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**Sharing as an Antidote to Food Waste:
Understanding Food Rescuing Apps and Their Users**

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Abstract

The ever-increasing amount of wasted food has emerged as one of the most significant sustainability challenges of our time. The predominant explanation for the amount of food wasted is often attributed to consumers' behaviour and an unsustainable food supply chain. In recent times, the possibilities of technological advancements have become central to the food waste discussion. One solution would be food rescuing apps as an emerging digital food sharing platform model. Therefore, the practice of participating on food rescuing apps and the businesses' and customers' behaviours and practices as users of those apps are examined through a practice theoretical perspective. Through in-depth, semi-structured interviews with businesses and customers, the underlying patterns of the studied practice were identified based on a range of derived indicators in order to define the existing typologies for the users of these digital platforms. Contrary to the claims of previous studies, our findings show how not only financial aspects but especially environmental concerns have a significant impact on both sides' participation on food rescuing apps. Furthermore, a strong influence of spatial-temporal aspects on the practices is identified for both businesses and customers. The study contributes to a greater practice theoretical understanding of the app users, which as a result, helps the app providers to attain insights and potentially improve their services.

Introduction

Society as we know it is facing significant challenges. Perhaps the most concerning one of them all is how to approach the ever-growing population and increased consumption, which has been pinpointed as one of the most significant sustainability challenges in the present time (Ranganathan et al., 2018). One of the most pressing issues regarding population growth and the increased consumption that it brings along is concerning the production and consumption of food. Furthermore, approximately one-third of all the produced food is wasted during the course of the supply chain resulting in a negative impact among all the three pillars of sustainability (Stenmarck et al., 2016). Food waste issues are perceived to be so big that they are acknowledged in the 2030 sustainable development goals, where the ambition is to halve food waste during the upcoming decade (Aktas et al., 2018). It needs to be noticed that some food waste is unavoidable, such as the inedible parts of vegetables and fruits (Porat et al., 2018). But another type of food waste can be defined, which is unnecessarily contributing to today's global waste problem. It consists of food being disposed of even though it is still fit for consumption (FAO, 2014). While it is found that the majority of consumers are averse to wasting food, and few deliberately do so, consumers still keep adding to food waste (Rohm, 2017; Van Geffen et al., 2020). Previous studies have accordingly highlighted the challenge of altering consumer behaviour in relation to food and waste (Aschemann-Witzel et al., 2015; Farr-Wharton et al., 2014) and the need to attain a comprehensive understanding of the drivers and logic behind the current food waste generation and identifying the culprits within the supply chain (Priefer et al., 2016). Furthermore, Qi and Roe (2016) highlight the need to increase consumer awareness as the perceptions, opinions, and attitudes among consumers could in part explain the high levels of food waste.

Moreover, as the concerns for sustainability, food waste, and the role consumers play have increased over the years, so have the efforts to find a solution. Cohen and Munoz (2015) suggest that the sharing economy provides a solution to decrease food waste. Acquier and Carbone (2018) support this notion arguing that platforms utilising the sharing economy could prove integral in enabling a sustainability transition within the food industry. Research has especially looked toward new technologies to create the substantial changes needed to reduce food waste through the sharing economy. In their research, Michelini et al. (2018) focus on differentiating digital sharing platforms models, which are characterised by varying purposes and actors involved. Thus, the researchers show the versatility and potentially high impact food sharing models can have on society. Various researchers highlight the opportunities that apps constitute having a positive environmental impact, especially on reducing food waste (Ganglbauer et al., 2014; Mummah et al., 2017; Oroski, 2020; Makov et al., 2020; Filimonau and Coteau, 2019). Also, it is shown how apps provide diverse communication forms and can lead to a greater customer reach (van der Haar and Zeinstra, 2019).

In the last few years, several food sharing apps growing at a high rate have appeared worldwide. In Sweden, both Karma and Too Good To Go (TGTG) have recently launched. The Swedish food rescuing app Karma was founded in 2016 and allows businesses to sell food surplus to consumers at a lower price, often for 50% off. On the app, 9,200 businesses sell specific meals to 1.4 million app users in 225 cities. One can find the app in Sweden, the UK and France. According to their website, over four million meals have been saved and 1,200 tonnes of food rescued so far (Karma, 2021). TGTG is the largest anti-food waste app used by 36 million consumers and 85,000 businesses in 15 countries. So far, 68.8 million meals have

been saved since its launch in 2016. TGTG can be found in Sweden since Summer 2020. In contrast to Karma, businesses on TGTG offer so-called surprise bags that contain a number of unknown food items at a marginal cost (often a third of the regular price) (Too Good To Go, 2020).

Although plenty of scholars have recently turned their attention toward food waste and digital food-sharing platforms and acknowledged their importance, there are still areas that have received little to no attention and thus provide opportunities for further studies. As the sharing economy is continuously evolving and expanding, Geissinger et al. (2019) call for further studies of the concept and its possible impact on businesses. At the same time, Cane and Parra (2020) highlight the need to explore the consumer behaviour towards food waste with new technological innovations at the centre. In contrast, Mullick et al. (2020) have called upon further studies analysing the motivations of digital food sharing platform users and the performance implications participation on these platforms may have on the business.

Furthermore, Schanes et al. (2018) highlight the importance of research to extend beyond just investigating the attitudes toward food waste and instead approach it from a social practice ontology, which in turn should broaden the knowledge of daily routines and practices that are intrinsic to food waste. As elaborated by Fuentes et al. (2021), practices related to buying food are very complex. Understanding the practical, routinised and material aspects considered when purchasing food through a practice approach helps flesh out the factors that matter to the users. In this context, Brons and Oosterveer (2017) have studied sustainable food consumption and the access to it through a practice theoretical approach. In their study, several indicators explaining consumption behaviour are derived and used to distinguish between the existing types of consumers sharing similar characteristics. Through their defined typology, the complex practice of sustainable food consumption has been mapped while taking the influencing practice theoretical factors like one's social and economic environment and materials into account.

This study aims to look into the factors that impact the participation on food-sharing platforms among the various actors to attain a deeper understanding of the businesses and customers currently using digital food-sharing platforms. Consequently, the behaviours of businesses and customers actively participating on food rescuing apps to reduce food waste are examined from a practice theory perspective to answer the following research questions:

1. *Which factors have an impact on the practice of participating on food rescuing apps?*

2. *What types of business- and customer users can be distinguished on food rescuing apps?*

Attaining more knowledge regarding these practices can be beneficial as it may help the digital platform providers improve their platform and, in turn, allow for a greater reduction of food waste. In addition, by gaining a better understanding of the different types of users, the apps can target them more effectively, for example, through adapted advertisements. In addition, a contribution to structuring and understanding the differences in the exertion of a complex practice, such as participating on a food rescuing app, is made. Also, constructing business and customer types facilitates characterising the distinct drivers and barriers for their participation, which can prove helpful for future academic discussions of food rescuing apps'

impact on their users and how to increase its future potential for positive sustainable changes in society.

This study looks at the practices of Swedish businesses and customers on the digital food-sharing platforms Karma and TGTG. The participants were selected through a mix of convenience, purposive, and snowball sampling. The data was collected through interviews, which was then transcribed and later coded with the help of QDA miner lite to facilitate a good analysis and discussion. The study is structured in the following way: In the coming segment, a literature review introducing the concepts and previous studies on food waste and sharing economy will be presented. Afterwards, the study's theoretical framework is outlined, which is a practice theory approach in relation to food and food waste management. Thereafter, five indicators around the users' practice of using food rescuing apps are derived and explained. Consequently, the method of the study will be described starting with an explanation for the use of a qualitative method where the data was collected through semi-structured interviews with both businesses and customers. After that, the chosen method of sampling is described, as are the respondents. Consecutively, the interview process and the chosen method of analysis and coding are explained in order to give the reader a greater insight into the development of the interviews. An analysis of these derived findings concerning the adapted indicators and identified types of users is conducted afterwards. In the end, the concluding summary and discussion are followed by the contributions and limitations of the study, as well as some suggestions for further studies.

Literature Review

As the overarching concepts in the focus of the study are food waste and the sharing economy, those two concepts will be discussed in the following sections in more detail. In line with the thesis' research aim, avoidable food waste will be more precisely studied at the retail stage. Here, especially the consumers' and foodservice providers' role will be investigated, as previous researches' insights can be applied to study customers and businesses using food rescuing apps. Also, research's identified solutions to the food waste problem occurring downstream the supply chain will be investigated in more detail. In the second part, the sharing economy as one potential pathway for managing avoidable food waste will be discussed, focusing on food sharing and digital food sharing platforms as the latter would also incorporate the studied food rescuing apps.

Avoidable Food Waste in the Foodservice Industry

The foodservice industry, a subsector of the food and beverage industry, includes companies serving meals for out-of-home consumption. According to the Euromonitor International (2016), the following companies are considered to be part of the sector: full-service providers (e.g. restaurants offering full table service), cafés and bars, take-away and delivery (where customers cannot eat on site), fast food, self-service cafeterias (which can often be found in corporate or school environments), street stalls and kiosks, and event/offsite catering (Martin-Rios et al., 2018). As already mentioned above, in the remaining paper, instead of the term "foodservice providers", "businesses" is used for facilitation purposes and for not disrupting the reading flow.

Edible food waste makes up the largest amount of food waste and can be defined as "suboptimal foods", which are regarded as unappealing by consumers as it is either close to

the expiring date or is perceived as visually or sensory "unnormal" (Aschemann-Witzel et al., 2015). In this context, according to Porat et al. (2018) and Lipinski et al. (2013), the largest part of food waste is connected to consumers and other final users such as restaurants. Martin-Rios et al. (2018) provide a clear overview on the topic of food waste management in the foodservice industry through their conducted interviews. For all types of foodservice companies, the generated waste occurs in two areas, back-office and front-office. The former would include all waste produced in the kitchens, such as peelings and trimmings, food packaging and bones. For this type of waste, the foodservice company has full control over the amount of food waste generated (Martin-Rios et al., 2018). Therefore, the consumer's and foodservice industry's role within this phenomenon will be investigated in more detail in the following.

<u>Consumers' Role</u>

Consumer-related food waste encompasses food scraps, leftovers and suboptimal food. Food waste occurring at the consumer level has been studied extensively as it represents a significant part of the overall food waste problem. According to the FAO, the food waste occurring at the consumption stage amounts to 35% of the overall food wasted (Fusions, 2016). But consumers do not only negatively contribute to the food waste problem in their households and in-store purchase but also their perceptions and (buying) behaviours around food indirectly influence stakeholders' actions in each stage of the supply chain. For example, most grocery stores would only accept flawless products as they assume consumers would only buy such food (Aschemann-Witzel et al., 2015; Rohm et al., 2017).

Consumer food waste has been discussed in previous research, mainly through two different approaches. At first, a plethora of researchers have studied the topic with regard to consumer behaviour and environmental psychology, in particular, focusing on different factors (e.g. motivational and intra-personal ones) impacting behaviours. The theoretical framework applied when analysing food waste is to a large extent the theory of planned behaviour, through which the role of attitudes, intentions, norms or knowledge on shaping consumers' behaviour is studied. Also, it is shown that a positive attitude towards reducing waste does not necessarily lead to a corresponding behaviour. In response, the second identified approach for studying consumer food waste revolves around a social practice theoretical framework. Here, the authors study the consumer and the food waste problem embedded in wider aspects of everyday life, such as the social, economic and cultural environment influencing their behaviour. Thus, individuals are not regarded as the cause of the food waste problem, but rather the activities, actors involved, materials and spatial-temporal aspects are studied with regard to their impact on food waste generation (Schanes et al., 2018).

In order to support positive developments towards avoiding food waste, various researchers highlight the significant role of new alternative behaviours, new lifestyles and identities around sharing, growing own foods or even dumpster diving. In this context, "consumers might take pride in being a smart shopper or thrifty household manager, enjoy the creative process of tackling leftovers or develop their identity via the formation of social relations in grass-roots networks" (Aschemann-Witzel et al., 2015: 6469). According to a study by Yue et al. (2009), consumers are not willing to pay the same price for imperfect food, especially when it comes to organic foods. However, higher tolerance is found for consumers being more environmentally conscious. Also, with regard to the willingness to pay, research shows that

consumers are less willing to pay throughout the shelf life of perishable food (Tsiros and Heilman, 2005). Therefore, businesses aiming to sell "old" food have to set discounted prices irrespective through which channel the food is sold. However, additionally focusing on the good environmental cause behind not wasting such food could enable them to sell at a slightly higher price.

Businesses' Role

The Food Waste Reduction Alliance (FWRA) states that 37% of food waste occurs in retail stores and food services (FWRA, 2014). The origins of food waste at businesses have been studied in detail for all potential occurring stages, namely the preparation, serving and consumption (Dhir et al., 2020). For instance, interviewed experts mention that the main aspects leading to wasteful practices are the need for more efficient processes to increase sales while avoiding the disposal of costly food and the perceived risk of reputational damage (Aschemann-Witzel et al., 2015). Such findings align with Martin-Rios et al.'s (2018) research, whose interviewees indicated that costs are prioritised over other aspects, such as sustainability, when it comes to waste management. Filimonau et al. (2019) studied several UK coffee shop chains and their food waste approaches. Their conducted content analysis revealed the little attention that is given to the food waste problem and as a result, the lacking strategies to mitigate food waste. In addition, other common causes of food being wasted in restaurants and cafés are incorrect storage, residues occurring at the preparation stage when products are not handled correctly or too much food is prepared, serving too large portions, difficulties in predicting the number of guests, forgotten food, lacking awareness of how much is food is wasted and the resonating costs (economic and environmental), and serving too many options (Sakaguchi et al., 2018). Once committed, businesses have the opportunity to significantly influence the overall amount of food waste through changing their direct practices (e.g. their offered menu and dishes) while also indirectly impacting the customers' awareness and behaviour regarding food waste, also outside the foodservice industry context.

Solutions for Avoidable Food Waste

Various authors recommend avoiding food waste by preventively reusing the surplus food instead of finding solutions for one's wastage (Gentil and Poulsen, 2012; Quested et al., 2013). But before businesses can implement different strategies, they need to be aware of the food waste problem and their contribution to it. In their research, Sakaguchi et al. (2018) discuss the factors influencing restaurateurs' behaviours regarding food waste policies and incentives as it is shown that their behaviour has a significant impact on the amount of food being wasted. Potential factors resulting in a positive, less wasteful behaviour are tax benefits for restaurants donating surplus food, implementing detailed tracking systems to quantify the amount of waste or also collaborating and exchanging with others across the food supply chain (Sakaguchi et al., 2018). In this context, Filimonau et al. (2020a) have shown in their study that when businesses (in this case, restaurants) engage in food waste reduction, customer loyalty can be increased, especially for those having high environmental concern and thus, higher revenues can be generated.

Overall, the main strategy identified by several experts and summarised by Aschemann-Witzel et al. (2015) is not to focus on blaming the consumers for wasting food but rather to engage them in mitigating food waste and encourage them to buy suboptimal foods (Filimonau et al., 2020a). Also, Graham-Rowe et al.'s (2014) analysis showed that the accompanying negative

emotions, especially guilt, when wasting food should not be used to promote a behavioural change, because such an intervention technique could result in compensation behaviours like denial of the food waste issue itself or one's contribution to it. In addition, in their different tasting experiments, Rohm et al. (2017) identify as another crucial step towards reducing food waste to convince consumers that suboptimal foods are still tasty. Regarding potential communication channels directed towards influencing consumers' behaviour, overall researchers' findings indicate that financial concerns are the strongest motivation to reduce waste and have a higher impact than environmental concerns (Schanes et al., 2018; Graham-Rowe et al., 2014, Quested et al., 2013). Besides, marketing strategies should be adapted towards the different segments' motives by communicating cost savings or environmental/ethical reasons for saving food as it can more effectively influence the respective target group's purchasing behaviour (Blichfeldt et al., 2015; Quested et al., 2013).

Previous research has highlighted several straightforward interventions through which the foodservice industry may reduce food waste. For instance, hotels and restaurants are advised to reuse suboptimal produce by cooking, freezing or providing it to secondary retail (e.g. food banks). Besides, Sakaguchi et al. (2018) mention as potential hurdles managerial values or corporate values, which can restrict the usage of surplus food. For example, strict safety and health regulations can prevent managers from donating food. In contrast, managers' strong moral norms can support such practices (Heikkilä et al., 2016; Filimonau et al., 2019). Therefore, as nowadays an increasing number of businesses, irrespective of their size or operating sector, are implementing some CSR policies and sustainability becomes an (important) part of their corporate values, more waste management practices can be expected to be implemented in the future. But not only specific actions, also just communicating one's intention of reducing food waste can lead guests to do so (Whitehair et al., 2013). Thus, communicating their sustainable practices and related corporate values should be vital for every business' operations.

Food Sharing

One possible approach for reducing food waste that businesses could implement would be through sharing their surplus food. It is perceived that food sharing, especially in developed countries, can play an integral role in saving edible food that is otherwise discarded by actors in the food supply chains (Kolk and Ciulli, 2020; Rombach and Bitsch 2015). Being a specific form of collaboration, food sharing centrally influences human life, social organisation and psychological aspects of cooperation (Davies et al., 2017). Nowadays, a rising number of food sharing initiatives managing surplus food from customers and businesses and supporting collaborative consumption models can be witnessed. In addition, the practice of food sharing is starting to go beyond the simple exchange of surplus food as especially start-ups emerge around the goal to cook and eat together, which results in another body of literature investigating the underlying social perspective of food sharing (e.g. the relationships built in such contexts) (Falcone and Imbert, 2017). In recent times, a growing number of scholars like Kolk and Ciulli (2020), Davies and Legg (2018) and Michelini et al. (2018) have started to look into the possibilities of the sharing economy and in particular, food sharing.

Concerning the users' motives for participating in food sharing, the main one identified is to save money, despite the increasing public environmental awareness, which is supported by various studies. However, customers are shown not to acknowledge their economic motivation

as they feel ashamed (Falcone and Imbert, 2017; Barnes and Mattson, 2016). In addition, Ganglbauer et al.'s (2014) research on the online interaction of "Food Sharing" members identified social, ecological and economic reasons as the main motives for becoming active on the platform. Social and ecological motivations mainly refer to taking responsibility and contributing through, e.g. supporting people in need and reducing the amount of food wasted. Also in their study, only a few admitted to participating due to economic reasons (Ganglbauer et al., 2014).

Despite food sharing's growing relevance and accompanying received attention, the literature has identified some weaknesses. First of all, critique revolves around the socio-cultural context of food sharing, and more specifically, the missing relationships and trust. There exists a safety issue when customers do not know how the food was stored, which is in line with the overall perceived lower quality and safety of "wasted food" (Farr-Wharton et al., 2014; Lazell, 2016). Makov et al. (2020) mention as a further weakness the potential insufficient interest in food sharing practices of businesses and customers. A reason would be the low economic value of food waste, which implies high transaction costs for the businesses as time and effort needed to redistribute the surplus food are often considered not worth the received benefits. But also, from the consumer perspective, the demand can be potentially too low due to supply constraints (regarding the volume and variety of food), which can lead to unsatisfied consumers' wants (Makov et al., 2020). Therefore, the purpose and process of sharing need to be discussed and communicated properly to mitigate such potential weaknesses.

Digital Food Sharing Platforms and Food Rescuing Apps

One way to mitigate such potential weaknesses is with the help of digital food sharing platforms. Historically, according to Davies et al. (2017), food sharing has been restricted by kinship, but the recent and rapid technological advancements in combination with the ever-growing acceptance of digital solutions have created even greater possibilities for food sharing (Ciulli et al., 2019). The recent digital revolution that has swept through developed countries has also caused an increase of new business models within the food industry (Michelini et al., 2018). Among these business models, "food sharing platform business models" have emerged, which combine food sharing with technological advancements by facilitating a digital link between suppliers and consumers and allowing for the transaction of edible food waste (Michelini et al., 2018; Ciulli et al., 2019). For instance, food donations and end-of-day sales can be ways how technology can help to deal with leftovers. Through online communication platforms, perceptions around donations are also improved and a new customer base can be established by promoting a positive image (Aschemann-Witzel et al., 2017; Martin-Rios et al., 2021).

Although rather limited, the body of research dedicated to food sharing platforms/apps has grown rapidly. Research on these digital food sharing platforms has in recent times looked into its possibility of reducing food waste among supermarkets, restaurants and other food services. Oroski's (2020) and Mummah et al.'s (2017) findings highlight how apps seem to constitute the best avenue for these food sharing platforms as they are both low in cost and highly scalable and effective. These notions are further supported by van der Haar and Zeinstra (2019), who argue for apps as they provide more communication forms and a greater reach as the customers can access the platforms at relevant times. Also, in this context, a growing part of the population, especially increasingly older people, are using smartphones and

downloading apps, which shows the potential food rescuing apps can have. Furthermore, Ganglbauer et al.'s (2014) findings highlight the ability of online platforms to facilitate food sharing among different communities and thus, connect strangers with different social backgrounds and locations, who would potentially not get in contact with each other offline.

One of the most recent studies on digital food platforms by Fuentes et al. (2021) specifically focuses on the app Karma and its potential impact on sustainable food consumption. Through a field experiment, their research shows and explains how the app fails to influence consumers' food practices and become part of their daily lives. The identified reasons are several app glitches and practice conflicts. More precisely, it is shown that technical, organisational and communicative glitches occur. Examples mentioned are the malfunctioning localisation, the limited number of participating food venues (outside of large cities) and the lacking communication of the app's functioning and its meaningful, sustainable purpose. In addition, regarding the identified practice conflicts, the practice mismatches discussed are the app availability in only large cities and its usage for only certain eating occasions, e.g. to buy lunch. Regarding the practice competitions as the second type of practice conflicts, the researchers show how Karma has to compete against respondents' perceived important food criteria such as variety or freshness of food or other established food provision modes (Fuentes et al., 2021).

Theoretical Framework

The importance of practices when it comes to food consumption becomes evident in studies by Fuentes et al. (2021) and Schanes et al. (2018). For example, Schanes et al. (2018) highlight how studying food waste management practices and the linked social and material contexts through a practice theoretical lens is beneficial for studying new sustainable consumption practices such as food rescuing. The reasons mentioned are that foo waste management is intertwined with several practices and is rather complex and thus, a broad perspective can be offered. In addition, as also stated by Fuentes et al. (2021), smartphone applications promoting a novel practice of food consumption can be best explored through a practice theoretical approach as the involved materials, meanings and competencies are explored. According to Evans (2014), a practice approach contributes to a holistic analysis of broad social and economic processes such as everyday practices. Thus, a practice approach is utilised in this study to explain the food rescuing apps' users' practices and behaviours towards reducing food waste.

In addition, in order to be able to structure and understand the complex practice of participating on a food rescuing app, the research framework by Brons and Oosterveer (2017) will be applied. Therefore, their used indicators explaining sustainable food consumption behaviour are modified and extended. Similar to their study, different types of users sharing similar characteristics are aimed to be identified. By also defining such a typology, the variations in the exertion of the complex practice can be mapped while taking the influencing practice theoretical factors like one's social and economic environment and materials into account. Distinguishing between the different types based on the defined indicators can also help the app providers to understand why and how businesses and customers are using their services, which can prove helpful to reach more potential users and satisfy the existing ones.

Practice Theoretical Approach to Food Waste Management

First of all, Reckwitz (2002: 250) defines practices as "[...] a routinised way in which bodies are moved, objects are handled, subjects are treated, things are described and the world is understood". Much attention has been given to eating as a practice, which involves mundane and socially symbolic aspects (Warde, 2014). Warde (2013) conceptualises this practice as a compound one consisting of several integrative practices, each having its own set of rules and procedures. Those practices can be the food supply, cooking, organisation of meal occasions (formalised through manners), and judgements of taste, which all configure cultural understandings (Warde, 2013).

Concerning food waste reduction, a social practice approach is shown to benefit the discussion as the research moves beyond individual psychological factors and offers a broad perspective. Thus, research on the food waste problem does not regard individuals as the cause of the problem because their behaviour is influenced by diverse factors beyond the individual's control (Evans, 2012a, b; Southerton and Yates, 2015). Therefore, instead of a linear causal relationship between attitudes and actions, a dynamic and co-created relationship between values, attitudes and practices is supported. One of the most cited researchers studying consumers' food waste and the accompanying transformation from household's food leftovers to excess is David Evans. Moving beyond the thesis of a throwaway society, a specific focus in his studies lies on consumers' perceptions of food safety and the practices of buying too much food (Evans, 2012a, b, 2014; Evans, 2012a, b).

As stated by Lazell (2016) and Davies et al. (2017), a practice theories approach has been mainly applied to food practices occurring in the household context (e.g. Evans, 2012a, b; Evans et al., 2017; Schanes et al., 2018). Moreover, not only research applying practice theories outside this space but also examining food waste prevention mechanisms instead of reduction-focused solutions is missing (Lazell, 2016). However, Fuentes et al. (2021) recently conducted a study applying a practice theory approach to food shopping on new digital platforms and showed how Karma failed to reconfigure consumers' food practices. Also, Davies et al. (2017) contribute to closing this gap by analysing food sharing through a practice theoretical lens. Food sharing can take place in various forms and involves other actors. The underlying relations with human and non-human entities and resources are reshaped (Davies et al., 2017). Schanes and Stagl (2018) highlight how people are motivated to engage in food sharing practices based on five factors: emotions and morality, identity and sense of community, reward, social influence, and instrumentality. As such, Schanes and Stagl (2018) show how the practice of food sharing is rather complex and dependent on a wide variety of aspects. Furthermore, both positive and negative emotions play an essential role in actively motivating people to engage in food sharing practices. Identification with the cause and a feeling of belonging as well as participation from people close to oneself is also deemed to increase the desire that people have when it comes to engaging in food sharing practices.

Derivation of the Food Rescuing Indicators

After having outlined the applied practice theoretical approach on food consumption and food sharing, the research by Brons and Oosterveer (2017) and their derived indicators for sustainable food consumption are presented and adapted in the following. Through their research, a typology for the to be identified types of businesses and customers in this study being active on apps like Karma and TGTG can be derived. In their study, Brons and

Oosterveer (2017) explore sustainable food consumption and access to it through a practice theoretical approach. Their framework consisted of four indicators: *mode of recruitment, mode of engagement, degree of commitment* and *bundle of practice*. *Mode of recruitment* concerns how practitioners get enrolled into a certain practice and is a practical indicator for highlighting the relevance of considering social trajectories. *Mode of engagement* refers to how practitioners are engaging in various practices, which helps researchers identify how the practitioners themselves view and make sense of the practices and their parts within them. Instead, the *degree of commitment* involves the degree of importance and value that a practitioner places upon various practices. This indicator provides valuable insights regarding the practitioner's commitment and how impactful obstacles in accessibility may prove to be. The last indicator *bundle of practices* explains the importance of sustainability and its resulting place in one's lifestyle in the context of other linked practices around sustainability.

Based on the identified indicators, the researchers conducted observations and interviews with students in Paris in order to define a typology for the consumers. The three distinct types identified by them are the *food-, balancing-* and *comprehensive environmentalist*. The *food environmentalists* mainly buy sustainable food in supermarkets. Their mode of recruitment is a logical extension of previous existing concerns when growing up. They are concerned with environmental, health, quality and ethical issues, but only with regard to consuming food. Also, sustainable food choices are challenged by their budget and mood. In addition, they know their limits, which means their shopping routines are not rearranged. Additional sustainable practices incorporated by them are limited but include recycling or buying second-hand goods. The *balancing environmentalists'* recruitment is characterised as a modification meaning that their social environment influences them. Similar concerns as for the first type are identified, but in addition, social inequality in food and other areas matters to them, as well. Furthermore, they question their limits as they are aware that they could be more environmentally friendly. Other implemented practices mentioned by them are recycling, transportation, saving energy and activism. The *comprehensive environmentalists* buy almost only organic food from organic stores. Their mode of recruitment is a transformation as they are not sensitised by their parents, but disruptive factors like an exchange or enrolments in an association changed their food consumption towards more sustainable practices. Sustainable food consumption mainly refers to environmental concerns in food and other domains and has not to compete against health or quality criteria. They push their limits as food routines are changed (e.g. becoming vegan) and they wish to expand their environmental concerns. The mentioned additional practices are the same as for the second type. Through this derived typology, the authors are able to map the practice of sustainable food consumption while also explicitly highlighting and explaining the existing differences within their sample. Their results show how not only financial means and one's personal attitude but a plethora of complex social practices influence access to sustainable food (Brons and Oosterveer, 2017).

Derived from Brons' and Oosterveer's (2017) research, their four indicators are modified and used as a part of the analysis in this study. The first derived indicator remains the *mode of recruitment*, which allows insight into the reasons for initially downloading apps aimed at food rescuing for both customers and businesses. Furthermore, this indicator helps explore to what extent both sides are concerned with sustainability and food waste as it allows for an insight into the practice trajectories of businesses and consumers on the platforms and how they found their way onto these platforms.

As an addition to Brons' and Oosterveer's framework, the indicator *motivations* is created, which is closely linked to the previous mode of recruitment. It draws upon the studies conducted by Schanes et al. (2018) and Secondi et al. (2019), indicating previous research's identified plethora of motivations underlying the mitigation of food waste. It is highlighted how the majority of consumers are concerned about throwing food away, which is shown to be a significant predictor of reducing food waste and plays an important part in one's reasons and intentions to reduce waste (Schanes et al., 2018). The *motivations* indicator explores how both customers and businesses are motivated to engage on multi-sided digital platforms aimed towards sustainability and rescue food and how those motivations might have changed over time.

The third indicator *mode of engagement* is directly derived from Brons' and Oosterveer (2017) and refers to how often and in which situations the app is used and to what extent it is part of their daily lives. Also, the potential drivers as to why people choose to participate on the app as well as the barriers that may keep both customers and businesses away from participating can be identified.

The fourth indicator, *commitment to food surplus*, is inspired by Brons' and Oosterveer's indicator degree of commitment but includes additional aspects. It is necessary for both customers and businesses to capture the importance and role of wasting less food through managing food surplus. Thus, both side's awareness, attitude and behaviour towards wasting less food can be understood. Therefore, further support and insight into the users' motivations to participate on the apps are given, while particularly focusing on the relative importance of wasting less food as a reason in this context. Also, the attached value to food waste is shown.

Closely connected to the previous indicator, the last indicator chosen for the theoretical framework is *linked practices*, which is based on the initial indicator bundle of practices. Through this indicator, the place that all practices around food surplus management occupy in the life of the practitioners can be identified. By capturing the businesses' and customers' other practices of wasting less food, conclusions regarding the practitioners' commitment to food surplus can be drawn and their mode of engagement with the app potentially further explained, which facilitates identifying differing patterns among the users.

Methodology

This study intends to investigate the practices that occur on various food sharing platforms to distinguish the types of users (businesses and customers) on these platforms. As such, this study aims to attain a deeper understanding of the phenomenon that is food rescuing apps (Jacobsen, 2017; Bryman and Bell, 2013).

A qualitative method fits the conducted study as it allows for the investigation of practices and aids the researchers to attain a deeper understanding of the studied phenomena as it facilitates the investigation and detailing of human behaviour at a depth, which other methods fail to reach (Eriksson and Kovalainen, 2008). It should be mentioned that the study would have benefited from an ethnographic angle, where the businesses and customers are shadowed when using the app while also walking along and viewing their use of the app and the practices involved. However, such an approach was ruled out due to the current situation and development of the Covid-19 pandemic, as it would be too much of a risk to both the researchers and the customers themselves. Such a method could thus be in breach of the

research ethics as it exposes those participating in the study of potential harm (Eriksson and Kovalainen, 2008). To achieve a trustworthy study, conscious steps have been taken throughout the research process relating to dependability, transferability, credibility, and conformability (Eriksson and Kovalainen, 2008). In particular, an effort is made to be as transparent as possible in order to ensure that the reader can follow the process of the conducted research. Additionally, the study relates to previous studies made by Brons and Oosterveer (2017), which highlights the transferability of the study. While more interviews are generally a possibility to further verify the credibility of the study's conclusion, the collected data can be regarded as sufficient for ensuring that the study's claims are credible as the point of saturation has been reached. Furthermore, the presented findings are made transparent by sharing and explaining the thought process behind the analysis and included interpretations to achieve conformability (Eriksson and Kovalainen, 2008).

Sampling

The study draws upon 31 semi-structured interviews conducted one on one through video calls or in-person (with sufficient safety distance). All the interviews were conducted during March and April of 2021. This method of collecting data was used to allow for more flexible interviews and facilitate opportunities to probe interesting topics that arise during the interview, which helps attain a deeper understanding of relevant topics (Jacobsen, 2017). Karma and TGTG are the selected services for this study as these are the two most prevalent food rescuing services currently operating in Sweden and thus provide the most suitable avenue for researching the topic. As of now, Karma has around 1,400,000 users, whereas TGTG currently has approximately 36,800,000 users (Karma, 2021; Too Good To Go, 2020). The selection of the businesses and customers was based on a few criteria in order to acquire a representative sample that would work for the study. First, the respondents were selected based on if they had used either Karma or TGTG. Other criteria that only apply to the customers are to acquire respondents from as broad of an age group as possible and ensure a gender balance. When sampling, it was also ensured that a variety of different businesses are represented in the study (e.g. chains and small businesses).

The general sampling method used to find interview partners was a mix of convenience, purposive and snowball sampling. The businesses participating in the study, summarised in table one, were acquired by directly contacting various businesses in Gothenburg to see whether they were willing to participate in the study. The contacts were made by either mail, phone calls, or on-site visits. The customers were, however, acquired differently and are further described in table two. To get a hold of the customers, posts were made on various Facebook groups, like "Dumpstra/Minska Matsvinn Göteborg". After acquiring an initial couple of respondents, the selection of additional customers was based on the recommendation of the previous interviewees. These sampling methods are beneficial as they provide an efficient way to access research participants who fit the study (Eriksson and Kovalainen, 2008).

The interviews were conducted with 16 businesses and 15 customers. As shown in table one, of the 16 businesses interviewed, six belong to a national or Gothenburg-based chain, eight are independent restaurants or cafés and two are part of an organisation or the municipality. As shown in table two, among the 15 interviewed customers, eight identified as female, whereas seven identified as male. All of the selected respondents are either current users of Karma or TGTG or have previously been users of the service. At first, eight of the interviewed

businesses only use Karma, five are using only TGTG and three are using both apps. In contrast, some of those using only one app have used the other one in the past or have at least considered switching or adding the other one. Also, some have been contacted by the other app but did not consider using it as they are satisfied with the current one in use. Thus, only a few are unaware of other similar apps. Regarding the customers, Karma is used by eight interviewees, six are using TGTG, whereas only one respondent is using both Karma and TGTG.

Table 1 Business Sample Description.

	Business Type	Guest Numbers per Day	Estimated Food Waste per Week
Godisbanken	candy store chain	20-50, 100 weekend	3-6 kg candy
Happy M Kitchen	independent whole-food lunch restaurant and deli	100	barely, only juices and chia puddings
Victoria Café	independent café	40 (before pandemic 80)	a couple of salads, sandwiches, etc.
AweSum Cakes	independent café focusing on cake orders	15-20 large orders, few drop-ins	20-25 cupcakes, some cake trimmings
Tårtverket	independent café focusing on cakes and cupcakes (orders)	15-20	some cupcakes and brownies
Subway	international fast-food chain	150-200	few breads and cookies
Café au Thé	independent café with social focus	60	2-3 salads, some soups sometimes
Kathmandu	independent Nepalese restaurant	lunch 60, dinner 20	a couple of lunch portions
Fröken Olsson's	café, part of the Condeco chain	200	6-7 sandwiches per day
South Indian	independent Indian restaurant	80	a couple of lunch portions
Holy Greens	lunch place part of a National chain	100-200	almost zero
Nordish Market	pre-ordered organic lunch boxes	50 (before pandemic 200-250)	almost zero
Espresso House	International café chain	150-200	some sandwiches and buns
TomToms Burritos	independent Mexican street food restaurant	100 (before pandemic 150)	0-20 portions (before zero)
Café Anonymous	National café chain	100-150	almost zero
Glashuset	independent café and lunch place with social focus	20 (before pandemic 100-150)	almost zero

	Gender	Age	Monthly Use
Agnes	Female	56 Years	0-1 times
Charlotte	Female	58 Years	1-2 times
Cameron	Male	63 Years	2-3 times
Elias	Male	23 Years	4 times
Ellie	Female	22 Years	4-8 times
Ethan	Male	25 Years	1-2 times
Jacob	Male	30 Years	8-16 times
Eva	Female	34 Years	5-6 times
Gustav	Male	40 Years	4 times
Lena	Female	38 Years	8-12 times
Lovisa	Female	43 Years	4 times
Sofia	Female	23 Years	2-4 times
Caroline	Female	63 Years	1-2 times
Charles	Male	24 Years	0-1 times
Martin	Male	24 Years	1-2 times

Interview Process

The interviews were structured based on the theoretical framework and its five indicators, as this is the foundation of the study and the primary source for analysis. As both businesses and customers were interviewed, separate interview guides were created in order to suit the intended respondent. Efforts were also made to ensure a good balance between simple and complex questions so that the respondents would be able to answer the questions in a good manner (Eriksson and Kovalainen, 2008). The interviews started with queries relating to the five developed indicators; mode of recruitment, motivations, mode of engagement, commitment to food surplus and linked practices. These questions were formulated openly so that specific follow-up questions could be asked based on the answers probing deeper into their experiences and practices. In addition, each interview included questions regarding potential barriers to engaging with food-sharing platforms, followed by a quick wrap up of the interview. Each interview ended with certain background questions. For the customers, the questions related to their demographic characteristics such as age, profession, and education. The questions for the businesses concerned, among other things, the number of guests and details on the offered food and menu. The interviews varied in length, but each one ended up being between 20 and 35 minutes long. The interviews with the businesses were conducted in English, while the interviews with the customers were held in Swedish, which was the preferred language of the respondents.

Before the interviews started, the respondents were informed of the aim of the study and that their participation in the study was completely voluntary and that they were free to withdraw their participation without giving any reasons at any time during the interview, which is in line

with good research ethics (Bryman and Bell, 2013; Eriksson and Kovalainen, 2008). Furthermore, the respondents were informed that they would remain completely anonymous if they wished, which one of the businesses made use of. They were also informed that the interview would be recorded and transcribed in order to reduce possible misinterpretations and allow for a more precise and correct analysis. While it is customary to anonymise everyone in case one or more participants want to remain anonymous, it was chosen to forgo that as naming the remaining businesses is perceived to significantly contribute to the study. It allows the reader to connect with the businesses and understand how certain business characteristics like its size might impact the findings (Jacobsen, 2017; Eriksson and Kovalainen, 2008).

Method of Analysis

As a part of the chosen method of analysis, the interviews were transcribed as it allows for an overview of all the collected material, which facilitates distinguishing the important parts of the collected material (Eriksson and Kovalainen, 2008). To improve the integrity of the coding and ensure completeness, the coding was conducted in several rounds. Each time, the material was coded similarly and only new identified codes were added in an additional round. In order to facilitate the analysis, the collected material is coded through the coding software QDA miner lite. The collected material was categorised based on the five indicators of the theoretical framework. These five indicators were subsequently coded into various subcategories, which includes, among other things, the app perceptions and degree of engagement. The retrieved information for each indicator is then used to identify the typologies consisting of the different types of business- and customer users so that the identified variations within the sample and potential patterns can be explained.

Findings and Discussion

Based on the conducted interviews with businesses and customers using TGTG and/or Karma, the retrieved findings are presented and discussed in the following. In the first part, the five defined indicators are applied to the received information and linked to previous research. Thus, the practice theoretical factors having an impact on the participation on food rescuing apps can be identified and structured. In the second part, the indicator adaptations are applied to develop the typologies consisting of the different types of business- and customer users so that the identified variations within the sample and potential patterns can be explained. Also, defining such typologies are required in order to understand the interactions between the users' lifestyles, materials, social environments and spatial-temporal contexts as the participation on food rescuing apps is not a straightforward outcome, but the users' previous individual routines and habits are challenged.

Indicator Adaptations

In the following first section, the answers given by the businesses and customers in the interviews are presented and discussed based on the five indicators *mode of recruitment, motivations, mode of engagement, commitment to food surplus* and *linked practices*.

Mode of Recruitment

Regarding the first indicator *mode of recruitment*, which explains the reasons why both sides initially started using the app, the most often mentioned reason by the businesses is that they got contacted by the app. This applies in particular to those using TGTG as the app heavily uses ambassadors to promote their services, especially when the app launched in Sweden in 2020. A reason would be that such apps rely on a large number of businesses participating in order to provide a variety of food to the customers, which is crucial for ensuring that the customers stick with them. Next, especially those places that belong to a chain reported that it was a chain decision and thus, some of the interviewees did not know the exact reason they decided to start selling on the app. However, some of those general chain decisions to use the app were also because of being initially contacted by the app. Other mentioned reasons are that they got to know the app through their employees, they used it privately first and they heard of the app through their network of other restaurateurs. Therefore, overall, a majority of the businesses were passive when starting to use such apps and only a few actively reached out to the app providers to become part of them. In this context, especially the by Schanes et al. (2018) acknowledged spatial-temporal aspect influencing practices can be found to impact businesses' practice of initially starting using the apps. In particular, TGTG launching and then recruiting new businesses in Autumn 2020 influenced the practice to a large extent.

As far as the customers are concerned, most were recruited through their networks and people in their lives, e.g. as personal recommendations. A fair number of customers also claim that they were recruited based on the possibility to do something for the environment, while a couple mention the desire to save money as the reason for their recruitment. Therefore, the apps' customer-focused advertisements can be regarded as less successful as the promoted environmental benefit in combination with the economic one (even though the latter is promoted to a lesser extent) is only reflected by a few respondents while no one specifically mentioned the apps' used advertisements. As Schanes et al. also highlight how each practice is embedded in a wider environmental context, with regard to both sides' decision to use the app, the social environment is shown to have a significant influence. For both, actors like heads of the business, employees, app's ambassadors, friends and other networks play a crucial role in each's recruitment (Schanes et al., 2018).

Motivations

For the businesses, the most often mentioned *motivation* for using the app(s) is to avoid food waste, which is also the main aspect advertised by Karma and TGTG. Twelve businesses also highlight offering cheap food as at least an aspect for using the app as it is, among other things, a possibility for extending their customer base and allowing people, who do not have a lot of money to buy their offered food. This would be in line with research by Martin-Rios et al. (2021), who acknowledge that through online communication platforms, a new customer base can be developed. However, the authors refer to a positive image promotion as the main cause, which is only sparsely communicated by the interviewees in this context. Advertisement is another

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reason, especially for the independent and small restaurants and cafés that require various marketing channels to increase public awareness. Related to avoiding food waste, sustainability is mentioned as another reason by half of the businesses. The sustainability aspects highlighted differ and range from environmental ones, social ones to including all three pillars of sustainability. Thus, some businesses' motivations go beyond merely wasting less food as they acknowledge their responsibility to be more sustainable in other areas, as well. Having the benefit of cross-selling is mentioned equally often. Cross-selling refers to customers buying from them and other businesses on the app at the same time or buying from the business not only on the app but in addition as a regular customer. Seven places mention not to lose money as another reason. Here, it needs to be highlighted that the focus is on covering costs and not on generating additional revenue. In this context, Subway explains: *"I mean it's better to have no waste than selling on TGTG. We pay for this waste"*. This would be in line with the apps' communicated purpose of avoiding waste and its costs, and not using it as an additional revenue stream. The last motivation mentioned by a few businesses is to improve one's reputation, which reflects that businesses acknowledge the high importance placed by customers on businesses caring about their sustainable impact. Besides, the main perceived motivation for the customer side communicated by the businesses is saving money while getting cheap, high-quality food. Also, saving food and doing something good for the environment is given as another benefit. Four businesses link this motivation to customers also feeling more important and meaningful and using such apps as a moral pat on the back.

As far as the customers are concerned, their answers mirror the businesses quite well, with most customers claiming to be motivated by the sustainability aspect of the apps with responses similar to Charlotte's: *"I was curious to see how it works and I liked the idea of possibly being able to rescue food"*, being common. The by Schanes et al. (2018) described embeddedness of practices in the social, economic and cultural environment is mirrored in the mentioned motivations, as well. The overall Swedish population is increasingly focused on sustainability, also with regard to their food consumption, which contributes to them using food rescuing apps. In addition, almost as many are said to be motivated by the chance to buy cheap food due to various circumstances. For example, Elias states: *"I wanted to save money on lunch. It was a cheap, smooth and easy option to get some food with a student budget"*. As such, Karma and TGTG both seem to successfully attract customers with their communicated emphasis on affordable and sustainable food. However, those reported motivations for using food rescuing apps stand in contrast to other researchers' findings indicating that financial concerns are the strongest motivation to reduce waste and have a higher impact than environmental concerns (Schanes et al., 2018; Graham-Rowe et al., 2014, Quested et al., 2013). Next, a third of the customers also mention the desire to avoid food waste, e.g. because of their upbringing to sustainability concerns. In this regard, Gustav highlights one's responsibility to fight the current climate crisis: *"I wanted to rescue food as an additional way of helping to offset the negatives that comes with the current state of the current restaurant business"*. Other sparsely mentioned motivations are the influence of friends and the good reputation of the service.

Summarising, for both sides, ecological and economic motivations surpass social ones. This would stand in contrast to Ganglbauer et al.'s (2014) studied food sharing motives, where especially social and ecological ones are mainly communicated and economic ones are barely admitted by the interviewees. In addition, Schanes' and Stagl's (2018) five identified motivations for participating in food sharing practices can be found for the interviewees only to

some extent. Out of the researchers' identified factors, especially reward, social influence (in the recruitment context), identity and morality (linked to sustainability and environmental aspects) are reflected as motivations in the interviews. A sense of community, for instance, is not a relevant reason for both sides. Only a few businesses mention it as a minor aspect when starting using the app. A reason for this would be the little focus that is placed on the community aspect by the apps as no events, forums or similar social media group engagements can be found. For example, in the "Karmunity", which is a part of the Karma app, almost no interactions in the chat rooms could be found.

Mode of Engagement

As a part of their *mode of engagement* indicating the role the respective app plays in the daily life of the interviewees, the businesses' perceptions of the used apps are positive. The main aspects highlighted are user-friendliness, the app's good business model, support, and efficiency. A few also particularly highlight the good cause behind the apps and the aligning philosophies with their own. Regarding the frequency of selling, one can witness an overall high engagement as seven businesses sell daily, six a few times per week, one sells once a week and two sell only a few times a month. Those two rarely using the app reported as main reasons to have no waste or to have found other solutions for managing their food waste. So for them, Karma and TGTG, *"[they're] another tool in the toolbox to get food into your belly"* (Holy Greens). Such other solutions can be the company's personal apps providing click-and-collect, which highlights how material factors (in this context other apps) impact the studied practice, which has been already indicated by Schanes et al. (2018) when discussing a practice theoretical approach. Such a barrier is also in line with Fuentes et al.'s (2021) identified reason for Karma's failure as the app is not able to disrupt the already established practices and cannot compete against them. Other mentioned barriers for not using or considering other food rescuing apps are being too busy, the app's not fitting model to their own business and the lacking support and communication (e.g. as they are too intrusive). Regarding the latter, it needs to be acknowledged that the communication and service highly depend on the individual ambassador and general assumptions about each app's service cannot be made. Fuentes et al. (2021) have identified such communicative glitches as one reason for the reported failure of Karma. Other aspects regarding the mode of engagement worth mentioning are overall, the same number of businesses show a high and respectively a low engagement with the app. A high engagement is characterised by putting thoughts into the app usage and going beyond the routine of uploading one's food. For example, Café au Thé reports ensuring to take appealing pictures of their surplus food for the app. Also, some of them communicate a desire to use the app more in the future. Linked to a low engagement, eight places mention not proactively promoting selling on the app or not proactively engaging in conversations about the app. Irrespective of their degree of engagement, it can be witnessed that the majority has not looked into the app's social media or website. Besides, most of the interviewed businesses are early adopters, meaning they started using the app soon after its launch or soon after opening their business, which can be closely linked to the apps' high usage of ambassadors reaching out to businesses. Lastly, potential barriers for why not more businesses are using the apps have been given by the business interviewees. For instance, Happy M Kitchen assumes: *"I guess now these days people are busy surviving. So they have too many things to be on and now everybody's busy introducing the latest how to sell your stuff online and make it easy for you"*. In addition to the already reported ones, also having a high entry barrier as it might seem too complicated, not knowing that the apps exist, not caring about their food waste

and too high fees are given in the interviews. Overall, it can be witnessed that most of the reasons for Karma's failure reported by Fuentes et al. (2021) are not reflected by the studied business side.

The frequency of which the customer respondents use Karma and TGTG varies. Just like the businesses, a high degree of engagement can be seen among the majority of the interviewed customers as seven of them use the services several times a week, which shows how food rescuing became a routine and part of their daily lives. This would stand in contrast to Fuentes et al.'s (2021) findings indicating how Karma failed to be integrated by the participants in their everyday practices. However, also more infrequent use can be seen among five customers in this study, who claim to use the service only once or twice a month, while three of the customers report an even more infrequent use and claim to rarely ever use the service anymore. Two of the customers who state that they rarely engage with the app anymore attribute it to the fact that they have started cooking more at home instead or did not enjoy the service. Thus, other practices of food consumption and also one's attitude are shown to influence customers' practice of rescuing food, which is in line with previous research that identifies such elements as impacting factors for practices (Schanes and Stagl, 2018). More precisely, in a similar manner, Fuentes et al. (2021) identified the same barriers in the context of a communication glitch of not understanding the app's sustainability contribution, and respectively the competition of the app(s) against other food provisioning practices, such as cooking at home. When it comes to the occasions in which the customers most frequently engage with the apps, various responses surfaced. However, by far the most common occasion to engage with the app was during lunch. Other responses mentioned by a few included during dinner time, to grab a quick snack when on the move, when there is no other food at home, when there is a good deal to be had and as a replacement for grocery shopping. Therefore, for the customers, the practice of using the app is closely linked to the activity of buying lunch, which also takes place in a fixed spatial-temporal context (Schanes et al., 2018). However, not a single customer reported that they used the app for any other occasion than when they were looking for something to buy. Thus, none of the respondents would use the app as a pastime or without the purpose to actually buy something. This ties into the claims of Fuentes et al. (2021), who highlight the limitations inherent in digital food sharing platforms like Karma as they are tied to certain occasions, such as buying lunch. The overall perception of the used apps is also overwhelmingly positive with a majority of the respondents specifically highlighting aspects such as a good business model and user-friendliness as the two most standout aspects. Also, some customers just like the overall experience of using the app. To some extent, these responses contradict the recent study by Fuentes et al. (2021), who highlight both technical and "interface" glitches that customers have encountered during their study. This is something that has not been reported by any of the 16 respondents in this study. Reasons could be that after their data collection, technical and communication issues have been fixed, and also only customers in Gothenburg, a city with a high density of participating food businesses, have been interviewed in this study. In contrast, a few of the customers do not have any strong feelings towards the app and remain rather neutral in their perception, while only one of the customers does not like the app due to a personal lack of interest in food waste, sustainability and affordability. The customers were also asked to highlight why they think not more customers are using these kinds of apps. The most common reason is that people avoid using these services due to the perception that the sold food is of lower quality and that these services thus have a rough reputation among some customers. Sofia highlights these notions stating: "*As far as the consumers are concerned, I will answer on behalf of my*

mother as she thinks that the food that is sold is either too old or not fresh enough". Such a perceived lower food quality and resulting safety issue for surplus food, which is also indicated by Lazell (2016) and Fuentes et al. (2021), cannot be found for the interviewed customers. However, it could be the case for people not using food rescuing apps, who are not portrayed in the thesis. It was also suggested by a few customers that some people might not know about these kinds of services and how to use them, while some people might simply not care about food waste.

<u>Commitment to Food Surplus</u>

In terms of the *commitment to food surplus*, which captures the importance placed on the food waste problem, all interviewed businesses show some attention to their personal food waste and take resulting measures to mitigate it, which makes sense taking into consideration that businesses not caring would probably not use any food rescuing apps at all. Almost half of the businesses explicitly state that managing food waste and being as sustainable as possible is part of their corporate identity. In addition, two places having Indian owners mention that not wasting is part of their culture. Therefore, most of them are talking emotionally about the food waste problem. For example, Happy M Kitchen states: *"I'm crying every time we have to throw something away cause we put so much effort and love into it"*. As Heikkilä et al. (2016) and Filimonau et al. (2019) highlight that an influence can be managerial values and corporate values supporting or restricting the usage of surplus food, the interview findings show similarly how managers' strong moral norms and the corporate identity can support such food rescuing practices (Heikkilä et al., 2016; Filimonau et al., 2019). Especially Fröken Olsson's and Happy M Kitchen clearly communicated how the manager's personal values are reflected in the business operations. The moral aspect of avoiding food waste is highlighted by a third of the places. Such findings reflecting an overall high commitment can be regarded as expected as the apps especially target businesses caring about the environment and who thus, would like to reduce their waste. Even though to varying degrees, over half of the businesses acknowledge that their awareness, attitude or behaviour towards food waste changed since starting to use the app. Thus, through the practice of using food rescuing apps, businesses' underlying relation with food as a resource is reshaped (Davies et al., 2017). For instance, Espresso House reported that their staff now understands that they are not supposed to be thinking that it is okay to prepare more food and have some waste because it can be sold on Karma as that is not what Karma is about and instead the goal is to not have too much waste from the beginning. Thus, as the apps achieve to increase the food waste awareness, they cannot only directly influence businesses' behaviour but also indirectly impact both sides' practices outside the foodservice providers' environment as businesses have the chance to influence their customers' awareness, as well. Overall, over half of the businesses highly value their surplus, stating that their food is still really good and totally fine to be eaten. A few even add that they would still sell expired food as long as they perceive that the food is still fine. Only a few places regard food waste as a necessary evil, which means it is unavoidable to have some wastage at the end of the day.

As far as the customers' commitment in regard to managing food surplus is concerned, a majority of the customers, just like the businesses, are highly committed to reducing food surplus, which can be attributed to their willingness to pay over the current prices as well as their desire to reduce food waste through the apps. However, almost half of the customers put a much lower value on food surplus as their use of the apps are primarily attributed to the

monetary or convenience aspect of the services. These customers also have a lower willingness to pay for the services, thus having an overall low degree of commitment to food surplus and the services as a whole. Agnes highlights these notions by exclaiming, *"I would at most be prepared to pay 40% of the original price"* and *"I would buy food from restaurants that's a day old but no older than that"*. Such findings are in line with Yue et al.'s research on consumers' willingness to pay in regards to imperfect food as many of the interviewed customers reported to focus on getting cheaper foods when using those apps. In addition, similar to previous research, a higher tolerance for imperfect food among environmentally-conscious consumers is found as customers caring about food waste are also shown to be willing to pay more for the rescued food (Yue et al., 2009). Overall, for both sides, it is shown how their values (regarding sustainability and in particular food waste) are reflected in their attitudes and also co-created with the practice of using food rescuing apps, indicating a dynamic relationship between those aspects as it has been described by Evans (2012a, b) in the context of food wasting at the consumer level.

<u>Linked Practices</u>

Regarding the *practices linked to managing food surplus*, every business mentioned at least one further practice. The maximum number of linked practices applied is five additional ones, which can be found for Happy M Kitchen, Holy Greens and Nordish Market. The majority listed two or three practices for managing their food waste. Overall, the most often mentioned one is to adapt one's food preparations, which is especially mentioned as a necessary practice because of the strongly fluctuating guest numbers in the ongoing pandemic. However, such a strategy stands in contrast to Filimonau et al.'s (2019) research on coffee shops identifying managers' preference to order larger quantities instead of only relying on stock forecasting. Almost half of the places reported eating their leftovers themselves, whereas some mention that they would like to do so but are not allowed due to some restrictions. An equal number of businesses use their own discounts for their leftover food and some places give their food away for free, either to customers or they donate it to some charity organisation. However, regarding the latter, it needs to be added that several businesses mention significant hurdles making it difficult for them to donate as charities demand to be registered and also the transportation can be difficult to achieve, which is also mentioned by previous research by Sakaguchi et al. (2018). Another practice is to avoid having any leftovers and, thus, food waste. A quarter of the places mention reusing their leftovers for other dishes, e.g. for the next day's lunch buffet or soups. Only Nordish Market mentioned focusing on educating on their social media and collaborating with other businesses that are working on reducing food waste. Also, only Happy M Kitchen reported to have discussions with other restaurants on food waste. The previous research's highlighted strategy to reduce waste through accurate demand forecasting is not reflected in the business interviews, which can be a result of the highly fluctuating guest numbers due to the pandemic, which makes it almost impossible to forecast the daily demand (Filimonau et al., 2020b).

A majority of the customers reported that they take other actions to reduce food surplus in addition to using the app, with only two of the customers admitting to not doing anything in addition to using the app. The most frequently mentioned practice among the customers is to reduce all possible food waste at home and to try to never throw anything away. However, those customers stating not to take any additional practices might still try to avoid waste at home, but might take it for granted and do not regard it as a distinct practice worth mentioning.

Other customers claim to adapt their food preparation, where they carefully plan their meals and grocery shopping in order to reduce the amount of surplus food. Two customers also mention the use of other services, namely matsvinn.se and hellofresh. Overall, the customers' additional practices reflect a high awareness and resulting engagement to reduce food waste. The mentioned practices are mainly those that are self-evident to do and can be easily incorporated in the daily lives not requiring a lot of effort. As a result, as already highlighted for both sides' motivations, the businesses' overall high commitment to food surplus and the accompanying various linked practices for managing food surplus can be traced back to the sustainability awareness in the Swedish society and the resulting other actors' actions towards reducing food waste, such as consumers' leftover management at home, which influences businesses to emulate them (Schanes et al., 2018).

Derived Typologies

Based on the described indicators in the first part, a typology is developed for the businesses (table 3) and the customers (table 4) to map the differences in the exertion of the practice of using food rescuing apps. Four distinct business types as well as four distinct customer types can be distinguished. It needs to be highlighted that not all five indicators are found to be relevant for characterising the existing types. More precisely, the indicator *mode of recruitment* is shown to have no impact and thus, cannot be found in the typology tables. Below the respective typology table, each identified type will be explained in more detail.

<u>Business Typology</u>

Table 3 Business Typology (own representation).

	Type 1 Full-on Food Waste Preachers	Type 2 Independent Food Waste Fighters	Type 3 Indecisive Food Waste Worriers	Type 4 Business-minded Food Waste Avoiders
Motivations	avoid food waste sustainability	avoid food waste offer cheap, high-quality food	avoid food waste advertisement cross-selling	offer cheap food not lose money avoid food waste (economic reason)
Mode of Engagement	high community feeling (around food waste)	low to medium focus on regular sales and having no waste	medium desire to engage more in the future community feeling (around app sellers)	low might fear a bad reputation
Commitment to Food Surplus	high part of corporate identity mission to have zero waste	high not about generating profit	medium care but less clearly shown and communicated	low more important to be fresh and offer food variety
Linked Practices	various, complex and time-consuming ones	various, less complex ones	few, mainly uncomplicated ones	few, mainly just adapted food preparations
Examples	Nordish Market Fröken Olsson's	Happy M Kitchen Holy Greens Café Anonymous Espresso House Glashuset AweSum Cakes	Tårtverket Café au Thé Kathmandu Godisbanken	Victoria Café Subway TomToms Burritos South Indian

As it is shown in table three, the first identified business type is the *Full-on Food Waste Preachers* (in short preachers). They are the most likely to use more than one food rescuing app or have at least considered alternative apps. Their main motivations for participating are linked to sustainability aspects and especially to avoid food waste. Such aspects are reflected in a high engagement on the used app(s). In this stance, preachers also tend to be early adopters, having started using the app soon after opening their business or as soon as the app launched. Their engagement is also reflected in putting many thoughts into the app usage on how to make the best out of it and would like to engage even more with the app in the future. For instance, Nordish Market is in contact with TGTG to plan potential events around educating people about food waste. The preachers are also shown to be among the only ones being proactive in engaging with others talking about and using the app as it can be seen for Fröken Olsson's when stating: *"I always try to encourage people, who come in and have bought something and to be like, oh that's so amazing that you bought there and I hope you come back some time"*. The interviewed businesses belonging to this type also reported a feeling of being part of some kind of community, which is created around those fighting food waste. As a result, their food waste commitment is also among the highest of all identified types. It is often reflected in their corporate identity as, e.g. Fröken Olsson's states: *"I know that the woman, who owns this place and the entire Condeco chain is very eco-focused. A lot of the stuff that we have here, we're constantly working towards being as vegan and eco-friendly as possible"* and it is also shown in their mission to have zero waste. Thus, their surplus food is highly valued and food waste is an emotional and moral matter to them. Consequently, one can find plenty of additional practices linked to reducing food waste for such businesses. It is striking that such practices tend to be quite complex and also time-consuming as e.g. Fröken Olsson's reuses their leftovers in various creative ways and Nordish Market is also doing the same with other's leftovers (e.g. from grocery stores) and is collaborating with other food waste-focused companies, as well. As a result, a potential reason why they might stop using such apps could be that they manage to have no food wastage at all making the apps redundant. Overall, the preachers can be seen as the pioneers having the chance to have a significant influence on other businesses and also customers to change their attitude and behaviours towards more sustainable practices with regard to using food rescuing apps and also additional linked practices. In addition, the preachers can also provide meaningful insights to the app providers and help them to improve their services as they have the knowledge, experience and dedication to make a change.

The second type is the *Independent Food Waste Fighters* (in short fighters), who are characterised by a similar high commitment to food surplus as the preachers but have a low to medium engagement with the used app(s). Thus, their motivations for using such apps are also mainly about sustainability and avoiding food waste, but also offering cheap, high-quality food. In contrast to the preachers, they use the app less frequently and instead focus on having no food wastage at all. In addition, fighters who also tend to be rather larger businesses belonging to a chain use other or their own digital platforms for additional services. For example, Happy M Kitchen sells their meals on mathem.se and Espresso House and Holy Greens use their own apps for selling their food, which makes Karma's full price service irrelevant to them. As already stated, their commitment is similar to the preachers' one. They highly value their surplus as, e.g. Holy Greens states: *"Because, if it looks fine, smells fine, tastes fine, usually nothing is wrong with the product as long as it's been refrigerated"*. Thus, also various additional linked practices for avoiding food waste can be found. Therefore, a potential barrier would be that food rescuing apps can be regarded as dispensable as other

solutions for managing food waste are perceived as enough or better. The applied additional practices still require a high commitment, as e.g. some of them would donate leftovers to charity. However, in comparison to the preachers, they are still less complex and time-consuming. For example, most businesses being part of this type would use their own discounts and give away their leftovers for free to their customers. For the app providers, this business type is of lower importance as they can be less impacted because they are about to reach the app's final goal, namely to have no waste making using the apps almost unnecessary. However, a way to encourage their app usage is to focus more on promoting their app's purpose because if more fighters knew about the apps and understood their goal, more of them would be willing to use them. However, as the fighters are already highly committed to managing their waste, they can positively influence their customers' awareness, which according to Filimonau et al. (2020a) would lead to customers having a higher engagement in reducing their food waste and thus, an overall positive environmental impact in society.

The third type is called the *Indecisive Food Waste Worriers* (in short worriers), who can be regarded as the least distinct type of all four. As some of the businesses part of this type just opened (e.g. Godisbanken and Tårtverket), worriers might be in a transitional phase to become part of one of the other types. Regarding their motivations for using food rescuing apps, besides the ones mentioned for the other two types, also advertisement is another relevant reason for them. For example, Tårtverket highlights: *"For us, it's mostly that we want to be decreasing the waste, of course, and also the marketing aspect since we're so new in such a pretty cafe-compact city like Gothenburg. It helps us to stand out"*. Thus, they highlight how selling on the apps helps them increase public awareness and build a customer base. Therefore, also cross-selling is mentioned by some businesses as another motivation, as e.g. some customers buying their food on TGTG or Karma would also buy from them as regular customers when picking up their rescued food or at a later stage. Regarding the worriers' engagement with the app, they tend to use the app often and it is part of their routine. However, the app's other channels are not considered, selling on the apps is barely promoted and no proactive engagement with others (e.g. customers and staff) can be found. Also Godisbanken states: *"Usually if we're talking about something and then it leads on to like sustainability or something like that, then you can mention that we're on Karma for them to know"*. However, they wish to use the app more in the future and thus, might become a preacher at some point. For instance, Godisbanken also reported: *"So they [the surprise bags] have special names. We need to make more though. We have so many products. Yeah, so we have a lot of options"*. In this context, they also tend to report to feel part of a community consisting of those selling on Karma or they assume it could evolve into one in the future. Thus, their participation on the respective food sharing app has affected the underlying human relationships (Davies et al., 2017). Their commitment is characterised by caring about the food waste problem, but it is rarely communicated or shown in their actions. A reason could be lacking knowledge of how to do so. This is also reflected in the few applied additional practices, which are only uncomplicated ones, such as eating the leftovers themselves. Therefore, the app providers can have a significant impact on this business type by educating them and listening to their feedback to facilitate the app usage for them so that they might become part of the preachers in the future. Also, through establishing a community around the businesses using Karma can be expected to be highly acknowledged by them, which would increase their app usage even further.

The last type is the *Business-minded Food Waste Avoiders* (in short avoiders). As the name suggests, their motivations are mainly cost-driven. For instance, TomToms Burritos states: *"You don't really make a lot of profit, you make no profit, but you're minimising the amount of money you're losing. And then it's a nice benefit as well, obviously"*. As a result, for this type, changes in the app's pricing model would stop them from using the apps. But also South Indian highlighted the advertising aspect when stating: *"Yes, it is some kind of marketing. So initially we started using it even though there was no surplus amount so that people will come to try cause maybe they may not like to try it for the full price"*. Next, avoiders' engagement with the used app is low, which is characterised by not promoting the app usage, having limited knowledge about the app and being the only ones, who might fear a bad reputation when using the app too much. Thus, they potentially underestimate consumers' flexibility regarding imperfect or old foods and as result, take no risks. When it comes to their commitment to food surplus, offering a variety of fresh food is more important to them. This is illustrated by Victoria Café when the owner explained: *"The most important thing is to be fresh. I have one staff member here, who was asking me why are you throwing away old sandwiches we just did yesterday and we can use them. And I said, I don't like to be a little bit not fresh".* Wastage is also regarded as a necessary evil, which means wasting is unavoidable no matter how hard one tries. Therefore, only a few additional food saving practices are implemented. The main one that can be found is adapted food preparations, especially due to the pandemic and resulting fluctuating guest numbers. Overall, it is shown that the businesses of this type only started using food rescuing apps because of the sudden food waste occurring due to the pandemic. Thus, one might expect that avoiders would stop using the app when the situation normalises. Such businesses regard the app's model as not interesting or not fitting. Their personal circumstances and the low placed importance on food rescuing leads to "being too busy" as another potential barrier for participation. In order to keep the worriers and potentially increase their app engagement, app providers should focus on educating them about the environmental aspects of wasting less food so that their motivations would move beyond merely economic ones. In addition, this type would highly benefit from a flexible pricing model that would allow them to sell their surplus at slightly higher prices.

Customer Typology

Table 4 Customer Typology (own representation).

	Type 1 Full-on Food Waste Devotees	Type 2 Food Waste and App Appreciators	Type 3 Acknowledging App Neutrals	Type 4 Inactive Uncaring Ones
Motivations	mainly sustainability	sustainability and cheap food	chance to buy cheap food	chance to buy cheap food
Mode of Engagement	very high use of the app engagement with other platforms	high, frequent use of the app	infrequent use of the app	almost never engaged with the app anymore
Commitment to Food Surplus	high committed to rescue food high willingness to pay	high committed to rescue food high willingness to pay	low commitment to rescuing food but neutral about it	low not committed to rescue food
Linked Practices	additional other actions	additional other actions	no deliberate practices, but might rethink their actions	no additional actions

As it is indicated in table four, the first identified customer type is the *Full-on Food Waste Devotees* (in short devotees). These customers are the most committed ones both toward the act of rescuing food and as well as toward the apps and companies behind them. The devotees are mainly motivated by the opportunity to be more sustainable and have a high use of the app while simultaneously engaging with the companies on other platforms than just the app. Furthermore, the devotees are very active in engaging with the app by talking about it with people around them. This is shown by, for example, Gustav, who states: *"Yes, I follow them on social media in order to keep up with any news"*. Therefore, through creating a community on their social media and in the app, devotees can be even further tied to the app. The devotees also have among the highest degree of commitment toward food waste, being both highly committed to reducing food surplus combined with a high willingness to pay for the rescued food. This is highlighted by Ellie, who claims: *"I would actually not need a big discount for rescuing food, but I would like a small reduction of the price. So I would say somewhere around 95% of the original price is how much I would be prepared to pay"*. The devotees also partake in additional practices linked to reducing food waste in their day-to-day life. For instance, Gustav reports various additional practices: *"More than obviously trying to reduce mine and other's food waste, I'm also really active on various Facebook groups that work on promoting sustainable living. I have also started my own little garden, where I produce some vegetables and I have also crafted my own compost station"*. As a result, a potential barrier for them to use food rescuing apps could be that the apps are regarded as dispensable as other solutions for managing food waste are perceived as enough or better. In a similar manner to the preachers, among businesses, the devotees have the potential to play a crucial role in influencing their peers to become users of the app or apply other practices of minimising food waste.

The second type is the *Food Waste and App Appreciators* (in short appreciators). The appreciators, while just like the devotees, are motivated by the sustainability aspect of the app. However, the appreciators also view the chance to buy cheap food as an additional motivation, as highlighted by Martin, who states: *"I think it is a smart service, which allows me to be a part of creating a better environment while at the same time paying less for the food"*. Just like the devotees, the appreciators also have frequent engagement with the app. However, these customers just use the app and do not engage with the companies on any other platform. In order to increase their positive impact on reducing food waste even further, new businesses joining consistently is important so that the app stays interesting to them as they cannot be further attracted through advertisements or educating them on the food waste problem. The latter is linked to the fact that the appreciators also show a high commitment towards reducing food waste. Thus, similar to the fighters, they can positively influence and educate their social environment and increase their environmental practices, in particular to reduce food waste. Appreciators also have a high willingness to pay for the food as they are willing to pay an even bigger portion of the original price when using these services. Furthermore, the appreciators also partake in additional linked practices in order to reduce food waste at home. For example, Charlotte reports: *"Well, I try not to unnecessarily buy things that I'm unsure if I'm going to use and I carefully try to look at what I got at home and plan what to buy and cook depending on that. I also try to plan my fridge and freezer so that the things that expire first are also the things you see first"*. Therefore, similar to the devotees, a potential barrier for using such apps could be that other practices for reducing food waste are regarded as enough or better making the apps irrelevant to them.

The third type is called the *Acknowledging App Neutrals* (in short neutrals). Neutrals are mainly motivated by the opportunity to buy food at a cheaper price, not paying all that much focus to the sustainability aspect of the services. An example is Jacob, who states: *"Mainly curiosity... as I said, I wanted to try the service and see if it fit into my day-to-day life. I was also motivated by the chance to potentially save money on food"*, which is the common theme among the neutrals. As a result, when the prices of the food offered in the apps would change, they might stop using them. The neutrals are defined by infrequent use of the app, with many of the customers claiming to only use it once or perhaps twice a month with small to no commitment towards the reduction of food waste. For neutrals, another potential barrier would be closely linked to their app usage occasions and identifying alternative solutions for eating (lunch), such as starting cooking at home. Furthermore, the neutrals do not engage in any particular linked practices or take any deliberate actions in order to reduce food waste. However, several of the customers classified as neutrals state that they have rethought their actions in regard to reducing food waste. Similar to the appreciators, neutrals could also be influenced to use the apps more often through ensuring new locations can be discovered on a regular basis. In addition, having additional offers and discounts, e.g. when rescuing a certain number of meals or boxes, could function as another incentive. Also, through expanding their marketing and social media usage and, more specifically, advertising the businesses selling on their app, the apps can encourage this type to use their services more often. When the apps focus more on improving the awareness and knowledge regarding the services, more people could also understand the app's purpose and might use them more regularly.

The last type is the *Inactive Uncaring Ones* (in short uncaring ones). As is indicated by the name, the uncaring ones do not care about food waste reduction. Their primary motivation for using the app is to be able to buy cheap food. However, after using the app for a while, the uncaring ones' engagement with the apps decreases, with them almost never using the app anymore. The uncaring ones do not show any direct commitment to food surplus, as highlighted by Agnes, who states: *"I do not value the act of rescuing food any higher than the chance to buy fresh food"* while also exclaiming that she would not buy food that is more than one day old. The general stance of Agnes is applicable to the other customers classified as uncaring ones, with them all sharing the notion of not being motivated to save food. In line with the aforementioned commitment and engagement shown by the uncaring ones, there are also no additional practices dedicated to reducing food waste described by this customer type. As those customers regard the app's model as not interesting, they are likely to claim that they do not have time for food rescuing due to their personal circumstances and the low placed importance on food rescuing. Here, in order to win them back or increase their app usage, it is crucial that app providers and participating businesses educate them about the still high quality of their surplus food. For instance, businesses could offer free samples or some kind of taste test at their places, which would also appeal to this type's economic-driven motivation.

Insignificant Indicators

Finally, it needs to be mentioned that certain characteristics are irrelevant for differentiating the respective types. For instance, for all business types except the first one, how many apps are used or at least considered and which one is used do not indicate to which type the business belongs. As far as the customers are concerned, which app they use does not have an influence on differentiating the respective types. Also, no matter the *degree of commitment*, all interviewed businesses report to have low food waste and the actual amount of waste is also

not linked to the business size. Reasons would be that no matter the *mode of engagement*, at least sporadically, being active on a food rescuing app comes with awareness and resulting actions to avoid food waste. In a comparable manner, almost all customers reported that they tried to reduce food waste in their homes in some manner, albeit for various reasons. Thus, the act of not deliberately wasting food does not determine the typology of the customers. In addition, the indicator *mode of recruitment* is shown to be irrelevant for identifying the different types of businesses and customers. In particular, for the businesses, it varies within each type and a plethora of businesses often just mention "chain decision". Thus, it is unclear why the head decided to start using the respective food rescuing app. But it can be witnessed that those being contacted by the app and not proactively reaching out to them are also showing a low *mode of engagement*. In a similar manner, for the customers, the indicator shows no correlation to which type the customers belong. Likewise, in which occasions the customers use the app does not notably influence the customer's type.

Concluding Discussion

Overall, linked to a practice theoretical approach, the described different types of users show how each type makes sense of food surplus differently, which is reflected in their varying perceptions of participating on food rescuing apps and their potential applications of other practices of food surplus management. Additionally, the importance of spatial-temporal aspects has been highlighted in previous research by Schanes et al. (2018) and is further confirmed by the findings of this study as they show just how impactful the environment, both social and physical, is to the inclination of taking part in food sharing practices on digital platforms. Besides, some of the results are shown to contradict previous ones regarding how and why digital food sharing platforms are used and what is valued. For instance, neither the customers nor businesses matched all the five identified motivations for participating in food sharing practices as outlined by Schanes' and Stagl's (2018). As such, it seems like fulfilling all the identified motivations is not a necessity for participating in food sharing practices on digital platforms. In addition, whereas Brons' and Oosterveer's findings (2017) show how for some identified types, the *mode of engagement* is limited to buying sustainable food and is not accompanied by a high commitment or does not expand into other practices, such observations cannot be made in this study. More precisely, for those identified types of business and customer users having a high engagement with the app, a similarly high commitment to reduce food surplus can be found, which is then again also reflected in a high number of linked practices. Thus, it can be assumed that the communicated app's purpose to waste less food is shared by almost all users and the apps achieve a positive impact on their users' food waste awareness and behaviour. As the study by Brons and Oosterveer (2017) also identifies how an environmental concern is not necessarily reflected in sustainable food consumption, similarly for some of this study's derived types, a commitment to food surplus has to compete with other criteria such as food freshness and is not exclusive with regard to the motivations for participation. For those types being highly committed and applying additional practices, reducing food waste and being as sustainable as possible is a crucial aspect of their identity and their business operations or lifestyle. Overall, it is shown that having a positive influence on each type's food waste management and linked sustainable behaviour requires different approaches, e.g. depending on their already existing commitment or their main motivations. Lastly, as it also becomes evident in the type descriptions, the derived indicator *mode of recruitment* and some other practitioner characteristics are shown to be irrelevant for the typologies. For instance, no patterns can be identified, among the type and

number of apps used, the businesses' amount of food waste and customers' app usage occasions, which would contribute to distinguishing the existing types of business- or customer users. Finally, it needs to be acknowledged that the identified types should not be considered as stages (potentially except for the worriers) but as distinct approaches for the practice of participating on food rescuing apps.

Conclusions

To conclude, the first research question "Which practice theoretical factors have an impact on the participation on food rescuing apps?", several aspects have been identified throughout the research. Through the conducted interviews, it becomes evident that especially the social environment, including other human actors, have been shown to significantly impact the practitioners. For example, one's close network of family, friends and colleagues as well as other businesses and the app ambassadors influence several of the studied indicators. In addition, the spatial-temporal context is of high relevance for both businesses and customers in regard to their recruitment, the occasions and the extent the apps are used (e.g. only to buy lunch). Furthermore, especially through the indicators *commitment to food surplus* and the *linked practices*, it can be seen how the users' identity and value system reflected in their attitude towards food waste and sustainability impacts their participation on the app. In contrast to Fuentes et al.'s (2021) discussed failure of Karma to suit the participants' other practices, the study shows how several business- and customer types achieved to incorporate the practice of participating on food rescuing apps into their routines and everyday practices. To a lesser extent, materials are shown to have an impact, e.g. in the form of corporate apps as alternative technical solutions. Summing up, through the identified factors, the complexity of the practice is clearly demonstrated.

To answer the second research question "What types of business- and customer users can be distinguished on food rescuing apps?", as shown in the derived typologies, four distinct types of business- and also customer food rescuing app users can be defined. For the businesses, the *preachers* caring a lot about food waste and being highly committed to food surplus (which is also often reflected in their corporate identity) mainly use food rescuing apps because of their sustainability aspect and to avoid food waste. Thus, their values strongly correlate with their attitudes and practices of food surplus management (Evans et al., 2012a; b). The preacher's motivation to avoid food waste does not have to compete with other aspects. In this context, a plethora of especially complex and time-consuming practices linked to food surplus management are incorporated in their business operations. They are further highly engaged with the app, which is the main aspect differentiating them from the second business type. The *fighters* are additionally motivated to use such apps by having the opportunity to offer cheap but still high-quality food. In contrast to the preachers, their engagement is rather low as for them, regular sales and avoiding wastage at all are more important aspects. Their commitment and accompanying linked practices are similar to the preachers' ones. Thus, a so-called attitude-behaviour gap becomes evident as even though they have a positive attitude towards reducing food waste, it is not reflected in their app participation (Schanes et al., 2018). Potential barriers explaining this discrepancy are mainly mental, material and social ones. For instance, as they regard not wasting as important, they try to avoid having any food surplus to reduce the risk of wasting food even further, making selling on those apps less appealing to them. Material aspects impacting their practice of infrequently using such apps are other digital platforms being incorporated instead, such as their own apps. Social barriers explaining the

existing gap are closely linked to their additional practices of managing food waste as, for example, surplus food is donated to charity or stores part of a chain sell each other's surplus. Therefore, the businesses' social environment plays a crucial role in why fighters participate less on the apps. The *worriers* are shown to be especially newly operating businesses, which might indicate the third type to be in a transitional phase. Their main motivations are app benefits, which are not largely promoted by the apps themselves, such as advertising and cross-selling. Thus, their practice of participating on the app is influenced by their personal priority of surviving and establishing a customer base. Even though they care about food waste, their overall commitment is less clearly communicated and rarely shown in additional practices, which can be explained again through an existing attitude-behaviour gap (Schanes et al., 2018). The barriers leading to a less frequent app usage are especially the temporal context, having often opened their business not a long time ago and the set personal priorities leading to a lower focus on such apps. But also a lacking mental commitment to educating oneself on how to manage food surplus can be a reason. The last type, the *avoiders*, mainly indicate economic reasons as their motivation for participation. Also, the sudden food waste due to the fluctuating guest numbers during the pandemic is mentioned as a further aspect for starting using the app. Their app engagement is low as they fear a bad reputation when selling too much on the app. Their commitment is the lowest of all types as other attributes such as freshness and food variety are perceived as more important, which is also shown in applying only a few, simple additional practices, like adapted food preparations. Such a restricted commitment is also found by Brons and Oosterveer (2017) for their first type "food environmentalists", as they know their limits and opt for the easiest way when buying sustainable food without any demanding rearrangements. Similarly, also avoiders would barely adapt their routines in order to reduce more food waste.

The identified customer types of app users are *the full-on food waste devotees, food waste and app appreciators, acknowledging app neutrals* and *inactive, uncaring ones*. The *devotees* show similar characteristics as the business preachers in terms of being motivated by the app's sustainability aspect, having a high engagement with the used app, also on other platforms, and being highly committed to reducing food waste. Thus, also similarly, the app's main promoted benefit of avoiding food waste is also the main criterion for their motivation and engagement, which has not to compete with other aspects. Their active engagement is not only reflected in their app participation but also through recommending the apps to others. For example, their social networks of friends, family and colleagues are affected, which shows how the practice of using food rescuing apps is embedded in their everyday social life (Schanes et al., 2018). Their engagement is also reflected in a high willingness to pay for surplus food and incorporating several additional practices of food waste management in their lives. This type's characteristics stand in contrast to Fuentes et al.'s (2021) identified misalignment of Karma's promoted mode of food provision with preceding or proceeding practices. The second type, the *appreciators*, is driven by the cheaper price while still highly valuing the sustainability aspect, which is the main distinctive feature from the devotees. They use the app frequently, which indicates a high engagement. Also, their high commitment linked to several additional practices is shown to be characterised by similar aspects that can be found for the first type. Such a high degree of commitment that can be found for both first types of customers is called "pushing their limits" by Brons and Oosterveer (2017) and is described by them as the comprehensive environmentalist's willingness to change their routines and do more in the future. Such characteristics can be applied to the devotees and appreciators, as well, but also the business type preachers and fighters would fall into this defined commitment. In contrast,

the *neutrals* mention only the economic aspect of the apps as their motivation, which is also reflected in their overall low commitment to food surplus. In addition, they use the app infrequently. They show some commitment to rescue food but are neutral about the sustainability aspect behind it. Thus, no deliberate practices can be found. However, neutrals still tend to rethink their actions. These characteristics would be in line with Brons' and Oosterveer's (2017) defined "questioning their limits"-commitment as some small things are done, but one's personal limits are acknowledged as more could be done regarding buying sustainable food and respectively, managing food waste. Also, the same would apply to the business type worriers. The last identified customer type, the *uncaring ones*, are motivated by the same economic aspect as the neutrals. Therefore, for both of them, their attitude and placed importance on saving money and being rewarded significantly impacts their practice of using the apps (Schanes and Stagl, 2018). However, their engagement is even lower as they seldom use the app anymore. In contrast to the neutrals, they are not committed to food waste management and also no additional practices are incorporated by them in their daily lives.

Contributions and Implications

The main contribution of this study is based on the practice theoretical understanding it provides concerning the practice of using food rescuing apps. Through this study, a new and different methodological approach is applied to explain the existing varying exertions of participating on food rescuing apps. Thus, the available research field is extended through expanding the knowledge of consumer behaviour in relation to food waste on digital platforms and highlighting the importance of spatial-temporal aspects as well as other factors for the practices of both businesses and customers. Therefore, the research shows with the help of such a theoretical perspective how food rescuing apps are integrated into the users' daily life and routines. Here, the existing complex interactions between the users and the app-related practices can be understood. The study also provides a foundation for much-needed further studies of food waste in relation to technological innovations. Furthermore, an improved understanding of businesses and customers as app users is achieved as the various underlying differences in the exertion of participating on these digital food-sharing platforms are structured. Also, the defined business and customer typologies provide insights into the interactions between the users' lifestyles, materials, social environments and spatial-temporal contexts as the participation on food rescuing apps is not a straightforward outcome. Also, through this study, a contribution to the sharing economy research field is made. Reflecting on food rescuing apps as an example for this new emerging form of sharing highlights how such a new approach can serve for achieving environmental effectiveness and economic efficiency. In addition, based on the structured indicator findings, each constructed business and customer type can be characterised by distinct drivers and barriers for their participation, which can prove helpful for future academic discussions of food rescuing apps' impact on their users and how to increase its future potential for positive sustainable changes in society. In particular, through the users' app participation, their food waste awareness and attitude can be directly and indirectly influenced, which is linked to Filimonau et al. (2020a), who highlight that environmentally committed and food waste aware consumers are also more engaged in reducing their food waste when eating out and demand businesses to do so, as well.

Apart from having a positive effect on the users' general attitude and behaviour towards food waste, also this enhanced understanding of the practice and the app users grants the platform providers Karma and TGTG with valuable insights. It allows for improvements to be made,

which can get more consumers and businesses to join and, in turn, help alleviate the food waste problem through adapted, type-specific approaches. Linked to this, a suggested improvement for the apps mentioned by the users is to solve the technical issues and, for example, improve the user-friendliness of the retail Karma app. A discussion forum for not only customers but also businesses could also be incorporated so that the exchange of personal experiences and tips is facilitated. Such an approach could solve Farr-Wharton et al.'s (2014) identified food sharing weakness of lacking trust and missing relationships. Moreover, the findings could have implications on a societal level as they may help contribute to more sustainable consumption practices, leading to a reduced amount of food waste.

Limitations and Future Research

In addition, even though a contribution is shown to be made, the limits of the study need to be acknowledged. First, regarding the sampling, the small sample size of 16 businesses and 15 customers needs to be taken into account for all drawn conclusions regarding the identified user types as it is difficult to make any sweeping assumptions. In addition, as the findings rely on the interviewees' given answers and food waste can be regarded as a sensitive topic, there is a potential risk of receiving biased answers as some businesses and customers might try to portray themselves in a better light. However, this issue can be regarded as minor as for both sides also economic motivations for participation are frankly reported. In addition, for the businesses, their findings can be further biased to some extent as the interviewees might communicate their personal instead of corporate viewpoints and also their knowledge might be restricted when there is another person (e.g. store manager or head of the chain), who is making the decisions, e.g. regarding why starting to use these apps. Lastly, also the current ongoing pandemic has an impact on the retrieved findings as some of the businesses had no food wastage before and they might stop using such apps when the guest numbers are less fluctuating. However, by the time the pandemic is over, there is a possibility consumers have gotten used to these kinds of apps and incorporated them into their consumption patterns. As such, the demand for these apps would not see a decrease, but instead, the popularity of such apps among businesses and customers can be expected to increase even further.

As the future of digital food-sharing apps is shown to look bright, in combination with the highlighted limitations of the study, valuable pathways for future research in this field can be suggested. First of all, as the study relies on a rather small sample, it would be interesting to see an extended version of the study with a significantly larger sample size in order to substantiate the results presented in this study. Due to the possible influence of the respondents' personal biases, it would add value to recreate the study with a quantitative method to (dis)confirm the results. Additionally, recreating the study in a new location and culture could provide insight into the possible differing influence the economic, social and cultural environment can have on both businesses and customers. In a similar manner, recreating the study after the Covid-19 pandemic would help understand to what extent spatial-temporal aspects affect the users' practices. Additionally, studies looking deeper into the indicators *commitment to food surplus* and *linked practices* could be valuable as they are able to give insight into the users' identity and value system.

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