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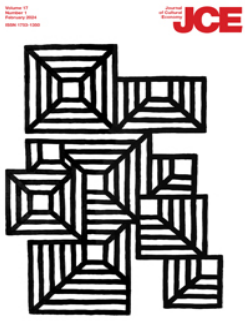
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Jack Pickering

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Questioning the disposability of plastic packaging; Consumer challenges to fresh food packaging market devices and their afterlives

Jack Pickering 

Management School, University of Sheffield, Sheffield, UK

ABSTRACT

Disposable plastic packaging has been conceptualised as a market device that has effects on the functioning of economic markets. It is particularly influential in food retail environments but also has significant environmental consequences. Consumers are aware of these issues, and this paper addresses their questions and objections to the packaging market device for fresh food. Drawing on empirical insights from 28 interviews and 25 completed research diaries conducted as part of the 'Reducing plastic packaging and food waste through product innovation simulation' project, these contestations are explored in a number of ways. Firstly, it explores how such objections become possible and the role of unintended consequences of marketing arrangements. Secondly, conflicting ontologies of freshness are examined, as they also create the potential for objections. Thirdly, the paper engages with the role of responsibility, looking at how municipal recycling systems and packaging design enable contestations. Exploring these contestations contributes to an understanding of how we can address non-market effects of market devices, once they have left the physical spaces associated with market activity and moved into other spheres of activity. It also holds several contributions for debates concerning consumer engagement and acceptance of plastic packaging and plastics policy discourses more broadly.

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Introduction

Due to their incredible versatility and durability, plastics as a class of material have become widespread in the packaging of fresh food items. Items can be packaged in ways that allow items to be stored, moved, and sold with much greater confidence about their freshness and edibility. Plastic packaging for food is so ubiquitous that it has been described as the 'skin of commerce,' that governs how food is sold and which has enabled further changes more generally in the sale of edible items (Hawkins 2018a). Plastic packaging has also been described as essential to the work of super-market staff and a critically important part of how supermarkets function (Sattlegger 2021). The ability of plastic packaging to keep food fresh has been well established by marketers and retailers, but freshness is far from an intrinsic property of food that can be evaluated against universal criteria (Jackson et al. 2018). The properties and affordances of plastic single-use packaging also exist in

CONTACT Jack Pickering  jack.pickering@sheffield.ac.uk  University of Sheffield Management School, Conduit Rd, Sheffield, S10 1FL

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relation to the price of production and the lack of costs associated with disposal. It is possible to use plastics in disposable packaging designs that deter multiple uses, as it can be notably insubstantial, light, transparent, and cheap to produce. Disposability for plastic packaging has a notably conflictual temporality (Hawkins, 2018b), and consumers are well aware of the problems associated with the longevity of many plastics in the natural environment. In fact, consumers are able to raise questions and objections to disposable plastic packaging. This paper focuses on some of these objections as they appear in the everyday life of consumers, as this may help to inform connections made between consumer-focused research, and research on the diverse policy discourses surrounding plastic packaging (Palm et al. 2022; Yalçın, Paredis, and Jaeger-erben 2023).

The acceptability of disposable plastics and the ubiquity of plastic food packaging have recently become more hotly challenged and contested, due to escalating environmental problems arising from plastic pollution (INCPEN and WRAP 2019; Langley et al. 2021). In the UK, A number of responses have emerged due to the level of public concern around this issue, such as national plastic packaging taxes (HM Revenue and Customs 2020), supermarket trials of new reuse and refill schemes (Lidl 2022; Refill Coalition 2023), reforms of waste management systems (Department for the Environment, Food and Rural Affairs (DEFRA) 2019; Burgess et al. 2021). There is evidence to suggest that a comfortable majority of the UK public is generally concerned about the environmental uses of this material for food packaging (INCPEN and WRAP 2019; Plumb, Downing, and Parry 2013). This concern is arguably driving the growth of package-free stores (Fuentes, Enarsson, and Kristofferson 2019). However, outside of specific communities dedicated to living without plastic or significantly reducing it through particular lifestyle choices and commitments (Bissmont 2020; Meissner 2019; Pedersen 2017; Ramjaun 2021) manifestations of this concern among consumers in their everyday lives are not well documented.

This paper identifies instances where mundane and otherwise unremarkable consumer practices and discourses emerge to form objections to disposable plastic packaging market devices, and to highlight how and why these emerge. It will draw on an analysis of 28 interviews and 25 diary entries completed by the same participants over the course of a week. It will further highlight how consumers are identifying and exploiting aspects of instability in the arrangement of packaging as a market device to make such objections, as they encounter it in domestic and retail environments.

This paper and the material it is based upon emerge from the findings of a particular work package within a wider project building a simulation model for estimating household food waste and packaging waste production levels, based on potential future interventions in policy, household behaviour, products, and packages. A previous version of this Discrete Event Simulation (DES) model (Kandemir 2020), which is referred to as the Household Simulation Model (HHSM) is already used by the Waste and Resources Action Project (WRAP), a United Kingdom based Non-Governmental Organization (NGO) to inform their research and recommendations for policymakers. WRAP focus on providing government and industry with the evidence to inform and support sustainable policy-making and decision-making among corporate actors relating to waste and resources. Previous versions of the model and this new version effectively allow decision-makers to estimate and compare the potential effectiveness and cost of particular packaging and retail interventions intended to reduce waste (WRAP 2022). Incorporating plastic packaging into the new model required a significant reworking of that model, and new qualitative research was needed to inform the new version of the model and the input parameter settings.

The qualitative research that informs this paper took place as part of the work package established to fulfil that objective, and as such it had a dual focus on plastic and food waste practices in the home. Previous qualitative research was used to inform past versions of the model, and this was focussed on domestic/consumer Food Waste alone (Evans 2011; Evans 2012). The role of qualitative social research in this project represents an important interdisciplinary approach to DES modelling and is a novel use of qualitative research (to inform quantitative modelling). The focus of the broader modelling project on the relations between food waste and packaging

waste that imparted the novel dual focus of the qualitative research is fortuitous because of how packaging is involved in managing freshness.

Generally, the topics of food waste and packaging waste have not been considered together apart from a few significant exceptions (Chan 2023; Langley et al. 2021; Wikström et al. 2019; Williams et al. 2012; Williams et al. 2020). There are a number of possible causes of this. One possible reason could be that the materialities and temporalities of plastic packaging and fresh food are wildly different and do not allow easy comparison. Another possible reason is that the disposal of plastic waste is generally taken for granted and disregarded in the market environment, and in many municipal disposal systems in the UK food waste is differentiated from packaging waste. These three areas relate strongly to the points made in the empirical section of this paper, as they all correspond to aspects of work that the packaging market device does. These forms of work are often what consumers engage with, question, or object to in the course of their everyday interactions with fresh food products and their packaging. Therefore the focus of the broader project has inadvertently brought specific qualitative attention to how these food and packaging materials interact in the home beyond how they may work as market devices in the retail environment, but it also addresses what their afterlives as waste may entail for households. It is these afterlives in the wake of unstable market devices that are leading consumers to question previously stable arrangements.

These three points regarding the temporalities and materialities of fresh food and plastic packaging, and the processes of disposal raised in the previous paragraph will be outlined in the empirical section of this paper. However, this paper departs from the traditional structure for empirical research paper. Following this section, the methodology and approach will be outlined, followed by a theoretical section. The theoretical section will be comprised of two parts, one addressing matters relating to freshness and another dealing with market devices and the ideas underpinning the notion of ‘afterlives.’

Materials and methods

The research that informs this article was completed as part of the ‘Reducing plastic packaging and food waste through product innovation simulation’ project (ref: NE/V010654/1), funded as part of the Natural Environment Research Council (NERC) Smart Sustainable Plastic Packaging Challenge (SSPP). The goal of this project was to create a new version of the Household Simulation Model (HHSM) (Kandemir 2020), a Discrete Event Simulation (DES) model which could simulate product packaging, alongside food products as they move through a simulated household. A qualitative work package formed an integral part of this interdisciplinary project, as qualitative research has played an important role in the development of past versions of the HHSM. Findings from this qualitative research directly inform the underlying structure of the modules within the model (Evans 2012; Kandemir 2020, 3). The model represents purchasing, storage, consumption, and disposal patterns as a series of linked decisions with the outcome for particular products generated in a probabilistic fashion. It is based on and validated by comparison with a number of datasets (including but not limited to: DEFRA and ONS 2020; Public Health England 2016), but qualitative data informs the validation process and can also inform how the input parameters of the model should be structured. For example, the range of portioning behaviours that the model can simulate was directly based on the findings of a qualitative work package.

The qualitative research that informed previous versions of the HHSM was ethnographic and such methods have also widely been used and recognised as valuable for other research on household food waste (Evans 2012; Hebrok and Heidenstrom 2019; Hebrok and Boks 2017). In-person ethnographic methods were originally planned for the qualitative research on this project, but due to restrictions and risks due to the coronavirus pandemic at the time of the data collection (November 2021 to January 2022), remote interviews were conducted as the most responsible method, and food and waste diaries were also sent out to participants after these interviews, to be filled out over

the course of a week. Together these formed an appropriate alternative given the circumstances (Isaacs et al. 2021). The interviews were semi-structured, with specific elements designed to identify and highlight both food and plastic waste to participants, and the diaries included 4 entries, intended to be filled out over 7 days. The diaries aimed to capture the movement of particular products through the home, from the purchasing stage to waste. Each entry corresponded to a particular point in the week, in relation to a significant shopping trip with prompts enquiring about the fate of particular products. Participants were recruited with an initial screening questionnaire distributed via social media (through the project twitter account) and through a university research volunteer list. This questionnaire contained demographic questions and a set of questions to understand potential waste behaviours to provide background information about the participants, but was not formally analysed.

Of the 92 people who completed the questionnaire, 28 participants completed interviews (which lasted between 40 min and 1 h 30 min), with 25 of these participants going on to complete the diary as well. Participants could also submit photos to be included in the diary, with images of people and identifiable information excluded from the data. It is also worth noting that the sample was predominantly white, female, with white-collar jobs and were relatively engaged with the issue of waste, based on their responses to a question in the initial questionnaire. This sample was far from diverse and the recruitment methods likely replicate the problems associated with self-selection biases in other research. However, in some respects the sample is highly useful, as it was relatively geographically diverse with respondents from rural and urban locations from across the UK.

It is important to note that this paper emerged from findings and analytical processes which were intended to provide insights which would inform and improve the model. The model simulates how food products and their packaging move through different locations in the household (from storage locations to waste locations) and as such particular actions of storing and preparing food were of particular interest to the researchers responsible for the modelling. Deductive coding was therefore used to identify these for further analysis so that insight could be provided to the modelling team. However, inductive coding, and thematic analysis were also used to make sense of the results in a broader and more open sense.

The relevant findings for this paper are grouped around a set of thematic codes which group particular emotional aspects of participant responses to waste together. Significant instances emerged within these codes in which participants engaged with, and reflected upon their food and plastic waste and their feelings and practices around those materials, with a vocal minority challenging or questioning the necessity of fresh food packaging. This was both rhetorical, and in relation to specific practices they enacted in relation to fresh food and packaging. Exploring these challenges or questions in depth revealed particular types of objection and challenge to the functioning of plastic packaging as a market device.

In the following section, the concept of disposable packaging as a market device with significant afterlives will be discussed, along with the theoretical background of a number of studies concerned with the multiple ontologies of freshness, which is a crucial quality for plastic packaging. This discussion of linked literatures will provide a basis for the empirical section which follows.

Theoretical considerations

The afterlives of disposable packaging

Single-use, disposable plastic packaging is a critical part of the modern, industrialised food system. What it does to preserve and protect products, particularly fresh food products through the supply chain and on the supermarket shelf is invaluable (Freidberg 2009; Parsons, 2022; Sattlegger 2021; Wikström et al. 2019), but disposable plastic packaging causes problems elsewhere. This can be understood by framing the problem as a design issue (Wikström et al. 2019) or a waste management

issue (Geyer, Jambeck, and Law 2017; MacDonald et al. 2023), but this may not take into account the breadth of the possible consequences of disposable plastic packaging as it currently is. Hawkins (2012; 2018a) provides a way to access this breadth by using the concept of market device to describe how single-use packaging became such a key part of food retail and distribution. To address these consequences here, we need to address the roots of these ideas. Market devices are a form of agencement, sets of physical and social relations which intervene in the social construction of markets (McFall 2009; Muniesa, Millo, and Callon 2007). Packaging is one such market device, which works to stabilise, qualify, and differentiate products, as extensively detailed by Cochoy and Grandclement-Chaffy (2005) and Cochoy (2008).

Market devices is a performative concept, and as such it does not represent packaging simply as a way to address the problem of shelf life as a technological challenge. It also acknowledges that packaging shapes what packages and the products they contain are in particular ways (Hawkins 2012; Muniesa, Millo, and Callon 2007). Packaging does not only prolong the life of products for example, because it also changes how customers relate to that product. It adds a layer of mediation that consumers notice when it is absent (Cochoy and Grandclement-Chaffy 2005). Outside of its impact on economic markets and the economic space of supermarkets this mediation still has effects. In other words, it affects the qualities of the product outside of economic spaces such as the supermarket. A number of economic sociologists refer to these kinds of effects as ‘overflowing’ the economic domain into other areas of life (Callon 1998), but these overflows are often focused on the borders between the economic and political domain, rather than the more prosaic world of the domestic. Disposable packaging in the home affects and is affected by the dynamics of the home space, and the relationships and responsibilities within it. The process of disposal is a well-studied sociological process (in the context of household food waste, see: Evans 2012) which is a necessary corollary to consumption, and the packaging materials which pass into and through the household are likely to affect this process.

This process of disposal or divestment moves consumption objects beyond the market, in the spaces beyond the space or zone of activity upon which the ‘market device’ aims to act, by resolving the remaining use-value an object has in relation to needs and other objects (Hetherington 2004). The ongoing life of plastic packaging here becomes important, after it acts on the market because for some of the plastics used in packaging, the ongoing after-life as a waste material is remarkably long. Some plastics are durable and persistent in nature long after disposal (and even successive cycles of recycling or repurposing) in ways that are difficult for scientists to communicate or represent adequately (Liboiron 2016). While packaging as a market device may be formed and crafted in such a way as to be disposable, through qualities of lightness, flimsiness, and insubstantiality (Hawkins 2018b), this conflicts with the relatively short duration in which plastic packaging coheres as a market device in the supply chain, retail environment, and the home. Hawkins (2018b) refers to this as a paradoxical temporality, since the long life of unrecycled plastic packaging in the environment contrasts with the repetitive, short spans of time in which the consumer is involved with the successive iterations of indistinguishable but separate packaged products.

Hawkins (2012, 72) uses the term ‘shadow realities’ adapted from Law and Lien (2012) to refer to the effects of the troubling afterlives of waste plastic packaging material. In the case of plastic food packaging, there are generally well-recognised ‘afterlives’ (Hawkins 2012, 72), aligned with public concern around the long-term environmental effects of plastic pollution. These afterlives are inscribed in networks of political accountability for waste (Hawkins 2021, 409), and these distributions of responsibility structure domestic practices surrounding the disposal process for plastic packaging. This paper aims to draw attention to the ‘afterlives’ of disposable plastic food packaging and will use this concept to draw attention to the particular physical details of packaging items which confound or obstruct domestic responsibilities, generating forms of objection. The afterlives of plastic packaging are not only implicated in how responsibilities for waste are passed from retailer/producer to household, however. The afterlives and materiality of disposable plastic packaging are also connected to broader processes of disposal and interfere with qualities such as freshness.

This is because fresh food has a temporality and materiality of its own that is governed by the biological nature of decomposition, and this is similarly in conflict with the temporality and materiality of plastic packaging. Disposability implies a fairly straightforward route to disposal for the packaging of fresh food, but notions of freshness operate in close relation to processes of disposal, and so freshness must be explored to establish this argument more fully.

Versions of freshness and the consequences

Freshness as a quality needs to be explored, in order to show how conflictual relationships between versions of freshness may affect routes to disposal for fresh food. This is highly relevant for one of the empirical sections that follows, but also for the broader argument concerning packaged fresh food. The technical and logistical systems involving single-use plastic packaging that reliably provide fresh food are a significant achievement that has been achieved over decades, as detailed by Freidberg (2009). Crucially, Freidberg (2009) also covers how the notion of freshness has been adapted and altered alongside the technologies used to provide and maintain it. Freshness as an ideal quality of fresh food is shown to be far from a universal or unchanging concept. Jackson et al. (2018) and Evans et al. (2022) have recently engaged with different ontologies of freshness, establishing the practices and contexts within which different versions are enacted. This framing, that insists that conditions like freshness are enacted by practices and can be multiple, relies on the works of Mol (1999; 2013) with others (Heuts and Mol 2013) and Law and Lien (2012) on ontological politics. Reality is not something to be understood or interpreted in this approach, but rather it is something that can be enacted in different ways by different sets of practices.

In the studies of the multiple ontologies of freshness, Jackson et al. (2018) and Evans et al. (2022), effectively combine this approach to reality as enacted with the notion of qualities as discussed by Callon (2002) and used by Cochoy (2008) and others (Kelsey 2018; Wagner 2017), to account for what the different practices are doing, and what they are acting upon. The ontology of freshness is enacted in different registers depending on differing contexts and practices, as identified by Jackson et al. (2018). These registers include: uniform and consistent, local and seasonal, natural and authentic, sentient and lively. A supermarket may guarantee a quantitatively standardisable version of freshness with specific tools, systems of measurement, and quality control (uniform and consistent) but consumers may establish a different version of freshness in the market and their homes through their practices of emotional and embodied engagement with produce (sentient and lively) (Jackson et al. 2018). These versions of freshness matter because conflicts between them create opportunities to consider alternatives (Evans et al. 2022). They are useful for understanding why particular objections to the packaging market device form in the way they do, in relation to the disposal process of fresh food.

A good example which is relevant to packaging and can be used to explore this issue is Modified Atmosphere Packaging (MAP). It is a form of packaging which directly intervenes in the materiality of fresh food products, aiming to slow down the biological processes of decay by removing some of the chemical/environmental factors that enable it to take place (Evans et al. 2022). As Evans et al. (2022) note, this intervention is difficult to reconcile with enactments of what is 'natural,' and it does not allow some of the practices which make different enactments possible to be performed. These processes are relevant, because the premature removal of fresh produce from packaging (to enact a more visceral freshness perhaps) is a recognised problem which contributes to food waste (White and Lockyer 2020). For other forms of plastic packaging than MAP, there are often similar aims, and the conflicts that result from differing enactments of freshness open spaces for political engagement over possible alternative arrangements of the underlying food system.

Such enactments are also arguably associated with disposal processes for fresh food, and this association is a critical associated part of this argument. Evans (2012) and others attending to the drivers of food waste (Schanes 2018) have documented the distinct routes of food to disposal.

These accounts of food waste are often influenced by material culture approaches, but a speculative comparison between the changes in use value may be informative for this argument. For food products, there is a gradual process of divestment in which the various forms of value attached to food are detached or rendered meaningless due to biological processes of decay or social obsolescence (Evans 2012; Schanes 2018). Disposable packaging on the other hand demonstrates an immediate change in use value once it is opened, as in most cases it loses the capacity to perform the same functions related to the enactment of freshness as uniformity and consistency (Chan 2023)

¹ The relationship between the packaging and the fresh food product that the market device embodies is such that in its afterlife and towards disposal, the customer is likely to begin to detach produce from packaging and transition each towards separate conduits of disposal.

Consumers often develop unique ways of dealing with the loss of value from food because this has negative emotional effects, and as such disposal practices around food can be counterintuitive and idiosyncratic as they try to slow down or delay the final acts of disposal (Evans 2012). Packaged fresh produce is presented to the consumer as a single economic entity, but in the domestic space the consumer is left with the task of untangling the entwined afterlives of food and plastic which ultimately become waste in different ways. This paper will go on to demonstrate how afterlives of the packaging market device create space for consumers to raise objections relating to the controversy surrounding single-use plastics due to their involvement in the process of disposal. These objections emerge due to ‘inconsistencies’ at the market stage, conflicting versions of freshness in the home, and through the unwanted responsibilities which packaging places on consumers.

Results

Packaging inconsistencies and their effects

When consumers are faced with plastic packaging in the supermarket, the principal negative emotional response appears to be one of uncertainty. This was often framed and arranged in a particular way, with a kind of exasperation expressed at the ubiquitous presence and doubtful necessity of plastic packaging, usually followed by a comparison of two similar items of produce, packaged and priced differently but sold together. This often revealed a critical understanding of retailer marketing practices, influenced by suspicion surrounding the motives for packaging the fresh produce. A number of participants like Esther made such comparisons while their specific concerns about plastic and freshness remained implicit. During one interview, Esther wondered aloud why broccoli was sold packaged in plastic and without it for example:

I don't understand why if you can buy broccoli not in plastic and in plastic then why is it in plastic? You know [...] I can get it if it's organic, but then they kind of need to label it because otherwise you could put it through as a normal one and save money. But it does seem like a lot of things, why do you need 6 apples in a pack, why not just loose in a paper bag? [Esther]

The problem that Esther identifies with the packaging is that in the context of the supermarket, with differently packaged vegetables placed together, the purpose of the packaging becomes unclear. Looking at this packaging as a hypothetical market device, the intended work being done by the packaging is unclear and the juxtaposition of the packaged goods with the unpackaged goods creates the grounds for her questioning. Esther even acknowledges that packaging can serve a legitimate, qualifying purpose in principle, as she recognises that packaging can successfully differentiate organic produce from non-organic produce. In the absence of information about why one has been packaged and not the other, her contention about how the product is formulated and how other common products in retail settings are formed is possible. She questions the marketing practice of bundling multiple items together to sell as a single product, connecting the issue of plastic packaging with practices of quantity discounting. This was also noted by another participant who claimed that this practice caused food waste in their household and influenced their choice of recipes. Selling items loose has recently been investigated by WRAP (2022), using the previous version of the HHSM

to estimate the potential it may have to reduce food waste and plastic waste. This is because selling items without packaging allows consumers to buy quantities of items which are more closely tailored to their needs. This added detail makes this connection to quantity selling particularly relevant. The decision to package items in a particular way will be informed by information gathered by marketers, packaging technicians, and food scientists, but this complex information/knowledge is not accessible to the customer. Some of the information will be relevant to the needs of supermarket professionals to manage their supply chain, order their store, and offer a range of products which are advantageous to them. The environment of the supermarket enables a particular informational asymmetry to emerge, and this provides space for consumer interpretations and questions to form, which have also been documented by Valenzuela, Raghubir, and Mitakakis (2013).

This is just one way in which packaging market devices that involve disposable plastic packaging can be questioned and objected to by consumers. Participants also used the same comparative framework to explicitly contest the idea that plastic packaging keeps items fresh. Emma is an example of one such participant, and was similar to Esther in many ways (they both lived alone and were fairly concerned about waste issues generally). Emma had problems with keeping items fresh due to damp cupboards and so may have been particularly sensitive to issues of freshness in the home but drew a comparison between onions stored and sold in sealed plastic bags and onions stored and sold in bags made from plastic netting. She accepted the idea that sealed plastic may keep things fresh in some circumstances, but found the simultaneous sale of onions in non-sealed packaging, where the produce was ‘exposed to the elements’ to be confusing, and it is here that her suspicion of packaging entered into the conversation.

I don't think this plastic is doing anything to preserve them, so why is it there, whereas some stuff I'm sure is doing a job of keeping it [...] good for longer, but I don't know which ones are which [...] it's just my suspicion that some of them do something and some of them don't, but I don't know which ones are which. [Emma]

In this case, the objection to plastic packaging as part of a market device associated with fresh food is again the result of a hypothetical comparison, but this time it is directly related to the freshness of the items. Emma is not directly challenging the idea that sealed plastic packaging does not and cannot keep fresh produce fresh. Instead, she is questioning the uncertain capacities of plastic as a purposeful material within the particular arrangement in some market devices and weighs this against implicit concerns about plastic packaging, which she made explicit elsewhere in the interview. While there may be valid operational or marketing reasons why retailers and brands opt for such packaging (Sattlegger 2021), these reasons are not clear to the consumer. These juxtapositions between packaging forms in the retail environment enable consumers to make their own assessments of particular packaging functions. At the root of disposability is a temporal shift to repetition and recurrence without significance, where items become identical and barely noticeable (Hawkins, 2018b). Combined with the new concerns around plastic as a packaging material, these incidental juxtapositions help to bring attention back to packaging features, creating the possibility that market devices may become less stable.

In both cases detailed here, the processes of comparison that participants engage in are driven by concerns related to the materiality of the packaging as it is found in the retail environment, but only in Emma's case is the connection related to the freshness of the items. There is an ambivalence in those responses around whether or not the packaging is effective in keeping the produce fresh. The participants are unsure about whether it is beneficial or not but seem to accept it in principle. As such, different versions of freshness are not invoked or brought into conflict directly. In the following section, we begin to engage with the afterlives of plastic packaging as a market device as it enters the home, and what it means when freshness is enacted differently.

De-packaging and ‘vital’ enactments of freshness in the home

As part of the interviews, participants were asked if and when they removed items from packaging once they got them home, and why they did this. The question was asked largely because of a

specific need from the modelling effort that underpinned this research to understand the general prevalence and possible conditions for this practice. This is because removing food from packaging once a product is brought home may significantly change the shelf life. It is a practice that could have significant impacts on estimated waste levels if modelled. The discussion that followed the question was unexpectedly significant in the interviews, as a significant minority of participants strongly stated that they believed that plastic packaging was not only ineffective and irrelevant to fresh products (as documented in the ‘Unnecessary packaging’ section) but also that it is also actively damaging to freshness. This belief seems to largely confirm the findings presented by Plumb, Downing, and Parry (2013) which detail consumer opinions about food packaging, packaging waste, and food waste (see also: INCPEN and WRAP 2019). The de-packaging practices can also be understood as an enactment of one of the multiple versions of freshness that can be realised which is in conflict with the version enacted by plastic packaging as a market device. These versions of freshness enacted by some consumers, while not uniform or singular, appear to be enacted in similar ways to the sentient and lively version of freshness described by Jackson et al. (2018) and Evans et al. (2022). Particular physical signals that the produce was in some way living, when encountered inside packaging, was interpreted as a sign of deterioration and the packaging itself was blamed, triggering the de-packaging practice.

Yeah, yeah, so anything where kind of, I guess, that isn't meat or, you know, yoghurt for example we try and take out the packaging. We think it lasts a bit longer when it's not in the plastic, almost doesn't like weep as much, I guess. I don't know if that's a technical term, but we find that [...] Mushrooms for example, we also take the packaging off that cos we find they weep sweat and go a bit, kind of, mushy I guess to an extent, which is really gross *laughs* try and remove that plastic packaging and the same for like apples and bananas, just take them out and let them breathe, I guess. [Claire]

The complaint Claire makes about mushrooms is shared by a number of other participants in this study, and others also used the words ‘weep’ and ‘sweat’ to describe a build-up of condensation. Of the word ‘Breathe,’ six other participants used it in their interviews, always in order to refer to the needs of produce, or to justify why they removed produce from the packaging it came with. In conducting these practices and talking about them in this way Claire is enacting a version of freshness that is in conflict with the version enacted by packaging. The product is enacted as alive and requiring the same treatment as living things generally (air, access to space, etc.). The quality of freshness depends on this state of being continuing, and the focus of the practice of de-packaging is on providing the correct conditions for produce which is vital, lively, and sentient, avoiding the sensually unpleasant effects of products remaining packaged. De-packaging is not based on scientific knowledge of the degradation of produce, but the sensory and embodied reality of produce as experienced by consumers directly.

This conflict between ontologies of freshness can be illustrated by elaborating further on the example of MAP (modified atmosphere packaging). The purpose of MAP is to prevent or delay the biological process of decomposition by providing conditions which are unfavourable to life inside packaging, and this achievement is largely enabled by the particular affordances of plastic films as excellent gas transfer barriers. More importantly, in this version of freshness, the produce is enacted as slowly dying, at risk of colonisation from other organisms. By sealing the environment, often with particular preservative gases, this process can be delayed, and the qualities associated with freshness enacted in this way can be preserved for a longer period of time. While not all plastic packaging uses MAP technology, it often functions along similar lines, enacting a similar reality of product freshness²². From the conflict between these two enactments of freshness, it is possible to see how enactments of freshness associated with particular spaces create particular problems and forms of questioning/objection around plastic packaging and change the process of disposal for market devices that combine product and packaging in physical terms (Evans 2012).

These conflicting enactments of freshness do more than show how consumers, retailers, and packaging technicians construct freshness differently. They demonstrate how the involvement of packaging materials in the shelf-life of produce outside of the market environment affects the

processes of disposal in domestic settings. By removing the packaging, consumers commit to another kind of freshness, with particular implied understandings of the boundaries of the natural world clearly present (Evans et al. 2022). The involvement of different knowledge in this enactment also carries with it specific assumptions about the appropriate kinds of packaging materials.

Things like mushrooms I generally stick my thumb through the plastic wrap to allow them to breathe a bit. [...] I've got this idea in my head that mushrooms should be in paper bag, a brown paper bag, and not in the plastic film [...] you know, a lot of fruit and vegetable has a skin on it anyway that will peel off or get rid of some other way, why does it then need to be enclosed in plastic, sometimes twice. [Drew]

Here, Drew is making a similar challenge to the general packaging market device as seen in the earlier section dealing with challenges to 'unnecessary packaging' but links this to the vital enactment of freshness. A comparison is drawn between the packaging material and the surfaces or skin of the produce itself, and the affordances of both. He also suggests an alternative, brown paper bags. Throughout the interviews with participants, brown paper bags were mentioned numerous times as possible alternatives to plastic suitable for most produce, seemingly based on an imagined past where these were used successfully. This drive to imagine and suggest alternative forms of packaging inflected by past packaging forms relies on the fact that the ontologies of freshness at play in this situation are in conflict. Consumers draw on their own intimate sensory and embodied knowledge of produce and past experience with packaging forms, enacting items of produce as fresh, vital, and lively in particular ways that conflict with the version of freshness enacted by packaging market devices.

This provides some insight into the composition and origin of persistent public displeasure with plastic packaging generally (INCPEN and WRAP 2019; Langley et al. 2021; Plumb, Downing, and Parry 2013). These forms of questioning around fresh food packaging are analysed through attention to the afterlives of the packaging market device in the home or domestic space, and what fresh food packaging does in the home. While the economic action performed is changed in the domestic space, packaging also mediates the qualities of the item when it is in storage in the home, in turn affecting the how the process of disposal works. The process of disposal is also explicitly referenced by participants, and the following section will explore how consumers engage with and question the arrangement of packaging market devices, and the shadow responsibilities towards packaging as a waste material (Hawkins 2012).

Unwanted, unmanageable responsibilities

Alongside the uncertainty and suspicion about the functions of plastic packaging, participants also regularly expressed resentment and frustration towards plastic packaging and retailers for burdening them with the responsibilities of disposal. This often came in the form of comments made in the diary entries, in response to a prompt to write about recycling in the home. These comments overlapped with uncertainty at times, as some of the resentment appeared to stem from a lack of trust in municipal recycling systems given numerous recent scandals about UK recycling and waste being exported abroad (Greenpeace 2021). Participants resented the responsibility for disposing of packaging waste and the prospect that it may not be recycled or even put into landfill appropriately when they feel they have little ability to avoid the responsibility. Even participants that could avoid plastic packaging waste or simply tried to avoid it by selecting unpackaged products acknowledged the difficulty and incompleteness of their efforts.

The origin of the resentment in such situations was not so much the core responsibility of disposal in general, but instead it lay in the perception that the responsibilities for disposing of plastic waste from packaging could not be adequately fulfilled, in the broader context of ambiguity about whether the packaging works as intended. These are the 'shadow responsibilities' which Hawkins (2021) describes, and this section addresses how consumers engage with these, and form challenges to the packaging market device around them. Particular materials used in packaging have important

consequences and effects outside of markets, and in the domestic sphere, these take the shape of particular networks of accountability relations which govern disposal. Extended producer responsibility (EPR) as it is currently configured in the UK waste management system attempts to redress this balance (Walls 2006), but the responsibility for correct disposal of packages issued by the retailer is still the responsibility of the consumer. This configuration of the non-economic responsibilities attached to packaging as a market device is not simply accepted by consumers; it is subject to objections and questioning. This takes place in a number of ways. Firstly, consumers take issue with the difficulties associated with fitting particular packages into particular municipal systems of disposal. Secondly, they also engage in similar forms of comparison as seen in earlier sections of this paper, in order to raise questions about the efficacy of waste management systems and recycling in the UK. Both of these challenges are rooted in consumer assessments of the shadow responsibilities attached to packaging materials, and will be addressed in the order given above.

One particular area of contention from consumers concerns the design of packaging, and the tendency for packaging types involving multiple materials to be prohibitively difficult to separate. This is linked to an understanding of the various scandals concerning UK recycling and the likelihood that incorrectly separating materials for recycling will cause problems for recycling centres. A few participants were more distressed/disturbed by this than others. Tom was one participant who was particularly bothered by this prospect. He described his partner as more active and zealous (his choice of adjective) than he was in sorting recycling and making sure that items were washed and ready for collection and he stated that his reluctance came from a general suspicion and doubt about the efficacy of the processes involved. In the diary entries, he described disappointment and anxiety about the likely consequences of the difficulty he had removing plastic film from a hard plastic tray.

Some of the plastic items say that parts (usually the hard plastic shells, rather than the transparent film) can be recycled, so we do that. I often feel that the incomplete removal of the film (since it's heat-sealed (or maybe laser-sealed?) to the shell) when sorting these parts means the item will probably be rejected from the recycling centre that receives it; I'm sure that anything not easily recycled onsite is trashed, and removing slivers of film from a container is probably far too much work for any personnel at those centres to engage in. That bums me out, since unless I take a razor to the film and ensure perfect separation, there's likely always a little ring of ruining plastic that remains on the ostensibly recyclable part. [Tom]

Rather than directing his criticism inwards and experiencing guilt about being unable to correctly separate the materials, Tom identifies how particular packaging forms do not allow assumed responsibilities towards plastic to be met if exacting standards are applied. It may be the case that Tom is mistaken, that the recycling centre may handle such slivers of 'ruining plastic' with ease, or may be able to recycle the entire object, but he directly specifies what action he thinks is required of him to recycle correctly and implies that he is not willing, or that it is not possible for him to meet the standard required. This may be a relatively strict interpretation of the required standards for disposal set by the local authority, but Tom resents being made responsible for the disposal of product packaging which is poorly prepared for recycling, simply because of his preferences. The problem with the distribution of responsibility is located with the packaging design, as it makes successful recycling appear more difficult or unlikely.

Other participants approached the problem differently, broadly accepting and following the guidance on separating waste materials in a rigorous way while questioning the effectiveness of the waste management systems that recover the materials for recycling. These challenges were made alongside explicit mention of the recent high-profile controversies and changes to international recycling and recycled material trading systems that packaging waste collected by UK municipalities feeds into. Daria for example lives in an area that allows citizens to collect their mixed recycling together for collection in one container. In the UK, there are recycling targets for local authorities, but there is no single system, policy or set of guidance that governs how local authorities should practice waste collection and recycling. Individual local authorities therefore individually negotiate contracts with private companies to provide these services, and this results in each area having

different collection systems with different materials prioritised and collected (Burgess et al. 2021; Walls 2006). In many of these areas, guidance is issued to keep materials that are to be recycled as free from contamination as possible, from food and from other materials. This seems to cause some confusion among the participants of this study generally, as they naturally compare and contrast different systems in places they have lived.

Yeah, yeah. I mean it's, it's [sighs], that's why I'm suspicious how good the recycling is, to be honest. Because, it all goes in one and I'm, it's like, OK, I hope they separate it out, but, you know, the paper and the cardboard together with, you know, the milk bottles and tins and stuff. Surely that gets wet and contaminated [...] But anyway, they all, they're happy to take it all in one, so, you know, that's what we do. [...] The problem is that, the council [sighs] only takes bottle, plastic bottles, so it's like, I think ever since China and East Asian countries stopped accepting recycling waste, they've really, well it was in the last few years, you can just see they keep putting leaflets through and just like, we only take plastic bottles, so don't give us anything else, like yoghurt pots or tubs and stuff. So it's like, OK. [Daria]

In her comments here and throughout her interview, Daria showed how her disbelief and concerns about the efficacy of mixed recycling in the UK have become mixed with knowledge of the wider international context of recycling. The resulting scepticism does not seem to deter her and she is resigned to following the guidelines and accepting the responsibility/accountability for the waste, but there is an underlying disquiet, or scepticism about official claims and policy. Daria displayed the combination of an intuitive understanding of the incompatible and contaminating materials with an awareness of the global effects of recycling policies and the eventual destination of waste material. This casted a shadow over her recycling practices and attitudes towards them, especially where aspects of material contamination are involved.

Shadow responsibilities are a demonstration of one possible kind of overflow from Market Devices. In this case, these are the arrangement of elements that holds products together with plastic packaging. Incompatible elements of the network of responsibilities implied by packaging lead to further questioning and reconsideration of the fundamental arrangement of market devices, and the responsibilities and obligations which are implicitly included with them. The mixing and interactions between packaging materials and food materials appear to generate fundamental uncertainty and unease among consumers, unsettling shadow responsibilities. Food and plastic, improperly separated, generate disquiet at an intellectual level similar to the disquiet from mixed plastics. Participants feel like they know enough about recycling facilities and material reality to question or doubt the effectiveness of certain policies, even if this does not affect their behaviour. This demonstrates that the material responsibilities associated with disposable plastic packaging are not accepted comfortably by consumers, and that this instability in networks of accountability relations can emerge from problems and inconsistencies in the network, as well as from the packaging materials.

Discussion

At different points in the process of consumption, from acquisition to disposal, consumers question and object to disposable plastic packaging for fresh food and its effects. These forms of weak contestation are made possible by 'inconsistent' arrangements in the market environment, different versions of freshness enacted in the market space and the domestic space, and unstable configurations of responsibility based on problematic and mismatched packaging materials and recycling systems. These forms of questioning differ significantly. Instances of challenge range from expressed disquiet and de-packaging practices, to changes in purchasing behaviour, but the scale of the effects from these kinds of practices is difficult to estimate and likely to be insignificant. They should be understood to represent a form of mundane, everyday objection to the presence of disposable plastic within the fresh food packaging market device. This set of minor examples and the theoretical approach taken to understand them has some significance however because of the broader policy environment in which policy regarding disposable plastic packaging is

being set currently. At the European Union level for example, there are strong distinctions emerging between discourses adopted by different interest groups advocating for plastics circular economy policies (Palm et al. 2022; Yalçın, Paredis, and Jaeger-erben 2023). Public support and acceptance of these competing discourse coalitions is part of how the policy agendas associated with these discourses are advanced and as such the approach taken by this paper is useful for offering insight into how consumer discontent with packaging may be configured. In particular, the approach to packaging as a market device which includes the afterlives in the home is particularly useful as it captures non-market effects of these devices, advancing the work of Hawkins (2021) in a new and different direction.

Revisiting market devices, it is important to understand how and why the different ontologies have come to matter in this situation, and what their role is in the emerging conflictual relations surrounding plastic as a material in packaging as a market device. For fresh food, plastic packaging of various kinds acts as a market device to guarantee certain qualities not just to the consumer, but also to the retailer and manufacturer. Plastic being the skin of commerce (Hawkins, 2018b) and a major part of changes in retail in recent history (Parsons, 2022), mean that challenges to the material also inadvertently pose questions and challenges to the systems that it enables. If supply chains and supermarket operations (Sattlegger 2021) responded to public concern about plastic pollution by completely removing single-use packaging, it seems likely that they would need to implement significant changes in their operations. Product choice and availability would also likely change as a result, as would product quality in some cases. As Hawkins (2021) argues, the market reconfigurations involved in detaching markets from plastic are likely to offer opportunities for market development in other areas, but these still represent significant, uncertain undertakings. The kinds of mundane contestation I have been discussing here are unlikely to catalyse such a change, but they offer some insight into the nature of the possible political tensions that plastic packaging generates as a market device among consumers outside of concerted efforts towards detachment from plastic (Hawkins 2021). Further detailed, qualitative research into the consumer narratives and discourses concerning plastic packaging and the environmental consequences of plastic packaging is clearly needed.

As this paper has demonstrated, consumers are able to question different aspects of packaging. The market device concept enables the researcher to draw out the different elements of marketing and logistical work that the package does, and subsequently to examine questions around the afterlives of packages (Hawkins 2012). Among the various aspects of the packaging market device that seem to provide grounds for contestation, the work that the packaging does to enact the produce as fresh seems to be the most directly challenged aspect of disposable packaging, despite freshness having little to do with the disposal of packaging waste on the surface. This paper demonstrates how attention to the agency of packaging can be fruitfully allied to the approach to freshness proposed by Jackson et al. (2018) and Evans et al. (2022). Combining these approaches reveals a juxtaposition between the materiality and disposal processes of produce and packaging, for packaged fresh produce. For consumers that enact the freshness of individual iterations of packaged fresh produce items as vital and living (and practice de-packaging, for example), the disposal process for such products draws attention to the bifurcation between living, sentient, and useful produce and artificial packaging which is difficult to re-use, and which they have a responsibility towards as a waste material. The participants of this study respond to the consequences of this separation in different ways, but I would argue that the afterlives of packaging and proposed alternatives also come into play. The customer anticipates the afterlives of packaging and packaging materials, knowing that these items will degrade differently, as they have different responsibilities towards them. As noted in the empirical section, they identify paper bags as packaging alternatives (paper bags) regardless of other sustainability criteria, and this is most likely because they are largely biodegradable. The selection of this particular alternative is arguably informed by an intuitive rather than scientific understanding of material circularity

and biodegradation. This has some relevance for discussions of the various discourse coalitions surrounding circular economy policies and the material politics of plastic packaging more broadly (Palm et al. 2022; Yalçın, Paredis, and Jaeger-erben 2023). Recognising the role of freshness in this set of relations, and the role of temporal processes (freshness, disposal, etc.) also advances theorisations of food packaging as a market device, as it highlights how the divergent but interacting afterlives of produce and packaging may affect the material politics of plastic packaging among consumers.

Understanding how the public reject the 'shadow responsibilities' placed on them by the packaging market device in more detail is similarly useful. People engage in a sustained and detailed way with packaging materials and municipal waste separation and recycling systems, and they judge how far the former can easily fit into the latter given their available time and energy to make acts of material separation. They also rely on knowledge of municipal recycling systems which are coloured strongly by scepticism and doubt due to numerous high-profile scandals concerning the exporting and dumping of waste, and the lack of consistency between UK local authorities. Again, the tendency of consumers to make comparisons, in this case between different waste collection systems, provides the basis for this form of questioning. It is worth noting how much this picture of consumer engagement with plastic and municipal waste systems corresponds with and confirms the findings of larger scale studies (INCPEN and WRAP 2019), and other smaller qualitative studies concerned with consumer attitudes towards packaging (Langley et al. 2021). It would be easy to suggest from this agreement in findings that further consumer education is needed, to harmonise enactments of freshness between consumers and retailers or to provide reassurance and up-to-date information about package recyclability, recycling rates, and the effectiveness of recycling systems to maintain confidence. From the other side of the issue, the legislative process for providing more standardised waste collection services nationally is already underway in the UK (Burgess et al. 2021). This paper is instead aiming to bring attention to how the combination of geographically inconsistent collection services may work with problematic packaging design to build resentment of packaging and packaging forms, through the responsibilities that packaging imposes.

Conclusion

Thinking about market devices thus far has focused more on the particular settings in which they are intended to act than in other locations such as the home. This is clearly logical. However, the contestations that consumers make to the fresh food packaging market devices described in this paper highlight how such market devices can work beyond the market-place. In the home, the affordances and functions of plastic packaging work against the enactments of freshness which are part of these market devices, and the shadow responsibilities that come with packaging cause disquiet as they interface with waste streams in the home. Even in the market, perceived inconsistencies in how the market devices are established in retail spaces open spaces for criticism and questioning of the packaging market device. These forms of consumer questioning, and the approach to exploring them presented in this paper, may be useful for considering the wider material politics of plastic as a packaging material. Further engagement with studies of the politicised, economic home, and the lively, sensory body, as spaces in which market devices like packaging act in their afterlives is urgently needed. Such approaches would be able to provide specific detailed insight into the afterlives of products in the domestic sphere, and what wider forms of consumer engagement could mean for the future material politics of disposable plastic packaging for fresh produce.

Notes

1. Creative re-use is possible but very much dependent on the consumer.
2. It is worth noting that while a significant amount of plastic packaging involves a seal of some kind, not all of it employs MAP technology, and that the benefit of such sealed packaging is far from settled. Recent reports

from WRAP (2022) have highlighted that the longevity of certain kinds of fresh produce is not significantly extended by the presence of sealed plastic packaging, and that storage conditions may be more important factors in the prolonging of product shelf life.

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ORCID

Jack Pickering  <http://orcid.org/0000-0002-6244-2424>

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