for many non-profit organisations (Ejnarsson and Bengtsson Ekström, 2020; Lunde Dinesen et al., 2018; LFB1; LFB2; SFB1; E1). The same applies to grocery stores, as there may be a lack of economic incentives, but sometimes a strong commitment to reduce food waste and help people (GS1; GS2). Therefore, I want to highlight how things can be done in a ‘good enough’ way that does not require major resource investments. These practices rather focus on tasks that are relatively easy to accomplish and are resource-efficient but still could improve the donation and redistribution practices. The best practices can therefore be interpreted more as an addition, or further development to optimise as the business e.g., may expand or receive increased financial support. This does not mean that good practices are step one with a corresponding step two in the form of best practice, instead best practices shed more light on what can contribute to an additional comprehensive approach to donations, when there is an opportunity or need. Even if some of the best practices may need more monetary resources, several of them could also be addressed without ‘unlocking’ potential lock-ins.

5.2.1 Food Banks

In Figure 18 the ‘good enough’ practices and best practices at food banks are gathered. The different practices are sorted based on the character, if it is a more practical practice, a managerial practice or
more institutional matter that might be outside the organisation to affect. The practices are also sorted on a maturity and scale axis, to emphasise the level of complexity of the practice, where an organisation with high maturity, operating in a large scale with sufficient funding might be more suitable for the practices to the outermost right. The more institutional the practices are, at a larger scale and in organisations with higher maturity, the more increases the need to ‘unlock’ the lock-in factors before adopting the practices.

![Diagram showing the maturity and scale axis for practices in food banks]

Figure 18 - ‘Good enough’- and best practices at food banks

The ‘good enough’ practices in Figure 18, are mostly related to practical routines, such as having lists and guidelines documented (LFB1; LFB2) and assuring staff have enough knowledge (LFB1; LFB2; SFB1). On the more managerial side, I have identified to have defined responsibilities to make sure everything operates smoothly (LFB1; LFB2; SFB1), and nothing is forgotten. Another practice is to rotate more physically demanding tasks to sustain good working conditions (SFB1). As the network of food banks and organisations that work with redistribution of surplus food is quite dispersed (Rosenlund et al., 2020; Sundin et al., 2023; E1), the financial situation may look relatively different from case to case. However, to have a financial plan can improve the general planning, prepare for sudden events where investment is needed and make sure all basic conditions can be met (input from feedback webinar).

The best practices at food banks that I have identified goes from practical concerns such as improved vehicles (LFB1, LFB2, E1), facilities and lifting aid (LFB1, LFB2, E1), to managerial practices of having an employed manager (LFB1; LFB2; SFB1), gather statistics (E1), using digital
traceability and self-monitoring tools (Lunde Dinesen et al., 2018; E1; LFB1; LFB2) and set up collaborations to take care of secondary surplus (LFB2; SFB1). On a more institutional level, having a network for food banks to exchange ideas and experiences, is also something that was suggested in literature (Lunde Dinesen et al., 2018) and identified by E1, who has co-founded The Swedish Food Bank Network. At a high maturity and larger scale, I would argue that more focus on holistic approaches could be implemented which was especially expressed by LFB2, such as focusing on packing more nutritious food bags, including other activities for recipients to relieve food insecurity and have a broader collaborations and visibility about their work.

5.2.2 Grocery Stores

In Figure 19 the ‘good enough’ practices and best practices in grocery stores are gathered and are structured in the same way as in Figure 18. Just like at food banks, ‘good enough’ practices are mostly related to practical routines necessary for the donation of surplus to function. For example, setting up clear routines (GS1; GS2; ODC1) and a convenient storage area (GS1; GS2). ‘Good enough’ practices also address some managerial practices, such as incorporating the sorting for donations into the daily routines (GS1; GS2; ODC1), and agreements between the food banks and the individual stores on how they can communicate before the pick-ups, as the preferences vary (LFB1; LFB2).

![Figure 19 - ‘Good enough’- and best practices in grocery stores](image-url)
The best practices have a larger range and are addressing more managerial and institutional matters, such as to manage unpredictable events with an ‘emergency number’ (ODC1). Another example is to plan more aligned with the conditions of the food banks, to optimise for example, what is better that they use in their own kitchen for cooking instead of donating something that the food bank must throw away due to food safety regulations. However, as cooked foods cannot normally be donated, it is also crucial that the grocery stores take that into consideration when planning, so they do not cook more than could be sold, instead of donating the products. As stated in ODC1, the cost-effectiveness of price reduction compared to donations is not clearly evaluated, therefore, a best practice could be to measure that, to map when and for which products, which option is more economically feasible. However, to have a positive system impact on reducing food waste, parameters of consumer behaviours would also need to be included in the evaluation, so the potential economic gain of price reductions at the grocery store do not cause overbuying and increased household food waste. To contribute to ‘unlocking’ the lack of support for regulations compliance, a best practice could be to develop possibilities in the grocery stores’ systems to have APIs that could be used in a food bank system (E1). However, as the grocery stores lack incentives to make investments for improving conditions for digital traceability tools, it probably needs to be addressed on a more institutional level. Economic incentives for surplus food donations would be ideal to accelerate the transition to a more sustainable food system that follows the waste hierarchy. However, that is currently outside the capacity of the grocery stores to change by themselves.

5.3 Limitations

What mainly limited the study was the difficulty to find interviewees at grocery stores. As the focus was on interviewing grocery stores that already donate their surplus, finding interviewees was based on contacts within the project and information from the food banks. Several relevant grocery stores known to donate their surplus were reached out to, without replying or declining. With the limited information of suitable grocery stores and a slow contact chain, it was not possible to organise more interviews. The samples were also limited to representing only a few locations in Sweden, while the circumstances might vary geographically and depending on town size.

More empirical evidence would be needed to assure a representative sample selection and have a higher level of transferability and generalisability of the phenomenon of surplus food donations. The interviewees were truly knowledgeable and engaged, which might also not be representative, for example, if the managers at grocery stores without a donation collaboration would be interviewed, the obstacles might be different to what I have found. The analysis of potential lock-ins and the consequences of these, as well as best practices, could also have been expanded and investigated more in detail, with more empirical data.
6 Conclusions

The aim of this study was to investigate surplus food donations from grocery stores to food banks, as an approach to address the paradox of the issues food waste and food insecurity. This was done by investigating the challenges, potential lock-in factors, and best practices of surplus food donations, to understand the potential of surplus food donations to alleviate both issues, as well as its role in the transition towards a more sustainable food system. The results show that there are some basic conditions that are generally needed for surplus food donation and redistribution to take place in a safe way, such as storage, transportation, refrigeration possibilities, and practical routines. The practices and challenges may vary between small, volunteer-led food banks and larger, more experienced ones, and grocery stores. However, the main drivers to the current incentives for surplus food donation and redistribution to occur seem to consistently be of social character, to help fellow people in need.

The study shows that there are several challenges at organisational-, industry-, institutional- and societal levels that prevent surplus food donations and reinforce food waste practices in the contemporary food regime. The underlying causes of these challenges could partially be present due to economic-, institutional and political-, as well as social lock-ins in the contemporary food regime. The identified challenges are often related to economic concerns, while the knowledge of potential economic gains and the cost-effectiveness of surplus food donation and redistribution is relatively unexplored. Statistics also show that most food is wasted in the consumption stage, indicating a low value mindset around food, as consumers can afford to waste it. However, this might be changing due to increased food prices and costs of living. As long as there is a low value mindset around food, retailers can keep selling more food than we need to eat, which eventually ends up as avoidable waste in households. If that food would never have been sold, it could instead have been donated to a food bank. With scarce time and resources for surplus food donation and redistribution, the current food market conditions together with fiscal policies and a lack of support for regulation compliance fail to enforce economic incentives to ‘unlock’ wasteful practices. The environmental and social costs of food waste seem to be consequently undervalued, even if research shows that there are both strong climate-, environmental-, and social related incentives to reduce food waste by fairer distribution. Instead, a ‘waste as a resource’ thinking has dominated and potentially led to unintended priority to less favourable treatment options for surplus food.

There are several potential lock-ins that might need to be ‘unlocked’ for surplus food donations to be a part of a radical transition to a more sustainable food system. Surplus food donation and redistribution can through the lens of MLP be seen as a niche development and is an example of how the idea of food as a valuable resource and a basic right could be realised in practice. There are, however, still several of the identified ‘good enough’- and best practices that can be implemented to incrementally improve the resource efficiency of the current food system. Addressing challenges of more practical
Conclusions

concern requires less economic means and could increase the maturity of surplus food donation practices, by for example establishing effective communication, structuring routines and increase the knowledge. The investigated surplus food donation practices seem to work relatively well, indicating that surplus food can be taken care of efficiently. However, more funding, economic incentives, and political priority would potentially be needed to address both food waste reduction and alleviation of short-term food insecurity on a larger scale. Surplus food donation and redistribution might not be a win-win solution to food insecurity and food waste, as these issues are more complex than a logistical problem. It may, however, be a key component in the transition towards a sustainable food system.

6.1 Future work

To increase the generalisability of the results, I would suggest collecting more empirical data in other locations to gain a more comprehensive picture of the situation, challenges, and practices. Since the statistics and general overview of donation and redistribution of surplus food is lacking, I would also suggest to further do a mapping of the organisations that donate surplus and organisations that redistribute the surplus to recipients on a national level in Sweden. I would also suggest interviewing grocery stores that currently do not donate their surplus and the possible reasons to that.

I think it would also be relevant to investigate the implementations and interpretations of food traceability compliance, and how the regulations could be followed without obstructing organisations to redistribute the food. The social factors, benefits, and potential drawbacks of surplus food redistribution in relation to addressing food insecurity could also be investigated more in depth. The role of retail to nudge or affect downstream and upstream waste, I believe would also be a relevant topic to investigate to address the interactions in the food supply chain. Lastly, it is important to critically analyse and keep up to date with the potential system effects surplus food donations and redistribution might have, so it does not undermine other social welfare support and bring social and economic benefits to the recipients. Therefore, I would suggest to further study surplus food redistribution from the perspective of recipients.
References


Franco, S., Barbanera, M., Moscetti, R., Cicatiello, C., Secondi, L., Massantini, R., 2022. Overnutrition is a significant component of food waste and has a large environmental impact. Sci. Rep. 12, 8166. https://doi.org/10.1038/s41598-022-11813-5


References | 47
Appendix A: Interview Framework

Surplus food donations

Broad questions: How does it work? What works well? What challenges are there? Potential improvements?

1. Organisational level
   - Practical (routines, logistics, time, roles, etc.)
   - Economic factors
   - Technology and information
   - Cooperation

2. Industry level
   - Branding/marketing
   - Collaboration and competition
   - Drivers, incentives, obligations

3. Institutional level
   - Laws, regulations, traceability

4. Societal level
   - Attitudes/expectations
   - Changes in the need for food support/recipient groups
## Appendix B: Summary of Challenges to Surplus Food Donations in Literature

### Table 5 - Summary of challenges to surplus food donations in literature

<table>
<thead>
<tr>
<th>Challenges to Surplus Food Donations (Literature)</th>
<th>Organisational Level</th>
<th>Industry Level</th>
<th>Institutional Level</th>
<th>Societal Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage capacity</td>
<td>(Ejnarsson and Bengtsson Ekström, 2020)</td>
<td>Finding collaborations (Ejnarsson and Bengtsson Ekström, 2020)</td>
<td>Lack of national guidelines (Rosenlund et al., 2020; Sandberg et al., 2022)</td>
<td>Lack of awareness (Sandberg et al., 2022)</td>
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<tr>
<td>Transportation logistics</td>
<td>(Ejnarsson and Bengtsson Ekström, 2020)</td>
<td>Mismatch of availability (Ejnarsson and Bengtsson Ekström, 2020)</td>
<td>Lack of strategies (Sandberg et al., 2022; Sundin et al., 2023)</td>
<td>Stigmatisation (Johansson, 2021)</td>
</tr>
<tr>
<td>Administration</td>
<td>(Ejnarsson and Bengtsson Ekström, 2020)</td>
<td>Dispersed network of actors (Rosenlund et al., 2020; Sundin et al., 2023)</td>
<td>Priority to other waste treatment options (Johansson, 2021; Sundin et al., 2023)</td>
<td>\</td>
</tr>
<tr>
<td>Traceability</td>
<td>(Ejnarsson and Bengtsson Ekström, 2020; Lunde Dinesen et al., 2018)</td>
<td>Labour costs (Sundin et al., 2023)</td>
<td>Misleading reporting (Johansson, 2021)</td>
<td>\</td>
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<tr>
<td>Cold-chain requirements</td>
<td>(Ejnarsson and Bengtsson Ekström, 2020)</td>
<td>Lack of economic incentives (Sundin et al., 2023)</td>
<td>Lack of fiscal incentives (Sundin et al., 2023)</td>
<td>\</td>
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<tr>
<td>Lack of volunteers</td>
<td>(Eriksson and Strid, 2013)</td>
<td>Interpretation of regulations (Lunde Dinesen et al., 2018)</td>
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<tr>
<td>Time-consuming</td>
<td>(Eriksson and Strid, 2013)</td>
<td>Large losses during redistribution (Eriksson and Strid, 2013)</td>
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*Red: not found in interviews*