# Digitally enabling sustainable food shopping: App glitches, practice conflicts, and digital failure

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# Digitally enabling sustainable food shopping: App glitches, practice conflicts, and digital failure

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ABSTRACT

New digital food platforms are being launched accompanied with the promise of also promoting more sustainable food consumption. However, despite some success, many of these efforts to digitally reconfigure consumers food practices fail. The aim of this paper is to empirically explore, conceptualize and explain such failures. Taking a practice theory approach, and drawing on a field experiment using the Karma app – an anti-food waste app – the paper shows that the inability of this app to promote a new way of acquiring food is due to glitches - app failures of different sorts - but also practice conflicts. Two types of practice conflicts, practice *mismatch* and practice *competition,* make the fostering of a new sustainable food provisioning practice difficult.

## 1. Introduction

New digital food platforms are being launched often accompanied with the promise of also promoting more sustainable food consumption. Examples include digitally enabled meal box services (e.g., hello fresh), food sharing apps (e.g., Olio), the digital enabling of local food markets (e.g., Reko-rings) and digital platforms that aim to reduce food waste by re-selling meals (e.g., Too Good To Go). What all these efforts have in common is that they are aimed at developing new forms of acquiring food. In a sense, these digital devices are developed with the aim to promote new modes of sustainable food shopping. However, as we know from previous research, promoting sustainable food shopping is not an easy task (Fuentes et al., 2019). Everyday habits and routines surrounding food are particularly difficult to change. Food shopping is often closely connected, not only to cooking and eating, but also to wide range of other everyday practices involving work, child care, and social engagements (Dyen et al., 2018). So while studies show that digital platforms are increasingly becoming incorporated into consumers everyday practices and routines (Elms et al., 2016), their success cannot be taken for granted. Many of the efforts of these digital food platforms to change consumers everyday food consumption fall short. How and why is this so? What can we learn from these failures?

There is now a growing body of literature that examines how digital devices are used to enable sustainable or ethical consumption practices. Studies have, for example, explored how QR codes can promote sustainable purchases in-store (Atkinson, 2013), examined how blogs work as key intermediaries, translating complex sustainability issues into hands-on advice on how to consume sustainably (Joosse and Brydges, 2018) or discussed the potential of online communities in promoting sustainable consumption, showing how these online spaces enable the dissemination of environmental knowledge and environmental dialogue (Rokka and Moisander, 2009). More critically, some have argued that these types of devices only serve to reproduce neo-liberal consumption subjects and can thus never truly be subversive (Humphery and Jordan, 2016; Kuehn, 2017).

Both critics and advocates of the digitalization of sustainable consumption tend to assume that these technologies, as long as they are accepted by consumers, will be successful in promoting more sustainable modes of consumption. The performativity of these digital devices is taken for granted and seldom empirically explored. This assumption is problematic. If we are to understand the digitalization of sustainable consumption and the role that these types of digital intermediaries can play, we will need to understand both how and under what conditions these digital platforms shape consumption, as well as how and why they fail to do so in other cases.

The few studies addressing the issue of digital failure show that the digital devices designed to encourage and enable new sustainable modes of consumption are often incompatible with consumers' everyday practices (Hargreaves et al., 2018). At times, this can be due to the immutability of the digital device, making it difficult for apps to be

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"worked into" consumers' complex everyday lives and changing practices (Fuentes, 2019). However, failure can also be due to consumers being unable to perceive how valuable the digital tool is to their consumption projects (Sörum, 2020).

Against this backdrop, the aim of this paper is to contribute to our understanding of digitally-enabled sustainable consumption by empirically exploring and conceptualizing a specific case of digital failure. Drawing on a pragmatic field trial of the Karma app – a food waste reducing app - and applying a shopping-as-practice approach, this paper investigates the socio-material complications behind the failure of this sustainable consumption app.

In the analysis that follows, we show that app glitches, practice mismatch, and practice competition make in some cases the fostering of a new mode of sustainable food shopping difficult or impossible. The new mode of sustainable food shopping being promoted and enabled by this digital food platform is incompatible with the existing food practices and everyday routines of the consumers in our study.

The paper is arranged into four sections. The first section outlines in more detail the practice theory approach being taken to conceptualize the work of digital devices. The second section describes the pragmatic field experiment that the study is based on. This is then followed by an analysis of how and what kind of practice the Karma app tries to promote, and the problems encountered when this app is introduced into consumers' everyday lives. The paper ends with a discussion of the theoretical and practical implications of this analysis.

## 2. A practice theory approach to food shopping and its digital reconfiguration

While practice theory has made great headway in the field of consumption, redefining how we view consumption and redirecting our focus away from the conspicuous towards the inconspicuous, and from the spectacular to the routine (Geels et al., 2015; Spaargaren, 2011) shopping has seldom been at the centre stage in practice theory studies. The redirection from the conspicuous to the inconspicuous, from symbolic to practical aspects, and from the spectacular to the routine has also been accompanied by a move from acquisition to use.

Despite this, there is now a growing field of studies that approaches shopping from a practice perspective (Bulmer et al., 2018; Elms et al., 2016; Fuentes, 2014; Tran and Sirieix, 2020). As other practice theory influenced studies, shopping-as-practice studies see practices as the basic unit of analysis and consider the social as made up by a web of social practices. In this context, shopping is seen as a set of doings and sayings focused on the "procuring many of the goods and services consumed in the course of other practices" (Röpke, 2009, p. 2495).

Practice theory offers an alternative to the prevailing psychological-economic and socio-cultural approaches to shopping (Fuentes, 2014; Tran and Sirieix, 2020). Rather than decision-making processes, attitudes, or symbolic value, the shopping-as-practice approach puts emphasis on the practical, routinized and material aspects of shopping (Elms et al., 2016). Practice theory influenced studies of shopping are interested in how shopping is performed, how it practically and materially plays out, what competence and skills are involved, as well as the multiple and often contradicting cultural dynamics involved. Following this vein, the practice of shopping is here, drawing on the resources of practice theory (Reckwitz, 2002), conceptualized as a set of bodily and mental activities, involving and interconnected through its basic elements; competence, meanings, and materiality (Fuentes et al., 2019). Accordingly, we can expect that food shopping, as a specific subset of the practice of shopping, will involve specific competences (e.g., how can one tell if food is fresh, were can one find good prices, what types of foods go together), meanings (e.g., what counts as "good" food in a given context, what is sustainable food, what meals are appropriate for a given social event) and materials/practical aspects (e.g., kitchen equipment and its cooking affordances, storage space, economic means).

More specifically, in this paper, we take a shopping-as-practice approach to explore if/how a digital device – in this case a digital platform and smartphone application designed to promote a novel and arguably more sustainable mode of food acquisition – reconfigures food shopping. Drawing on this theoretical framework, we treat the Karma case as an attempt to establish an alternative form of food shopping, involving a specific set of materials, meanings and competencies. Of particular interest here, then, is; a) the work of the digital device, b) the unfolding Karma practice, and c) its connection with other practices.

This paper takes a distinct socio-material practice approach. In our analysis, we treat digital devices as a generative practice element. While there is no consensus on the role of devices or materiality in practice theory, some streams have been drawn, influenced in part by developments in science and technology studies, towards treating devices as active participants in practices, granting them at least some agency (Gherardi, 2017). From a socio-material perspective, devices/-things/artefacts/materialities play an active part in the reproduction of practices (Preda, 1999). A device – e.g. a smartphone application – is thus not merely a passive tool to be used in shopping practices, but an active co-performer of that shopping practice. Devices, such as trolleys, smartphones, and price stickers have agency in the sense that they matter to and shape the practice of shopping; they make some actions more possible than others (Cochoy, 2008; Kelsey et al., 2019).

One assumption made during much socio-material research is that devices (or artefacts) come with scripts, programmed plans of actions, which are built into their make-up and which are read, or de-scribed, by users (and scholars) (Akrich, 1992). This becomes, then, a form of socio-material language used to translate prescribed actions into performed actions; it is a way of materially influencing practice. Its use can be read by users of a similar cultural background. A shopping trolley, an artefact that was not in use before the transition to self-service in the 1940s (du Gay, 2004), is today "read" similarly by shoppers of different cultures and backgrounds, enabling, as a result, a specific mode of shopping. Likewise, a smartphone app that is designed to enable a set of shopping actions, comes with a programme that can be "read" by users (Fuentes and Sörum, 2019).

Much, however, can change during this translation and as devices are de-scribed the way they are used often comes to differ from the script. The performativity of the devices is then realised in sets of specific practices, in which the device configures practices but is also configured by them. An app designed with one objective in mind can be repurposed for a completely different use, as is for example the case when message apps, such as Facebooks messenger app, are used to sell local food or other goods, thus becoming informal market apps. This means that, to understand the performativity of a specific device – a smartphone app for example – you can not only study its design and marketing, you have to also study how it is used in practice and how it performs practice (Fuentes and Sörum, 2019).

Adding complexity to this issue is the fact practices do not exist in isolation. They intersect and interact. They often go together in blocks or nexuses, and can be parallel or overlapping, tightly or loosely coupled (Fuentes et al., 2019; Hui et al., 2017). Practices are sometimes complementary and at other times compete (Spurling, 2018), and they can be held together by the materialities involved, the competencies required, or the meanings attached to them (Mylan, 2015). More specifically, in the case of food, numerous studies have illustrated how various food practices – shopping, cooking, eating, and disposing – go together in blocks or chains and are often tightly interlinked, one dependent on the other (Dyen et al., 2018; Evans, 2012). These studies also show that food practices are linked to, and patterned by, a broader set of non-food practices and everyday routines connected with other issues, e.g. the work schedule, family composition, geographical area of the household etc (Dobernig and Schanes, 2019; Gojard and Véron, 2018; Plessz et al., 2016). Because of this complexity, mismatches in practices are common and to be expected. Evans (2012), for example, showed how a number of mismatches between food provisioning and eating resulted in the generation of food waste, with households, for

example, buying more fruit and veg, aspiring to healthy eating but not managing to incorporate these food items into their everyday cooking routines.

In sum, the establishment of a new practice is a complex accomplishment. For a practice to be routinized it has to be performed recurrently and faithfully (Southerton, 2003). Changing the elements of a practice or unsuccessfully interlinking them will lead to the disruption of the practice. As will mismatches between practices. Taken together, this suggests that both the linkage between practices and the linkage between the elements of a practice is important when establishing a new practice. More specific for this study, this means that in order to understand how devices perform we must therefore understand the type (or types) of practice they materially-semiotically enable as well as how this practice connects with other practices. With this objective in mind, understanding the situations or cases in which there are mismatches of practices is just as important as understanding more successful examples of practice performance and coordination.

Drawing on these insights and concepts, our analysis will discuss both how a digital device – the Karma app – attempts to enable and encourage a specific practice – a mode of food acquisition – and how this practice fits (or not) into the food practice nexus of the participants.

## 3. A pragmatic experiment: the case of Karma

The Karma app, launched in 2016 in Sweden, provides a platform that enables restaurants, cafés, and food stores to sell unsold food that would otherwise have to be discarded to consumers at reduced cost. The aim, the company claims, is to reduce food waste and contribute towards more sustainability. At the time of writing, Karma claims to have over 500,000 users and to sell food from more than 2000 restaurants, cafés and food stores. This platform is in use in 150 Swedish cities and towns, making it the largest food app in the country that focuses on sustainable consumption. The size and coverage of the app on the Swedish market makes it appropriate as a case for studying how a digital device can potentially changes sustainable consumption practices. The Karma app was thus chosen because it was a successful and interesting case of the digital promotion of sustainable consumption.

Our analysis is based on what we refer to as a pragmatic experiment: we asked a group of consumers to use the Karma app in their everyday lives for a week and then studied the outcome through ethnographic interviews (Spradley, 1979) and digital observations. This approach draws on the growing body of work that carries out and argues for the usefulness of experiments or interventions in understanding everyday practices and how these can be changed (Devaney and Davies, 2017; Jalas et al., 2017; Kaljonen et al., 2019). In this study, we set out to combine the logic of the field experiment – which intends to test a set of relationships in a real-world setting - with the ambition to go beyond simplistic causal relationships and understand practice-in-context using multiple methods. Our pragmatic experiment is thus an effort to understand how actions and their meaning are changed. The idea is that, by taking a contextual perspective, an understanding can be gained of the possibilities, problems and mechanisms involved in changing specific practices (see also, Mylan, 2015). The study conducted was, by necessity, a form of short-term ethnography (Pink and Morgan, 2013); it did not seek prolonged participant observation, nor total immersion in the field of study. Rather, it set out to put a very specific set of actions into motion –the use of the Karma app– and to document how these unfolded in the lives of the participants, both during and directly after the field experiment. In addition, direct observation of the practices carried out was not possible as it would have entailed the simultaneous shadowing of multiple participants. Instead, to solve the problem of not being able to be at multiple places at the same time to follow the action, the participants were enrolled as ethnographers of their own lives (Czarniawska, 2007) and asked to document their use or non-use of the apps in notes and screenshots and to tell about this in interviews.

To understand the Karma app – its design and marketing – we conducted a series of digital observations closely examining the Karma app and its multiple functions, carefully reading and trying out the app. Digital observations were also conducted of the Karma webpage, and Karma's social media accounts on Facebook. The observations were carried out between the 1st of March and the October 28, 2019. All the digital observations were documented using screenshots. The goal was to understand what kind of food practice the Karma app was encouraging and enabling, as well as how and with what resources it went about doing that. Starting out from the understanding that digital devices, like all artefacts, have a script prescribing certain actions (Fuentes and Sörum, 2019), we systematically read the "script" of these multiple digital devices in order to understand what activities they have enabled and in what way they have framed these as meaningful to consumers. This has produced a dataset consisting of more than 250 screenshots from these various digital devices.

To explore the use of the Karma app, and its ability to reconfigure everyday practices, we asked 14 informants to test the app for a period of seven days. The informants were recruited via personal networks and informant referrals. The informants were recruited from Stockholm and Malmö – two of the three largest cities in Sweden and the two cities where the Karma platform has the strongest presence in terms of the food and users available. The informants varied in terms of their age, occupation, type of household, previous experience with digital food shopping, and dietary preferences (see Table 1 for details).

As can be discerned from Table 1, many of the participants were young (in their 20s) and lived by themselves or with a partner but without children. Many of them had a university education and all of them had experience from online shopping, although not always extensive previous experience with online food shopping.

Many of the informants had previously used the Karma app but were not regular users, almost all of them had either heard of or read about the app and had a basic understanding of its concept. The informants were asked to document their use via screenshots and to also reflect on how the app worked and how well it fitted into their lives. The screenshots were collected during the interviews. The participants were asked to try the app but they did not have to use it to purchase food. Informants were guaranteed anonymity and pseudonyms are therefore used in the table above and the quotes below.

The interviews were conducted directly after the trial period. Eleven interviews were conducted in person and three via Skype (due to difficulties with the participants' schedules). The interviews lasted between 45 and 60 min, and were transcribed in full. They were designed to explore both use and non-use of the Karma app and, more broadly, the participants' everyday food practices. The questions asked addressed the use of Karma and the participants' everyday food practices and views on food sustainability. Drawing on previous practice theory food consumption research the interviews were designed to cover a number of themes deemed relevant including, but not limited to, general food routines, views on food waste, views on sustainability and food as well as specific situation in which the app was used. As is common in ethnographic interviewing (Spradley, 1979), each theme included an opening "grand tour" question and a number of possible follow-up questions to ask if needed.

In addition, a digital walkthrough was conducted during which the interviewers and participants jointly "walked through" the apps and their multiple functions (for a similar approach, see Fuentes and Sörum, 2019). The participants were asked about the use of specific functions in the app, as well as the problems and opportunities associated with the various functions. This enabled us to gain a better understanding of the digital use details, which are otherwise difficult to talk about during regular discursive interviews. The screenshots taken by the participants were also collected during the interviews. These included images of purchases made. Finally, a short follow-up e-mail interview was conducted with the participants two weeks after the trial period had ended. This brief inquiry was intended to investigate their continued use of the Karma application.

**Table 1**
Study participants.

| Participants | Age | Occupation | Type of household | City | Other digital food channels used | Special dietary preferences/food allergies |
|---|---|---|---|---|---|---|
| Olle | 22 | Salesman | Lives alone | Stockholm | Online grocery shopping | Intermittent fasting |
| Ludvig | 26 | Accountant | Lives with partner | Stockholm | Orders take-out online | None |
| Matilda | 27 | Journalist | Lives alone | Stockholm | None | Vegetarian/nut allergy |
| Emelie | 24 | Student | Lives alone | Stockholm | None | Ecological/low calorie |
| Isabell | 33 | Digital strategist | Lives with partner and children | Stockholm | Tried online grocery shopping | Eating more vegetables |
| Johan | 25 | Student | Lives with partner | Stockholm | Orders take-out online | None |
| Sara | 24 | Construction engineer | Lives alone | Stockholm | Orders take-out online | Vegetarian |
| Ella | 25 | Student | Lives with a friend | Malmö | Online grocery shopping | None |
| Klas | 26 | Engineer | Lives alone | Malmö | Food aggregator app | None |
| Jennifer | 24 | Shop assistant | Lives alone | Malmö | None | Lactose intolerant |
| Alexandra | 27 | Student | Lives with a friend | Malmö | Some online grocery shopping | Vegetarian |
| Anton | 26 | Student | Lives with partner | Malmö | Some online grocery shopping/take-out | None |
| Joakim | 25 | Student | Student hall | Malmö | Orders take-out online/Meal boxes | None |
| Lina | 24 | Shop assistant | Lives alone | Malmö | None | Eating more vegetables |

As has been made clear in past research, this type of experimental strategy has its drawbacks (Fuentes and Sörum, 2019). It urges consumers to use apps that they would otherwise perhaps not use. It also means that the participants have limited experience of using the app. Conversely, the benefit of this strategy is that it produces first-hand data on the use of a specific app, data that is recent and thus easier to account for, allowing us to overcome some of the difficulties of studying technology use in everyday life.

Once it was clear that the Karma app had in our pragmatic experiment failed to become part of consumers' everyday food practices, the overarching question became: Why did the Karma app fail? Our analysis was inspired by the procedures of the constant comparative method (Charmaz, 2006) and categories were developed from the empirical material but structured using the practice theoretical framework, outlined in the previous section. More specifically, our analysis was developed over two rounds. The authors took turns coding, analysing and writing comments. In the first round the analysis was done manually. In the second round Nvivo was used to further refine the categories and relations between them. Both interview transcripts and screenshots were analysed in this way. We identified a number of situations in which the app failed and then moved on to code and analyse how and why it had failed. The categories generated are presented below and illustrated using quotes from both interviews and the written material collected as well as screenshots. The interview quotes included in the analysis below were transcribed from Swedish to English by a professional language editor and checked by the authors.

## 4. Karma in everyday life: a short story of failure

Once the study had been designed, our expectation was that Karma would be successful in recruiting the consumers in our study into this new mode of food acquisition. However, while most of the participants in this study supported Karma's mission of reducing food waste, and were positively-inclined towards this app, few of them had managed to integrate it into their everyday practices. Karma had failed to encourage and enable a new mode of sustainable food shopping. While the Karma app has be proven to be successful in other cases, even successful apps fail at times. What we are interested in exploring in this paper is why the Karma app was, under certain conditions, unsuccessful. Below, we discuss the multiple reasons behind the failure of this digital device. We begin, however, by presenting and closely examining the app itself and its socio-material script.

### *4.1. The work of the karma app: promoting a sustainable mode of food acquisition*

The app is designed to encourage and enable a new and arguably sustainable mode of food acquisition. The Karma slogan: "Buy good food at half price! Stop good food from being thrown away!" encapsulates this app's mission. This new way of shopping for food offers consumers an opportunity to save money and combat food waste while also getting good food at the same time. If consumers scroll down the webpage, they will then be able to read:

> Every year, 1.3 million tonnes of food are thrown away in Sweden.
>
> The food thrown away corresponds to emissions of 2 million tonnes of CO2.
>
> About half of this is food waste – good food that could have been eaten.
>
> (www.karma.life)

As has been noted in previous research, defining an established practice as problematic while also offering an alternative is a common first step in trying to make space for an "innovative" and sustainable practice (Jaeger-Erben, Rü;ckert-John, & Schäfer, 2015). Here, Karma focuses on the problem of food waste, a sustainability problem that has gained considerable attention in the public debate, in policy discussion and in sustainable consumption research (Dobernig and Schanes, 2019; Evans, 2012; Hebrok and Heidenstrøm, 2019). The Karma app and its website highlight the problem of food waste and its multiple environmental consequences for consumers, while concurrently offering the app and service as a solution to that problem.

The solution is very easy and convenient, the app promises. Just follow three simple steps: (1) download the app to browse for food which is going to be discarded, (2) rescue food for half the price, and (3) pick it up as take away and enjoy (www.karma.life). More specifically, consumers are told that, by buying edible food at a discount from food venues (restaurant, cafés and grocery stores) forming part of the Karma supplier network, they will be consuming both economically and sustainably. However, for this to work, consumers have to be socio-materially enabled to take part. Accordingly, the Karma app is designed to digitally "configure consumers" (Fuentes and Sörum, 2019), making a number of consumer actions possible and desirable.

Its start menu allows the consumer to *explore*, on an interactive map, the restaurants connected to Karma and the meals available in that consumer's vicinity (or beyond if the he/she zooms out) (Fig. 1). Consumers can then choose to adapt the map and explore according to preference: eating a meal, having coffee, buying bread or groceries.

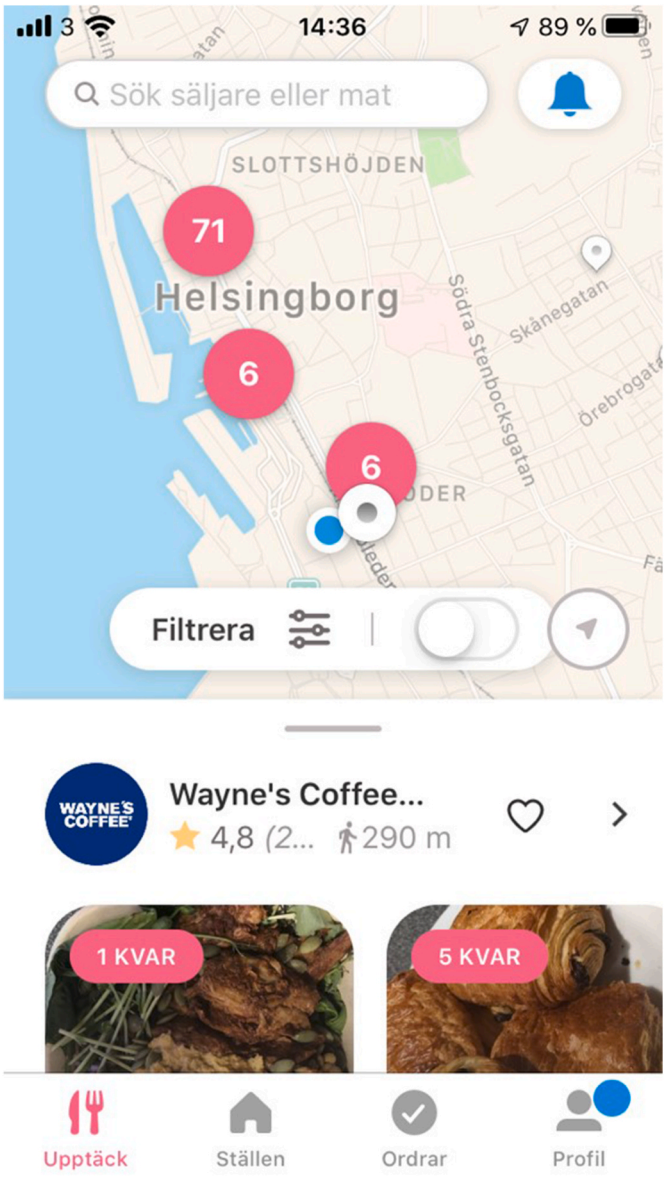


**Fig. 1.** Screenshot of Karma interactive map.


**Fig. 2.** Screenshot of Karma filter.

When consumers tap on a specific restaurant, café or grocery store, they are given information about that food venue, the food available (no. of items and price), and the time they have left to "rescue" this food. Consumers can also choose to only show vegetarian, vegan, lactose-free or gluten-free meals and food, creating a personalized map and fine-tuning the selection process even further (Fig. 2). Consumers are also offered the possibility of *following* their favourite food venues and receiving notifications whenever meals are available. These notifications are intended to help consumers to stay updated and to "push" them into purchasing Karma meals. When consumers find a meal to *purchase*, they tap "add to cart", followed by "go to cart" and then finally "pay" (Figs. 3 and 4). Once the item has been bought, the app produces a confirmation page and the consumer is then given a window of time during which to pick it up at the restaurant, café or store, usually within a couple of hours. When the consumer arrives at the store, he/she shows the staff the Karma app confirmation page and is then given the purchased product. Consumers are then provided with positive feedback. The app generates a message thanking them for rescuing food ("high five for rescuing food"), and prompting them to rate their purchases. Finally, consumers are also encouraged to *read* their Karma profiles. These profiles keep a record of consumers' orders and the food they have "rescued". The app quantifies consumers' sustainability, allowing them to keep track of their impact. This is not an uncommon strategy when developing sustainability apps (Fuentes and Sörum, 2019), being a part of the broader self-tracking and self-quantifying trend in digital technology (Lupton, 2018). The aim is to motivate consumers to engage in sustainable consumption by visualizing their impact.

In sum, by encouraging and enabling consumers to explore the Karma food map, to follow Karma venues, to purchase and rescue Karma food, and to read their Karma profiles, the app is working towards enabling the Karma practice: i.e. a specific mode of food provisioning. The app is thus designed to recruit consumers, making them part of the project of taking products that are soon-to-become food waste and requalifying these as valuable food products.

### 4.2. *Glitches interrupt practice generation*

The participants in the study were all more or less positively-inclined towards the app. However, while the design and functions of the app were often appreciated, there were also many stories of malfunctions, accounts of *app glitches*. By app glitches, we mean instances where the Karma application did not deliver the promised service, thus making the

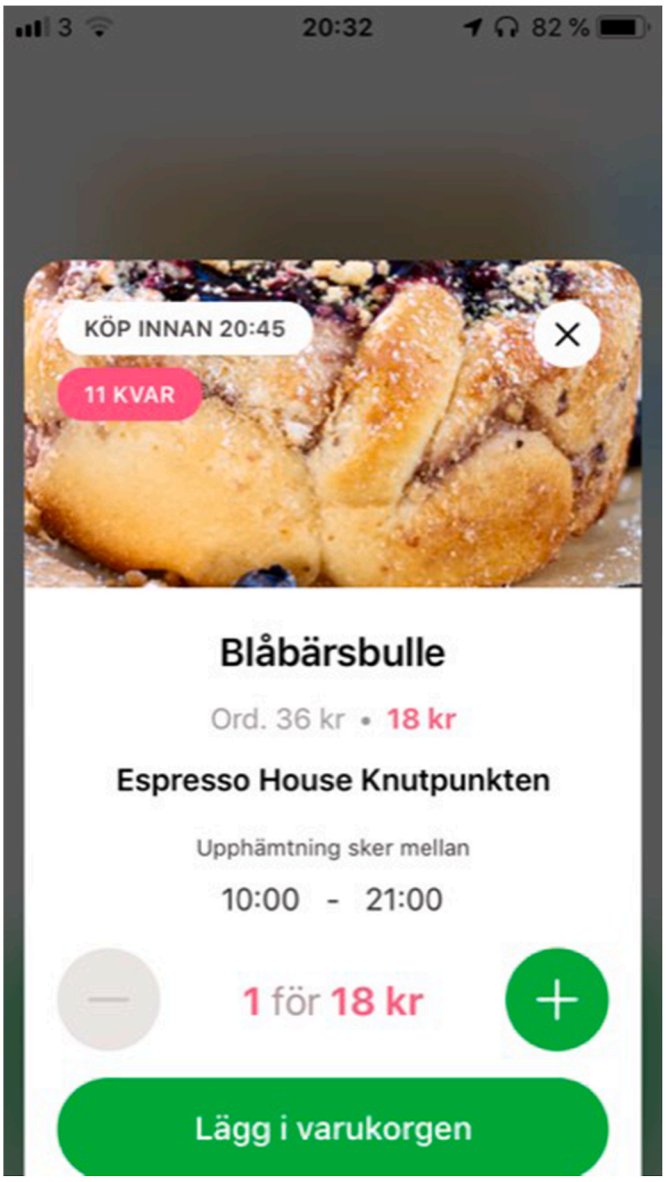


**Fig. 3.** Screenshot of Karma ordering.

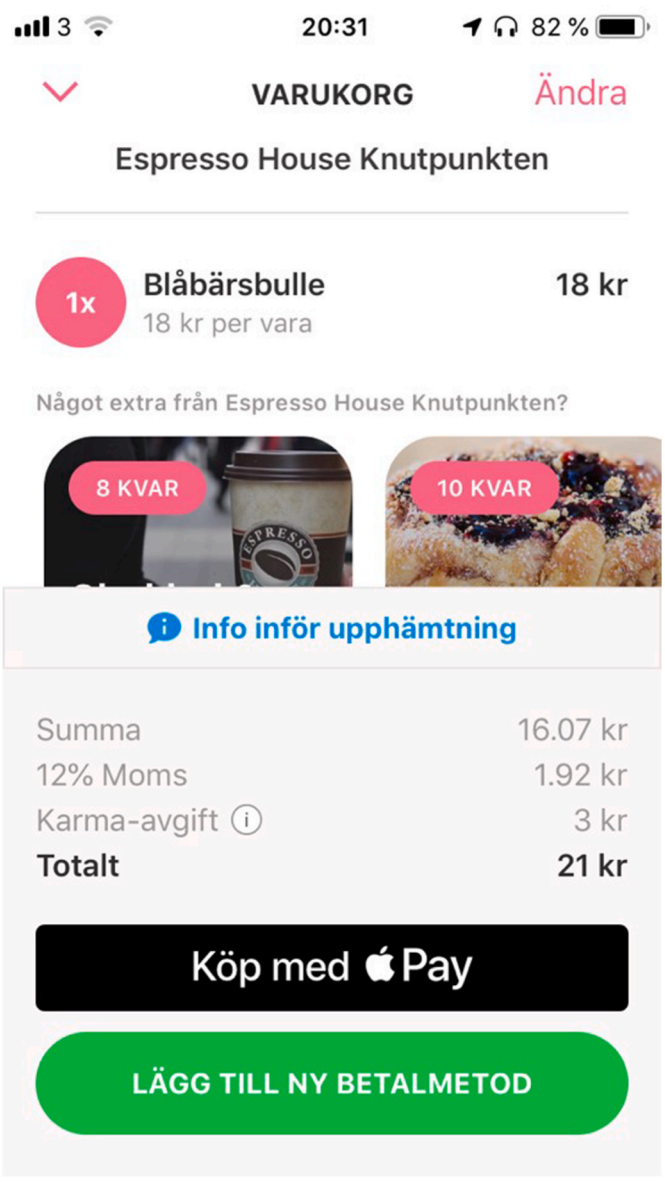


**Fig. 4.** Screenshot of Karma pay function.

performance of the Karma practice more difficult, or impossible. We have identified three types of app glitches: technical, organizational, and communicative. One example of a technical glitch were the problems with the app's navigation system, on which the interactive map depends:

> The business concept is really good [ …] but I did have some problems, as I said, with the location function, I was just getting restaurants in London. I have an Android, I don't know if it's that maybe (…). So I've had to actively search the area where I am as it doesn't detect that. - Klas

Here, we see how Klas, who is using the app in Stockholm, can only see Karma meals available in London. This technical problem forces him to use the search function to correct the issue. Here, the localization function, central to the enabling of this particular form of food provisioning, fails. This consumer is thus left without one of the key capacities needed to perform this specific mode of shopping.

Other glitches had to do with organizational problems. Olle, for example, who is very positively-inclined towards the app, and keen to try it out, had difficulties using it in everyday life:

> And then as I live a bit outside, in Bromma, there was nothing there. It showed no places with any food, or anything. But when I scrolled around a bit more on the map, I didn't think it showed anything at all. /Olle

Here, the app glitches, not because of technical failure, but because it cannot deliver on its promise to connect consumers with food venues, enabling them to find cheap meals and to "rescue" these meals from becoming food waste. This is an organizational problem that translates into an app glitch, limiting the Karma app's ability to promote this new mode of food provisioning.

Finally, there were also a number of examples of communication glitches. At times these have to do with the lack of clarity of the script of the Karma app. Anton, for example, did not understand that he had to create a profile using both his given and family names, which the app's script did not force him to do. This, in turn, translated into a glitch at the point of purchase:

> I: Well (.) there were some complications while I was there. I was supposed to buy Nutella buns … / but when I got there, she said that my name in the app was only my given name on her display. … /In

> any case, she only saw "Anton" and then there was somebody else called "Anton" who had also ordered but, in his case, she could also see his family name but then she thought that everything was part of the same order so she had packed both our orders in one bag. So, when she gave me the bag, I said that it looked like there really was a lot and then we noticed that it was wrong. And then she told me off a bit (laughter) and said that I should have entered my family name into the app but I don't know if I saw that alternative when I registered. / Anton

These misunderstandings counteract the normalization of this practice. These types of communication problems can be of consequence as they can produce a situation of awkwardness, making the exchange inconvenient. Enabling a reliable, predictable, and convenient mode of exchange is often key to the normalization of new provisioning practices (Hagberg, 2010).

At other times the communication glitch did not have to do with unclear information but rather lack thereof. In spite of the Karma app's careful design, it was also capable of failing to provide the requisite know-how to enable the new food provisioning practice:

> I: Smooth once you knew what you wanted, but it was a bit difficult at first as regards what to do and how you were to do it, or after you'd made your purchase. What do you do then? Or if you have to buy it first and then collect it or if you have to go there to see if there's any left? You see, it was a bit like that it worked. That is, purely purchase-wise … / You see, before I found the instructions and that as they were slightly hidden, and then I thought it was a bit unclear … / Ella

Here, we see that the effort to build consumer competence, thus enabling the Karma practice, falls short. When this happens, the consumers in our study felt lost, unsure as to how to perform the practice. As this key element of the practice being promoted unravels, so too does the practice. Faithfull and recurrent performance of this new mode of food provisioning is made impossible.

Finally, in some cases it was not that the message communicated was unclear but rather that it was not deemed to be meaningful to the consumers in our study. Making the practice promoted meaningful is often a key task in sustainability apps, which are frequently designed to motivate consumers by making ethical/sustainable consumer actions meaningful (Sörum, 2020). As we saw in the previous section, Karma framed this mode of food provisioning in terms of being both economical and sustainable, thus working towards making this practice meaningful in a way appealing to consumers' economic and ethical selves. Despite this, there were participants who remained unconvinced:

> Lots of things play a part. I won't need to shop, not because I'm penny-pinching and not because I want to feel that I'm a better person who wants to save the climate, that's not happening. / Isabell

While Isabell did not feel motivated to save money, she did see herself as a sustainable consumer and was in favour of the general goal of reducing food waste. She did not, however, find this mode of provisioning a meaningful practice for working towards this end. She remained sceptical of its sustainability impact and found the economic motivation too small to warrant action. Also, in this case, the app failed to encourage faithful and recurring performance of the practice.

In all the situations discussed above, app glitches either made the performance of the Karma practice difficult or impeded it altogether. What we see here is a breakdown during the process of digital agencing (Fuentes, 2019). The inability of the app to work as intended, and to enable the new mode of food provisioning, makes it difficult for this practice to become a routinized part of consumers' everyday lives.

### 4.3. Practice mismatches and practice competition

However, app glitches were not the only reason why the Karma practice failed to become part of the participants everyday food practices. Instead, in many cases, it was *practice conflicts* that made it difficult for the Karma practice to take hold. In these instances, it was not the apps itself and its design that was problematic. Instead, the practice promoted and enable by the Karma app – a new mode of sustainable and economical food provisioning – did not align with the nexus of (food) practices in consumers' everyday lives. Below, we distinguish between two types of practice conflicts: practice mismatches and practice competition.

As mentioned, previous research has shown that practice mismatches are common, often generating unexpected results (Evans, 2012; Ryan, 2018). In this context, practice mismatches refer to instances where the new provisioning practice being enabled and promoted by the Karma app did not align with the practices preceding or succeeding it.

For example, the Karma app, because of its somewhat limited coverage of restaurants and food stores, was only available in certain locations, typically city centres. If the participants everyday routines did not take them to these areas, performance of the Karma practice became impractical:

> The downside, however, is really the fact that most products are often to be found in places around the centre of Malmö so there have kinda just been a few times when they've had stuff either around where I work or else I've been able to go to *Gateau* after work. Most of the time, I finish at 7 and they shut at 6 (.) so it's been on Sundays kinda thing when we've shut at 4 and they've shut at 5 that I've been able to go there. / Jennifer

In this example, we see that the spatio-temporality patterning of consumers' everyday routines matters (Southerton, 2003; Spurling, 2018). Jennifer's everyday routines did not take her to the centre of Malmö, where the Karma app was most useful, thus limiting her ability to perform this practice. Her work and commuting practices did not align with the Karma practice.

There were also mismatches between the Karma mode of food shopping and specific food practices, e.g., eating. While Karma provisioning is seen as compatible with work lunches or eating-on-the-go, it does not, according to the participants, align with fine dining:

> … yes I'd probably say that. I think subconsciously that this is the way you think, that it reflects … I think you lower your sights a bit too with Karma, if they've reduced the price. You don't have the same expectations about food that's half-price compared to when you buy it at the normal price. If you just want lunch or whatever, then I view it very positively. But then if you want a fancy dinner, then maybe I wouldn't have chosen Karma, instead paying the normal price and also having greater expectations about something. / Olle

This mismatch between the Karma provisioning and "fancy dinner" means that the applicability of the app is limited. The Karma mode of food shopping is only appropriate for certain eating occasions. Here, we see how conventions concerning eating make it difficult to promote this new mode of food provisioning.

All these examples show that a common source of failure in the Karma practice is its inability to fit into the practices that precede or succeed food provisioning.

Practice competition refers instead to the competing relationship between the Karma practice and other modes of food provisioning. Food consumption is, as previous studies have shown, a highly-routinized endeavour, closely linked to other household practices and patterned by norms, conventions, know-how, socio-technical arrangements, and family relations (Evans, 2012; Gojard and Véron, 2018; Plessz et al., 2016). Existing modes of food provisioning are thus often locked-in, held in place by multiple elements.

For example, Matilda, who is a 27-year-old vegetarian, alternates between Växjö (a town in Sweden), where she works, and Stockholm, where she shares a flat with her partner. When she is staying in Växjö,

she prefers to buy her groceries at the Coop store close to her home, then making lunchboxes to take to work. This mode of provisioning is organised so as to be efficient and practical. It is also driven by a specific set of goals:

> But I choose stores on the basis of their vegetarian ranges and then I choose on the basis of proximity, what's close to me (..). And then I also choose on the basis of, very much on the basis of their vegetable cabinets, (.) if they look fresh and have been replenished, …/. I don't choose according to price, erm because I'm really bad at keeping tabs on that and then I choose you see, erm lots of ecological and all that stuff. I do. But it's primarily the vegetarian thing in that case, how much of that they have. / Matilda

Here we see that key to Matilda's everyday food provisioning is finding fresh vegetarian food. Variety is important, and so is ecological food, while price is not a concern. On these issues, the Karma-enabled mode of food provisioning cannot compete and is thus not used. Conversely, while she is in Stockholm, she frequently goes out to eat with her partner or friends. Here, food provisioning is mainly organised so as to be social. This involves frequenting restaurants or cooking with friends. Karma food provisioning is thus seen as incompatible and unable to compete with the modes of provisioning already in place.

Similarly, the Karma app has not been able to disrupt the established modes of provisioning in Olle's everyday life. After reporting that he did not use the app so much, he goes on to offer an explanation as to why this is the case:

> In part, I don't believe I've been in a situation where I've had to (.) use it kinda thing. Because most of the time when I'm at work, I've made food at home and taken it with me. Or it's usually the case that once you go out to eat, you do so in a group, and then maybe you go to a nicer restaurant or something like that. But sometimes, it may be the case that you buy from a restaurant or whatever and take it with you to the office, but I haven't really been in that situation this week.. / Olle

Here, we see that Olle first frames the Karma practice in terms of being connected to work lunches exclusively. He does not entertain the thought that Karma can be used, for example, to buy groceries on the way home, or a sandwich when off work. Once placed in that context, Olle also talks about the competing modes of food provisioning linked to his work lunches. Making lunchboxes at home to eat at work is, for him, the most common method of food provision, even though he also goes out to eat from time to time with colleagues at a "nicer restaurant". Both these established forms of food provisioning compete with the Karma app. However, he admits that he also gets take-out food to eat at the office from time to time. This, he indicates, is the one mode of food provisioning that Karma could be involved in and reconfigure. However, this mode of provisioning seems less frequent and was not performed during the field trial week.

## 5. Discussion and conclusions

The aim of this paper has been to contribute to our understanding of digitally-enabled sustainable shopping. Drawing on a practice theory vocabulary, and a pragmatic field experiment using the Karma app, this paper has developed both a specific approach to and analysis of digital failure.

While the Karma app has in general enjoyed great success, attracting thousands of users and food providers and expanding internationally, it did not, during our field trial, manage to become part of the everyday food practices of the consumers in our study. This, we argued, was for two different reasons. First, the app failed because of glitches: The functional limitations of the app, whether technical, organizational, or communicative made the performance of this new mode of provisioning either difficult or impossible during the field trial. A shopping practice that is not performed repeatedly and regularly never fully takes shape and is bound to dissolve. Second, the Karma app failed because the practice it promotes – a specific mode of sustainable food provisioning – did not fit with the participating consumers' established nexuses of (food) practices. Either the Karma practice was unable to take hold due to a mismatch between it and the (food) practices preceding or succeeding it, or because it could not compete with established and often highly-routinized modes of food provisioning.

What can we learn from this? This paper contributes to the emergent body of work addressing the digitalization of sustainable consumption (e.g., Graham and Haarstad, 2011; Hansson, 2017; Humphery and Jordan, 2016) by exploring how and why efforts to digitally promote sustainable consumption sometimes fail (see also, Sörum, 2020). We know from previous research that it is difficult to promote sustainable shopping (Fuentes, 2014; Fuentes et al., 2019). Established practices are generally thought to be robust, routinized, and resilient, and efforts to destabilize and promote sustainable alternatives them often fail (Jalas et al., 2017; Shove et al., 2012) or result in unexpected consequences (Fuentes et al., 2019). However, over and above merely stating that shopping practices are difficult to change or that efforts to change them can have unexpected consequences, our study shows *how and why* a certain digitalized attempt to develop a new sustainable form of food acquisition failed.

More to the point, this is done in two ways. First, by extending the concept of glitches beyond the purely technical and adding organizational and communication glitches, this paper shows how we can develop more well-rounded analysis of app failure, one that not only takes into account the technical aspects but also how the app work in a specific user context. Second, drawing and elaborating on practice theory, as well as its findings on practice mismatches (Evans, 2012; Ryan, 2018) and competing practices (Spurling, 2018), this paper has developed a different yet complementary explanation of how digital devices – such as smartphone apps - fail to promote more sustainable modes of consumption. Our analysis has shown that, while the limitations and misfunctions of the app were a cause of failure, this was not the only reason the app failed (cf. Fuentes, 2019). Over and above app glitches, our study has also shown that the Karma app failed mainly because of being ill-suited to the existing nexus of (food) practices. Even if the Karma app had worked perfectly, the mode of food acquisition it promotes does not always align with the practices preceding or proceeding it, and nor is the app necessarily able to replace established modes of food provisioning. This is problematic. The existence and durability of practices is partly a result of their connection with other practices (Mylan, 2015). When a practice becomes a resource for other practices, when it becomes part of a larger nexus of practices, it is held in place and partly reproduced by this nexus of practices (Nicolini, 2012). The more links a practice shares with other practices, the more stabilized these become. Therefore, to exist, to be reproduced and temporarily stabilized, a new (sustainable food shopping) practice needs to find its place among other practices.

To sum up, this paper develops and illustrates a different methodological and conceptual approach to explain why digital devices sometimes fail to achieve their objective to promote sustainable modes of consumption. From a practice theory perspective understanding why a digital application is integrated into consumers everyday life or not is not about isolating specific factors – such as perceived usefulness or enjoyment – but rather about understanding the complex device-consumer practice interactions involved in the digitalization of everyday practices.

More specifically, what this analysis suggests is that to understand the possibilities of promoting sustainable consumption digitally we have to do more than examine the app. We also have to do more than just examining the promoted practice and its internal dynamics. Understanding how digital devices promoting sustainable consumption work, and could work, involves zooming out, to borrow a concept from Nicolini (2012), and then (also) considering how the practice being enabled

fits into the larger nexus of practices of consumers' everyday lives. Practices can only be understood relationally; they can only be understood as part of a nexus, complex or bundle of practices (Hui et al., 2017; Nicolini, 2012). To understand how the introduction of new sustainable consumption apps can promote new practices we must acknowledge and take into account that both the app and the practice(s) it promotes can only exist as part of a broader practice nexus.

## 6. Managerial implications

How does this analysis of digital failure inform the design and marketing of digital devices like the Karma app?

Often the developers of apps and other digital devices have a poor understanding of their intended users and the various contexts in which their devices will be used (Fuentes and Sörum, 2019) and therefore fail to design apps capable of promoting the intended practice or set of practices among users (Fuentes, 2019). Our study suggests that to make digital devices – smartphone apps, websites or other software - that promote sustainable consumption more successfully, it is important to understand how the digital device itself works as a practice enabler as well as how the practice it enables fits into the nexus of consumers' everyday practices. This second consideration is as important as the first. A sustainability app that successfully promotes a new mode of food provisioning is of little use if the practice it promotes cannot be fitted into existing practice complexes. To understand how this can be accomplished, we have to move beyond the design of the app and its script.

In this case, this means that we must expand our focus away from the smartphone app, and the doings and sayings of the practice it is scripted to generate, towards the web of practices in which this digital device and practice are to exist and operate. Tracing relationships with other practices can be laborious but is essential when it comes to understanding the role that digital devices may play in enabling and shaping sustainable modes of consumption. This form of practice-mapping, we suggest, is required if we are to understand both the potential and problems of digitally-enabling sustainable consumption.

Moreover, this mapping should probably be specific for different types of consumption fields. For example, retailers or app designers interested in promoting sustainable food practices must then map out the different food practices of household as well as how these practices interconnect with other non-food practices, such as everyday commuting or child care practices. If instead the consumption field targeted is fashion or travelling, then a different but equally thorough mapping would be required.

In other words, the design and marketing of these digital sustainability enablers, whether these are apps, websites, or other digital tools, have therefore to be grounded in an understanding of a specific nexus, complex or bundles of practices. Without an understanding of this practice nexus, digital sustainability enablers, such as the Karma app, run the risk of missing the target or even misfiring, causing unwanted consequences.

## 7. Limitations and future research

Finally, no analysis is without its limitations. The analysis produced by this approach is by necessity contextually bound. Both the app and the sample of participants that this study is based on is limited and with specific characteristics: Swedish, urban, mostly young (in their 20s), professionals and students, living in single households or couples without children. A different sample of consumers, a different cultural context, or a different app would generate different results. The ambition here is thus not to offer the final account of what makes sustainability apps fail to promote sustainable consumption, but rather to use this specific study to begin and explore some of the mechanisms behind the digital failures of sustainable consumption apps.

Interesting studies for future research include examining how such food waste reducing sustainability apps work among families which often have other food priorities, consume less take-out food, and have complex schedules. Or, alternatively, groups of more economically disadvantageous groups, whom are perhaps more likely to focus on the economic aspects of the such apps. While digital failure is surely common also among these groups of practitioners, the reasons for and mechanisms of failure are surely different. Another interesting avenue for future research would be to explore other types of digital failures. For example, rather than examining why apps never take hold, another tack would be to explore why routine users stop using an app, what prompts defection from the practice, what interrupts an already established digital shopping routine?

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