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Reusable Takeaway Containers: Disposable to Durable

A feasibility study of transition towards reusable takeaway containers in Sweden

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Abstract

Ever growing environmental impact due to human activities has increased efforts globally to tackle the issues by promoting sustainable behavior. Similar efforts are also being made to handle the waste and litter problem of single-use takeaway food packaging. Sweden aims to reduce the impact of takeaway food packaging by introducing a directive to reduce consumption of single-use packaging and replace them with reusable containers for takeaway food and beverages. This research investigates the feasibility of transitioning to such a practice of reusable containers from perspective of both, business owners and consumers, in Sweden. The research used mixed method strategy to collect qualitative data for understanding challenges from perspective of business owners and quantitative data to understand consumers' perception towards such a change. Based on the collected data of current research and compared with findings of previous studies, the research concludes that more pilot studies are needed to generate solutions for reverse logistic challenges that entails a system of reusable containers for takeaway food and need for increased awareness among business owners and consumers to drive the change forward.

Keywords: takeaway, reusable packaging, multi-use takeaway containers, single-use to multi-use, deposit return system, circular economy, theory of planned behavior, Sweden.

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1. Introduction

1.1 Background

The concept of sustainable development was introduced in the 1970s and then was popularized by the release of Brundtland report, "Our Common Future", in 1987 that termed sustainable development as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (Gertsakis & Lewis, 2003; Kopnina & Blewitt, 2018, p. 84; Sustainable Development Commission, n.d.). Since then, there have been various debates on what sustainable development exactly means. However, the underlying argument remains the same that a system of infinite growth cannot be achieved on Earth's finite natural resources (Gertsakis & Lewis, 2003; Kopnina & Blewitt, 2018, p. 57). The United Nations later adopted sustainable development in its policies. In 2015, it released a 15-year plan with 17 Sustainable development goals (SDGs), which was accepted by all UN member states (Kopnina & Blewitt, 2018; United Nations, n.d.). One of these goals is SDG 12, termed "Ensure Sustainable Consumption and Production Patterns" (UN Environment Programme, n.d.), and aims to decouple economic growth from environmental degradation by reducing consumption of finite natural resources and increasing throughput through the adoption of a model called Circular Economy (Kurniawan & Fernando, 2023; UN Environment Programme, n.d.).

Circular Economy is a model based on the concept of eco efficiency that, "refers to the idea of doing more with less" (Kopnina & Blewitt, 2018, p. 15) and advocates efficient usage of resources by bringing changes in the process through which products and waste are produced (Kopnina & Blewitt, 2018; Ellen MacArthur Foundation, n.d.-a). It recommends moving away from the linear model of economic development from "take-make-waste" towards a model of a closed loop by circulating the resource back to the system through applying concepts of reduce, reuse, repair, and recycle and thereby reducing the need for virgin resource extraction (Kopnina & Blewitt, 2018; Sæter et al., 2020; Diprose et al., 2022; Ellen MacArthur Foundation, n.d.-a; Ellen MacArthur Foundation, n.d.-b). Since 2015 the European Commission has also implemented an action plan in its policy to transition towards a circular economy by helping to "close the loop" throughout the whole life cycle of resources from

production to waste management (Environment, n.d.-a; Environment, n.d.-b). In accordance with this, The European Commission issued a directive (EU) 2019/904 in June 2019 to reduce waste generated from plastics and single-use products. The argument behind this directive is that increasing the reusability of products and reducing waste will not only help in fulfilling Sustainable Development Goal 12 for sustainable consumption and production but will also benefit the economy of the European Union while at the same time reducing the burden on precious resources and the environment (EUR Lex, 2019). Packaging is one such field that these regulations target and aims to reduce the waste generated in this area (EUR Lex, 2019; Environment, n.d.-c).

Packaging has a valuable function to contain the product, protect it, deliver it as well as convey essential aspects about the product, such as certification, ingredients, health and safety requirements, and others (Shipton, 2007; Bortolini et al., 2018; Diprose et al., 2022). Packaging has also contributed to the transformation of the food market and has facilitated its mass production and distribution in global markets. It has had a phenomenal impact on how food is produced, distributed, stored, and consumed globally. But at the same time, this has also led to a significant problem of waste and environmental crisis generated due to discarded packaging materials (Hawkins, 2013). Growth of various industrial and retail sectors resulted in increased use of packaging materials and the waste thereof (Coelho et al., 2020). According to the European Commission website, in 2022, the EU will be responsible for an increase of 19% in packaging waste and a 46% increase in plastic packaging waste by 2030 if they do not take appropriate actions now (European Commission, 2022). Takeaway food is one such sub-sector of the food industry that has also contributed to packaging waste due to its reliance on single-use containers. Through initiatives in the recent past, investigations are being made to transition towards reusable containers for takeaway food service (Gallego-Schmid et al., 2018; Schuermann & Woo, 2022). And with respect to that the current research aims to conduct a feasibility study of a deposit return system for takeaway containers in the Swedish market.

1.2 Problematization

Takeaway food is known by various phrases in different places like “take-out, “to-go”, “takeaway”, “carry-out”, and so on, and all these phrases mean the same thing, that is, to buy prepared meals from a restaurant or café and take it with self or get it delivered, to eat it somewhere else (TakeawaySupplies, 2019). Takeaway food is not a new phenomenon, and in fact, its origin can be traced as far back as to

the 18th and 19th centuries (Rude, 2016; Kim, 2020). Today many restaurants, along with dining-in experience, have also started to provide takeaway services through "to-go" or online delivery apps (Ahuja et al., 2021; Fernandes, 2022). In today's time takeaway food is a phenomenon that occurs globally in some form or the other (MoneyBeach, 2021; Fernandes, 2022), whether one goes and buys it themselves or has it delivered to their home. It has become a trend owing to the fast and busy paced life and lack of time to cook a proper meal at home (Fernandes, 2022). Consumers who face time restrictions due to long working hours, childcare, single or working mothers and among others, usually opt for takeaway meals that are easily and readily available without requiring any waiting time usually associated with dining out or time spent in cooking by self (van der Horst et al., 2011; Mackay et al., 2017; Rahkovsky et al., 2018).

Takeaway meals have offered easy access to ready-made food to consumers; however, it is not without its challenges. Takeaway food has resulted in food and packaging waste that negatively impacts the environment. Single-use cutlery and packaging end up being thrown away due to being of poor quality, and so are not considered for reuse by the consumers (Liu & Chen, 2020). A study of global classification of ocean litter revealed that of the 12 million litter items from 7 different aquatic environments like riverbeds, open waters, and others, packaging waste from takeaway food made the largest share, i.e., 50-88%, compared to all other categories in most of the regions (Morales-Caselles et al., 2021). Irrespective of waste and environmental concerns, statistics show that the takeaway food business has been growing steadily in recent years. A McKinsey report in 2021 stated that the food delivery market grew to $150 billion, three times more than in 2017 (Ahuja et al., 2021). Another report from Statista predicts the global growth of meal delivery revenue to $0.45 trillion by 2027, with the user base also growing steadily in this area (Statista, n.d.). Other studies showed that over 7.5 billion plastic-based food containers are used in the USA alone, and more than 1.8 billion, aluminum containers are used in the UK, resulting in 297 million tons (Mt) and 167 Mt of CO2 emission per annum respectively in these two countries (Gallego-Schmid et al., 2018). Single-use packaging waste is disposed of immediately after consumption, which ends up in incinerating plants, landfills, or other places such as aquatic environments. Furthermore, most of these takeaway packaging products are made up of materials such as aluminum, extruded polystyrene (EPS), polypropylene (PP), and others, which are when leaked into the environment through landfills, water sources, and others, results in issues such as clogged sewers, breeding ground for disease causing pests, choking threat to animal and

marine lives, ozone depletion and leak toxicities into human, terrestrial and marine lives (Gallego-Schmid et al., 2018; Liu & Chen, 2020; Ncube et al., 2021).

To address this waste issue of takeaway packaging, several theoretical and empirical studies have been conducted that suggest measures, such as, biodegradable packaging material, recyclable packaging, reusable packaging, and others. For instance, a new packaging was developed in Malaysia for Satay takeaway boxes which not only preserves food quality and freshness but also are easily decomposable due to the usage of biodegradable raw materials (Marwee & Masrol, 2021). One more such research conducted is in the field of edible cutlery which also decomposes quickly due to bioproducts used for their production (Rajendran et al., 2020). Another approach to waste management is reducing waste through the reusability of products, although some argue the potential benefits of reusable food containers over single-use containers. The reasons for such views are that reusable containers consume more raw materials for their production, require more cleaning resources, and hence need to be reused many times to overcome the negative impacts of single-use containers (Schmid et al., 2021). However, studies Gallego-Schmid et al., 2018; UNEP, 2020; Diprose et al., 2022, have found that reusable containers can perform better than single-use containers. There is support for adopting a circular economy paradigm that involves reduce, reuse, recycle, and recover at the end-of-life cycle. The circularity of raw materials in the case of takeaway food containers will involve reusing the same container to deliver the same service of takeaway food to the consumer. Hence, reusing takeaway containers will involve considerations for reverse logistics that are, collections, delivery, tracking and cleaning of these containers for a smooth operation. Life cycle assessment (LCA) analysis of reusable versus single-use food containers has shown that reusable containers can outperform single-use containers when reused for a sufficient number of times (Gallego-Schmid et al., 2018; UNEP, 2020; Diprose et al., 2022). Studies also show that there are factors like cost, hygiene, and others, that would affect consumers and sellers' willingness to adapt to such a change which will require changes in behavior for those affected by it (Ertz et al., 2016; Baird et al., 2022; Li et al., 2023) Hence, although reusable containers could help in tackling the issue of packaging waste, however, it will require overcoming some practical obstacles for reverse logistics as well as increased awareness and knowledge in these areas to motivate behavioral changes.

In alignment with the EU directive, Sweden has also taken steps with regard to packaging products and aims to apply similar policy changes on food and beverage containers (Copello et al., 2021). A

new law was voted in the Swedish parliament which will come into effect from 1st Jan 2024 in whole of Sweden that advises usage of reusable boxes or mugs for takeaway food and beverages respectively (Håll Sverige Rent, n.d.; IVL Swedish Environmental Research Institute, 2022). Concerning single-use containers for food and beverage, Sweden has started testing a return system for takeaway packaging in certain parts of the country. The new system aims to phase out single-use containers and replace these with reusable ones (Håll Sverige Rent, n.d.; IVL Swedish Environmental Research Institute, 2022).

1.3 Research Aim and Questions

Several studies are being conducted around the globe to understand the challenges and opportunities of reverse logistics involved in reusable systems for takeaway containers. For instance, a study in Switzerland investigated whether social influence can encourage others to opt for reusable takeaway boxes instead of single-use (Dorn & Stöckli, 2018). Another study was done in the UK that performed LCA of various options for takeaway packaging as well as to identify factors that could influence consumers to switch towards reusable packaging (Greenwood et al., 2021). A cost-benefit analysis was performed in China by Li et al., to identify barriers to the deployment of a system for reusable takeaway containers and found that the operational cost of such a system and how it is shared by different actors across the system could be a determining factor in its successful deployment (Li et al., 2023). However, much of the research conducted in the field of reusable packaging in the food industry is focused on food products like cereals, baby food, and others (Coelho et al., 2020; Greenwood et al., 2021; Diprose et al., 2022). Research in the field of takeaway food packaging is an emerging field, and most of the studies conducted so far are either theoretical, or focus on specific aspects of reusable container system, such as consumers perspective, LCA analysis of packaging materials, or on reverse logistics challenges (Coelho et al., 2020; Greenwood et al., 2021; Baird et al., 2022). To the knowledge of researchers, there is a lack of study that holistically investigates the feasibility of a reusable system for takeaway containers from both buyers and sellers' perspective. The aim of this research is to investigate challenges and willingness as perceived by the business owners and consumers for such a change. Based on this the current research aims to do a feasibility and preparedness study for transition to reusable takeaway containers in Sweden and to that end, the research questions are:

How feasible is it to transition towards multi-use containers in takeaway business in Sweden?

What are the challenges and opportunities for its adoption?

Aligning with EU guidelines for reducing waste from packaging products, Sweden has made a proposal through 2021/401/S that aims to reduce litter and waste caused from consumption of single-use products. Hence, they propose a transition towards reusable containers for takeaway food and beverages, starting from 2024 (European Commission, 2021). Following this several studies have been conducted in Sweden for a return system for takeaway containers (IVL Swedish Environmental Research Institute, 2018; Håll Sverige Rent, n.d.). And the current research aims to contribute to these studies by conducting semi structured interviews of restaurant owners and participants of previous studies done in Sweden and surveys of consumers within the Skåne region. Previous studies on this subject were conducted in Stockholm and Gothenburg region of Sweden, however, as the researchers are living in Skåne region and due to financial and time constraints, Skåne region is chosen for the current study. Semi structured interviews of participants and document review of previous studies will be conducted to analyze what gaps still exist in respect to reverse logistics that entails a return system for takeaway containers. Interviews of restaurant owners within the Skåne region will also be conducted to highlight their views and challenges they perceive. Moreover, to get a holistic view of the change, a short survey of consumers is undertaken to understand their awareness of waste and environment issues attached to single-use takeaway containers and willingness to switch to the new reuse system.

1.4 Structure of this Thesis

The subsequent chapters of this thesis are structured as follows. Chapter 2 provides a theoretical framework used for data analysis and discussion with respect to the research. It includes literature on reusable packaging in the food sector relevant for the research question along with “theory of circular economy” and “theory of planned behavior”. Next chapter 3 introduces and explains in detail about the research methodology employed for this study. Chapter 4 then presents findings and analysis of the collected data and finally the last chapter 5, provides a discussion of findings in connection to the theoretical framework. Lastly, we conclude this thesis in chapter 6 with conclusion, managerial and societal implications, limitations, and recommendations for future research.

2. Theoretical Framework

2.1 Chapter Overview

This chapter provides a theoretical framework for current research. As the study is about reducing waste by adopting a circular system for takeaway containers, the theory of Circular Economy (CE) is introduced, focusing on the packaging industry. Furthermore, the research also aims to analyze behavior toward sustainable consumption in terms of takeaway packaging, and hence, the Theory of Planned Behavior (TPB) is used and explained next. The last section of the chapter shows Empirical studies on Reusable Packaging in the food industry, including in the takeaway business.

2.2 Circular Economy (CE)

Circular economy has gained a wider prominence and has become a "go-to-concept" in sustainable development discourse. Moving away from the traditional linear approach of "take-make-use-dispose" that leads to resource depletion and increased waste generation with harmful impacts to the environment, the circular economy instead focuses on reducing virgin resource extraction and waste reduction by extending the lifespan of the product through reuse, repair, and recycle methods (Kopnina & Blewitt, 2018, pp. 240-256; Diprose et al., 2022). The principles of CE overlap with the waste hierarchy concept that advocates the 4R framework of Reduce, Reuse, Recycle, and Recover before waste disposal (Kirchherr et al., 2017; Kopnina & Blewitt, 2018, pp. 240-241; Diprose et al., 2022). Through Reducing, the aim is to reduce consumption by making the products last longer and promote reusability. Reuse advocates extending the usage of products by using them multiple times, repairing them for further use, or repurposing them for another use. Recycling aims to recover raw materials from the product when reuse is not possible and use the recovered material for manufacturing the same or some other product. Recovery is to recover value out of the products in the form of energy through incineration when no other previous options are possible (Kirchherr et al., 2017; Seroka-Stolka & Ociepa-Kubickab, 2019; Diprose et al., 2022).

The concept of Circular Economy is believed to have been introduced before the 1990s (Geissdoerfer et al., 2018). However, it became popular in 2012 with the release of the report from the Ellen

MacArthur Foundation, “Towards a Circular Economy”, which suggests that CE results in not only waste reductions but also an economic advantage in the form of material cost savings (Lieder & Rashid, 2016; Kopnina & Blewitt, 2018). However, implementing CE has its challenges. In the linear model, product development starts from raw material extraction and ends with waste and disposal of the product after its usage. While in the circular model, the product must be fed back into the system to close the loop. It hence requires several actors within the supply chain to cooperate and produce innovative solutions for product design for extended usage, financial and logistics challenges, changing consumer behavior, and many more, which renders complexity to the application of CE concepts within business processes, often requiring innovative changes to the prevailing business models (Bressanelli et al., 2018; Geissdoerfer et al., 2018; Kopnina & Blewitt, 2018, pp. 240-259). Nevertheless, studies have shown that with cooperation, strategic and innovative solutions can be achieved to make CE possible in different sectors. For instance, leveraging crowdfunding or government funding for financial and economic challenges (Bressanelli et al., 2018), repurposing waste for another purpose such as using sewage sludge for fertilizer (Seroka-Stolka & Ociepa-Kubickab, 2019), using digital technologies for product promotion, awareness generation, and others (Bressanelli et al., 2018), redesigning of product to support circularity such as reusable street lights (Corvellec et al., 2020), quality aluminum sheet production from recycled materials, fashion accessories from fire hoses, new business opportunity with the market for bike sharing and many more (Geissdoerfer et al., 2018). These studies reveal that the implementation of CE has many challenges; however, at the same time, it also has possibilities to create new market opportunities while contributing to the circularity of resources through reuse, recycle, and recovery (Bressanelli et al., 2018; Geissdoerfer et al., 2018; Seroka-Stolka & Ociepa-Kubickab, 2019; Corvellec et al., 2020).

For reasons such as resource scarcity, estimated economic gain of 600 billion euros in the manufacturing sector, and environmental obligations, European Commission (EC) has also included CE in its’ policies and recommends policy changes aimed at job creation, increased resource efficiency, transparency, and promotion of new business models (Lieder & Rashid, 2016; Grafström & Aasma, 2021). Following the same direction, EC prioritizes reusability over recycling and recovery of packaging materials through its directive 2004/12/EC (Accorsi et al., 2020). Packaging plays a vital role in the protection and transportation of products, and the growth in demand for consumer products results in a considerable need for packaging materials for these products (Bortolini et al., 2018; Gardas et al., 2019). Regarding packaging for the food sector, studies have revealed that most impact comes

from carbon emission, energy demand, and waste from extraction and use of virgin materials like plastics and carton-board (Baruffaldi et al., 2019; Accorsi et al., 2020). Moreover, Eurostat data shows that 163 kg of packaging waste per capita per annum is generated and is primarily made of cardboard, glass, plastics, and wood materials (Bortolini et al., 2018). Hence, it is recommended that employing circularity through reusable packaging can be a solution to prevent such impacts generated due to linear models of single-use packaging (Baruffaldi et al., 2019; Accorsi et al., 2020).

However, as the author mentions, implementing a closed-loop network for reusable packaging systems could lead to the "complexity of the logistics network as compared to the traditional one-way system" (Bortolini et al., 2018; Baruffaldi et al., 2019). Reusable packaging requires reverse logistics that entails the collection of the used products, storage, cleaning, redistribution along the supply chain, and recycling. All these additional logistics operations, as compared to the linear model, add complexities, additional costs, and increased emission due to increased transport; however, on the other hand, it reduces raw material extraction resulting in resource efficiency, reduced consumption, waste generation, and environmental impact (Bortolini et al., 2018; Accorsi et al., 2020). Hence, to offset the impact of reusable packaging as compared to single-use packaging system, careful logistic planning is required to manage associated challenges such as shorter distance for collection and redistribution of products, increased return rates, efficient cleaning, health and safety standards, and proper disposal at the end of the life cycle (Baruffaldi et al., 2019; Accorsi et al., 2020; Ellsworth-Krebs et al., 2022).

Applying these concepts to PET (Polyethylene Terephthalate) bottles for beverages, in Sweden, a Deposit Refund System (DRS) is in place to address the waste problem of such products and increase the recycling rate for PET bottles. Under this system, consumers are charged a deposit for such packaging material when they buy beverages and are refunded after the packaging is returned to the system. Although it is found that the cost of the DRS system for recycling is high, however, it is suggested that by making improvements to the current system, this facility can be then extended to other similar products to support the reusability of such products, which can help manage the waste and reduce the environmental impact generated through such products resulting in indirect benefits (Zhou et al., 2020; Lu et al., 2022).

2.3 Theory of Planned Behavior

The theory of planned behavior (TPB) is a widely used tool in academia to analyze the factors that influence individuals' behavior and the choices they make. It suggests that intentions can be used to predict consumer behavior. TPB was first explained by Ajzen in 1985 and then further developed in 1991 as an extension to the previously proposed Theory of Reasoned Action (TRA) (Sheoran & Kumar, 2021; Lira & Costa, 2022).

TRA is a model that mainly focuses on two attributes which are under one's own control, i.e., Attitudes and Subjective Norms (SN)**,** that define an "individual's *intention* to perform a given behavior" (Ajzen, 1991, p.181), and suggests that these factors can be helpful to understand and explain intentions and behaviors of individuals (Ajzen, 1985). According to Ajzen, 1985, a behavior could be a habitual or routine exercise, or it could be ad hoc; however, in both cases, specific planning is needed to execute a set of activities to accomplish the goal that a person wants to achieve. For example, driving to work could be defined as routine behavior; however, it requires getting up, getting ready for work, taking the keys, leaving home, getting into the driving seat, planning the route, and driving to the destination. All these actions are carried out subconscious or consciously planned manner due to the intention that a person wants to fulfill, and TRA suggests such intentions can be explained and predicted by analyzing the attitude and subjective norms of the individual (Ajzen, 1985).

However, Ajzen, 1985, further revised TRA into a model called the Theory of Planned Behavior (TPB) and included a third attribute of Perceived Behavioral Control (PBC) to account for situations that are not under the individual's control. Many factors can also influence one's "goal-directed" behavior, defined as the third attribute, PBC, in the TPB model (Ajzen, 1985; Ajzen, 1991). Ajzen, 1991, mentions that intentions and PBC jointly construct the performance of a behavior. In this article, the author also explained that intentions refer to the motivational factors influencing an individual's behavior, capturing the level of willingness and effort they give to perform specific behavior, and PBC is the individual's actual control concerning opportunities and resources required to perform the behavior in question (Ajzen, 1991).

- **Behavioral Beliefs and Attitudes towards Behaviors:** This attribute refers to one's belief towards a behavior that they view as positive or negative based on its consequences as

favorable or unfavorable, further defining their attitude towards that behavior (Ajzen, 1991). Lee, 2022, suggests that positive attitudes toward a behavior can play an essential role in creating habits toward sustainable consumption (Lee, 2022).

- **Normative Beliefs and Subjective Norms:** This attribute refers to the approval or disapproval of behavior from the "important others" such as family, friends, and others (Ajzen, 1991). Zhang et al., 2021, further explain it as "Social pressure" that informs and influences an individual's behavior (Zhang et al., 2021).

- **Perceived Behavioral Control:** According to Ajzen, 1991, an individual's intention is influenced by confidence to accomplish a certain behavior while dealing with obstacles and perceived external barriers which may refrain them from achieving that behavior (Ajzen, 1991). Furthermore, PBC can reflect both internal factors as well as external factors. Internal control factors are determined through an individual's belief in the efficacy of their action. In contrast, external factors could be perceived as specific barriers, e.g., availability or affordability of the product and services (Vermeir & Verbeke, 2008).

Various scholars have used TPB to study individuals' intentions toward different phenomena, including sustainable consumption. For instance, Zhang et al. (2021) found that SN and PBC positively influenced commuters and promoted public transport to deal with environmental pollution from personal vehicles (Zhang et al., 2021). Similar findings were also made by another study, concluding that SN and PBC can be used by companies developing environment-friendly products to encourage their consumer base to make sustainable choices. Another study found that policymakers can influence attitudes towards sustainable food choices through the right policies like traceability, transparency, and others, and guide choices towards sustainable consumption (Vermeir & Verbeke, 2008). Ertz et al. (2016) further explain that motivation and intention differ. One may be intended to make sustainable choices but not motivated enough to do so. Hence, they suggest motivation as an additional attribute for changing consumer behavior. Furthermore, they argue that contextual factors can positively impact consumer attitudes; for instance, promoting pro-environmental behavior can facilitate such changes by influencing consumer attitudes towards it. Hence such contextual factors can further influence motivation and PBC. They suggest that motivation supported by contextual factors that highlight environmental concerns can be a valuable tool in addition to TPB attributes to influence consumers' response towards pro-environment changes (Ertz et al., 2017).

2.4 Empirical Studies on Reusable Packaging

Although the EU has recommended reusable packaging since 1994, however even today, it stands "limited to business-to-business packaging (such as returnable plastic crates used for fresh produce), beverages, a few consumable refill packs (e.g., instant coffee and cleaning products) and bring-your-own (BYO) container options in 'zero waste' stores" (Coelho et al., 2020; Greenwood et al., 2021). Nevertheless, with increased awareness about the environmental, social, and economic issues of single-use packaging, more attention is being paid to reusable packaging, including takeaway food packaging (Li et al., 2023). Over the years, demand for takeaway food has been growing around the globe for reasons such as the convenience it offers consumers and the saving of time and effort required for meal preparation (Mackay et al., 2017; Rahkovsky et al., 2018). However, at the same time, this phenomenon has also raised awareness and investigations related to waste generated through single-use takeaway containers (Morales-Caselles et al., 2021), which has generated responses for handling the problem by applying concepts of circular economy to takeaway packaging. Options such as biodegradable packaging, recyclable or compostable packaging, and reusable packaging have been suggested as a few of the possible solutions to reducing waste generated through single-use takeaway containers (Gallego-Schmid et al., 2018; Coelho et al., 2020; UNEP, 2020; Diprose et al., 2022).

Studies have shown that environment-conscious consumers tend to be mindful of their consumption behavior and are more likely to extend the life of resources and find innovative and repurposed ways to make several uses of the existing products (Haws et al., 2014); however, many factors, such as packaging material, aesthetic properties, design, and practical aspects and others, defines and motivates the reusability of packaging by the consumers (Shipton, 2007; Sæter et al., 2020). Packaging can be reused in various ways, as shown in Figure 1 (Greenwood et al., 2021), where the left side of the figure shows repurposed ways of reusing resources.

Fig 1. Reusability paradigm (SUP: single-use packaging)

Source: Greenwood et al., 2021

Refill is another mode of reusability where consumers can use their own containers, i.e., Bring Your Own (BYO) or the original package and get the products refilled for further consumption. This mode of reusability has been gaining attention, and retailers and consumers see it as one way to reduce packaging waste (Fuentes et al., 2019). Refill practice is done in various ways such as at home or on the go (Sæter et al., 2020; Greenwood et al., 2021).

Refill at home is the simplest form of reuse, where the original package is reused and refilled from single-use refill pouches or pods (Coelho et al., 2020). In the case of food products, such options are limited. However, some companies offer similar options in the form of concentrated products such as soups, broth tablets, and others. The benefit of such options is due to the absence of water in these products, which makes them weigh less, resulting in decreased transport cost and emission, saving of space while in transit, and the volume of packaging material used, which makes these options less impactful than the original product (Coelho et al., 2020; Sæter et al., 2020). Refill on-the-go requires consumers to refill the original package or their own container at the store offering a refill option. Such options, although limited, can be found globally in certain countries like France, Brazil, the US, and others, where retailers offer products from different brands in bulk dispensers. Such offerings include candies in stores, cereals, nuts, and many others. When it comes to takeaway food and beverages, consumers own reusable coffee mugs or food containers are also excellent examples of refill on-the-go where they can get their containers refilled in the café or restaurants (Coelho et al., 2020; Sæter et al., 2020; Greenwood et al., 2021).

In the Return/Renting model, consumers can rent the packaging container from the organization providing such a service. “Loop” is an excellent example of such a system currently used by major brands such as Unilever, Nestlé, Procter & Gamble, and others, where Loop picks up packaging, cleans, and refills before it is resold to other consumers. Although this model is more prevailing for product types such as personal care and cleaning products, in recent years, similar changes have also been made in the food sector (Coelho et al., 2020; Sæter et al., 2020; Greenwood et al., 2021). In the Business-to-Consumer (B2C) sector, returnable packaging practice already exists for bottles such as beer bottles, soda or water bottles, and others; however, in recent years, this model has been expanding to include takeaway food and beverage containers. For instance, “Again Again” in New Zealand, “CubClub” in the UK, “ReCup” in Germany, “GoBox” and “Ozzi” in the US, “reCIRCLE” in Switzerland, and many more are providing such returnable and reusable takeaway containers (Coelho et al., 2020; Diprose et al., 2022).

According to Bortolini et al. 2018; Accorsi et al. 2020; Sæter et al., 2020, studies have shown that reusable packaging is a promising strategy for reducing packaging waste and preventing the extraction of raw materials. However, such a system of reuse and return is not without its challenges. A system with reusable packaging will require comprehensive planning concerning its logistic operations. Disposable packages can be discarded and recycled after the product has been used. However, reusable packages will require reverse logistics operation for collection of empty containers, storage, cleaning, tracking, and delivery back for reuse and recycling after their end of life. The steps for reverse logistics will require cooperation and management between various actors in the supply chain, and the costs involved and challenges for a streamlined process must be considered for successful execution (Bortolini et al., 2018; Accorsi et al., 2020; Sæter et al., 2020) and some of the challenges for takeaway food business, explored in this research, are listed as below.

A) Products as Reusable Packaging for Takeaway Containers

Reusable products must be durable and designed for multiple uses (Sæter et al., 2020). One of the debates about the impact of reusable vs. single-use packaging is due to the Life Cycle Assessment (LCA) of these different kinds of products. LCA studies have shown that due to the increased quantity of resources used during the production process to make takeaway packaging durable and reusable, the resulting environmental impact of such products is higher than single-use packages. However,

single-use packaging threatens the environment for reasons like low recyclability rate and littering (Gallego-Schmid et al., 2018; UNEP, 2020). Moreover, these studies also reveal that although reusable products have a higher impact during their production and usage stage (washing, transportation, and others) but if reused a sufficient number of times, these packages have the potential to perform better and counteract the impacts of production cycle such as of extraction of virgin materials and with the optimum supply chain for cleaning and transport between different points in the network, it can also help to reduce the litter problem caused by single-use packaging. Such products can provide further additional benefits if designed for recycling purposes after their shelf life (Gallego-Schmid et al., 2018; Changwichan & Gheewala, 2020; UNEP, 2020). Furthermore, the reusable product needs to be designed to support reusability so that it maintains its function of protecting the food without causing any harmful impact on health and is easy to clean and maintain (Sæter et al., 2020).

B) Challenges of reverse logistics

For reuse systems to be successful, reverse logistics will be required for packaging containers for collection, cleaning, and redistribution of the used containers. Process design changes like these pose a significant barrier as it requires cooperation between several actors (Coelho et al., 2020). Jiang et. Al (2020) studied and analyzed various modes for reverse logistics and concluded that different modes (using own container, collection via the delivery driver, collection bin, and others) are preferred by different consumers and restaurant owners depending on the convenience, frequency of takeaway meal consumed and the cost of the service (Jiang et al., 2020; Lu et al., 2022). However, in all cases, it is recommended to have a collection mode within convenient distance to promote reusability and reduce the transport cost that a consumer will have to bear for returning the box (Jiang et al., 2020; Lu et al., 2022; Li et al., 2023). Hygiene and space are further concerns associated with the return system, especially for food containers. Hence, it is found that a third-party service supplier for cleaning and redistributing the containers can provide solutions to these problems. Moreover, such service suppliers can use commercial dishwashers as these are more efficient in resource consumption than home-use dishwashers (Greenwood et al., 2021). Another requirement for this system is to have a digital platform in place that can ensure proper tracking and reporting about the container, how many times it has been used, the return rate of containers, the deposit, and refund process and other such operations (Ellsworth-Krebs et al., 2022; Li et al., 2023).

C) Cost of additional services

Cost is another factor associated with a return system. As discussed above, the infrastructure required for reverse logistics to enable the circularity of packaging will incur additional setup costs. Other costs that will be incurred are recurring costs for maintenance of the container, such as collection, cleaning, and redistribution, as well as the cost of hosting and maintaining a digital system for supporting different operation activities for the return system (Lofthouse et al., 2009; Jiang et al., 2020; Lu et al., 2022; Schuermann & Woo, 2022; Li et al., 2023). However, studies show that consumers might be willing to pay a premium price if the rationality for the change agrees with their moral accountability (Singh & Pandey, 2018). Other studies on cost-benefit analysis argue that the indirect and long-term assumed benefits of environmental protection, resource efficiency, and social benefits through strategic cost-sharing among different actors can result in positive net benefits for everyone (Lu et al., 2022; Li et al., 2023).

D) Awareness and Willingness to adopt required changes

Various studies have shown that consumers are motivated for sustainable choices due to their perceived moral norms and personal attitudes, guided by knowledge and concern about environmental impact. However, consumers need more knowledge about alternatives to make informed choices and engage effectively towards sustainable behavior (Rhein & Schmid, 2020; Jacobsen et al., 2022). Furthermore, investigation in behavior towards different forms of reusable packaging has shown that consumers resist such changes for different reasons like an inconvenience that requires extra time and planning, increased cost or perceived lack of monetary incentive, and quality of the products, while on the business side the reluctance is due to logistics issues such as additional space and efforts required for maintaining of reusable containers and cost incurred for having such a system in place (Lofthouse et al., 2009). Such findings suggest that reusability for packaging will require changes in behavior for different actors, e.g., consumers will need to plan for returning the container, both consumers and business owners will need to think about additional storage space needs, cost-sharing between different actors, and others. Nevertheless, informing them about the environmental values associated with such changes can have greater motivation and chance of success (Sæter et al., 2020). Moreover, information and knowledge dissemination can be fruitless if not adequately targeted, and so by understanding the individual, motivational and contextual factors that influence willingness to

change, strategic dissemination of knowledge and policies can be made to motivate the target group and evoke individual responsibility (Ertz et al., 2017; Singh & Pandey, 2018; Rhein & Schmid, 2020; Baird et al., 2022). A study on social influence found that consumers were more likely to choose reusable containers when they observe others doing that, suggesting that demonstration-oriented social influencing can also help promote sustainable choices (Dorn & Stöckli, 2018).

3. Methodology

3.1 Chapter Overview

Research methodology defines various steps undertaken by researchers to study a research problem. It involves deciding on the methods and techniques relevant to the research and creating a detailed plan for how to conduct the whole research (Kothari, 2004, p. 8). Based on that, this chapter depicts the methodological considerations of the current research relevant to the research aim and elaborates on methods of collecting data through qualitative and quantitative techniques and analysis as well as interpretation of collected data through the lens of existing literature relevant to the research question. This chapter ends by explaining ethical and quality considerations, followed by limitations of methodological choices made during the research.

3.2 Research Strategy

As Alan Bryman (Bryman, 2012, p. 35) explains, research strategy provides insights into the direction undertaken by the researchers towards achieving the answers they seek. Usually, these could take the orientation of a realist with quantitative research or an idealist with qualitative research (Bryman, 2012, pp. 35-36); however, he also mentions later that sometimes it can be helpful to combine these two different orientations of research into a “Mixed-method research” approach in order to achieve a complete explanation to the research questions where the results generated by different methods can be used to explain each other (Bryman, 2012, pp. 633-645). As Molina-Azorin, puts it, “Mixed methods research is the combination and integration of qualitative and quantitative methods in the same study” (Molina-Azorin, 2016), and this research employs a mixed method research strategy to get a more holistic perspective that includes both sides of the coin (Onghena, 2023).

Changes from single-use to reusable containers affect both buyers and sellers of the service. Changing the process and business of takeaway service will not be enough if consumers refuse to adopt it. Hence it is essential to understand how this change is perceived from both sides and what challenges exist for its adoption by them respectively. Hence, the research employs qualitative methods to gain a deeper understanding of the pros and cons of this change as perceived by various participants, primarily the business owners and other experts (Bryman, 2012, pp. 159-180). However, since this change is not widely available to all the regions of Sweden, it would be difficult to get a more nuanced insight into consumers' perceptions of what works and what does not. Keeping that in mind, the researchers decided to use a quantitative research strategy to investigate consumers' views about this change and how willing they are towards its adoption. Mixing these two strategies and methods allows researchers to investigate the feasibility of the change as a whole and enables them to answer the question they set out to ask (Bryman 2012, pp, 633-645; Onghena, 2023).

A qualitative approach is essential to understand individuals' interpretation of social phenomena in their own words (Bryman, 2012, p. 400). The aim of this research is aligned with understanding the subjective norms and perspectives of the restaurant owners and participants involved in previous pilot studies; thus, the analysis and interpretation will focus on identifying their preference for accepting or not accepting reusable containers, prospective challenges, and solutions perceived by them, based on the collected empirical data. As venturing to see and understand things from another's point of view is the base of interpretivism, this research considers the qualitative method, which works with the combination of constructionism ontology and interpretivism epistemology. According to Bryman (2012, p. 36), individuals in society perceive different meanings of their reality, which are considered social constructs to motivate human behavior. Thus, what constructs act as an influencer and what influencers hinder restaurant owners' behavior will be identified and analyzed while focusing on interpretivism (Fay, 1996, p. 113).

As explained above, the qualitative strategy was used to investigate the complexities from the seller's point of view. Furthermore, for the consumer's point of view, this research used a quantitative method to capture their response toward the change for reusable containers. As the author mentions, results from one method can be used to complement and expand upon results from another (Molina-Azorin, 2016); hence, the quantitative method is employed here to capture a broader consumer base and evaluate their perception about current situation and the upcoming change in takeaway business.

Quantitative tools provided a way to get measures of consumers' knowledge and awareness of environmental impact of single-use containers and to assess their willingness to adopt the change for reusable containers. Without this information it would have been difficult to answer the research question, since both buying and selling aspects must be covered to understand the phenomenon (Bryman, 2012, pp. 633-645; Onghena, 2023).

3.3 Empirical Data Collection

Observations and measurements are coherently congregated through the empirical data collection process. Depending on the aim and research question of this report, the empirical data was collected from restaurant and café owners who provide takeaway services, consumers of takeaway services, and participants of previous pilot studies as well as regional authorities. This study was primarily conducted in the Skåne region of Sweden. Survey data was collected from participants residing in Skåne. Participant for interviews of business owners were selected from Malmö and Helsingborg as these are the two largest cities in Skåne, comprising of a population with different nationalities and having a significant number of restaurants for different cuisines. Participants of previous studies, however, were from several different locations.

3.3.1 Sampling Techniques

According to Flick (2014, p. 224), the rationality of statistical sampling in a qualitative method begins with the research objective and distribution. Then materials are systemized per specific criteria such as social situation, demographics, and others. By following Flick (2014, p. 224), this research paper has selected sampling techniques that aid in understanding the research objective more in-depth rather than covering the maximum population. Bryman (2012, p. 416) postulates that research questions can indicate the appropriate sampling in a qualitative method. Considering the above arguments, this research required a sample of candidates who have considerable experience regarding the business of takeaway food and customer service in this field, and so “purposive sampling” was used to collect data from food business owners (Bryman, 2012, pp. 418, 424; Flick, 2014, pp. 232, 242).

Moreover, the maximum variation sampling method was chosen within purposive sampling. It was done to ensure that viewpoints are captured from different angles as it can differ between business

owners due to different types of cuisine and the size and type of business they have (Bryman, 2012, p. 419; Etikan et al., 2016). Since the study aims to gain access to the candidates relevant to the research question, this sampling method is suitable as it enables selection of the candidate that has required knowledge relevant to the research (Bryman, 2012, pp. 416-418).

Following this guideline, 25 restaurants were contacted for an interview. These restaurant owners were purposively selected based on the cuisine category and average to higher ratings on the delivery apps, Foodora and Wolt. The cuisine category includes Indian, Oriental, Salad Bar, Pizza Joints, Thai, Burger Joints, and Japanese. All the restaurants were approached for the interview via email that explained the research aim. It was followed by several phone calls and personal visits to the restaurants or cafés to get their consent and plan an interview with the respective candidates. However, in the end, only 10 of these businesses chose to participate.

As part of purposive sampling, the snowball sampling method was used to identify candidates from previous pilot studies (Bryman, 2012, pp. 418-424). Initially, the researchers found six organizations and started communication via email, requesting to participate in interviews. The details and contacts of these organizations were collected through an online search. Among those, one was the organization that funded these projects, so they could provide references to 16 organizations involved in the previous studies. Five of these 16 organizations had already been contacted, so researchers reached out to the remaining 11 organizations. From the pool of 17 contacts from previous studies, 9 participants responded and agreed to answer the questions. Hence in total, 19 interviews were conducted. Ten were restaurant owners. Nine were participants of previous studies, out of which two responded via email.

Moreover, as mentioned previously, the consumer point of view is also investigated to be able to answer the research question holistically. Here the aim was to capture responses from many consumers, so it was decided to use a survey form of self-administered questionnaire to achieve this aim (Bryman, 2012, p. 233). For this purpose, the sampling method used was Convenience Sampling. This sampling mode was chosen, since it was easier for researchers to find participants via Facebook, WhatsApp groups or to contact passerby in central stations and shopping malls within Skåne (Etikan et al., 2016). This kind of sampling is used because of the of ease access to the respondents (Kothari, 2004, pp. 15, 59; Bryman, 2012, p. 201; Bryman & Bell, 2016, p.158).

3.3.2 Designing Semi-structured In-depth Interviews

A semi-structured interview method was selected to collect data from restaurant and café business owners and participants of previous studies. This type of interview method provides interviewers with a guide that contains a list of questions and topics that needs to be considered during the interview providing a general direction the interview should take (Bryman, 2012, p. 471; Flick, 2014, p. 259); however, it is also flexible and adaptable enough that enables interviewers to get more in-depth details regarding the topic based on interviewee's replies (Bryman, 2012, p. 471; Flick, 2014, p. 261; Ruslin et al., 2022). Semi-structured interviews do not involve a closed set of questions, instead it gives the flexibility to ask additional relevant questions based on how the interviews progress (Ruslin et al., 2022).

Based on this approach, several mock interviews were conducted by researchers among their contacts to design questionnaires relevant to two groups of participants, that is takeaway business owners and participants of previous studies. Concerning the business owners, the aim is to understand the challenges and opportunities from their perspective based on their experiences and the size and type of their business, while with participants of previous pilot studies, the goal was to understand their experience during and after the studies and challenges and opportunities perceived by them for transitioning towards reusable containers in takeaway business. Although the topics in the questionnaires were reasonably related, the questions' tones differed based on the type of interviewee. Furthermore, after mock interviews, the questionnaire was found to be very haphazard and without a clear direction. It was then modified to follow the line of questioning by specific themes for each group, as listed in appendix III and IV.

3.3.3 Designing Survey

The survey was designed as a self-administered questionnaire as it can be quickly and easily made available to large sample sizes. Moreover, the questions were designed with proper instructions and easy-to-follow design using simple and everyday terms (Bryman, 2012, p. 233). Google Forms tool was used to design the survey questionnaire. The questionnaire starts with a brief introduction about the research and researchers, the terms used, and instructions for the survey. The form consists of 20 questions formulated to capture consumers' demographic details, consumption patterns for takeaway

food, knowledge, and awareness about the impact of single-use takeaway containers, and their willingness to transition towards reusable containers. Initially, the survey questionnaire was shared digitally with the immediate contacts of the researchers to get responses and necessary feedback for correction. Based on their feedback, questions like concerns for reusable containers were changed from single choice response to multichoice response and name was made an optional field. After the required corrections were made, the researchers started collecting data with the final version of the survey questionnaire from the people who live in the Skåne region of Sweden.

3.3.4 Conducting Semi-structured In-depth Interviews

Interviews were conducted either face-to-face or online based on the comfort and availability of the interviewees. Out of 19 interviews, ten were conducted face-to-face in the premises suggested by the interviewees, two were received as email responses, and seven were online interviews over Zoom or Teams meeting. Interview questions and topics were also shared with some interviewees as per the demand, which facilitated replies over email for 2 of the interviewees and helped other interviewees to prepare for the interview. Following the guidelines provided by Bryman (2012, pp. 217-222) on how to conduct interviews, researchers began the interview by building up a rapport through small talks about their life in general with topics like about their workplace, place of origin and others. It made interviewees comfortable, and ease into the interview process as a discussion rather than question and answer session. The interviews were conducted in quiet settings to allow for clear recording after taking permission from interviewees to record the conversation (Bryman, 2012, pp. 217-222). A point to note is that not much difference was observed between online or face-to-face interviews. Below is a list of the interviews conducted for both restaurant owners and other participants, along with the duration that each interview lasted for.

Table 3.1 Interview of Restaurants Owners in Skåne Region

Interview	Date of Interview	Time of Interview	Duration of Meeting in minutes	Type of Cuisine	Job Role	Mode	Platform
R1	21.02.2023	1430 Hrs.	14.35	Poke Bowl, Thai, and Sushi	Manager	Face to Face	

R2	24.02.2023	1500 Hrs.	35.05	Indian	In charge	Face to Face	
R3	27.02.2023	1400 Hrs.	32.52	Pizza	Manager	Face to Face	
R4	28.02.2023	0900 Hrs.	37.37	Sushi	Owner	Face to Face	
R5	01.03.2023	0300 Hrs.	38.1	Burger	Manager	Face to Face	
R6	01.03.2023	1420 Hrs.	33.55	Burger	Manager	Face to Face	
R7	04.03.2023	1500 Hrs.	37.45	Asian Mix Food	Owner	Face to Face	
R8	07.03.2023	1500 Hrs.	26.53	Thai	Owner	Face to Face	
R9	08.03.2023	1630 Hrs.	28.43	Oriental and Indian	Owner	Face to Face	
R10	24.03.2023	1500 Hrs.	41.38	Salad Bar	Sustainability Manager	Online	Zoom

Table 3.2 Interview of Previous Study Participants

Interview	**Date of Interview**	**Time of Interview**	**Duration of Meeting in minutes**	**Type of Company**	**Job Role**	**Mode**	**Platform**
P1	07.03.2023	1100 Hrs.	39.28	Private Company	Owner	Online	Zoom
P2	03.03.2023	1300 Hrs.	25.15	Private Company	Head - Material Product Quality	Online	Zoom

P3	16.03.2023	1100 Hrs.	42.06	Private Company	1. CEO 2. Sales Manager 3. Product Manager	Online	Teams
P4	16.03.2023	1330 Hrs.	43.44	Municipality	Head - Food and Hygiene Department	Face to Face	
P5	22.03.2023	1100 Hrs.	55.43	Municipality	DMO - Sustainability Development	Online	Zoom
P6	28.03.2023	1300 Hrs.	38.41	Private Company	Sustainable Manager	Online	Zoom
P7	28.03.2023	1500 Hrs.	32.09	Non-Profit Organization	Project Manager	Online	Teams
P8	15.02.2023	1133 Hrs.		Research Institute	Researcher, Project Leader, Lecturer	Via Email	
P9	17.02.2023	1609 Hrs.		National Authority	Material Flow Expert - Sustainable Consumption	Via Email	

3.3.5 Conducting Survey

The survey was conducted both online and face-to-face. For the online survey, people in the Skåne region were contacted via Facebook, Whatsapp, Messenger, and LinkedIn groups. For the physical survey, researchers requested passersby in train stations, shopping malls, restaurants, and in buses within the Skåne region for their participation. A total of 305 responses were accumulated, of which 205 were collected from online forms, and 100 were gathered from face-to-face, physical surveys. Among the physical surveyed, 93 respondents also shared their personal viewpoint in brief on reusable containers, which were not included in the questionnaire. This brief discussion with consumers during in person survey helped researchers to get more insight on their perception on the research topic. A list of survey respondents based on demographic division is provided below.

Table 3.3 Survey data demographic

Age	Gender	Online	Face to Face
15-25	Female	30	9
	Male	17	6
26-35	Female	56	15
	Male	32	17
36-45	Female	23	17
	Male	13	10
46-55	Female	16	11
	Male	8	6
55+	Female	5	3
	Male	5	3
Not Mentioned	Female		2
	Male		1
Total Respondents		**205**	**100**

3.3.6 Empirical Data Analysis

Thematic analysis of data allows for dominant themes to emerge and facilitates integration of quantitative and qualitative data. With this view in mind, themes were identified and both interviews and survey results were analyzed according to the emerged themes (Dixon-Woods et al., 2005; Castro et al., 2010). As a first step to start data analysis, the recording was transcribed using the tool for transcription in "Microsoft Word" after each interview. The transcribed copies were read multiple times to gain familiarity and arrive at central themes (Bryman, 2012, p. 579). Following this, data was reduced and bundled into several categories and subcategories: awareness, logistics, product, consumer, cost, and willingness (Flick, 2014, p. 538; Bryman, 2012, p. 579). From the emerging themes, four main categories were chosen further for thematic analysis of the data as shown in the below figure.

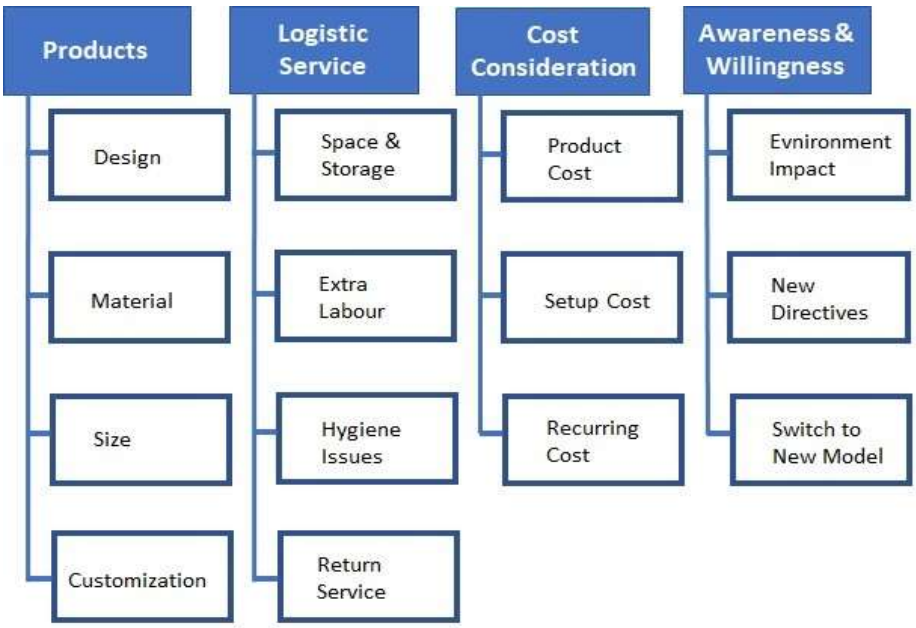


Figure: Categories identified and the subcategories

For quantitative data, an SPSS analysis tool was used to examine the survey data. Replies to different questions were given values as mentioned in the table below. These values were then fed to the SPSS tool to gather results that are shown in Appendix -I.

Table 3.4 SPSS Coding

Reply	**Values**
No	0
Never	0
Somewhat	1
Maybe	1
Depends on price	1
Rarely	1
Yes (Depends on question)	1 or 2
Once in a two week	2
Once in a week	3
Twice in a week	4
Every alternate day	5

3.4 Choosing the Literature

Literature was searched in various databases, including Lund University databases EBSCOhost and LUBsearch, and other databases like Google Scholar, ScienceDirect, and Emerald InSight. Keywords like “takeaway,” “reusable,” “multi-use food containers,” “single-use to multi-use,” “deposit return system,” “circular economy,” “circular business model,” “planned behavior,” were used to search for literature relevant to the research topic. The literature gathered by the online search were screened by the content of their abstracts. While reading the literature in detail, additional papers were picked out based on the references and suggestions made on these databases. Chosen literature reflected the research’s core theme, which revolves around circular business strategy and sustainable consumption behavior for takeaway service.

3.5 Ethical Considerations:

Ethical considerations include a code of ethics that prevents research participants from being misused during or after the research (Flick, 2014, pp. 83-100). Following the guidance on ethical considerations, privacy and integrity concerns are maintained throughout the research (Bryman, 2012, pp. 130-143). Information was provided about the issue and research being conducted to avoid deception, and voluntary consent was taken from all participants for their participation and recording of interviews (Bryman, 2012, pp. 130-143; Flick, 2014, pp. 83-100). All the responses in the recorded data, along with transcription and data presented in this research, have been anonymized to maintain participants’ privacy and prevent them from being misused or cause harm to the participants (Bryman, 2012, pp. 130-143).

3.6 Quality Considerations

Sampling techniques for qualitative and quantitative data were employed to consider relevant respondents for the research and avoid biased responses. Moreover, interviewees were selected from different cuisines of two cities and survey respondents with different origins; hence, multiple accounts of social reality were considered (Bryman, 2012, pp. 393-395). Mock interviews and surveys helped correct the questionnaires, making them more relevant to the research question and allow for capturing

as much relevant data as possible. Moreover, the interview guide and survey form covered questions relevant to the research aim and created validity by showing the relationship between the theoretical framework of research and empirical data (Bryman, 2012, pp. 393-395; Flick, 2014, pp. 593-624). Questions were also formulated in a way that verified responses from participants that resulted in confirmation and provided credibility to participants' perceived challenges and opportunities concerning the research question (Bryman, 2012, pp. 393-395; Flick, 2018, pp. 593-624). Furthermore, comparing collected empirical data with the finding of previous studies, provides additional credibility to the current research.

3.7 Reflecting on the Limitations of Methodological Choices

Though the methods and approaches used in this research were justified considerably, inversely, those choices also had a few limitations. The use of quantitative research on consumer responses captured only high-level concerns and consumer perceptions about reusable takeaway containers. Quantitative method was chosen due to the reason that the phenomenon of reusable takeaway containers is not widely available in Sweden yet, and hence, it would have been difficult for consumers to relay their views towards such a change in detail.

Moreover, the limitations of the interview method were observed when researchers tried to get more participation from various restaurant owners; however, several of them declined due to time constraints and language barriers. Many restaurant managers commented that they did not speak or understand "English" so well, so they refused to be interviewed. Also, two respondents from previous studies replied through email and shared reports of their findings, as they did not have time to participate in the interview. It resulted in a lack of opportunity to capture their personal considerations concerning the research aim. Finally, the reports of previous studies referred to the respondents are written in Swedish. To get the English version, researchers had to translate those using "Google Translator", which could have resulted in some errors.

4. Analysis of Findings

4.1 Chapter Overview

The result has been found based on the thematic analysis as described in the previous chapter. Several categories were identified based on the theoretical framework that are: Products Design, Logistics Concerns, Cost Concerns, and Awareness and Willingness. The analysis of primary data presents the perceptions of restaurants owners and consumers based on these categories, which are also supported by the previous studies reports.

The data is collected in two modes.

- 10 Interviews of restaurant and café owners and 7 interviews, and 2 email responses from participants involved in previous pilot studies and regional authorities. These respondents are represented as:
  - o Restaurant and Café owners: R1 – R10 (Refer to Questionnaire in Appendix II)
  - o Participants involved in previous studies and Swedish regional authorities: P1 – P9 (Refer to Questionnaire in Appendix III)
- 305 consumer survey responses, of which 205 were from online surveys and 100 from physical consumer surveys (Refer to Questionnaire in Appendix IV)

4.1.1 Products Design

Product used as packaging is one of the concerns for having a circular system in place for takeaway business. Data reveals that various aspects of a product, such as its design, recyclability, environmental impact, raw material used, and others, impact the choice of reusable containers for takeaway. However, the choice of raw material for takeaway containers is not directly investigated in the research. Here, the focus is on the design of the container and its acceptability by restaurants and cafés.

In the previous pilot studies, recyclable plastic containers were used as an option for reusable containers, as mentioned by P2, but it was not seen favorably by the users.

"Mission was not so keen on the plastic box that was used for sample project…they did not really like the look of it" (P2)

However, another participant had a different view of this. According to them, plastic raw material is considered cheaper, easier to recycle and can be used multiple times, making it an ideal choice.

"I think to start with… if it is food container or anything, we should try to reduce the amount of different materials, so going to less and less different materials, than is easier to recycle the material and in that case polypropylene is cheap, is easy to recycle, it is very common, so in that way polypropylene is the right choice again, and it is possible to make it biobased" (P3)

The above statements suggest that plastic-based containers were considered a choice for reusable containers in pilot studies. However, the participants of the study viewed this choice negatively, suggesting a lack of knowledge amongst them about the reason behind it. Generally speaking, plastic is seen negatively by people; however, the argument that is being made here is that the reusability of the product is more important to conform to the concept of circularity and waste hierarchy (Kirchherr et al., 2017; Seroka-Stolka & Ociepa-Kubickab, 2019; Diprose et al., 2022). LCA studies that compared different materials for containers all agree that if not reused enough times, a reusable container will cause more harm than good, irrespective of what material is used (Gallego-Schmid et al., 2018; UNEP, 2020). It is also confirmed in the findings from the reports, which are listed below in Table 4.1.

However, the aim is not to advocate using one material over another. Instead, it is to highlight that these statements reflect a lack of knowledge from users' perspective about why the specific container was chosen and its benefit for the environment, which could be a reason for less engagement from the consumer side conforming to the previous study done by Jacobsen et al. (2022).

Another aspect of product design is its usability and the degree of customization required. Although many restaurant owners favor the rental/returnable system, they have concerns regarding reusable containers as the product's design impacts their business. For instance, R4, whose business is mainly Sushi bowls, but they also serve Poké bowls in one location, shares that:

"…sushi and also the Poké bowls, is a very visual food …one of the most important things is that … do you see all the vibrant colours" (R4)

For R2, who serves Indian food, packaging is the first impression when food is delivered, so they need different options and sizes based on the different food types they sell.

> *"Packaging is always a very important aspect for our industry … Packages we consider not only just carry the food but also it gives first impression to the customer, so we're pretty serious on this"* (R2)

> *"… we don't want to have a big box for the small dishes, so we are very careful …we change the packaging depending upon the amount of food it will be there. So it may be let's say three to four types of different sizes you can say"* (R2)

They further add to it:

> *"…we have curries, we make its liquid so if you use the same box many times then obviously the airtight quality deteriorates… the curries spoil then I think customers will be very disappointed because they carry the bag in the car on something and then the car seat will be spoiled, so important is that even the idea is good we need to see its durability, practicality and also the comfort and over all the strength of the pack…"* (R2)

R3 that sells Pizzas and uses around 2000 foldable boxes each week, has little space requirement as the boxes are flat, to begin with, and so reusable boxes will need to have such features so they can store boxes in less space.

> *"…cardboard boxes that we have, they consume very less place because they come as a flat box to us and I can store them in thousands in a small place... So the first challenge that coming is a storage problem"* (R3)

Similar concerns were also raised by regional authorities, for instance one mentions below.

> *"…if you look at fast food chains like burger restaurants, they need maybe specific containers for each different type of products and in developing new products today it is easier for them to have different types of packaging that like if they have different looks or aesthetics to be their branding, it will be harder when it is reusable I think."* (P4)

Another respondent had a different opinion where they specify that, the aim in the short run is to try the system out and then, in the long run, make changes that is suitable to the specific needs of different businesses:

> *"…everyone in someway has to have an opinion about it and I think that's going to be a very big barrier also to in order to succeed …in the start I think it is important to understand for business owners that this is just a test, let's try this, and then maybe in the long run we can find the box that is more suitable for our organisation…"* (P5)

Similar comments about the design of containers were also found in the reports of previous studies, as provided by respondents P8 and P9, and are listed below in Table 4.1. The findings of this research complement the findings of the reports of previous studies and provide a further detailed understanding of the design needs of containers according to different cuisines.

Table 4.1: Findings from Reports – Product Concerns

(Stenmarck et al., 2019, pp. 12-15)	● Concerns related to loss of marketing if restaurants cannot customize reusable containers with their own logo. ● Concerns related to design of product as visualization of food inside matters. ● It should be possible to use boxes for both dine-in as well as takeaway
(Jong et al., 2021, pp. 10-11, 25, 43)	● Plastics containers are considered to perform better than disposable packaging. ● Recyclable plastic containers were chosen for the project since these are considered to be performing better than other materials and can be used for many years and washed 1000 times. ● Containers used during project were not perceived as environment friendly as these were made of plastic, which impacted the commitment from business as well as consumer side

(Jong & Sondal, 2022, p. 10)	• Need for different types of boxes for different types of food

Summarizing the above comments highlights following conclusive points:

- Functionality concerns that the containers can be used for different kinds of cuisine. For instance, R2 serving Indian food uses containers of different sizes for each order for different dishes like curry, rice, and others.
- Opportunity to use containers other than their intended purpose, such as marketing with customized logos.
- The duration of the product is essential to ensure that it can be reused the required number of times without getting damaged and harming human health.
- Space requirement for storing reusable containers.
- Visual aspects of the containers, e.g., transparent lids that provide visual satisfaction to consumers.

Durability is a concern also reflected in previous studies about reusable packaging (Ncube et al., 2021; Diprose et al., 2022). However, functionality for the multi-cuisine food market and marketing aspects are additional points highlighted through the data gathered in this research. Reusable containers need to satisfy demands for different cuisine and be easier to manage in the restaurant or at home. However, when it comes to losing marketing opportunities, this could require a behavior change from business owners. As mentioned in circularity concepts, cooperation is needed from all actors, and everyone will have to make some changes to make this a reality (Lieder & Rashid, 2016; Kopnina & Blewitt, 2018, pp. 240-259; Coelho et al., 2020).

Moreover, not every business owner has the benefit of having extra space that could be required for storing reusable containers. This concern is further discussed in the following category of logistics challenge, but a point to note is that businesses' need much more single-use containers than they will need reusable and so perhaps in that sense the space requirement may be manageable if boxes are not too bulky.

4.1.2 Logistics Concerns

Logistics is found to be another complex aspect as per the collected data. Space management for takeaway business owners, extra labor, and cost associated with activities such as collection, cleaning, and redistribution further illuminate the complexity associated with the reverse logistics of reusable containers. Businesses are not of the same size or type, and hence the concerns raised by them differ to some extent. For instance, R5, a big burger chain with both dine-in and takeaway options, has below to comment about logistic issues:

> *"here we don't have that much storage but there are other restaurants that are being built"* (R5)

The above comment suggests that all facilities might not have enough storage space for reusable boxes. They further added their concern about losing reusable boxes, which can result in a considerable loss.

> *"to not get everything back and so we will have to account for lot of loss"* (R5)

Another big pizza chain R3 that uses foldable cardboard boxes said:

> *"So, the first challenge that is coming is a storage problem, second is the hygiene ... if I consider the whole week, we would be selling around 2000 pizzas it would be a challenge and separate size boxes you need a really big room to store 2-3000 boxes so these two challenges I can see"* (R3)

They further said:

> *"there is no such thing, no washing, make the pizza, put it in the box, slice it, give it away, no washing, all you need to wash is the blade, a few containers that is like a 15-minute job and you are done. Washing the dishes is like full time, you need a dishwasher just to wash dishes."* (R3)

Another mid-size business, R1, that sells Sushi, Thai food, and poke bowl and with a more takeaway percentage compared to dine-in commented as below:

"About the space I think we have enough space because this is also not small …but about cleaning, yeah, maybe we need like extra dishwasher …we need to hire more people" (R1)

On the other hand, some also commented that a reusable container system could be beneficial from a cost perspective as it saves the recurring cost of garbage handling as well as warehouse space for vast amounts of single-use containers:

"our warehouse space will be saved because we need to buy a tremendous amount of boxes every time …the garbage vehicle cost will be also saved and also important is that our time will also save buying every time as well, so there is a lot of indirect benefit" (R2)

These statements highlight the complexity of switching to reusable models for business owners. Different types and sizes of businesses will have different concerns about cost, space, hygiene regulations, and others (Bressanelli et al., 2018; Coelho et al., 2020).

Furthermore, mixed views were presented when inquired about a third-party service that will provide a reverse logistic solution for collection, cleaning, and delivery to them as per their requirement.

"I think it will be of great help definitely because it will reduce the stress from the restaurant" (R2)

"logistic would be helpful but if they don't deliver on time, if the hygiene is not great as we demand and then we could be in trouble" (R3)

"the third party as you mentioned is a great option because we can get rid of this washing, this storage problem and you can order what you need but it has to be like really reliable" (R3)

"I have to look at it, alright, did we really get 1267 containers right now because that's what I'm paying for it, yes it is challenging in so many ways and even though somebody fixes all the logistics still going to be pretty labor intensive just to keep track on where it is, where it is going" (R4)

"again if you want to do this because of the environment then it won't work, because you need somebody to come and collect all the places and then deliver also, so the gas and then it is not pro-environment" (R7)

"you have to see how much it cost because I don't know if every restaurant can manage to pay that amount" (R8)

Apart from restaurant owners, questions were also raised to the organizations involved in previous studies and to regional municipalities. Below are some of the excerpts from their interviews:

"*I think for coffee shops maybe are not too busy, then I think it is more simple to do it by themselves and they have all their control*" (P1)

"but especially those traveling, I mean, maybe you don't want to, I'm just in Malmö for the day and then I'm going home, I'm not coming back here for two weeks, then you maybe don't want a reusable container that I have to return back to a restaurant that's in Malmö. So I mean if you have a system where you can return them in multiple locations that will help" (P4)

"I mean if you have like a food truck for instance, they won't wash things, it is impossible to have a washing function in their food truck …the only thing that could and should add is maybe they can have a collection bin close by where you can throw things or we can add in the in the public space of public domain like maybe collection bins for this type of takeaway packages" (P7)

Apart from these specific issues of space, cost, and logistic operation, business owners also mentioned that although they can see reusable containers as a benefit to the environment, the concept is vague, and difficult to see how it will work. Moreover, some also mentioned the additional time required to fill the order, changing the business model, and losing out to competitors if they do not follow the same rules of reusable packaging. Other concerns raised were about consumer behavior, return rate, and consumer perception of this change which can impact their business.

On the consumer side, the survey result in Appendix-I, (sec. 8.1.4.8) shows that out of those who are willing to use reusable containers, about 47% prefer to have a collection and cleaning system for these containers. When asked specifically during physical survey collection, they commented that having a collection service will make it easier for them to return the containers. While there were some who would use a system like this depending on the cost or preferred to do it themselves.

These comments indicate the variability in preferences of collection mode for reusable containers and a need for a system that can provide a simple solution that handles the concerns raised and simplifies the process of returning the product to the system (Jiang et al., 2020).

Results from previous studies done in Sweden also reflect this complexity of a return system for takeaway containers as shown in Table 4.2

Table 4.2: Findings from Reports- Logistics Concerns

(Jong et al., 2021, pp. 47, 54-57, 74)	● Return at restaurants take time and can create irritation for both consumers and employees. ● A return system with Loop-it app required employees to scan QR code both for delivery and return which takes a lot of time and hence can be problematic. Also, the return of used containers at the counter in restaurant posed concerns of hygiene. ● Issues identified with logistics required for the return system are lack of space, extra time and cost for cleaning of the containers, time spent for staff training, shelf life of products, hygiene and compliance with existing laws. ● For Bring Your Own (BYO) containers, hygiene is a concern of restaurants as it could pose health issues for others. Some also have concerns of different sizes of BYO containers which can result in difficulty managing portion size
(Jong & Sondal, 2022, p.15)	● Several obstacles exist for reverse logistics with respect to return of containers, dishwashing, storage space and others. None of the systems like Loop-it, TINT/Panters, &Repeat, BYO are sufficient
(Jong et al., 2023)	● Factors such as weight of containers, central or non-central dishwashing etc. can contribute to increased impact

Several concerns are highlighted for returning containers; for instance, using the Loop-it app took longer as it required consumers to register and scan both times during purchase and return, which took time at the checkout counter in the restaurants. Moreover, returning used containers at the checkout counter was not perceived as hygienic, resulting in queue build-up and time taken to handle the return. It further signifies and agrees with the findings supported by the article on the importance of a separate collection system without hampering the day-to-day activities at the restaurant (Coelho et al., 2020).

Moreover, when compared with "Bring Your Own" (BYO) container option, where customers can bring their own boxes or mugs and get a refill, it was found that business owners have concerns with hygiene and portion sizes as they cannot control the size of the container in the BYO option. In addition, the data collected from restaurant interviews indicates that very few customers today observe BYO practice in the Skåne region of Sweden.

Jong & Sondal (2022) also highlight the complexity of logistics and recommend further pilot tests to answer questions related to logistics issues. Furthermore, previous literature on this topic also found that factors such as the transport of containers between different locations and non-central dishwashing at different restaurants could be inefficient, resulting in a higher impact of reusable containers (Accorsi et al., 2020; Coelho et al., 2020; Greenwood et al., 2021; Ellsworth-Krebs et al., 2022). Similar concerns were also raised by Jong et al. (2023), as shown in Table 4.2, further signifying the importance of strategic return system planning to identify factors that increase the impact and devise optimum solutions for those factors.

As mentioned in Table 4.2, Jong & Sondal (2022) also highlights that although there are several return systems in place in Sweden for other purposes, such as Loop-it that support reusable packaging via their app, TINT/Panthers where consumer get returnable package via a QR code, &Repeat that operates in France and Singapore and provides reusable takeaway packaging solution and BYO as a refill option, however, previous studies have found that none of these options including Swedish return system, are sufficient enough for a full-scale reusable system for takeaway containers and hence further studies are needed to provide answers to logistic obstacles.

The above data show different views and practical challenges for businesses, consumers, and municipalities to have the infrastructure in place for reverse logistics. However, as Coelho et al. (2020)

mentioned, such challenges must be handled through supply chain reorganization, behavioral changes in consumers and business owners, policy changes and others.

4.1.3 Cost Concerns

Cost is an issue that is usually associated with considerations for environmentally friendly solutions, since these require initial cost for research and design of solution, setup cost as well as recurring cost of maintaining such a system.

Participants of previous pilot studies commented on the general perspective of cost for both challenges i.e., new product as well the logistics setup that it requires.

> *"what I can say is, it went pretty good, it gives you a good idea and, it adds to the value of the brand in a way where customers are aware of things, but it's also very high cost, so it's very hard you know to get the people on board to do this, why are we paying so much for our cups compared to what was, that's why it's much easier when there is a law change"* (P1)

> *"if I was on the corner selling some fast food, than I have to worry about other costs, starting to have a dishwasher and manage the logistics to get this dirty packaging back*" (P3)

> *"So I think there will be some businesses that won't be too happy about this change, since it would be a cost to it to change the infrastructure and maybe some businesses don't even have the opportunity, the business itself is not built for these type of handling"* (P4)

> *"the convenience for the consumer but also the cost, because this multi-use box is much more expensive than single-use paper. You need to wash this 100 times, 200 times to make it worthwhile. and the looping cost money for the transport, you need to store, this adds cost to the system"* (P7)

According to other participants, cost can be a significant concern here for business owners due to the complexities of logistics operations. From the consumer perspective, they further commented below, suggesting that if the cost of a reusable container is not sufficiently high, then there can be a risk of it getting used as a single-use box which will be more hazardous for the environment.

"if I am going to a restaurant for a day in Malmö and I have to pay 100 SEK for the lunch 20 SEK deposit or use a single purpose container that will also make a lot of people use a single purpose container as well. Because otherwise you risk having more expensively produced and more environmentally hazard containers being used and if it does not cost more than I think there is a risk that it will be used as one time container even if it is made for being reusable" (P4)

On the other hand, business owners have a mixed response to the cost question for this change. For instance, R4 said that since they spend around 200K SEK per month on the packaging, a change like this will help in cost saving along with waste that is generated. However, on the other side, there is also concern about the cost of the logistics involved since it is not known how much it will be and who will bear it:

"if I can see that alright I'm changing and my money going out from buying paper to having staff clean the containers, of course that's alright but if it costs me like 20% more to do with or and I don't know 30-40-50% more than it would be challenging" (R4)

"It would be really helpful but depends on the cost because our customer is scattered, it is not like the third party can go and take it from one place and obviously if they open a warehouse it would be situated in one place then customer has to travel back to them to just return the box, there is money involved" (R3)

"all depends on the costs like …there is going to be addition initial cost for the product itself but if we keep on reusing it we don't need more, so then this is one cost for the product, but then third party comes in and want payment for like the whole supply chain like picking it up for the customers, cleaning it, depends on what it costs, like if it is cheaper for us to buy single-use packages, you see the problem there" (R6)

"Ya that's the thing so it is like an investment in that way, so the first year maybe it will be a lot of cost but then I think it depends on the cost for third party as well like if it is manageable and then we feel like okay it is not worth the hassle then it is better to use a third party so it all depends on the cost." (R5)

Contrasting to the above responses, one respondent, who deals with a huge number of boxes, was found saying something very different than others. According to that respondent,

> *"we need to buy a tremendous amount of boxes every time so the warehouse cost will be saved by the logistics when the vendor comes with those boxes every time that logistic costs will be also saved, the garbage vehicle will be also saved."* (R2)

These findings highlight the cost issue with reusable systems supporting the findings of Jiang et al. (2020), informing readers about a threshold of increase in cost that both consumer and supplier could be willing to accept. However, a change like this can also bring opportunities for cost savings and new opportunities (Coelho et al., 2020; Li et al., 2023).

Finding from reports regarding cost perspective are shown in Table 4.3

Table 4.3: Findings from Reports – Cost Concerns

(Stenmarck et al., 2019, p. 56)	• Takeaway is easy and cheap today and to move to change the practice towards more sustainable reuse alternative requires cost-effective solutions
(Jong et al., 2021, pp. 55, 66)	• Since customers are not charged separately for single-use takeaway packaging, hence, additional cost for packaging to consumers was not favored by any participants involved in the study as they believe it will impact their business. • Challenges exists for takeaway industry to move to reusable containers with respect to logistics but also cost for managing collection, washing, delivery and transport

(Jong & Sondal, 2022, pp. 9, 19)	• Reusable packaging can be expensive and needs clarity on who will be responsible for initial investment. Also, customers might not be willing to pay for it which can be additional obstacles. • Suggestion to make single-use packaging more expensive than reusable packaging for consumers through tax and provide discounts for BYO. Also provide financial aid to companies for setting up reverse logistics system for reusable containers.

These reports found that there needs to be clarity on who is responsible for what expenses. For instance, Jong & Sondal (2022) suggests applying an extra tax on single-use packaging for consumers. However, business owners have concerns about it and do not want to charge consumers anything extra for reusable packaging as that can hamper their business. Also, the initial setup cost is not just for packaging material but also for reverse logistics, and that depends on what system is put into place.

The current research also inquired about consumers' perspectives on the cost and two questions were asked on this aspect through a consumer survey. The first question was asked to both physical and online consumers about their willingness to pay a deposit for the reusable container. All the data used below is mentioned in Appendix-I.

As shown in Appendix-I, (sec. 8.1.4.10), amongst total frequent consumers of takeaway service 48.6% of consumers are willing to choose reusable containers, and about 46.01% are willing to pay a deposit fee for such containers. However, results were also compared between physical and online survey data, showing that average takeaway frequency differs between these groups. Furthermore, section 8.1.4.9, shows that about 30% of online respondents replied that they consume takeaway often, while for the physical survey, this was 52%, and the total average came to 37%. Since people consuming takeaway service often are the most affected by this change, the responses for cost were taken from the physical survey to present a more realistic concern of the consumers of this service, presented as below.

Moreover in (sec. 8.1.4.5), about 48% of the physically surveyed said they would choose reusable containers, and the same percentage answered maybe, while only 4% said no. However, in (sec. 8.1.4.7), 68% of the physical surveyed respondents said they would like to use a deposit return service

for reusable containers. Data also reveals in (sec. 8.1.4.13), that about 83% of consumers of those willing to choose reusable containers amongst physically surveyed are concerned about the environmental impact of single-use containers. Furthermore, in (sec. 8.1.4.14), around 65% of respondents willing to use reusable containers said they are ready to pay a deposit for takeaway containers, while 27% said maybe, and 8% said no. Data also showed in (sec. 8.1.4.16), that on an average, consumers are willing to pay 50 SEK as a deposit for containers. Refer to Appendix–I for a complete result of the survey.

A similar response was also found for the cost of deposit return service (DRS), and in (sec. 8.1.4.15), around 67% said they are willing to pay for DRS service, 6% said maybe, and 27% said no amongst consumers willing to use reusable containers. When asked about the service fee to physical survey respondents, comments were as below;

> *"Not willing to pay for 3rd party service, because it should be concern for restaurant or Govt"*
>
> *"Willing to pay for 3rd party, because life will be easy"*
>
> *"People will be ready to pay if its low like 20 SEK. Or, if people are served incentives, then they will be more interested"*
>
> *"Willing to pay for 3rd party, 50 Sek as monthly subscription"*
>
> *"Not willing to pay for 3rd party, because it was not customer demand"*

The amount varied, ranging from 2-5 SEK per order to 250 SEK per month subscription. But, the data shows that more than 50% of consumers are willing to pay a certain amount for the service of collection and cleaning, suggesting that cost is not a major factor for consumers compared to other reasons, as discussed in the next section. Moreover, this also supports the findings in previous literature that consumers can be motivated to pay more if the reason behind it agrees with their behavioral intentions (Ertz et al., 2017).

4.1.4 Awareness and Willingness

This category explores the awareness and willingness of consumers and business owners to transition towards reusable takeaway containers.

Awareness can be classified into two subcategories, that is, first, awareness of the environmental impact of single-use containers and second, awareness of the policy that Sweden will implement from the beginning of 2024.

Collected data shows that restaurant owners are generally aware of the environmental impacts of waste as out of 10 restaurants, 7 of them replied that they are aware of it; however, comments such as below suggests they do not know specifically of the issues related to single-use of packaging.

> *"No not really to be honest, I think everybody says yes but they are not really concerned, but I don't know what scale it is, I don't know how we should fix it, so no I don't know"* (R4)

Moreover, when enquired about their efforts to minimize the impact, some of them have commented that they try to use recyclable products, promote no cutlery with a takeaway, and make efforts such as these.

> *"Normally today we are using the packaging packs from a supplier who is the largest supplier for all the restaurant industry… so they give the packs but those all packs are recyclable later with a good quality and if we wash properly, we can reuse"* (R2)

> *"hard cardboards yeah but these are very sustainable... but we also use foam that is specially made …I don't know what type of material they used but they told us it is a new type of foam, biodegradable"* (R8)

> *"they take the food without cutleries… they prefer to use their own cutleries, if somebody need in case they want to eat in the park or something then we prefer to use wooden fork and knife so in case somebody ask, but, we see cutleries as pretty low used"* (R2)

On the consumer side, survey data in Appendix–I, section 8.1.4.4, for both physical and online surveys shows that awareness of environmental impact due to single-use packaging is more than 50% among the consumers. This finding is also confirmed by participants of previous studies.

> *"consumers are very environmental aware and they want to reduce littering and they want to reduce the use of plastic, promote recycling and reuse, I think there is a target group that really wants this kind of solutions as well"* (P2)

But on the other hand, another participant commented as

> *"You know the people who are aware and want to do they are always positive to things like this, the problem is how do you get everybody else on board"* (P1)

Adding to that, when asked about the new legislation that Sweden is planning to implement from 2024, the general reply from restaurant owners was that they know the plastic ban is happening, but they did not know much about this specific change. Also, few restaurants knew because they are part of a big chain, and so this change was discussed in their internal meetings.

> *"No, I did not know, I just know that there are new directives and they said all the package needs to be reusable but I thought it was more for supermarkets when they have ready food, people just buy and take home that needs to be reusable, they did not say much about restaurants"* (R7)

These statements suggest that there is some knowledge about the issue of single-use packaging among both business owners and consumers. However, the point to note is that having general awareness will not automatically translate intention into action, as awareness about an issue does not mean users consider themselves responsible for it or capable of solving it. This is further hindered by their skillset and knowledge about possible solutions to specific issues that can slow the change in behavioral patterns (Lofthouse et al., 2009; Rhein & Schmid, 2020; Jacobsen et al., 2022).

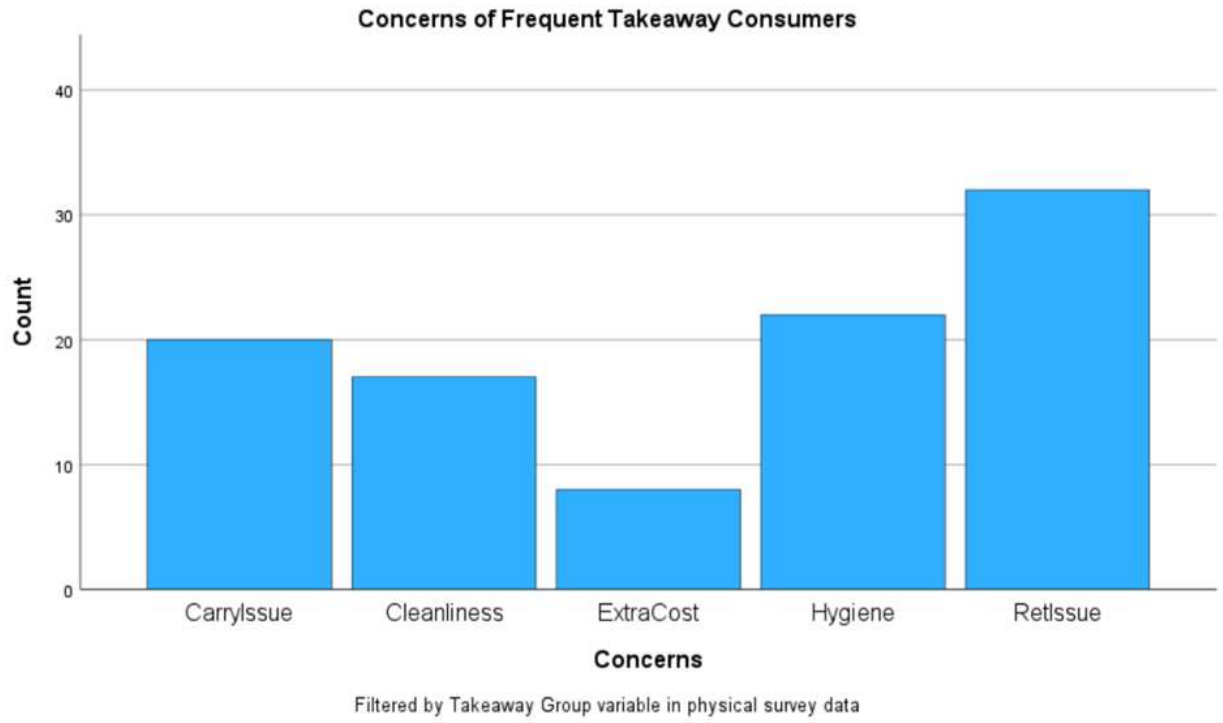
Jong & Sondal (2022) conclude that although there is an increase in general awareness about environmental issues, there is also a need to further raise awareness amongst all participants, especially for the issues related to single-use packaging, and different modes of campaigns should be used for such information dissemination.

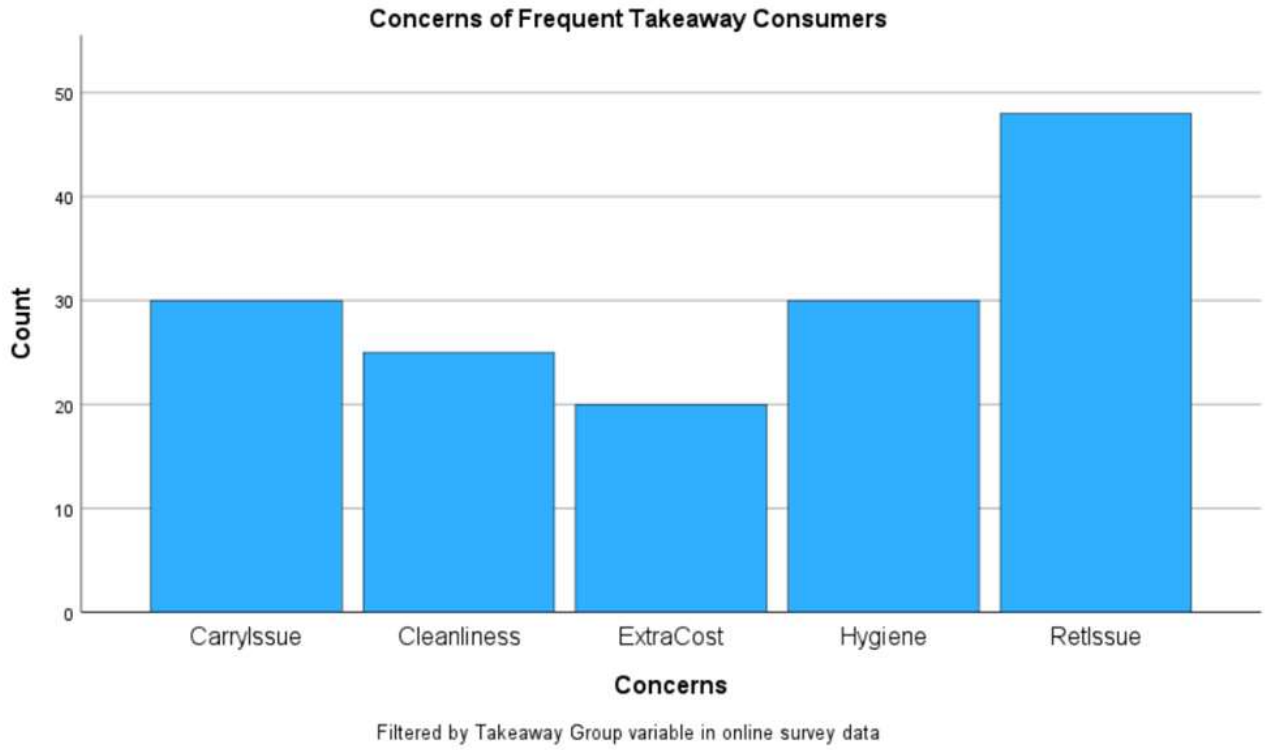
Furthermore, concerning willingness to change, almost all the business owners gave positive indications about this change except a few who thought this was not possible for them. Business owners did, however, raise concerns about how the change will work and its cost impact, but they were generally favorable towards trying this out. It supports the conclusion in the existing literature that if motivated enough in the context of environmental benefits, consumers and buyers can be influenced to change their behaviors given that they are able to with respect to challenges posed by

such a change. Understanding these motivational factors is the key to steering the change toward reusable models (Ertz et al., 2017; Baird et al., 2022).

On the consumer side, as shown in Appendix-I, section 8.1.4.9, physical survey data shows a higher percentage (52%) of takeaway consumers than in online surveys (approx. 30%). Out of the physical surveyed shown in section 8.4.1.10, 51.9% of frequent takeaway consumers are willing to use reusable containers, and 48.07% said they might be interested, indicating that the people surveyed physically comprised consumers who are highly positive about this change. While in online data, for frequent takeaway consumers, 54.09% are willing, and 37.7% may be will use reusable containers. This data shows there is little difference in behavior or intention amongst takeaway consumers for both online and physical survey data.

Further analysis of survey data reveals concerns related to takeaway containers and are as shown below





Both these graphs show that the primary concern of takeaway consumers is the return issue for the container, followed by hygiene as well as the issue of carrying and keeping the box until it has been returned. Cost is the least of the concerns for all the consumers in both sets of data, indicating that cost is not the primary reason for consumers to choose/not for reusable containers. Instead, it is the convenience or the lack of it, for returning the container back to the system.

This data further supports the conclusion made by Singh & Pandey (2018) that consumers will be willing to pay for sustainable choices if the logic behind them coincides with their personal beliefs and moral norms (Singh & Pandey 2018). Furthermore, the results also indicate that personal attitude and intention towards sustainable choices are not enough to transform intention into action, rather their ability to execute the actions, i.e., their perceived behavior control, is also important, which in this case would be the knowledge about the return system and how convenient it will be for them to be a part of it (Ajzen, 1991; Vermeir & Verbeke, 2008).

5. Discussion

5.1 Chapter Overview

At the beginning of this paper, a research question was raised about the feasibility of reusable takeaway containers connected to the law that will be introduced in Sweden in 2024. The current study aims to understand how possible it is for takeaway business owners and consumers to switch from single-use takeaway containers to reusable containers in Sweden. The arguments below provide insight for answering the research question. The findings and analysis provided in the previous chapter are discussed in the below sections through the lens of the theoretical framework presented in this thesis.

5.1.1 Product Design

When it comes to a product as a reusable container, it is prudent to mention again that the raw material used for the product is not in the scope of this study. Instead, the focus is on its reusability and design features. LCA studies have revealed that the extraction of virgin material and resources consumed during the production cycle for new products are the most impactful stages, and hence ensuring that circularity is achieved for takeaway containers by reusing products a sufficient number of times can help reduce the harmful impact (Gallego-Schmid et al., 2018; UNEP, 2020; Greenwood et al., 2021; Jong et al., 2023). Keeping that in mind, it is essential that the products are functional, durable, and maintainable irrespective of cuisine type and designed for repeated washing and reuse to foster the change in behavior in both business owners and consumers towards reusable systems (Sæter et al., 2020; Greenwood et al., 2021). Note that these points are also supported by results from previous studies done in Sweden (Jong & Sondal, 2022; Jong et al., 2023).

5.1.1.1 Different containers by cuisine type

One of the concerns raised by Asian and Indian restaurants is about the functional aspect of the container. Take, for instance, Indian or Asian cuisine that generally uses multiple components, like separate small bowls for curry or sauces and big bowls for rice or bread. Another such requirement is for pizza boxes that are different from food boxes commonly used for other cuisines. Hence it becomes vital that the reusable boxes are designed to support these requirements, e.g., compartments like

stacking up or already have sections to ensure easier packaging for food. One example of such containers can be seen in Ozzi O2Go products used in the USA (Ozzi, 2023). Without such options, it will increase the complexity of stock management for multiple sizes of containers. Consumers will also have to pay a deposit for multiple components, which could make it more expensive to use this system. Having containers suitable for the cuisine type will make it easier for both consumers and business owners. It will also reduce the chances of products getting lost. The results presented in reports of previous studies do not mention this requirement specifically; hence, this is one of the recommendations when considering the product design.

5.1.1.2 Durability of product

Other features of product design that are necessary to ensure are the product's durability concerning issues like leakage and ensuring reusability for several times for it to be considered a better option than other single-use products. If the product breaks frequently and is not usable enough, then the environmental and cost impact will be much higher than single-use packaging (Sæter et al., 2020; UNEP, 2020; Jong & Sondal, 2022; Jong et al., 2023).

5.1.1.3 Customization and Look and Feel of product

Some other concerns related to product design were concerning the plastic material used, the look and feel of the product, and lost marketing opportunities if business owners cannot customize it with their logo. These concerns require behavioral change and need to be handled through better awareness which is discussed below in detail. If containers made of bioplastic or PP, is the way to go, as suggested by some participants and the report data (Hillier-Brown et al., 2017; Jong et al., 2021; Jong et al., 2023), then sufficient information about the reasons behind it should be provided to all, to achieve their commitment towards this change. Moreover, some degree of standardization for, e.g., standardized products without any customization needs like company logo, will result in a more straightforward reverse logistic process with no need for time and effort required for sorting collected containers for businesses according to their customizations (Coelho et al., 2020).

5.1.2 Logistic Concerns

For reverse logistics for collection, cleaning, and distribution, the data shows arguments made for both sides, i.e., having restaurant owners manage their own collection and cleaning versus having a third party provide such services. Some businesses, especially big fast-food chains, could want to manage the return system on their own. However, it will not be fair to expect small and mid-size business owners like food trucks, especially those with most of their business depending on takeaway food, to abide by a legal change that will be difficult for them to handle without external help.

5.1.2.1 Service provider for business owners

Reverse logistics to shift towards Circular Economy does pose significant challenges. It requires investments and research, as it involves redesigning the business model and supply chain for reuse. However, studies have shown that understanding the challenges and opportunities of such change could have the potential to create new opportunities and reduce environmental impact (Kopnina & Blewitt, 2018; Coelho et al., 2020; Diprose et al., 2022). Also, some studies suggest that using an optimized centralized system for handling washing, transport, and other reverse logistics concerns can help tackle these challenges and reduce the cost of the return system (Accorsi et al., 2020; Lu et al., 2022). Hence, the recommendation is to have some third-party service that can provide and facilitate reverse logistics services to businesses that want or need it.

Data shows that many interviewees have commented about different issues with managing a return system on their own, for instance, space constraints, lack of dishwashers, extra labor cost, and others, and so a service provider here can be helpful to tackle such challenges of the return system. Moreover, it has been suggested both in the reports (Jong et al., 2023) as well in previous research that a commercial washing system is much more efficient and can be audited for its efficiency at a third-party location, but this will not be easy to ensure if every restaurant used their own machines which can negate the benefits of reusable containers (Greenwood et al., 2021; Lu et al., 2022). Furthermore, the data also shows that not all business owners have the opportunity or affordability to make changes as required by this system. Hence, a third-party service can be beneficial in such circumstances.

5.1.2.2 Service provider for consumers

The next challenge an external service provider can solve is for consumers concerning the return of the boxes back to the system. With sufficient enough collection points, it will be easier for consumers to return the boxes, which will help to alleviate their most significant concern with reusable systems, as indicated by the data. In Sweden, there is a deposit return system for PET bottles which is quite simple and easy to use and has proven to increase the return rate for cans and PET bottles (Lu et al., 2022). However, the data from reports and participant interviews (P9) reveals that such a system has yet to be investigated for takeaway containers. A study has shown that if a DRS system similar to the one for PET bottles in Sweden is designed to reuse other products, it can yield higher benefits than the cost (Lu et al., 2022). Hence, this research recommends that further studies be conducted to analyze the feasibility of using a similar DRS system for reusable takeaway containers (Lu et al., 2022).

5.1.2.3 New system for reverse logistic and its benefits

Another option, as suggested in the report (Jong & Sondal, 2022), is to encourage industries within this sector to collaborate and innovate on a possible system for reverse logistics and advice for public funding to support such activities. It also supports previous research findings on the need for "public investment… targeted towards the top of the waste hierarchy rather than focused on recycling and waste disposal" (Diprose et al., 2022). At the same time, LCA studies do mention that transport impact due to the collection of boxes could negate the benefits (UNEP, 2020; Jong et al., 2023), emphasizing a need for further research for optimal planning of supply chain for reverse logistics (Accorsi et al., 2020).

Having a third-party system will make it convenient for buyers to procure reusable containers and for consumers to return these to the system. It will also ensure simplified auditing of the system to verify its effectiveness for environmental benefits, as well as reduce the risk and liabilities for restaurant owners that could arise due to contamination, lack of hygiene, and other such issues, as the service provider will be held accountable for these concerns (Coelho et al., 2020). In addition, a third-party service can monitor and provide reports about the system's effectiveness through digitization. As mentioned in the reports, trials have been done using the Loop-it app that facilitates the deposit and return of containers for consumers (Jong et al., 2021; Jong & Sondal, 2022). However, the article by Ellsworth-Krebs et al. shows that digital systems can be used for much more than that (Ellsworth-

Krebs et al., 2022). Based on the premise of the article, a digital system can be used for collecting data for the performance of the system, return rates, and other factors that can help to analyze how beneficial the system is, identify flaws, report on behavior patterns as well as create opportunities to receive/provide feedback from/to users for further improvements (Ellsworth-Krebs et al., 2022).

5.1.3 Cost Concerns

As explained previously, another challenge of the reverse logistic system is the cost required for initial setup and recurring costs. Previous research on this has shown that cost can become a barrier if not distributed throughout the supply chain, but cost and benefit studies also indicate that sharing of cost between different stakeholders can result in a net benefit for all involved (Coelho et al., 2020; Li et al., 2023).

Data collected from business owners indicate that if the cost of reverse logistics is the within expected threshold, they could perhaps save money on single-use containers and the waste generated from it. Consumers have also commented that they are willing to pay a reasonable amount for the collection service. Hence, the data supports the findings of previous research that by managing the cost efficiently, there are opportunities here not just for reducing the impact on the environment but also for new business models, packaging concepts required for the reverse logistic as well as indirect benefits for different actors of the market (Coelho et al., 2020; Li et al., 2023).

Moreover, a study conducted on the benefits of using the DRS system for reuse in Sweden suggests that with proper planning, even distribution of cost, optimized logistics, and high return rates, this system can result in higher benefits than the cost, and long-term benefits for the environment (Lu et al., 2022).

5.1.4 Awareness and Willingness

Furthermore, as one of the interviewees commented, solving the above challenges would yield satisfactory results only if the system is accepted by consumers and business owners alike. The finding of Jong & Sondal (2022) concludes that there is a need for increased awareness amongst all the stakeholders.

5.1.4.1 Awareness and willingness amongst users

Data from business owners as well as from consumer surveys indicate that there is a general awareness of the environmental impact of both groups of people. However, when inquired further, restaurant owners showed a lack of knowledge of specific issues related to single-use takeaway containers indicating that targeted knowledge dissemination is needed amongst such groups to increase awareness about the impact of their business on the environment (Rhein & Schmid, 2020).

On the consumer side, the survey result, as per Appendix-I, (sec. 8.1.4.3), reveals that more than 50% of respondents know about the impact of single-use containers, and about 65% (8.1.4.11) of those respondents are willing to use reusable containers. It shows that more than the average number of consumers are aware of the issue and willing to do something about it. Appendix-I (8.1.4.12) data also indicates that among the frequent consumers of takeaway service, most of them are even willing to pay for DRS service within a reasonable limit. Further analysis of data, however, reveals many of them have concerns for reusable containers concerning convenience for returning of the containers as well hygiene, but the cost was not found to be a significant factor as shown in the previous chapter.

5.1.4.2 Perceived Behavioral Control (PBC)

The patterns that emerge from this provide insights into the behavioral aspects of consumers and business owners. Although both groups have shown positive responses toward this change, they are both restrained from doing so due to some practical constraints.

For business owners, the constraints are related to supply chain challenges and the cost of reverse logistics, as discussed in detail previously. However, particular concerns like the loss of marketing opportunities discussed previously require some awareness generation amongst them to weigh the benefit of environmental protection compared to the loss of some opportunities for which other means can be utilized. The recommendation is to provide knowledge about specific issues through campaigns, as suggested in previous studies and reports. Rhein & Schmid, (2020); Jong & Sondal, (2022).

On the consumer's part, the concerns are related to practical issues of carrying the used boxes without a readily accessible return system, the inconvenience of returning to restaurants instead of collection

points like those for PET bottles, and hygiene. As shown in the data in the previous chapter, these are the three biggest concerns of consumers.

As argued before, a third-party service provider can help to alleviate these concerns of consumers and business owners. Hence, when analyzed through the lens of the "Theory of Planned Behavior (TPB)", the pattern suggests a presence of intention amongst both groups of people. However, these intentions are not translated to actions due to their "perceived behavioral control (PBC)" (Ajzen, 1985; Ajzen, 1991).

As mentioned in Chapter 2, TPB helps to understand and influence an individual's action and behavior through three attributes, personal belief or attitude, subjective norms (SN), and PBC (Ajzen, 1991). SN has not been directly investigated in the current research, but previous research has shown that social influences can motivate users to make sustainable choices (Dorn & Stöckli, 2018).

Current research indicates that there is a concern for environmental impact among the users and sellers of takeaway services. The belief in protecting the environment motivates them to change their behavior provided it is possible and convenient to do so, emphasizing a positive intention and motivation to make changes on both sides, consumers, and business owners. Hence, it suggests that from a personal attitude perspective, given enough incentive, individuals in Sweden will be able to translate their attitude towards actions for reusable takeaway containers.

Studies have also shown that if a reuse system is too inconvenient for consumers and requires them to extensively plan for consuming takeaway service, it could hamper them from transitioning towards reusable systems (Lofthouse et al., 2009; Sæter et al., 2020). The collected data also shows that consumers and businesses are unable to bring any significant changes due to their perception of the barriers and their lack of control over it. With respect to this, several studies have shown that PBC is one critical factor in ensuring that behavioral attitudes translate into action (Ajzen, 1991; Vermeir & Verbeke, 2008). In this particular case, PBC can be attributed to the legal policy as well as the practical means of performing the required action. Previous researches in this topic argues that the government needs to encourage reusability changes through appropriate packaging policy (Lu et al., 2022; Li et al., 2023). And Sweden intends to bring into effect such a policy in 2024, but as discussed, without practical means to bring the required change, the policy change could fail to bring any impactful result.

Hence, the recommendation here would be not only to provide a legal premise for sustainable consumption but enable individuals through practical means to bring the change about.

Several studies have shown that people are motivated to make changes when concerned for the environment (Ertz et al., 2017; Rhein & Schmid, 2020), but in this case, the current study finds that although there is a concern for the environment and motivation to change, external factors are preventing them from transitioning towards it.

Furthermore, as per the data in Appendix-I, there are some percentages of people who are unwilling to make this change, and that's where increased awareness about the issue can play a role and encourage more people to demand such a change. Another point to note is that different level of awareness exists within the population and so knowledge dissemination should be targeted as per the consumer base through the use of different methods such as social models, campaigns, celebrity influences, and others (Ertz et al., 2017; Dorn & Stöckli, 2018; Rhein & Schmid, 2020; Jong & Sondal, 2022).

Based on the presented discussion, one can summarize that, the findings of the current research and compared with the findings of previous studies, reveals that more pilot studies are needed to find solutions to the challenges associated with reverse logistic of a return system for takeaway food containers.

6. Conclusion, Implications, Limitations and Future Research

6.1 Chapter Overview

The previous chapters presented the challenges and opportunities discovered from the collected data for transitioning towards a reusable container system for the takeaway business. This chapter provides a conclusion and recommendation for further actions that can be taken to move forward with the change. The last section of this chapter outlines the implications and limitations of this research.

6.2 Conclusion

The objectives of a return system are to tackle the issue of waste and litter caused due to single-use products and find solutions to the challenges of finite resources through optimum resource utilization. However, the study also reveals an opportunity for a new business model for handling reverse logistics creating possibilities for new businesses and jobs.

The research questions raised in this paper were about the feasibility of transitioning towards a return system for takeaway containers and the challenges and opportunities associated with such a change. The analysis shows that the need for reverse logistics creates possibilities for new business opportunities. For instance, a few possibilities are of a service provider for collection, cleaning and distribution, and another is of a business providing digital solutions for such a framework. Such services can simplify the process and contribute to new job creation. Hence, one recommendation of this research is to conduct further studies for cost-benefit analysis of reverse logistics, investigating such options for long-term benefits.

Concerning the feasibility of transitioning towards reusable containers, two options are identified to achieve this. Still, the current study finds that challenges exist for both options. Hence, these require further research to analyze and generate solutions for the existing obstacles.

One option is promoting BYO as suggested by previous studies and aligned with refill mode of reusability. Although BYO is not part of this study, however during the interview process, very few

restaurants confirmed that they get consumers who come with their own boxes, indicating a lack of behavioral intention on the consumers' part for this option. Moreover, as the previous studies have mentioned, other issues like hygiene and portion sizes with BYO containers exist. Also, BYO can have increased environmental impact due to ineffective dishwashing. Hence, BYO requires further research to understand consumers' behavior and challenges associated with this option.

For the return system, which is the main objective of analysis for this research, further studies are required to iron out the challenges concerning product type and its design, logistics challenges, and increased awareness for single-use packaging issues. This is aligned with the conclusion made in previous studies; however, the recommendation here is to conduct further pilot studies as close to a realistic model as possible, keeping the below points in mind.

Instead of registering a few specific restaurants, the study should be conducted in a small region that provides the opportunity to involve different kinds and sizes of restaurants serving different cuisines. It will allow for trying out products from its design and functionality aspects to support repeated usage of the containers and understand the complexities involved with varying sizes of businesses. Moreover, a DRS system with a third-party service within a small region will also help determine challenges concerning the scalability and affordability of reverse logistics and generating insights for further optimization needs. Furthermore, by using digital platforms along with options such as rewards or awarding badges to the participants, pilot studies like these can be used to generate awareness and gain commitment from local people to engage with pro-environment studies, which can help in getting more people involved and to receive their feedback for further improvements.

To conclude, this research has added to the existing knowledge about the transition toward reusable packaging for the takeaway business in Sweden. This research has provided insights into challenges perceived by restaurant owners of different sizes and cuisines, further complicating the logistic solution required for various businesses in this sector. The research has also complemented the finding with results from consumer survey, and both sets of data point to the fact that, although the Swedish legislation changes coming in 2024 will motivate people to transition towards the reusable system, however, challenges with reverse logistics could result in lack of implementation from both consumers and business owners' end. As mentioned in studies of circular economy, transitioning towards a reusable system has many challenges and requires cooperation amongst various actors, extensive

research, and new business models for reverse logistics and so this research concludes on the same ground that more studies are needed for smooth transition to reusable system for takeaway services.

6.3 Managerial and Societal Implications

The research has identified various barriers for behavioral change towards reusable containers, however, managers in existing restaurant business have a pivotal role to play. They can already promote reusability by offering financial incentives to their consumers and motivate them to use reusable containers aligning to BYO model. Furthermore, managers, especially in big restaurant chains, can participate in the change process by requesting their suppliers for such options and generate interest towards a business for handling the reverse logistics required by this sector.

For society, there are direct and indirect implications of this change. Implementing the reuse model will help reduce litter and waste, resulting in a cleaner environment, litter-safe spaces such as beaches, reduced impact on marine lives resulting in safe seafood, and many others. Other implications could be new job opportunities if new businesses are created to handle the reverse logistics process required for this sector. Moreover, the research identifies a lack of action from consumers in regard to BYO option, reflecting that consumers could promote and demand such change by adopting practices like BYO and help in creating further awareness for issues of single-use products.

6.4 Limitation and Future Research Directions

There could be other reports of previous studies that are not considered in this research due to a lack of knowledge about it. Also, as there is no solution available in the Sweden market for reverse logistic service for reusable containers in the takeaway food business, it is difficult to understand unseen challenges which might arise with its implementation. It could also be insightful to conduct interviews with consumers who participated in previous pilot studies to understand their preferences and perceived challenges in detail. Furthermore, as previously mentioned, future research is needed to study the product design for multi-cuisine and investigate cost-effective solutions for reverse logistic challenges for takeaway service. Research can also be done for the BYO solution of takeaway packaging to understand its drivers and barriers to transition towards reusability. Finally, a study can be carried out on how digital technologies can support reverse logistic processes, especially regarding takeaway food packing.

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8. Appendix

8.1Appendix I - Graphs

8.1.1 Variables assigned to questions.

Question	Variables
Name	Name
Gender	Gender
Age	Age
Education	Education
Work status	WorkStatus
Country of Origin	CountryOrig
Gross monthly Income (SEK)	MonthIncome
How often do you eat food from a restaurant	RestaurantFreq
On an average, how much do you spend (SEK) on a restaurant in a week	RestaurantExp
Do you prefer eating at restaurants or takeaway options	EatingPref
On an average, how often do you order/buy takeaway in a week	TakeawayFreq
Do you know about waste generated from single-use takeaway containers	WasteAware
If yes, then are you concerned about waste generated from single-use takeaway containers	WasteConcern

Do you know about the environmental impact of single-use takeaway containers	EnvImpactAware
Are you concerned about the environmental impact of single-use takeaway containers	EnvImpactConcern
Would you use multi use containers instead of single-use for takeaway	ChooseMultiuse
If returning or collecting service are made for multi-use takeaway containers, will you prefer to use multi use containers	MultiuseDRS
Challenges you think with multi use takeaway containers · Lack of Hygiene · Lack of Cleanliness · Issue while returning of containers · Difficulties in carrying containers while traveling · Extra cost	 · Hygiene · Cleanliness · RetIssue · CarryIssue · ExtraCost
Are you willing to pay deposit for renting multi-use containers, which you will get back once you return the containers	WillingToPay
For renting a multi-use container for takeaway, how much deposit are you willing to spend	Amount

Extra questions for physical survey

Are you willing to pay for DRS service	PayforDRSService
Additional remarks	Not used in SPSS

8.1.2 Values assigned in survey data

- Questions that have replies “Yes” and “No” have values 1 and 0 respectively
- Questions that have replies “Yes”, “No” and “Somewhat” have values 2, 0, 1 respectively
- Questions that have reply “Yes”, “No” and “Depends on price” have values 2, 0, 1 respectively
- In amount question value “NA” is coded to 0 in SPSS
- Each challenge variable for challenges have values assigned as 0 or 1, where 0 means option “Not selected” and 1 means “Selected”
- Additional question for DRS service is assigned values as 0, 1, 2 signifying “No”, “Maybe” and “Yes”
- Options for takeaway frequency are assigned values as below

Never	0
Rarely	1
Once in a two week	2
Once in a week	3
Twice in a week	4
Every alternate day	5
Everyday	6

8.1.3 Takeaway group

Takeaway groups are additional variable created based on below logic.

Takeaway group	Takeaway frequency
0: Rarely	Never, Rarely
1: Sometimes	Once in a two week
2: Often	Once in a week, Twice in a week, Every alternate day, Everyday

8.1.4 Frequencies of key variables

8.1.4.1 Waste Awareness

WasteAware	Online (205)	Physical (100)	Total (305)
No	31 (15.12%)	12 (12%)	43 (14.09%)
Somewhat	63 (30.73%)	34 (34%)	97 (31.8%)
Yes	111 (54.14%)	54 (54%)	165 (54.09%)

8.1.4.2 Waste Concern

WasteConcern	Online (205)	Physical (100)	Total (305)
No	29 (14.15%)	14 (14%)	43 (14.09%)
Somewhat	53 (25.85%)	28 (28%)	81 (26.56%)
Yes	123 (60%)	58 (58%)	181 (59.34%)

8.1.4.3 Environment Impact Awareness

EnvImpactAware	Online (205)	Physical (100)	Total (305)
No	30 (14.63%)	8 (8%)	38 (12.45%)
Somewhat	69 (33.66%)	39 (39%)	108 (35.4%)
Yes	106 (51.7%)	53 53%)	159 (52.13%)

8.1.4.4 Environment Impact Concern

EnvImpactConcern	Online (205)	Physical (100)	Total (305)
No	26 (12.68%)	6 (6%)	32 (10.49%)
Somewhat	41 (20%)	30 (30%)	71 (23.28%)
Yes	138 (67.32%	64 (64%)	202 (66.23%)

8.1.4.5 Willing to use multi-use container.

ChooseMultiuse	Online (205)	Physical (100)	Total (305)
No	25 (12.2%)	4 (4%)	29 (9.5%)
Maybe	64 (31.2%)	48 (48%)	112 (36.7%)
Yes	116 (56.6%)	48 (48%)	164 (53.8%)

8.1.4.6 Willing to pay deposit for multi-use container.

WillingToPay	Online (205)	Physical (100)	Total (305)
No	18.5% (38)	12% (12)	16.4% (50)
Maybe	42% (86)	44% (44)	42.6% (130)
Yes	39.5% (81)	44% (44)	41% (125)

8.1.4.7 Prefer having DRS service.

MultiuseDRS	Online (205)	Physical (100)	Total (305)
No	10.2% (21)	4% (4)	8.2% (25)
Maybe	31.2% (64)	28% (28)	30.2% (92)
Yes	58.5% (120)	68% (68)	61.6% (188)

8.1.4.8 Choose multi-use containers if DRS is provided (Prefer DRS)

MultiuseDRS	Online (205)	Physical (100)	Total (305)
ChooseMultiuse=Yes	46.3% (95)	47% (47)	46.6% (142)

8.1.4.9 Takeaway group frequency

Takeaway Frequency	Online (205)	Physical (100)	Total (305)
Rarely	43.9% (90)	36% (36)	41.3% (126)
Sometimes	26.3% (54)	12% (12)	21.6% (66)
Often	29.8% (61)	52% (52)	37% (113)

8.1.4.10 Willing to choose multiuse and pay deposit for frequent takeaway group (Freq. = Often)

ChooseMultiuse	Online (61/205)	Physical (52/100)	Total (113/305)
No	8.19% (5)	0% (0)	7.07% (8)
Maybe	37.7% (23)	48.07% (25)	44.24% (50)
Yes	54.09% (33)	51.9% (27)	48.6% (55)

WillingToPay	Online (61/205)	Physical (52/100)	Total (113/305)
No	19.67% (12)	0% (0)	12.39% (14)
Maybe	42.62% (26)	40.38% (21)	41.59%% (47)
Yes	37.7% (23)	59.62% (31)	46.01% (52)

8.1.4.11 Willing to choose multi-use containers for consumers aware of environmental impact.

ChooseMultiuse	Online (106/205)	Physical (53/100)	Total (159/305)
No	11.32% (12)	1.89% (1)	8.18% (13)
Maybe	21.69% (23)	35.85% (19)	26.42%% (42)
Yes	66.99% (71)	62.26% (33)	65.4% (104)

8.1.4.12 Physical survey: Willing to pay for DRS service amongst frequent takeaways consumers.

Takeaway Group * PayforDRSService Crosstabulation

			PayforDRSService			
			No	Maybe	Yes	Total
Takeaway Group	Rarely	Count	20	5	11	36
		% within PayforDRSService	50.0%	55.6%	21.6%	36.0%
	Sometimes	Count	5	1	6	12
		% within PayforDRSService	12.5%	11.1%	11.8%	12.0%
	Often	Count	15	3	34	52
		% within PayforDRSService	37.5%	33.3%	66.7%	52.0%
Total		Count	40	9	51	100
		% within PayforDRSService	100.0%	100.0%	100.0%	100.0%

8.1.4.13 Environment impact concern amongst physical surveyed

EnvImpactConcern * ChooseMultiuse Crosstabulation

			ChooseMultiuse			
			No	Maybe	Yes	Total
EnvImpactConcern	0	Count	0	3	3	6
		% within ChooseMultiuse	0.0%	6.3%	6.3%	6.0%
	1	Count	3	22	5	30
		% within ChooseMultiuse	75.0%	45.8%	10.4%	30.0%
	2	Count	1	23	40	64
		% within ChooseMultiuse	25.0%	47.9%	83.3%	64.0%
Total		Count	4	48	48	100
		% within ChooseMultiuse	100.0%	100.0%	100.0%	100.0%

8.1.4.14 Willing to pay deposit for consumer willing to choose multiuse container (chooseMultiuse = Yes)

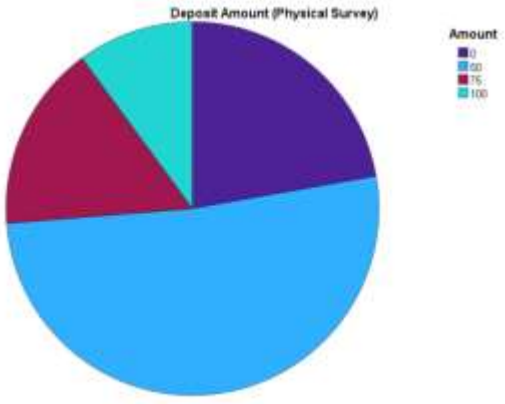
WillingToPay	Online (116/205)	Physical (48/100)	Total (164/305)
No	7.76% (9)	8.33% (4)	7.92% (13)
Maybe	42.24% (49)	27.08% (13)	37.8% (62)
Yes	50% (58)	64.58% (31)	54.27% (89)

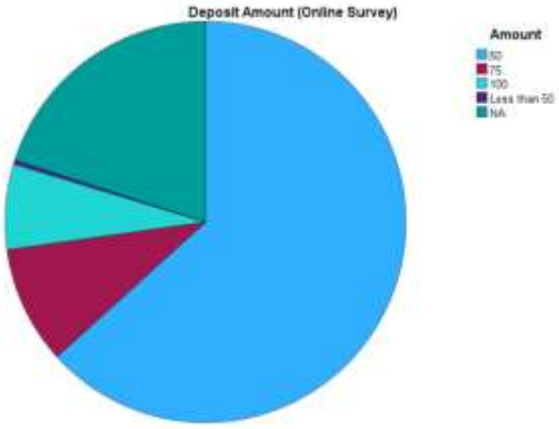
8.1.4.15 Willing to pay for DRS service (data only available for physical survey)

ChooseMultiuse * PayforDRSService Crosstabulation

			PayforDRSService			
			No	Maybe	Yes	Total
ChooseMultiuse	No	Count	3	1	0	4
		% within ChooseMultiuse	75.0%	25.0%	0.0%	100.0%
	Maybe	Count	24	5	19	48
		% within ChooseMultiuse	50.0%	10.4%	39.6%	100.0%
	Yes	Count	13	3	32	48
		% within ChooseMultiuse	27.1%	6.3%	66.7%	100.0%
Total		Count	40	9	51	100
		% within ChooseMultiuse	40.0%	9.0%	51.0%	100.0%

8.1.4.16 Deposit amount willing to pay





8.2 Appendix II - Interview Questions - Restaurant Owners

List of questions

1) Introduce interviewer (self and colleague) and explain why you are taking this interview
2) Ask interviewee to introduce him/her
    a. Name
    b. Restaurant and their role
    c. What they do

Questions

A) Current Business Practices

a. Please explain briefly about your business and what kind of food you serve here
b. Do you also have takeaway or online delivery through your own or delivery channels like foodora etc.
c. On an average how much delivery or takeaway orders do you get in a day
d. Packaging for delivery or takeaway used
    I. Type of packaging: Eg. Mugs, boxes, bowls, small bowls for sauces, cutleries etc.
    II. Material of packaging: plastic, paper, aluminum
    III. Do you use reusable packaging like reusable boxes that can be returned to you and you can then clean it and reuse it to serve another customer?
    IV. Do customers ever ask you for such packaging?
    V. Do customers ever come with their own boxes for takeaway? If yes, how many on an average in a day?
    VI. On an average how many packaging components are used per order – like single-use bowls, boxes, cutleries etc.
    VII. Is the cost of packaging included in the food prices or do you charge it separately?
    VIII. On an average how much does packaging costs per order or per month

B) Awareness about sustainability issues

a. How much do you know about the waste that is generated from single-use packaging?

b. Are you concerned about it?

c. Are you aware of environmental issues that result from single-use packaging?

i. If yes, have you taken any steps to prevent this?

d. Do you follow any practice of "No cutlery" with takeaway orders?

C) Rental takeaway boxes¨ Explain rental model for takeaway boxes

a. Are aware of any such model of rental take away boxes

b. If you were asked to use multi-use takeaway boxes, what would be your thoughts about it?

i. Storage space of such boxes

ii. Rent amount

iii. Cleaning, collection and delivery of empty to restaurant

iv. Tracking of boxes

v. Who bears cost of loss or damage to boxes

c. What challenges do you see when moving towards such a business model?

i. Infrastructure needed?

ii. Deposit and refund system

iii. Tracking

iv. Cost

d. Are you aware of the directives that is being implemented in Sweden for banning single-use takeaway packaging

e. What are your concerns related to such a directive? Hint:

i. Impact to business

ii. Staff training

iii. Time taken to fill the order

iv. Space to store such boxes

v. Any other

f. How willing are you to move towards such a practice

g. Do you have anything else to share with respect to this interview

8.3 Appendix III - Interview Questions - Participants of previous study

List of questions

1. **Please share:**
   a. Name, Organization and Designation
   b. Your work area

2. **To start with, could we have information about the whole project conducted previously for reducing litter due to takeaway food containers?**

(In 2018 - "New initiative to reduce takeaway litter"

In 2020 - "A return system for takeaway packaging is tested in Sweden")

Overview of Project

a. What was the aim of the project? For instance, takeaway waste reduction or finding out challenges to rental business models for takeaway, etc.

b. How long was the project executed for?

c. What companies were involved in the project?

d. What do you think the business model for rental takeaway boxes will look like? For instance, with additional services like cleaning, collection of boxes, deposit and refund, storage of boxes, tracking etc.

e. Did you choose one specific type of food boxes for renting or were there multiple products under study?

f. Did the study involved order for both online and at the store takeaway? If online order was also studied, then please give a brief about which online order platform was it, challenges faced and solutions to the whole flow.

g. Did you also study consumers' response towards such a change? If yes, what was the expectation and result?

h. Did you also study restaurants' response to such a change? If yes, what was the expectation and result?

i. Was there any increase in the cost of takeaway business – for instance cost of additional services and who pays for those services?

j. What challenges did you face during this study?

k. What results were expected and observed? For instance, damage to boxes, lost boxes, gaps identified in the whole business model etc.

l. Any additional learnings from this study?

3. Questions for future studies

a. Was this the only study conducted by you or are there more going on or planned in future? If yes, then what is different for the next study.

b. How long do you think it will take to implement this in the whole of Sweden?

c. What infrastructure will be needed to be in place in each municipality before implementing this? For instance, something like a deposit refund system of PET bottles at various grocery stores?

d. How can the collecting, cleaning, and returning process be managed? Will it be the restaurant's responsibility or any middle agency providing such services?

e. Who will bear the cost for loss/damage of boxes? Will that cost be included in the deposit charges?

f. How do you perceive the response would be from general consumers and restaurant owners when this process is implemented in whole of Sweden

g. Can restaurant owners opt for their own DRS (deposit refund system) and multi-use boxes, or will it be directed by the authorities which boxes to use etc.?

h. Can customers return the boxes to the restaurants, or they must return to the middle agency?

i. Will consumers be able to refund the boxes in another city when they travel?

j. What challenges do you think will be faced when implementing this in the whole country?

k. What do you think how much realistic this is in your opinion to implement such system from 2023?

l. What do you think how many years are we behind to implement this especially in case of logistics?

m. Anything else would you like to add in this?

8.4 Appendix IV - Survey Questionnaire

Title: Takeaway to Rent away (A feasibility check of moving from Single-use to multi-use takeaway food containers)

Brief Introduction:

We are students at Lund University, studying Master's Programme in Service Management. We are currently working on our master's thesis and conducting a research study on the rental business model for takeaway food containers.

Takeaway means food that you buy, get it packed and either get it delivered or bring yourself, to eat it at some place other the place of purchase.

Single-use food containers are used only once and then thrown away.

Multi-use food containers can be rented for multiple times. Customers are supposed to pay deposit for these containers and once they returned it, they get their deposit back.

Instruction: We are hoping you can help us by completing this brief questionnaire.

1. It is about 20 questions.
2. It should take you no more than 5-10 minutes.
3. Your responses are anonymous and will not be identified with you in any way. Your participation will be entirely voluntary.
4. You must be at least 15 years old to participate.
5. Please read all questions carefully before answering

Thank you, in advance, for your participation.

1) Name:
2) Gender:
    a. Male
    b. Female
3) Age:
    a. 15-25
    b. 26-35
    c. 36-45
    d. 46-55
    e. 55+
4) Education:
    a. School Student
    b. Bachelor's Student
    c. Master's Student
    d. Doctorate
    e. Other
5) Work status:
    a. Full time work
    b. Part time
    c. Student, without any paid work
    d. Pension
    e. Unemployed, looking for jobs
6) Country of Origin:
7) Gross monthly Income (SEK):
    a. 10000-20000
    b. 20000-30000
    c. 30000-40000
    d. 40000-50000
    e. 50000+
    f. Other
8) How often do you eat food from a restaurant?

a. Everyday
b. Every alternate day
c. Twice in a week
d. Once in a week
e. Once in two weeks
f. Rarely

9) On an average, how much do you spend (SEK) on a restaurant in a week?
a. Less than 200 SEK
b. 200-400 SEK
c. 400-600 SEK
d. 600-800 SEK
e. 800-1000 SEK
f. More than 1000 SEK

10) Do you prefer eating at restaurants or takeaway options?
a. Eating at Restaurant
b. Takeaway
c. Both

11) On an average, how often do you order/buy takeaway in a week?
a. Everyday
b. Every alternate day
c. Twice in a week
d. Once in a week
e. Once in a two week
f. Rarely
g. Never

12) Do you know about waste generated from single-use takeaway containers?
a. Yes
b. No
c. Somewhat

13) If yes, then are you concerned about waste generated from single-use takeaway containers?
a. Yes

b. No

c. Somewhat

14) Do you know about the environmental impact of single-use takeaway containers?

a. Yes

b. No

c. Somewhat

15) Are you concerned about the environmental impact of single-use takeaway containers?

a. Yes

b. No

c. Somewhat

16) Would you use multi-use containers instead of single-use for takeaway?

a. Yes

b. No

c. Maybe

17) If returning or collecting services are made for multi-use takeaway containers, will you prefer to use multi-use containers?

a. Yes

b. No

c. Maybe

18) Challenges you think with multi-use takeaway containers?

a. Lack of Hygiene

b. Lack of Cleanliness

c. Issue while returning of containers

d. Difficulties in carrying containers while traveling

e. Extra cost

19) Are you willing to pay a deposit for renting multi-use containers, which you will get back once you return the containers?

a. Yes

b. No

c. Depends on Price

20) For renting a multi-use container for takeaway, how much deposit are you willing to spend?

a. 50 SEK
b. 75 SEK
c. 100 SEK
d. NA