

# Towards realizing the sustainability potential within digital food provisioning platforms. The case of meal box schemes and online grocery shopping in Norway

## Abstract:

Digital technologies for food provisioning are often proposed as solutions to developing a more sustainable food system. Consumers can now use their mobile phones and computers to buy food online from websites, apps, and social media. Many of these services are marketed as sustainable by reducing transport emissions, direct sales of local products, organic alternatives, and reduced food waste through better meal planning, portioning and so-called food saving. There is a tendency to assume that the services are used in the way designers and producers intend. However, we know very little about how consumers use them and how they integrate with daily life. This study explores the use and integration of online food provisioning services from a social practice perspective, allowing for the identification of how they affect food handling practices such as planning, acquisition, storage, cooking, and disposal, and how different forms of use condition the sustainability potential of the services. Moreover, we draw on the concept of scripting and de-scripting to grasp the differences between the intended and actual use of the services. To do so, we draw on ethnographic interviews with 20 Norwegian families who use meal box schemes and online grocery shopping. The analysis shows that box schemes have a higher sustainability potential than online grocery shopping but is far more demanding to integrate with existing food handling practices. Online grocery shopping is to a larger extent mirroring in-store shopping, in this way reproducing existing food handling practices. In conclusion, we suggest a stronger focus on co-design with consumers to move closer to realizing the sustainability potential inherent within digital food provisioning platforms. This can be done by focussing on values that are important to consumers such as convenience and efficiency, acknowledging the interrelatedness of food handling practices, and improve existing scripts and interfaces of the services.

**Keywords:** digital platforms, sustainable food consumption, social practice theory, scripting, box schemes, online grocery shopping

## 1. Introduction

Food value chains are estimated to contribute to 19-29 per cent of global GHG emissions (FAO, 2015), making the transition to a more sustainable food system among the most significant challenges of today. Efforts to reduce the impact of food production and consumption is high on the political agenda worldwide (Jackson et al., 2020). Its increasing prominence is reflected in the UN Sustainability Development Goals (SDG's) on social sustainability, as articulated in SDG2: to "end hunger, achieve food security and improved nutrition, and promote sustainable agriculture" and environmental sustainability in SDG12: to "ensure sustainable consumption and production patterns". In the context of the latter, digital technologies have been proposed as one solution that will make it easier for consumers to change their food consumption patterns in a more sustainable direction (Borrello et al., 2020).

With more consumers having access to an internet connection and with the introduction of reliable electronic payment options (Li et al., 2020), online food provisioning has increased in Europe. Eurostat data shows that in 2009, 5 per cent of consumers had bought food online during the past 12 months, in 2018 15 per cent reported the same (cited in Oncini et al., 2020). In food retail, digitalisation is now enabling new platforms for food provisioning that are promoting novel and more sustainable ways of not only provisioning but also storing, preparing, and cooking food (Michellini et al., 2018). Over the past

few years, and particularly after the introduction of the smartphone, we have seen an increase in food provisioning platforms such as online grocery stores, meal box schemes, food donation, swapping and sharing networks in social media, and online farmer's markets and direct sales from producers to consumers. We have also seen an increase in smart technologies (e.g. smart fridges), mobile apps (e.g. food waste apps and dietary and health apps), QR-codes (on products or posters in-store), websites, and social media content (e.g. information videos and influencer marketing) to transform consumption patterns (Atkinson, 2013; de Almeida Oroski, 2020; Strähle & Gräff, 2017; Wilson et al., 2017).

However, we still know little about under which conditions these digital platforms can change food consumption patterns in a more sustainable direction (Fuentes et al., 2021). According to Cochoy et al. (2017), there has until recently been a lack of studies of the intersection of digital technologies and consumption. To date, a large share of research on digital platforms for food consumption has been conducted in business, engineering, and computer science, focussing more on marketing strategies and the technical aspects of platforms than how they are used by consumers and their sustainability potential (Kolesova et al., 2020; Martín et al., 2019). If we look to studies of food consumption practices, however, they have demonstrated that changing practices is difficult because they are entangled in established routines, rhythms, and the overall organisation of everyday life (Southerton, 2020; Warde et al., 2007; Yates & Warde, 2017). On the topic of food waste, Evans (2012, 2014) has shown that wasting food is not an act or practice in itself, it is a consequence of consumers constantly negotiating the complex and often conflicting demands of everyday life. Our kitchen organising and ridding practices, for example, are according to Waitt and Phillips (2016) affecting the amount of food consumers waste. Thus, if we want to change how we consume food in a more sustainable direction using digital platforms, we need to understand the dynamics of the practices that involve or are connected to food handling.

Through ethnographic interviews with 20 Norwegian households on their use of online grocery shopping and meal box schemes, this paper explores how digital food provisioning becomes entangled in food handling practices. As many digital food provisioning services do, the online grocery shopping and meal box scheme suppliers in our study market their services with a sustainability potential: to reduce food waste, reduce transport emissions, and provide better portion control and meal planning. Based on the sociology of food consumption and more specifically in food consumption as social practices (Evans, 2014; Halkier & Jensen, 2011; Warde, 2019; Watson & Meah, 2012), we ask: (i) whether and how has the use of digital platforms changed the households' food consumption practices, and (ii) have these changes increased their level of sustainable food consumption? To answer these research questions, we also make use of the "scripting" and "de-scripting" concepts, borrowed from Science and Technology (STS) scholar Akrich (1992). A script is a vision or prediction of how an object is going to be used by those who acquire it, constructed by the designers, producers, and marketers of those products. De-scripting on the other hand, involves the user's re-writing of the original script, adapting the product to their life situation. We employ these concepts together with practice theory to explore how the design of the food provisioning services (including the website or app, subscription, and meal box and food products) shape how we use the service, and how consumers aim to adapt the services to fit their existing routines.

After a review of existing literature on food consumption and digital food provisioning services, we present the theoretical framework in more detail. We then outline the methodological approach based on ethnographic interviews and three supplementing techniques (kitchen demonstrations, digital walkthroughs, and photography). Our focus in the results section is firstly to identify how the meal box and online grocery shopping services are used by households, and secondly to discuss whether using them would increase sustainable food consumption. In conclusion, we summarize our findings and discuss their policy implications.

## 2. Using digital technologies to change food consumption

In line with the above-mentioned technological developments, some studies have started looking at the entanglements between digital technologies food consumption. From a cultural studies perspective, Lupton and Feldman (2020) do a broad sweep of “digital food cultures” as cultural representations that are related to food and presented in digital media. Cochoy et al. (2017) are more focused on the processes through which consumption is increasingly digitalised and how technologies are becoming more integrated with our everyday lives. A special issue in *Futures* deals specifically with how digitalisation has the potential to transform future food production and consumption edited by Choi and Graham (2014), in which they argue that as more food handling practices are conducted using digital technologies, there is a need to better understand their potential as well as their problems (p. 153).

From a sustainability perspective, several studies have aimed to address this need. In business research, studies of consumer behaviour and marketing have shown positive effects of using digital technologies to increase sustainable food consumption. Atkinson (2013) finds that consumers can be motivated to use mobile advertising, such as QR-codes, in-store with information about sustainability if the information is provided by a trusted actor such as the government. Similarly, social media and blogs are found to increase sustainable food purchases when the information is considered trustworthy (Minton et al., 2012; Strähle & Gräff, 2017). Moreover, so-called ‘goal-setting techniques’, where consumers are given information about the carbon footprint of their shopping basket in the online store as well as a reduction target, have shown to positively affect shopping behaviour (Kanay et al., 2021).

However, Fuentes et al. (2021) claim that critics, as well as supporters of digital technologies to increase sustainable food consumption, seem to assume that the technologies will be successful if they are adopted by consumers. Yet, we know little about the reasons why they sometimes work and other times not. For example, a common environmental claim in the marketing of online grocery stores is that growing use of online food provisioning services might contribute to more sustainable mobility patterns, as the supplier has the potential to control distribution to consumers. However, digital technologies might change consumption in unpredictable ways (Hargreaves et al., 2018; Rivera et al., 2014; Røpke & Christensen, 2013). Consumer demand for fast delivery, shopping from more than one supplier at the time, and combining online shopping with in-store shopping would significantly reduce the potential energy saving and emission reduction (J. Berg & Henriksson, 2020).

Online grocery shopping has also been found to affect household decision-making before actual shopping occurs. Decisions regarding product types, amounts and preferences are shifted from the store to the planning phase at home, so-called “front-loading practices”, which include the use of historical lists and re-purchasing, evaluation of new products using online resources (De Kervenoael et al., 2014). Shifting decisions to the planning phase at home might lead to better meal planning and thus reduce food waste. However, as noted by Hebrok and Heidenstrøm (2019) and Evans (2011, 2012), long-term planning might increase food waste in case of overprovisioning or if the plans are not executed. A study by Ilyuk (2018) also finds that products bought online are more likely to be wasted than those bought in-store because online purchases decrease the experience of emotional ownership of the product.

Elms et al. (2016) furthermore demonstrate how the dynamics between internet and store-based grocery shopping resonate with changes in lifestyle, social relationships and kinship, and emotions such as anxiety. Online shopping supplemented in-store shopping during periods of change contributed to better management of food provisioning for consumers. While Elms et al. (2016) found that online shopping became integrated with consumers’ practices over time, C. Hand et al. (2009) found that when

lifestyle changes were stabilised or disappeared, online shopping was discontinued. Although these two studies did not consider sustainability issues, they have introduced two relevant topics that might have consequences for sustainable food consumption, and that we aim to highlight in this paper: (i) the dynamics between different modes of consumption and (ii) the integration of the online mode in existing consumption patterns.

Human geography scholars have stressed the first point by considering the spaces and places of food consumption practices (Feagan, 2007; Jackson, 2004). Gregson et al. (2002) show that shopping practices are performed within an interwoven set of different spaces, in the form of locations (such as different types of stores and online stores) but also generic spaces consisting of different sets of shopping practices. The charity shop space Gregson et al. studied consisted of practices that were defined and reproduced in constant comparison to other shopping spaces, such as retail shops.

The latter point has also been made by Fuentes et al. (2021) and Fuentes and Samsioe (2020) in their studies of the food saving app Karma and meal box schemes in Sweden. They found that digital technologies did not become an integrated part of consumers' everyday food handling. How the app expected consumers to use it came into conflict with their existing food practices, while the meal box scheme required significant work on the part of consumers to become a more convenient alternative to cooking. Halkier (2021) has also demonstrated the need for skillfulness in using meal box schemes. Consumers balance between cooking rules and improvisation, between planning and organising for flexibility, assembling meals from different sources (the meal box and other products), and handling normative food issues. When the meal box scheme is integrated with daily routines it is found to provide convenience by relieving meal planning pressure and reduce shopping time are environmentally friendly in terms of reduced food waste and packaging (Hertz & Halkier, 2017)

### **3. Digital reconfigurations of social practices**

We approach the question of under which circumstances digital technologies have the potential to change consumption patterns in a more sustainable direction through a social practice perspective. The general principles of practice theory, as outlined by scholars such as Reckwitz (2002b) and Schatzki (2002), have become well established in food consumption studies over the past two decades (Warde, 2014, 2016). Practice theory represents a marked departure from studying consumption as part of individual identity formation and cultural representations and symbols to studying the social structuring of routine and ordinary consumption patterns (Gronow & Warde, 2001). Practice theory entails seeing the social world as composed of practices that individuals adopt and perform in a routinized manner (Schatzki, 1996). These practices, consisting of shared understandings, meanings and material artefacts (Shove et al., 2012), is the smallest unit of analysis in practice studies. As such, practice theory is also critical towards seeing consumption as an individual act that is a result of personal attitudes and beliefs (Southerton, 2013). The latter view suggests that if consumers are presented with environmentally friendly products accompanied by appropriate information about their benefits and with suitable values, they would adopt more sustainable behaviours (Shove, 2010).

In line with Warde (2005), we instead understand consumption as something that is performed as parts of our interwoven everyday practices. Online food provisioning relates to other practices such as mobility, eating, storing, disposal, and time management. Moreover, shopping implies the enactment of consumer competences and skills, situated and socially embedded norms and values, and materials such as the internet and computer that together make up the practice of shopping (Evans, 2014; Jackson et al., 2006; Miller, 1998; Watson & Meah, 2012). Because consumption is structured, reproduced, and changed as part of networks of interlinked practices, we need to look at the totality of how everyday life is organised to find maintainable solutions that reduce its environmental impact. Such solutions

require profound changes to normalized forms of consumption as well as developing appropriate infrastructure (Devaney & Davies, 2017; Jackson et al., 2006; McMeekin & Southerton, 2012; Southerton et al., 2004; Spurling et al., 2013).

We take what has been called a “material-semiotic practice approach” to online food provisioning (Evans, 2020). This perspective is particularly attentive to the role materials play, such as the computer, mobile phone, documents and books, storage units, kitchens, fridge, and cupboards, and so on, in the performance of practices (Waite & Phillips, 2016). As Reckwitz (2002a) notes, materials are active in producing, reproducing and changing practices. To study how materials promote or hinder more sustainable food consumption, we take inspiration from Akrich (1992) concept of “scripting and de-scripting” that aims to capture the dynamic relationship between people and technologies; how users and technologies interact with each other. Akrich argues that ‘like a film script, technical objects define a framework of action together with the actors and the space in which they are supposed to act’ (p.208). Technological products are designed and marketed with a specific world view inscribed in them, through the technical and material content of the product. The designer of a product designs with an imaginary of the future; of how a fictive user will end up using the product. As such, certain characteristics are included, foregrounded in the products, while others are not. Moreover, the design of a product includes decisions about what the technology takes care of (e.g., setting temperatures, volume, preferences etc.) and what the consumer should engage with. Consumers interpret these products in different ways, through the process of de-scripting. Some are conformed users that stick to the built-in script of the product, while others are challenging the script.

Scripting and de-scripting have been applied in several food consumption studies. Shove and Southerton (2000) and Hand and Shove (2007) have demonstrated how freezers are scheduling and coordinating domestic practices over time, but that the role of the freezer has changed from a symbol of modernisation in the 1970s to a device of convenience today (Shove & Southerton, 2000, p. 314). Silva (2000) has furthermore identified normative gender expectations in microwave and oven thermometer operation scripts that contributed to reproducing gendered kitchen practices. In her study of the multi-food processor Bimby, Truninger (2011) also shows that scripts also come in the form of pre-defined schemes and instructions for use that are communicated by people. In the case of Bimby, the demonstrations and demonstrators of the food processor were mediating specific norms of how cooking should be done. In the consumer technologies field, Fuentes and Sörum (2019) use scripting to show that ethical consumption apps enable as well as put pressure on consumers to consume what the app defines as ethically. What these studies show is that technologies become means to fulfil goals such as convenience, to be a good cook, or a healthy and ethical consumer, and that these goals become intertwined with the scripts of the technologies. The concept of scripting has been used in design, to improve sustainable designs, services, and products, with the idea that the force, scale, and direction of scripts can be adjusted to the socio-cultural landscape in which it operates (M. Hansen & Hauge, 2017; Jelsma, 2003; Pettersen, 2015; Zachrisson & Boks, 2012).

#### **4. Material and methods**

To empirically study the entanglements of consumption practices and digital technologies for food provisioning, we use data gathered in the research project PLATEFORMS - Sustainable Food Platforms: Enabling sustainable food practices through socio-technical innovation.<sup>1</sup> The project commenced in 2018 with a mapping of digitally enabled food platforms currently to be found in the partner countries; Norway, Germany, Ireland, Sweden and Italy (Oncini et al., 2020), and moved on to conduct

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<sup>1</sup> <https://plateforms.oslomet.no/>

ethnographic case studies of how selected platforms are used and integrated into households' everyday food consumption practices and identify possible reconfigurations of these practices.

Grounded in the practice theory notions that; (i) practices are the smallest unit of analysis, and (ii) practices are interlinked in bundles, our objective has been to study how a variety of intersecting food handling practices were affected by the introduction of online grocery shopping and meal box schemes. To do so, the project developed a methodological toolbox for conducting ethnographic interviews in households. Although there is an ongoing debate on suitable methodologies for practice-oriented studies (Halkier, 2017; Martens, 2012), we agree with Halkier and Jensen (2011) and Hitchings (2012) that ethnographic interviewing can provide expressions of practices and their performances, which makes study participants capable of expressing mundane actions. We aimed for the ethnographic interviews to be informal, meaning that they were unstructured conversations with the households guided by their understanding of how their everyday lives were affected by digital food provisioning technologies. An informal interview form allows for exploring issues distinct to the context we are in, to let the narratives about the food handling practices of that particular family shape the conversation (Spradley, 2016). We developed an interview guide to ensure that we covered what we defined as relevant topics for our study, although it was not used actively during the interviews (see appendix B for the full interview guide).

We sought to connect the families' narratives with the materialities of food handling practices (including the kitchen, the ICT equipment, the food, the recipe books etc.) with a twofold intention. First, to concretize food handling by looking at 'the materialities they engage with' (Sedlačko, 2017). In line with methodological efforts to understand food waste related practices, we argue that engaging with materialities provide highly detailed stories about the rhythms of food handling practices (Cappellini, 2009; Evans, 2014; Mavrakis, 2014; Sobal & Wansink, 2007). Second, to study the specifics of the materials themselves, their design and shape, which practices they followed, when they were actively used and when they were put aside (Evans, 2018; Waitt & Phillips, 2016).

Three techniques were employed to study the materialities of food handling practices. First, we conducted a *kitchen demonstration* where the informants guided the researchers through their kitchen infrastructure including their fridge and freezer, oven, dishwasher, countertop, utensils etc., which was combined with questions of how these were used. We take inspiration from Pink (2009) who shows the importance of the sensory home, in our case how food items smell and taste, or how the kitchen feels to be in. Different versions of kitchen demonstrations have been used in several food consumption studies, including food safety (Jacobsen, 2013; Wills et al., 2015), food waste (Evans, 2014; Hebrok, 2020; Mavrakis, 2014; Ose, 2018), and gender (Meah & Jackson, 2013). Second, we conducted a *digital walkthrough*, which is a demonstration of how the informants typically used the digital platform, including showing its features, connection to other platforms, and technical or other difficulties. This technique has been used to understand the workings of digital technologies as sociotechnical artefacts, identifying design visions, embedded cultural values, everyday use (and non-use) (Light et al., 2018). Third, we *photographed* materialities from the kitchen and took screenshots of how the digital platform was used. Photographing was used to slow down the conversation and focus on one single object and its story (e.g., some dinner leftovers or an online shopping list), while the images provided texture to the data material and are used in this article to make visible the interactions people have with technologies, infrastructures, and food items. Taken together, we argue that these techniques also construct a dynamic rather than static interview situation, where we can actively use the surroundings of the home. Our implementation of the design is presented in the next section.

#### ***4.1. Implementation, data material and analytical strategy***

The Norwegian case study consists of 20 at-home visits to families who use online grocery stores (N=10) and meal box schemes (N=10). Our visits took place between January – September 2020. Between January and March, we visited 10 households who live in or nearby Norway's capital Oslo and who use meal box schemes at least once a month. Due to the covid-19 pandemic, the final 10 interviews with households who use online grocery shopping were conducted digitally in September 2020. These households live in or nearby Oslo, Trondheim, and Kristiansand, which are three large cities in Norway.

The Norstat recruitment agency was responsible for the recruitment of all the informants. We sought to cover a variety of age groups, family compositions, and gender. Although each interview had one main informant, other household members would join in for parts of the conversation, sometimes for the full interview. Appendix A displays an overview of the participating families, with key characteristics and the data collected.

The digital interviews were conducted using a version of Zoom that has been authorised by the Norwegian Council for Research Data. All the digital interviews were in the form of a video conference between a researcher and an informant who was sitting at home in their kitchen. The video was recorded after approval from the informant. All the informants signed a written consent form either at the time of the visit (10 face-to-face interviews) or via email (10 digital interviews). The form included a separate section giving consent to the use of photographs in dissemination activities.

During the digital walkthrough, the informants showed the researchers how they used the digital platform by simulating an order in the app or on the webpage. We sought to understand the interactions between the digital platform and the physical infrastructure of the kitchen (such as using the platform to make a shopping list based on the food in the fridge and the freezer), as well as how the use of a digital service might affect the way they stored, cooked, ate, and disposed of their food (such as portioning, types of meals, division of responsibilities within the family, transport and so on). To engage further with this, we also conducted a kitchen demonstration including a 'fridge study' (Heidenstrøm & Hebrok, 2021). Here, we asked the informants to show us how they organised their kitchen, focussing on storing food in cupboards, the fridge and freezer. Moreover, we were shown how the kitchen was used when cooking, including appliances, recipe books, utensils, and the organisation of the kitchen. We rummaged through the fridge with the informants, looking at leftovers from yesterday's dinner, an opened jar of now mouldy salsa, packages of ham and cheese, frozen bread and vegetables, and asking them to tell us about these items. Where did they come from? Did they have a plan for them? Was this how the fridge usually looked?

In the digital interviews, the informants used their mobile phone, tablet, or laptop to film the kitchen while they conducted the kitchen demonstration, and we believe it was completed similarly as in the face-to-face interviews. Digital walkthroughs were more difficult to complete. It was possible to share screen in Zoom, but it was not possible to conduct a dynamic dialogue with the informants at the same time. In the face-to-face interviews, the digital walkthrough spurred interesting discussions about the details of the platform. We were shown how they typically navigated the site, which buttons they pressed, search words and phrases and so on, as well as what features they did not use and why. We were shown how they managed the box meal subscription, lists of products they would typically buy, as well as other apps that were linked to food acquisition such as online shopping lists, coupon apps from grocery stores, takeaway restaurants, and delivery services. In the digital interviews, we had to rely on more specific questions about the use of the platform, without aid from the walkthrough.



In the first ten interviews, we tried out a 'photo diary'; photos taken by the informants of food handling contexts in the week before the interview (Novak, 2010). However, the diary did not work as we planned. In some cases, the informants forgot to do it, in other cases the images were what we might call 'Instagram friendly', adapted to fit their ideal of food handling, which is interesting but not within the scope of our project. Instead, the researchers photographed and filmed the use of apps and webpages, kitchens, fridges and freezers, appliances, and food items during the kitchen demonstration and digital walkthrough in the face-to-face interviews. The digital interviews were fully video recorded. Figure 1 shows examples of how the researchers and informants engaged with materialities during the interview.

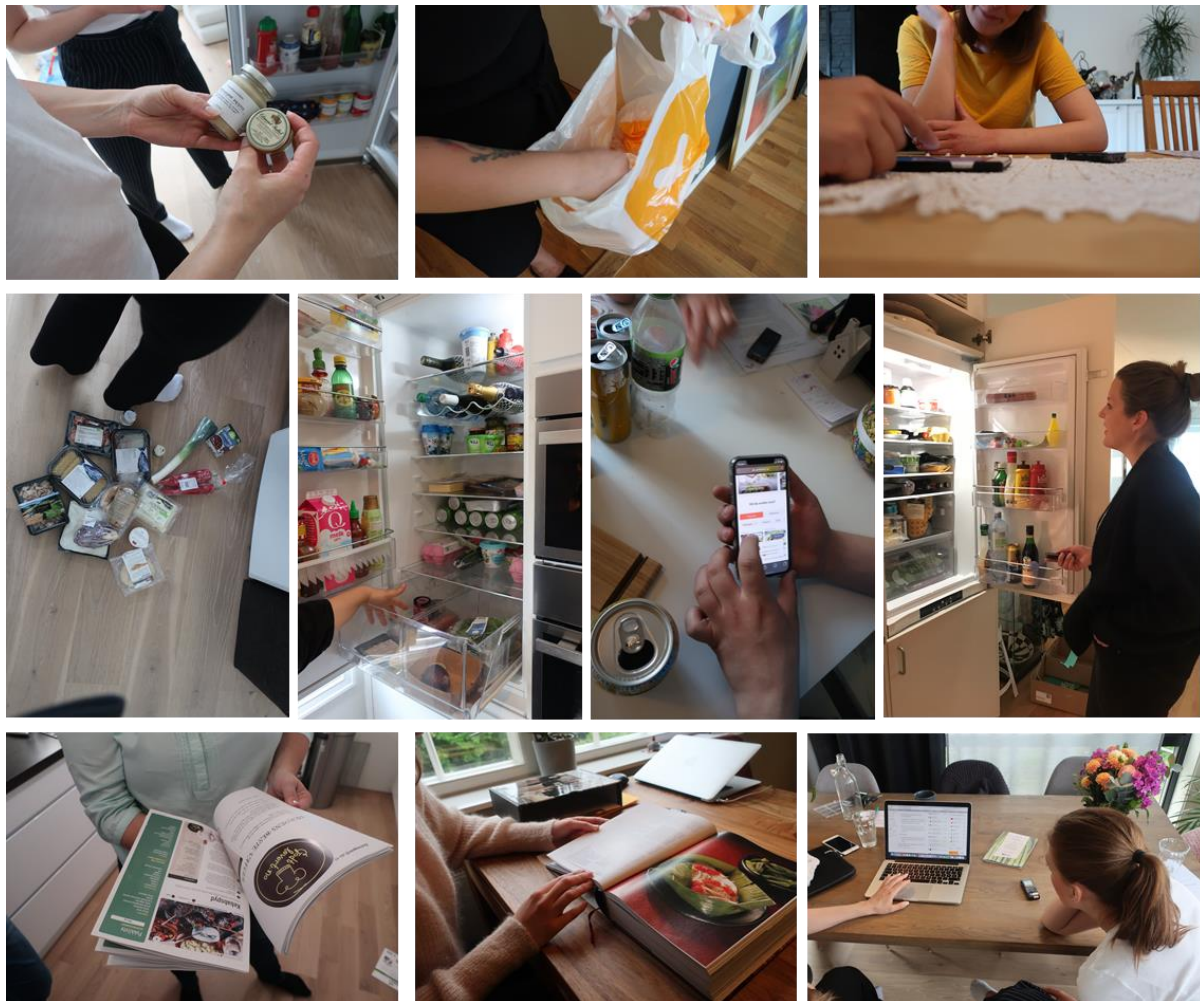


Figure 1: Kitchen demonstrations and digital walkthroughs (Photographs taken by the authors)

The overall data material consists of audio and video recordings, and images. All recordings were fully transcribed and then coded using the Nvivo software. A three-step coding process was used. First, the research group discussed themes that had emerged in the interviews. Based on this discussion, the second step included a set of theoretically informed codes, such as 'scripts', as well as thematic codes such as 'a proper meal'. During the coding process, more codes were added. Two researchers coded the material and read through the codebooks. In a third step, codes were grouped in broader analytical categories.

#### 4.2. Digital food platforms and the covid-19 pandemic



On Thursday 12. March 2020, the Norwegian government implemented restrictions to minimize the spread of the SARS-Cov-2 virus. These included the closing of schools and kindergartens, all sports and culture events, bars and restaurants, and travel restrictions abroad as well as on public transport. Grocery stores remained open, however. As was the case in many other countries, Norway experienced a brief period of hoarding in the days after the implementation of the first restrictions. Results from a representative survey conducted by Consumer Research Norway between 12.-16. March 2020, shows that 84 per cent bought dry goods and 40 per cent bought toilet paper to be prepared in case of a complete shutdown (L. Berg, 2020). During this period, the use of digital food platforms such as meal box schemes and online grocery shopping exploded. The two largest meal box scheme suppliers reported a growth of 290 per cent in new subscribers in March, and the largest online grocery store reported an order increase of 250 per cent. Due to the overload of orders, all suppliers had longer delivery times and a reduced product range.

Several studies have registered a reduction in self-reported amounts of food waste during this time, attributing this effect to changes in food handling practices related to more time spent within the home keeping on top of food supplies, more meticulous planning of meals and purchases, less frequent shopping, and reduced financial resources (Amicarelli & Bux, 2021; Principato et al., 2020; Rodgers et al., 2021).

Our interviews with meal box scheme users were conducted right before the shutdown, the final interview was completed on 3. March, and did not include questions about the pandemic. In the online grocery shopping interviews conducted in September, the pandemic quickly became a topic of discussion. All the informants used online grocery shopping during the pandemic. Some of the informants had started provisioning for food through online grocery services during lockdown because they wanted to avoid going to the physical store in fear of contagion. Others were already using an online platform regularly or had restarted using it during the first wave of the pandemic. The newcomers had continued their relationship with their chosen platform after the lockdown because they had established new routines for food provisioning, and some had experienced not only convenience but also substantial reductions in their monthly expenditure on food. The informants described how they worked to adapt to a new situation where they needed to plan for meals weeks ahead, and at the same time think of stocking up on basic food items such as flour, pasta, cereals, etc. This resulted in much larger orders than usual.

## 5. Results

In this section, we present our findings on whether and in what ways meal box schemes and online grocery shopping influence already existing food consumption practices. In the subsequent section, we discuss barriers and opportunities related to realizing the sustainability potential inherent within these digital platforms for food provisioning.

### 5.1. Meal box schemes

In 2019, the PLATEFORMS project registered 27 suppliers of box schemes in Norway, four of which are represented in our data material (Oncini et al., 2019).<sup>2</sup> Although some suppliers offer fruit and vegetable boxes, the *dinner meal* box scheme is by far the most widespread. Generally, suppliers offer the service of planning dinner for you. As such, it is a service with a script that aims to reconfigure the practice of

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<sup>2</sup> The four box schemes represented in the material are 'Adams matkasse' and 'Godt Levert', which are the two biggest suppliers, and two smaller suppliers, 'Kokkeløren' and 'Kolonihagen'.

dinner by moving some of the work associated with planning, purchasing, and cooking outside the household. Figure 2 shows two screenshots from Adams matkasse (left image) and Godt levert (right image), the two largest suppliers of meal box schemes. Adams matkasse markets their service as an aid in the kitchen, with the slogan ‘Adam helps you succeed in the kitchen’, while Godt levert markets their service with ‘Freedom to *not* have to choose, ...or to choose your dinners’.

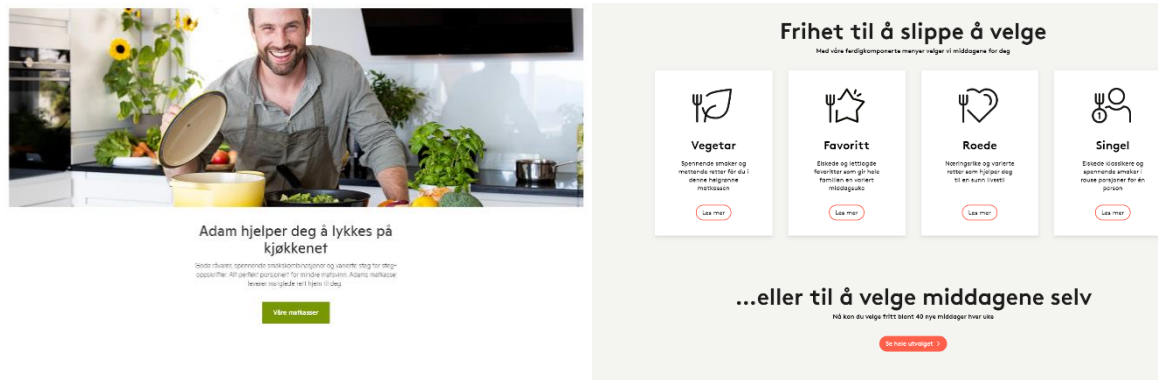


Figure 2: Screenshots from [adamsmatkasse.no](http://adamsmatkasse.no) and [godtlevert.no](http://godtlevert.no)

The meal box is ordered through an app or a website and contains from 2-5 meals per week with pre-portioned ingredients and a recipe booklet with instructions. Fuentes and Samsioe (2020) point to the meal box scheme as a heterogeneous market device of artefacts and people, including the digital platform, the box itself, the food items, recipe booklet, and the scripts manifested in these materialities. In the following, we explore the task of integrating meal box schemes in existing routines, and how the meal box scripts the dinner meal.

### 5.1.1. Tweaking, rhythms, and flexibility

When ordering a meal box consumers choose between several different schemes (categories include healthy, vegetarian, inspiration, express, and family), or in some cases put together their own menu. The box must be ordered, or the subscription must be paused or stopped, approx. six days before the delivery day. These rules produced a certain planning rhythm for the families that needed to be maintained (Southerton et al., 2012). Sometimes they forgot that they had an ongoing subscription and did not stop it in time, and sometimes they forgot to order. Consequently, many of the families ended up ordering the meal box occasionally without a fixed rhythm, as this discussion demonstrates:

Interviewer: *Do you have a running subscription, or?*

Informant: *No, because if you keep it running then you will get the meal box every week, and we only want it every other week. So, then we must remember to cancel it every other Tuesday.*

Interviewer: *Do you always remember to?*

Informant: *No, we don't. Then we have had to cancel and not have it for a few weeks before we bother to order it again. So, it has not been that regular (Household 2).*

As previous research has shown, for a subscription of meal box schemes to be integrated in existing food handling practices it has to be tweaked into a format that suits the families (Fuentes & Samsioe, 2020; Hertz & Halkier, 2017). Finding their way through such tweaking was key for use over time. Another form of tweaking was that of portioning, as this informant from a family with two small children described:

*When we ordered for four people, then there were too many leftovers. A lot was left over. Because we were only able to finish two portions, even though we are four people. But when we order three portions for four people, then it usually works fine.*



*Figure 3: Leftovers in the fridge of household 1 (photograph taken by the authors)*

Tweaks using the digital platform included changing the number of meals they would order each week, the number of portions in the box, the type of scheme and type of meals, and delivery time. It was not always successful and resulted in periods of not using the meal box at all because it was too much work to make all the adjustments. As Lehtonen (2003) has pointed to, trying to integrate new technology into existing routines is a set of trials and errors.

Unsuccessful tweaking of their subscription and tweaking of how they portioned and used the meal box ingredients resulted in a sense of less flexibility. The lack of flexibility was a major reason to discontinue the meal box subscription for many of the families. One of the informants said that: *'(...) If I would do meal box schemes, I would have to know what I would do each week, and I don't, especially now in the summer holiday'* (Household 4). Halkier (2021) argues that handling the planning and organising flexibility is a key skill in using meal box schemes and that it should be seen in relation to the temporal rhythms of other practices. Finding and connecting family members' timeslots for planning, preparing and cooking dinner was more challenging with the meal box. Hebrok and Heidenstrøm (2019) also find that flexibility is an important skill to reduce household food waste. Long-term planning (e.g., for a full week) is shown to create more food waste than short-term planning (2-3 days), more frequent visits to the grocery store and fewer pre-planned dinners.

Although most of the informants indicated that the meal box scheme was difficult to incorporate into their existing routines, such as timing and coordination of leisure activities for children, different dietary needs and wants, or sudden changes in their weekly schedule, once it had passed the tweaking phase, the box scheme took over many of the tasks associated with dinner. One of these tasks was planning. Interactions with the company's digital platform were kept to a minimum in families that regularly ordered the meal box. As this informant expressed, it was the whole point of the service:

*The box scheme service offers more choices now than it did before. You can go to the app and choose each meal. However, we don't use that function because then we would have to be creative [in planning dinner] and dinner would be boring.*

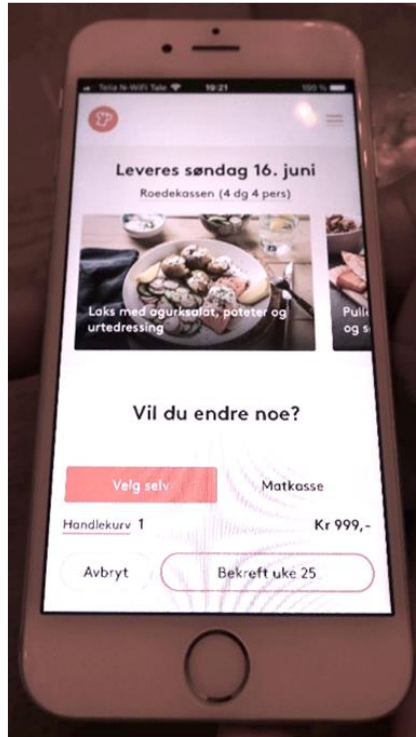


Figure 4: Household 6 showing the meal box scheme app (photograph taken by the authors)

Their chosen subscription with a predefined meal plan set by the company was automatically renewed. Planning dinner was then performed by the company. It is, of course, also a marketing strategy used by the company. For some box schemes, there is even a small fee for switching meals or delivery days. Going from the tweaking and trial to incorporating the scheme in the informants' everyday food handling also required making sense of what the dinner meal should be, or the normative meaning of dinner.

#### 5.1.2. Scripting and de-scripting a 'proper dinner'

For the families in our study, one main motivation for using meal box schemes was to have a 'proper dinner' during the weekdays. According to them, a proper dinner should be healthy and consist of different types of vegetables, fish, or meat (not processed meat) and rice, bread, or potatoes. One of the informants provided these descriptions about what constitutes a proper dinner for her: *'My husband thinks I am a bit picky, and perhaps I am, but I want variation, and I want the dish to be, in a way, it should be a good dish. I can eat almost anything as long as it is correctly composed'* (Household 1). However, proper was defined by more than ingredients. It should be a hot meal, and the family should eat it together at the dinner table. Ideally, the proper dinner should be homemade from 'scratch' (Murcott, 1982; Warde, 2016; Yates & Warde, 2017). The meal box scheme was considered an aid in successfully cooking and serving this proper dinner for the family. This can be exemplified with an informant that talked about what they ate when they did not order the meal box: *'I think it was a lot of*

*pasta, and not a lot of pizza, fish balls<sup>3</sup>, that sort of thing, that we buy when we do not have a meal box'* (Household 4), implying that these are ready-made, non-healthy and not proper dinner alternatives.

However, there was a significant difference between a proper weekday and a proper weekend dinner. The meal box scheme was never used during weekends. The typical box scheme would include 3-4 meals that were usually eaten from Monday to Wednesday or Thursday. The informants ordered the box to arrive on Sunday evening, all set for the upcoming week. One of the informants showed us a picture of their weekend dinner, which was not from the meal box:

*We often have steak on Saturdays, a 'steak Saturday'. I usually try to check out some new recipes and make some new sauces. I really like trying out new sauces and side dishes*

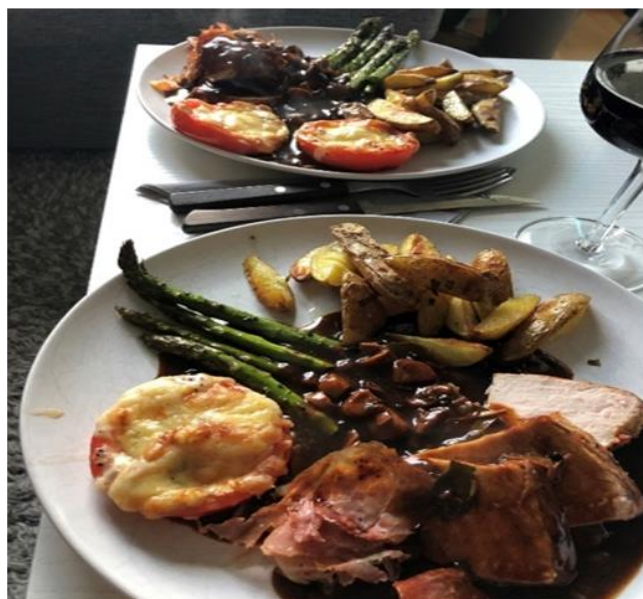


Figure 5: A weekend dinner from scratch (photograph taken by household 9)

The weekend meals from Friday to Sunday followed a completely different logic. The Norwegian traditions of 'taco Friday' and 'pizza Friday' (Bugge, 2005, 2019) are deeply rooted in the meal rhythm and marked the beginning of the weekend. On Saturdays and Sundays, more time was freed to cook, and the meaning of a 'proper' dinner changed. Instead of health and variety, a proper weekend dinner took time to make, consists of more expensive ingredients (like beef), and was eaten later in the evening or with friends and extended family. Although the meal box has the potential to affect the practice of dinner, it did not affect the performance of the weekend dinner practice because of the strong cultural norms of what that should be.

All the box schemes were delivered with a booklet that included recipes and information about the food, and that also advised users when to eat which meal. Figure 6 shows some of the booklets that were delivered with the meal box. The booklets included cooking tips, time use such as 'fastest dish of the

<sup>3</sup> Fish balls is a traditional Norwegian dish made from white fish, flour, and milk, that is shaped into a meatball shape. The share of fish is often low (approx. 50 percent), especially in ready-made alternatives.



week', and recommendations for when the dishes with short shelf life should be eaten. As fish had the shortest shelf life, many informants ate fish on Mondays and Tuesday, even naming them 'fish days'.

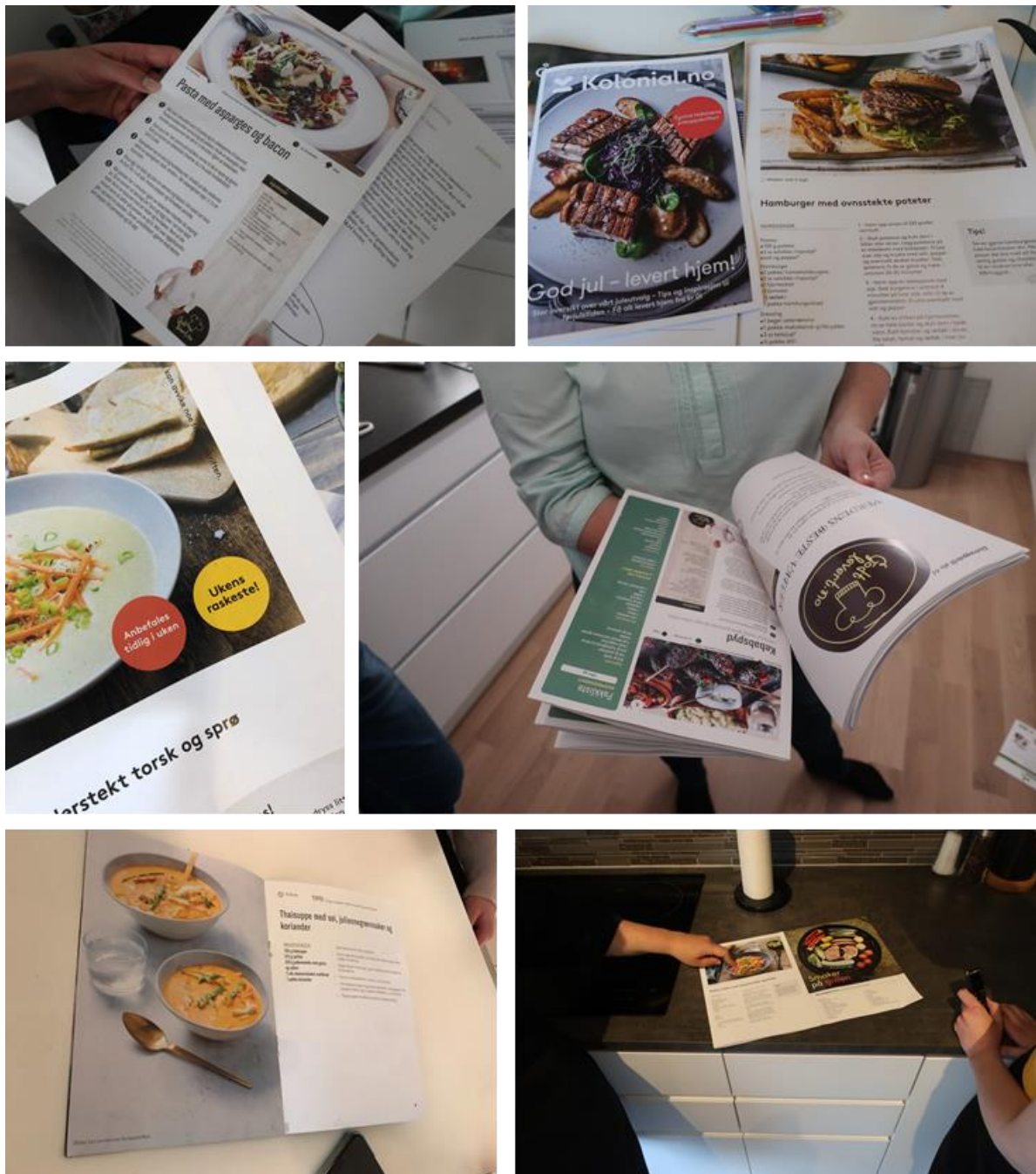


Figure 6: Meal box scheme booklets (photographs taken by the authors)

The cooking procedure described in the booklet was also followed rather rigidly by most users. It made cooking more effective and with less involvement. Cooking, then, was more 'mechanical' with box schemes. One of the informants talked about the way she cooked today's dinner:

*Today the food was not good. It was pork with tzatziki spices and yoghurt and red onions and leeks and potatoes. You were supposed to mix all those things, and then fry a head of lettuce in the frying pan. But it was too much onion, it was not good. (...) The disadvantage with this is that I could have said to myself that I should not add that much onion, but I do not think when I cook these dinners. I just do it.*



Figure 7: Today's dinner in household 4: Recipe booklet hanging over the stove (photograph taken by the authors)

The most common motivation for using meal box schemes was to get new and inspiring dinners and not have to come up with a dish and purchase ingredients themselves. The booklet worked differently than a recipe book. Most of the informants also had these and described the recipes as a source of inspiration perhaps for a dinner party or special occasion but not something they used actively, as this informant explained when we were looking at her recipe books:



*Some I could throw out and some I use a bit more. I use them periodically, but not as actively now. I have more than these. There are some nice recipes. (..) But now I am so tired of cooking.*



Figure 8: Recipe books in the kitchen in household 7 (photograph taken by the authors).

One of the informants talked about the difference between grocery shopping in-store and using the box scheme with the booklet:

*The meal box often contains things that I would not consider putting together myself. Then I would have had to search recipes and stuff, I do not know if I would have done that. No, if I had done my shopping in the grocery store, it would have been different dinners, yes (Household 7).*

The recipe booklet took over some of the work of planning and cooking by providing inspiration and motivation for cooking the proper weekday dinner, as well as made the cooking process predictable. This partial automation process provided by the meal box and particularly the booklet can be seen as de-skilling consumers in the same way convenience foods has been criticised for doing, for example in public health policy (Halkier, 2021). However, some of the tasks that require cooking skills and that were shifted from consumers to the meal box scheme, such as portioning a meal and weekly meal planning, have the potential to significantly reduce food waste. We know that a large share of household food waste in Norway comes from dinner leftovers - approx. 30 per cent (Stensgård et al., 2019).

Interestingly, sustainability, for example in the form of reduced food waste, reduced meat consumption, vegetarian or vegan meals, or organic products, was completely absent from the informants' descriptions of the proper dinner, as well as from their motivations for using the meal box scheme. It was not mentioned once in the interviews. When asked directly, all the informants agreed that sustainable food consumption was a good thing, but most were reluctant to change their meal box scheme subscription to for example a vegetarian alternative. One informant talked about marketing of sustainability and said that:

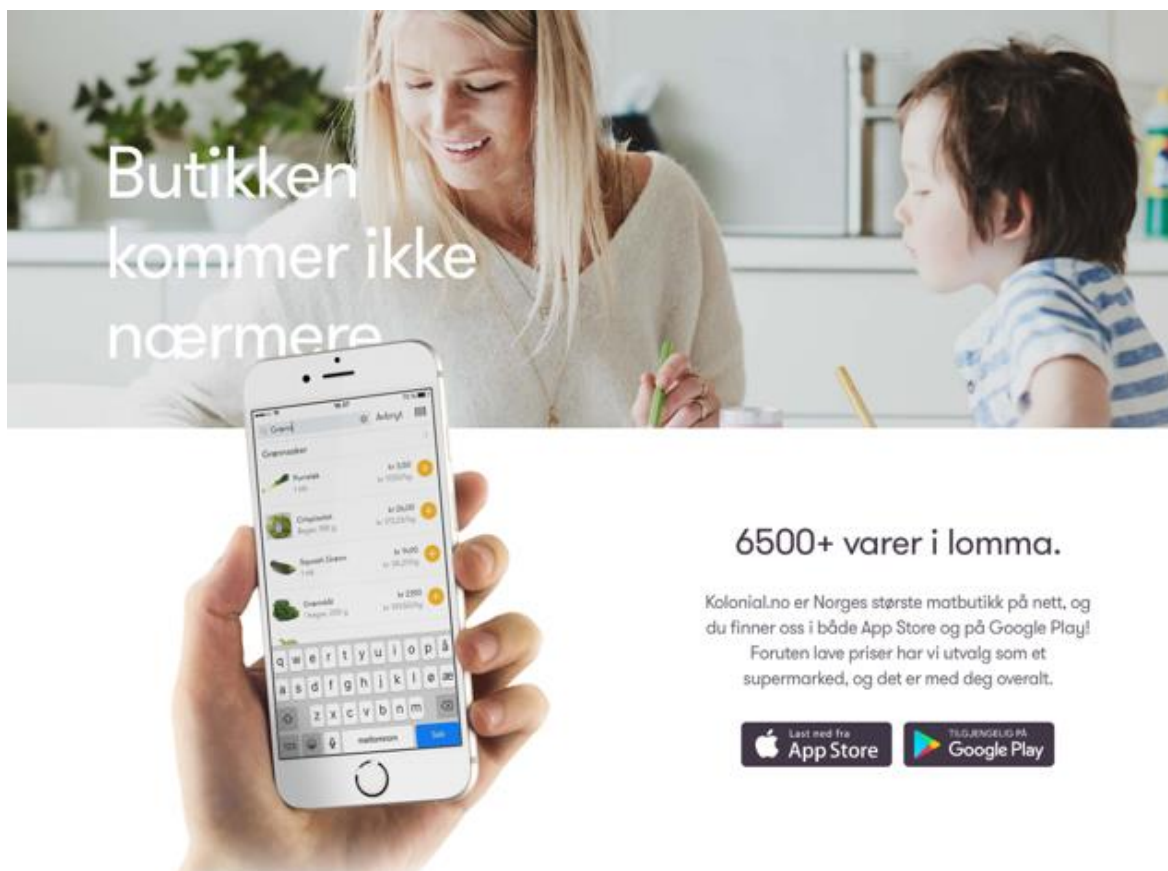
*I would not buy it [a more sustainable meal box], mostly because it is marketed as climate-friendly and environmentally friendly, and ecological. Then, I get more reluctant to try it. Had it been presented as an exotic dish, a trendy thing, then I would be willing to try (Household 2).*

A study of eco-friendly lifestyles has shown that sustainability itself is not appealing enough to shift consumption habits and that so-called egoistic concerns would more likely contribute to shifting habits (Herziger et al., 2020). Marketing a service as trendy by referring to ideals not linked to sustainability, might then contribute to more sustainable shopping patterns.

## 5.2. Online grocery shopping

In Norway, 2019, the PLATEFORMS project identified 10 online supermarkets and 44 online niche stores delivering food to Norwegian consumers. This article focuses on two of the online supermarkets, which are represented in the data material; kolonial.no and meny.no. Kolonial.no is a purely online service, while meny.no is the online service of a physical grocery store chain. The online grocery market is growing in Norway, in 2017 11.6% of Norwegian consumers provisioned for groceries online – this was double the number in 2016 (Nielsen, 2017). Currently, the online grocery market stands for 1,1 % of the total turnover of the Norwegian food retail market (Dagligvarehandelen, 2020).

As shown in figure 9, kolonial.no focuses strongly on the convenience aspect of the service in its communications towards the consumer, sporting slogans such as ‘The store doesn’t come closer’ (translated from the image below). Its competitor, meny.no, communicates home delivery more as an added service. This illustrates the different perspectives of the two actors, where one is portraying itself as ‘the grocery store of the future’, and the other is firmly rooted in the conventional physical space of grocery shopping. Nevertheless, the online experience of using the two different services is more than similar.



The advertisement for Kolonial.no features a woman and a young child in a kitchen setting. The woman is holding a smartphone displaying a grocery list. The text 'Butikken kommer ikke nærmere' is overlaid on the image. Below the image, there is a hand holding the smartphone, showing a list of items: 'Purusk', 'Chips', 'Sesamlied', and 'Dressing'. To the right, the text reads '6500+ varer i lomma.' and 'Kolonial.no er Norges største matbutikk på nett, og du finner oss i både App Store og på Google Play! Foruten lave priser har vi utvalg som et supermarked, og det er med deg overalt.' At the bottom, there are logos for the App Store and Google Play.

Figure 9: Screenshot from [kolonial.no](https://www.kolonial.no).

Online grocery shopping is made digitally available to consumers through a website and an app. The architectures of these digital tools are close to identical between the different services, relying on widespread software for online shopping. In this way, switching between services is made to be effortless.

There are mechanisms in place that make it most convenient to stick to one service over time, although in most cases, location will decide the choice of service, as they are unevenly available across the country. Some examples of mechanisms that support convenience for consumers are the constant tracking of purchase history which enables prompts to buy 'what we think you need' and saving personal shopping lists:

*On the first page, you can go to saved shopping lists, and then you also have the list of what you bought on the previous order, and then there are these small pop-ups saying 'we think you need this'. (...) So, I actually use all these three to decide what to order. It's almost frightening how much information they have about my shopping (Household 7).*

As illustrated by the quote above, informants use the information and prompts provided by the online platform to make their online shopping more convenient, and less time-consuming. These features can be seen as scripts that are structuring food practices in terms of how much and which food items they are purchasing. More importantly, these and other features of online grocery stores, which we will discuss in the next section, are influencing whether and how they are integrated with existing routines.

#### 5.2.1. *Reproducing in-store purchases and existing online stores*

The similarity between the digital architecture of online stores makes entering online grocery shopping particularly easy for those who are already familiar with online shopping in general. Online grocery shopping is also the digital mode of provision that most closely resembles the conventional analogue way of shopping for food, which is in the physical grocery store. Consumers seem to navigate in similar ways online and offline, in terms of how they browse for products (Benn et al., 2015). Furthermore, it is a way of shopping that consumers are accustomed to using digital shopping platforms for the purchase of other consumer goods, such as clothing, furniture, appliances, and electronic products (Gregson et al., 2002). Consequently, it is the online platform that seems to be most easily integrated as a way of provisioning food. Once the groceries have been delivered, nothing new is demanded of the consumer, who can go about storing, preparing, and eating the food as normal. This stands in contrast to the way box schemes demand the reconfiguring food practices in terms of how the food is acquired, how it is stored, and how it is prepared.

Nevertheless, our study finds that certain reconfigurations of food practices can be found within the households of online grocery shoppers as well. The most prominent reconfigurations are connected to the way purchases are planned, the characteristics of food items purchased from online stores (and those who are not), and the way prices and discounts are monitored. Furthermore, and in line with box-scheme users, informants distinguish qualitatively between weekday meals and weekend meals. Online purchases are most often for the preparation of weekday meals, while the weekend meals are somewhat more elaborate made from ingredients purchased in more high-end physical stores. However, the online grocery store *kolonial.no* seeks to fill this gap in its offering by adding store-in-store concepts such as ‘Mathall’ (The food court), shown in figure 10.

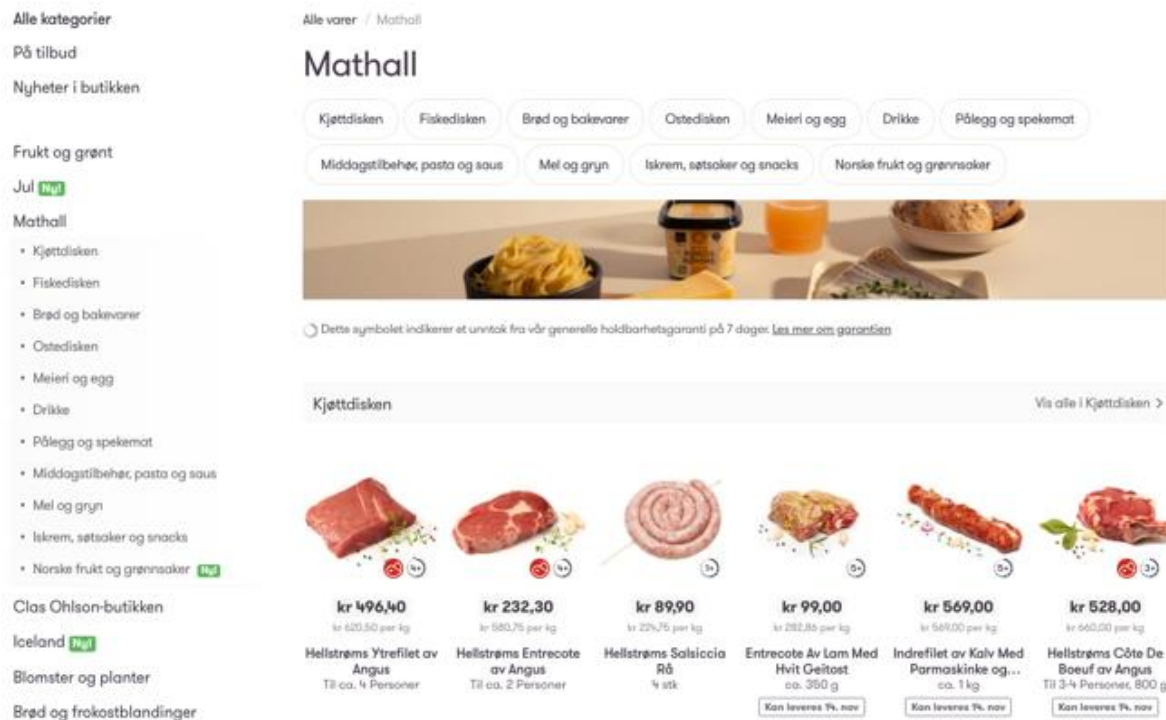


Figure 10: Screenshot from the Mathall (Food Court) pages at [kolonial.no](https://kolonial.no).

When clicking on this entry in the menu bar in the online store you get redirected to a list of subcategories such as ‘the meat counter’, ‘the fish counter’, ‘the cheese counter’, ‘bread and bakery’, etc. Here you can find the more exclusive range of food items otherwise found in high-end grocery stores and delis. The images above show how these online counters look. The presentation of products, and the search option provided by online stores, make it easy to compare similar products in terms of basic information such as price per kg and nutritional content. In this way, relevant information about the environmental aspects of food could also become more visible to the consumer. This can induce consumers to make different choices than in a physical store. However, we do not find consumers to make more sustainable choices online than offline.

### 5.2.2. Shopping from the kitchen increases convenience and saves money

We find that the physical act of shopping online is much more connected to the materiality of the home, in particular of course the kitchen and the stock of food that is stored within its cupboards, fridge, and freezer. Our informants describe their shopping routines as incorporating checking current stocks of food to identify needs and adding items continuously to the online shopping cart in between purchases

when detecting that they already have or are soon running out. Furthermore, using the information the online service is tracking about frequently bought items to be reminded of what they might need.

*(...) on Wednesday or Thursday, we get food delivered, and when I have got it in the cupboards, I have an overview. Then I add the rest, so then I usually go to a page where you see often bought items, and then just go through there and use it as a reminder and then I add what I need, check cabinets, see if I really need it, or if we will soon be empty of it. And when we start to run out of things (...) that triggers that we order new (Household 1).*

Informants are also describing how the digital architecture of online grocery shopping enables effective monitoring of prices and special offers. By searching for categories of products the service produces a list of items and prices that are very easily comparable. In this way, informants find themselves saving money. Moreover, several claim to buy less food than before, both because of the increased comparability of prices, and because they refrain from spontaneously throwing something in the cart that was not planned for.

*(...) that was the reason why we started using it, because you should not go searching (for food). You should buy what you need, and if I go and look for things, I will always find something. And then it becomes much more expensive and such, (...) we are trying to cut down on impulse buying because of that. We went from 6000 (NOK) to 4000 (a month spent on food after starting to do grocery shopping online) (Household 6).*

Others quite enjoyed monitoring prices and bargains and used it to structure the way they interact with the platform, timing purchases according to the release of new offers.

*(...) I sat there and enjoyed myself with the coffee and was picking out special offers. It is exciting to see what is on offer (...) so on Sunday I pick the offer items (...) And then there are new offers often on Thursday, so then we check in there on Friday and then send the order usually on Friday or Saturday (Household 1).*

The quotes above illustrate some of the ways the digital architecture of online grocery stores contribute to reconfiguring parts of food handling practices, such as planning, spending, purchasing, and storing, by providing scripts that are accepted and enacted by consumers.

### **5.3. The locality of material and digital infrastructures for food provisioning**

Meal box schemes and online grocery shopping services take place within a particular geographical space, within the material infrastructure of the kitchen, and it connects with other modes of shopping such as in-store purchases (Gregson et al., 2002). Bissell (2020) argues that the use of digital platforms is reshaping consumption practices in cities. The data material in this study was mainly collected in an urban context (see appendix A for details). Our findings indicate that the store density in the local area impacted the use of meal boxes and digital grocery shopping. When the families could buy their dinner from the grocery store located 50-100 meters from their homes, using box schemes and online grocery shopping felt less flexible. One of the informants who lives in central Oslo said that: *'I am not sure whether we are going to use it [digital grocery shopping] in the place we live now. We have the store right down the road, and then it is almost no point to it'* (Household 10).

Informants who were using online grocery stores described how they usually plan weekly purchases from their preferred online store, and then supplement these purchases with items bought in local stores.

*My shopping has almost become automated, I go straight to the shopping list that is there (saved online), put everything in the shopping cart, and then add what we need in addition or remove what we don't need. (...) What we buy in the (physical) stores is just what we cannot find at Kolonial. Often fruit, because I'm a little picky about it, and Kolonial doesn't specify the different varieties. I and my children are very like; I know what pears they like, I know what sort of apples I want, it's not just red apples but specific sorts of apples, and grapes, so that's what I most often shop in the store, specific varieties. And maybe certain types of brands that Kolonial doesn't have (Household 7).*

As illustrated by the quote above, the supplement items acquired from physical stores are typically ones that are not available in the online store, or that informants wish to inspect physically, such as fresh vegetables and fruits, fish, and meat.

The kitchen infrastructure also played a part in how localization influenced food provisioning. Small urban apartments have smaller fridges and freezers (most often a combined fridge/freezer unit), smaller kitchens with less storage space, and no storage in booths. Informants who live in the city centre also used the grocery store as a 'storage unit', and would visit the store daily, sometimes several times a day. An informant living in a small apartment in central Oslo talked about how the kitchen infrastructure influences her shopping routines:

*We don't shop very large quantities each time (...) I think that it is so bad when it is messy [in the kitchen]. You know, when the fridge, when you completely lack an overview of things. And could have spent half of the money you spend on food. So, I gladly pay more when I shop more often and eat all of it. I really hate it when there is stuff on the counter, like the bread over there. It was an impulse buy, that focaccia.*



Figure 11: The kitchen in household 3 (photograph by the authors)

This finding resonates with the argument made by Waitt and Phillips (2016) of how food consumption is closely linked to organising and de-cluttering in the kitchen. Here, it does not necessarily produce more food waste, but it results in more trips to the grocery store. However, some families using the box scheme argued oppositely. They had found a way to use box schemes regularly because of the high store density in their local area. Then, dinner was taken care of by the box scheme. In addition, they supplemented with groceries from the local store, which many of the informants referred to as 'small shopping', just a few items, like this informant said, while showing us her fridge:





Figure 12: Household 4's fridge (photograph taken by the authors)

In summary, we find that both box-scheme users and online grocery shoppers routinely supplement their online purchases with purchases from local physical stores. Box scheme users do it by necessity because the box scheme only provides them with dinner, and not with the ingredients needed for other meals, such as breakfast. Online shoppers do it to get access to food items and brands not provided by their online service, to assess fresh products physically and visually, and to supplement the online order when something runs out, or in the context of special occasions, such as having dinner guests. As such, neither of these services are used exclusively by consumers to cover their total food consumption.

Although our study shows that using meal box schemes and online grocery stores change what the consumers buy in-store, these services do not significantly reduce the total number of trips to the grocery store. As mentioned earlier, Kolonial.no seems to be working to reduce this 'leakage' towards the local physical stores by offering store-in-store concepts that make the high-end gourmet part of the food market available to its customers. Furthermore, by engaging in collaborations with other store concepts such as Clas Ohlson, which is a store for household appliances, electronic devices, ironware, lighting, and much more. Kolonial.no does also seem to be attempting to reduce the same leakage towards box schemes as they are providing their customers with recipes that can easily be composed into a weekly meal plan, and the ingredients needed for those recipes are put in the cart by a few clicks.

**6. Discussion: barriers and opportunities for realizing the sustainability potential of online food provisioning services**



So far, we have shown how online food provisioning services get entangled in everyday food practices. In this section, we discuss our findings in terms of barriers and opportunities for achieving the sustainability potential that online provisioning services have. In table 1, we have summarised and detailed the identified barriers and opportunities according to key food handling practices that could, through the use of digital food services, be changed in a more sustainable direction.

**Table 1: Barriers and opportunities of meal box schemes and online grocery shopping**

Food handling practices	Barriers	Opportunities
<b>Meal box schemes</b>		
Planning	<ul style="list-style-type: none"> <li>The weekly meal plan is rigid, quickly becoming unattuned with unexpected events</li> </ul>	<ul style="list-style-type: none"> <li>More flexible ordering opportunities (i.e., ad hoc ordering and cancellations)</li> <li>Integration with personal calendars</li> </ul>
Acquisition	<ul style="list-style-type: none"> <li>Not providing food for all meals (breakfast, lunch, snacks)</li> <li>Difficult to adjust subscriptions and portioning</li> <li>Not choosing sustainable subscriptions (vegetarian, organic)</li> </ul>	<ul style="list-style-type: none"> <li>Collaboration with online retailers to provide a complete service</li> <li>More flexible ordering opportunities</li> <li>Broaden the offer of sustainable options</li> <li>Increase incentives to choose the sustainable options</li> <li>Make all options sustainable (the default), reducing the responsibility of the consumer to make the sustainable choice</li> </ul>
Transport	<ul style="list-style-type: none"> <li>Trips to the store taken to buy the food needed for other meals (breakfast, lunch, snacks)</li> </ul>	<ul style="list-style-type: none"> <li>Collaboration with online retailers to provide a complete service</li> </ul>
Storage	<ul style="list-style-type: none"> <li>Too much food delivered at the same time of which some would expire if not following the right order of consumption</li> </ul>	<ul style="list-style-type: none"> <li>More frequent deliveries using electrical vehicles, or other forms of none emitting transportation</li> </ul>
Cooking	<ul style="list-style-type: none"> <li>Too much food in the box</li> <li>Disliking and subsequent wasting of ingredients</li> <li>Not good enough for weekend dinners</li> </ul>	<ul style="list-style-type: none"> <li>Introducing subscribers to new (more sustainable) food products and meals</li> <li>Including a more elaborate meal labelled as the weekend dinner</li> </ul>
Disposing	<ul style="list-style-type: none"> <li>Did not change the overall level of food waste regardless of pre-portioned ingredients.</li> </ul>	<ul style="list-style-type: none"> <li>Increase choices related to portion sizes</li> <li>Enable subscribers to opt out on certain ingredients (i.e., spices, chutneys, etc.)</li> </ul>
<b>Online grocery shopping</b>		
Planning	<ul style="list-style-type: none"> <li>Online shopping does not influence planning of meals</li> </ul>	<ul style="list-style-type: none"> <li>Ordering from home gives better control over food stocks and what you need - explicitly encouraging this practice could reduce over purchasing</li> </ul>
Acquisition	<ul style="list-style-type: none"> <li>People want to assess the quality of fresh produce physically and visually</li> <li>They buy the same products as they would have in-store</li> <li>No incentive to choose more sustainable products</li> <li>It becomes very easy to compare prices, making price (and not environmental issues) the guiding parameter</li> </ul>	<ul style="list-style-type: none"> <li>Ensure good experiences with receiving high quality fresh produce</li> <li>More visible communication of sustainability parameters connected to each product</li> <li>Making it easy to compare sustainability parameters between products</li> </ul>
Transport	<ul style="list-style-type: none"> <li>Top up trips to the store reduces the gain of less transport</li> </ul>	<ul style="list-style-type: none"> <li>Improve logistics to enable smaller ad hoc deliveries without increasing the impact of transport</li> </ul>
Storage	<ul style="list-style-type: none"> <li>Because of delivery prices and perceived time gains, ordering large batches of food at a time has become custom, leaving people with restricted storage facilities at home less interested in the service</li> </ul>	<ul style="list-style-type: none"> <li>Reduce or eliminate the cost of delivery</li> <li>Improve logistics to enable smaller deliveries without increasing the impact of transport</li> </ul>

Cooking	<ul style="list-style-type: none"> <li>• Only in the case of consumers using the online recipes offered were the types of meals cooked affected</li> </ul>	<ul style="list-style-type: none"> <li>• Increase communication of sustainable recipes online</li> </ul>
Disposing	<ul style="list-style-type: none"> <li>• Did not change the level of food waste</li> </ul>	<ul style="list-style-type: none"> <li>• Enable more frequent deliveries of small quantities of fresh products with low shelf life</li> </ul>

The food provisioning services in our study market themselves as sustainable alternatives with the potential to reduce transport emissions, reduce food waste through better portioning and planning, increased use of organic products and vegetarian meals, and information about sustainable choices on their websites and apps. What can be taken from the considerations of barriers and opportunities presented in table 1, is that although both box scheme and online grocery store services can be seen to provide both infrastructure and technology that could, in theory, influence food practices to become more sustainable - this potential is currently not unleashed. However, by seizing the listed opportunities, we could move closer to the realization of such a potential.

As previously noted, none of the informants in our study used box schemes or online grocery stores as means to make pro-environmental choices. Previous studies of fruit and vegetable box schemes have shown that box schemes marketed as sustainable were used by already active and aware consumers that were motivated to reduce the environmental impact of their food consumption (Brown et al., 2009; Hashem et al., 2018; Terragni et al., 2009). One of the key elements of this realization is thus to use these platforms for food provisioning to make sustainability the default choice, and to facilitate convenient ways of keeping track of domestic food stocks, and the organization and portioning of meals. Flexibility needs to be built into the platforms to avoid the failure of rigid systems crashing with the occasional fall outs of the rhythms of everyday life.

Convenience, saving time and money, and reducing the mental load of organizing proper meals, are the primary motivations of the informants in our study. A common feature for the two platforms is that they market their service as timesaving and efficient. This means that even though sustainability is not at the core of the service at this point, there might be a potential to offer more sustainable alternatives within the framework of timesaving, thrift, and efficiency. Since online grocery shopping is scripted in a way similar to physical stores, requiring fewer adjustments to existing food acquisition practices than meal box schemes and alternative food networks, we suggest that scaling up these kinds of digital food platforms that mirror existing food acquisition practices rather than aiming to create new (and more sustainable) ones, could be a fruitful trajectory towards creating more sustainable food systems and practices in the future. This suggestion is also a more general observation made by research on the sharing economy (Hamari et al., 2016) and food consumption (Grunert et al., 2014), that many people are not engaged in issues of sustainability in a way that motivates them to make substantial changes in their existing routines.

## 7. Conclusions

This article has explored under what conditions two online platforms for food provisioning, meal box schemes and online grocery shopping, could change food consumption practices and whether these changes may contribute to more sustainable food consumption. We conclude that online food provisioning has the potential to change household food consumption in a more sustainable direction, but that in their current form – they are not fulfilling this potential in any significant way. Based on our findings, we make the following overall recommendations for businesses and policymakers wanting to contribute to achieve the sustainability potential of digital food services:

- *Co-design to align scripts with needs*: The intended use of a digital technology for food provisioning does not necessarily correlate with how it is used by consumers at home, who are in many cases and for several reasons, circumventing the intended script. Consumers are far from passive agents; they operate and adjust digital technologies according to their social world. Hence, future innovations should be co-designed with consumers to align scripts more closely with their needs.
- *Focus on convenience*: Sustainability may not be a concern for the users of these services; however, more sustainable consumption patterns can be achieved through the desire for convenient and efficient grocery shopping and providing a proper meal for the family. Food services should thus develop new scripts, which make it convenient to engage in sustainable food practices. Such scripts could for instance be related to navigation, shopping lists, delivery frequencies, and labelling.
- *Acknowledge the interrelatedness of consumer practices and focus on context*: It is important not to focus on single practices (i.e., acquisition) but to include the entire context in which they exist (everyday life) when developing services and policy measures to reduce the environmental impact of food consumption.
- *Scaling up online grocery stores is the lowest hanging fruit*: We argue that in a short-term perspective there is greater potential in upscaling online food services that mimic some of the practices of the offline version of them than there is for services requiring more substantial changes within established food practices.

The above recommendations also serve as input to future research endeavours. Future research should further explore how the scripts embedded within digital food services can be developed to efficiently contribute to more sustainable food consumption. By considering the key findings presented in this article, concerning how consumers interact with digital food services as well as how these services become integrated or not in the practices of everyday life, we believe future efforts can become more fruitful.

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## Appendix A – Overview of data material

id	Household members*	Platform(s) used	Geographical context	Interview context
1	<b>Woman</b> (36), man (41), four children (0,3,6,8)	Meal box scheme Online grocery shopping	Detached house in suburban area. Access to 6-7 grocery stores within walking distance	At home interview, 1 hr, 52 min recording, 90 photographs, Photo diary
2	<b>Man</b> (34), man (40), child (5)	Meal box scheme	Apartment in central urban area. Use 3-4 grocery stores within walking distance, restaurants, and food court	At home interview, 1 hr, 18 min recording, 11 photographs, 1 video, Photo diary
3	<b>Woman</b> (32), man (36)	Meal box scheme Online grocery shopping	Apartment in central urban area. Use 3-4 grocery stores within walking distance, restaurants	At home interview, 1 hr, 20 min recording, 41 photographs, Photo diary
4	<b>Woman</b> (34), man (40)	Meal box scheme	Semi-detached house in suburban area. Use 2 grocery stores within walking distance, 1 takeaway restaurant	At home interview, 1 hr, 13 min recording, 65 photographs, Photo diary
5	<b>Man</b> (29), woman (29), child (5)	Meal box scheme Online grocery shopping	Semi-detached house in suburban area. Use 2 grocery stores within walking distance	At home interview, 1 hr, 3 min recording, 34 photographs. Photo diary.
6	<b>Woman</b> (46), <b>man</b> (53), <b>son</b> (18)	Meal box scheme	Semi-detached house in suburban area. Use 1 grocery store within walking distance, and 5 grocery stores within 10 min driving	At home interview, 1 hr, 52 min recording, 52 photographs, Photo diary
7	<b>Woman</b> (51), <b>Man</b> (55), child (14).	Meal box scheme	Detached house in urban area. Use 4 grocery stores within walking distance	At home interview, 1 hr, 38 min recording, 52 photographs, Photo diary
8	<b>Man</b> (47), children (5,7)	Meal box scheme Online grocery shopping	Detached house in suburban area. Use 2 grocery stores within walking distance	At home interview, 1 hr, 40 min recording, 36 photographs, Photo diary
9	<b>Woman</b> (38), man (42)	Meal box scheme	Apartment in urban area. Use 2 stores within walking distance	At home interview, 1 hr, 5 min recording, 59 photographs, Photo diary
10	<b>Man</b> (63), woman (53), children (20)	Meal box scheme Online grocery shopping	Apartment in central urban area. Use 5-6 stores within walking distance	At home interview, 1 hr, 10 min recording, 21 photographs, Photo diary
11	<b>Woman</b> (35), man (42), child (3)	Online grocery shopping	Semi-detached house in suburban area. Use 1 shop within walking distance	Digital interview on Zoom, 1 hr, 1 min recording, video of kitchen tour
12	<b>Man</b> (24), living with parents (unknown age)	Online grocery shopping	Apartment in central urban area. Use 4-5 shops in walking distance	Digital interview on Zoom, 44 min recording, video of kitchen tour
13	<b>Woman</b> (52), man (unknown age)	Online grocery shopping	Detached house in suburban area.	Digital interview on Zoom, 41 min recording, video of kitchen tour
14	<b>Woman</b> (35), man (unknown age), child (11)	Online grocery shopping	Detached house in urban area. Use 6-7 shops within walking distance	Digital interview on Zoom, 43 min recording, video of kitchen tour
15	<b>Woman</b> (40), man (unknown age), children (3,6)	Online grocery shopping	Semi-detached house in suburban area. Use 3-4 grocery shops within walking distance	Digital interview on Zoom, 48 min recording, video of kitchen tour

16	<b>Man</b> (43), woman (unknown age)	Online grocery shopping	Apartment in urban area. Use 3-4 grocery shops within walking distance	Digital interview on Zoom, 28 min recording, video of kitchen tour
17	<b>Woman</b> (48), man (unknown age), children (13,8)	Online grocery shopping	Detached house in urban area. Use 2-3 grocery shops within walking distance	Digital interview on Zoom, 1 hr, 1 min recording, video of kitchen tour
18	<b>Man</b> (52), woman (unknown age), two teenage children	Online grocery shopping	Detached house in suburban area. Use 2 grocery shops within driving distance.	Digital interview on Zoom, 1 hr, 5 min recording, video of kitchen tour
19	<b>Man</b> (58), woman (55), child (19)	Online grocery shopping	Detached house in suburban area. Use 3 grocery shops within driving distance	Digital interview on Zoom, 1 hr recording, video of kitchen tour
20	<b>Woman</b> (44), man (50), child (17)	Online grocery shopping	Apartment in urban area. 6-7 grocery shops within walking distance	Digital interview on Zoom, 44 min recording, video of kitchen tour

\* Interviewees marked in bold

All quotes are marked with id number, the informant's age, and gender.

## Appendix B – Platforms interview guide

Version A) If the photo food diary is detailed and contains enough material the interview can begin by asking about the photos and work in the questions of the interview guide.

Version B) If the photo diary is useful but not detailed enough to structure the interview around then begin with the questions and integrate questions about the photos when relevant.

### 1. Introduction of interviewee

Would you please introduce yourself briefly and tell us something about you and your household?

(If version A)

Let us have a look at your pictures - please describe your daily activities regarding food acquisition and eating!

### 2. Food shopping/provisioning

Can you tell me about the last time you shopped groceries?

- When/what/where/who
- (If captured in photo diary use the material)
- How did you plan that shopping trip?
- shopping performance – at the store (online/offline) – variations
- after shopping – bringing grocery home/receiving grocery
- after shopping evaluations of shopping

Can you give me another example of a recent shopping trip?

- (See above)

What would you say is a typical (grocery) shopping week for you?

How would you say that [x type of shopping] is different from [y type of shopping]?

Do you have any other way of acquiring food? Could you tell me?

- (Give examples, sharing, growing your own etc.)

### 3. Eating

Can you tell me about the last meal that you had?

- When/what/where/who
- (If captured in photo diary use the material)

Can you give me another example of a recent meal?

- When/what/where/who
- (If captured in photo diary use the material)

Can you tell me about breakfast/lunch/dinner/snacks?

- When/what/where/whom

- (If the informants do not eat breakfast/lunch/dinner/snacks ask why)

Would you characterize this (breakfast/lunch/dinner/snack) as a “proper” meal? What would a proper meal entail?

#### 4. Cooking

Can you tell me about the last meal that you cooked/prepared?

- When/what/where/whom
- (If captured in photo diary use the material)

Can you give me another example of a recent meal you cooked/prepared?

- When/what/where/whom
- (If captured in photo diary use the material)

Who does the cooking in the household? Does this change according to schedule? Has it changed over time?

Would you characterize yourself as a skilful cook?

How/when/where/from whom did you learn to cook?

#### 5. Storing food

Where and how do you store your food? Can you show me please?

- Where is it placed – cupboards, fridge, other?
- When is it placed there?
- Principle of organization

#### 6. Disposing of food

What happens with leftovers?

(How preserved or included into new meals)?

#### 7. Platform specific questions

[these questions must be formulated specifically for the platform/pipeline under study – also when digital these questions could be combined with the digital walkthrough]

Can you tell me about the last time you used [*Name of the platform*]?

- When/what/where/whom
- (If captured in photo diary use the material)

What did your food provisioning looked like before you were using [*Name of the platform*]?

Which other channels of food provisioning are you using? Can you tell me about those?

Why are you using exactly this platform – what is it offering you?

*Further topics to consider:*

- Frequency, connection to other activities
- Influence of money, time, availability of products

## **8. End**

Do you think the way you acquisition and prepare food has an influence on matters of sustainability?  
If you could change one thing regarding your food acquisition and preparing what would that be?  
Do you have any other issues or thoughts before ending the interview?