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Environmental Innovation and Societal Transitions

journal homepage: www.elsevier.com/locate/eist

Research article

Replacing meat, an easy feat? The role of strategic categorizing in the rise of meat substitutes*

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ARTICLE INFO

Keywords:

Transition studies
Strategic categorization
Categories
Meat substitutes
Niche-regime patterns

ABSTRACT

This study investigates categories and categorization strategies in the transition towards sustainable diets. We look at the rise of meat substitutes and understand the meat substitute category as a hybrid one, covering products that are to replace meat while implicitly appealing to vegetarian/vegan diets. The category is negatively defined, solely and explicitly indicating the product to be substituted. The category's fuzzy nature presents an innovation challenge for producers. We investigate the strategies of nine Dutch meat substitute producers that seek to resemble meat along five dimensions. We conclude that by privileging meat resemblance innovation strategies, most producers tend to 'fit and conform' to the meat regime, largely copying dominant production and consumption practices. However, we also show that, as a hybrid category that is negatively defined, the meat substitute category provides opportunities for more radical innovations that have the potential to 'stretch and transform' the regime in the longer run.

1. Introduction

Food production, and in particular the production of meat from animals, has been recognized as one of the main contributors to the environmental problems created by mankind (Steinfeld et al., 2006; Smetana et al., 2015). Meat consumption per capita has increased quickly globally and is expected to keep rising significantly in the next decades, putting an even greater strain on the environment (Godfray et al., 2018).

Meat substitutes may contribute to a transition towards more sustainable food consumption (Smetana et al., 2015; Tziva et al., 2020). Researchers have started to build a body of literature on what is called the protein transition, which focuses on the transition towards diets that include protein from non-animal food sources (Aiking and De Boer, 2020; Hundscheid et al., 2022; Tziva et al., 2020). Such a transition could contribute to food security and sustainability by reducing harmful greenhouse gas emissions and land-use, which is required to meet the current global demand for meat consumption (Aiking and De Boer, 2020; Tziva et al., 2020). Governments and organizations focused on sustainable food consumption are urging consumers to eat less meat and as a result often suggest opting for meat substitute products (Aiking et al., 2006; Hartman and Siegrist, 2017).

The meat substitute category originally emerged as a socio-technical niche based on consumer concerns about animal welfare and

* Acknowledgements: This paper benefitted from insightful comments by Mary Tziva and Britney Bulah.

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<https://doi.org/10.1016/j.eist.2023.100703>

Received 5 August 2022; Received in revised form 26 January 2023; Accepted 1 February 2023

Available online 11 February 2023

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sustainability, and in recent years it has started to attain an established segment in the food industry (Lonkila and Kaljonen, 2022). Though the meat substitutes market is growing, producers still face challenges to compete in the current food regime where eating meat is the norm (Hundscheid et al., 2022). Indeed, a rapid increase of consumption of meat substitutes has not yet come about. For example, in The Netherlands – where meat substitutes are popular compared to other European countries – the market share of substitutes in comparison to the meat sector only reached 2.5% in 2021 (Bechtold and Will, 2021). Additionally, consumers' awareness of the environmental impact of meat, as well as their willingness to change their diets, remains low (Hartman and Siegrist, 2017; Stanley, 2021).

What is more, while meat substitutes have emerged as a new product category, the label 'meat substitute' remains rather undefined and fuzzy. It covers a broad range of products that are supposed to replace and resemble meat. Some definitions of meat substitute products limit them to products that are "primarily vegetable based" (Hoek et al., 2011: 662), while legumes (e.g., soy) often represent the main ingredient (Lemken et al., 2019), and "hybrid meats" which contain both meat and plant-based ingredients are also marketed as meat substitutes (Grasso and Jaworska, 2020). Furthermore, non-vegetable food products, based on insects, fruit or algae, are also labeled as meat substitutes (Sexton et al., 2019), which illustrates the variety and breadth of the product category.

The fuzziness of the meat substitute category is by no means unique. Categories are "socially constructed partitions that group together objects perceived to be similar" (Grodal et al., 2015: 424), bringing coherence to social systems by providing means to evaluate items comparatively (Hsu and Hannan, 2005). It is not uncommon that product categorizations and their labels are fluid as new markets develop, reflecting a limited understanding of what a technology can do, and consumers want (Clark, 1985; Kennedy, 2008; Grodal et al., 2015). When new industries emerge, the meaning of product categories may remain ill-defined and 'under negotiation' for prolonged periods of time (Granqvist et al., 2013). Firms may nevertheless use the same category to communicate to consumers and regulators, even if the meaning that they attach to the category, and the products that they develop under that category, differ. Therefore, the categorization and new product development processes co-evolve (Grodal et al., 2015). While categories shape new product development by firms, the subsequent success or failure of new products may also change a category's meaning over time.

Our study starts from market categorization theory and looks at new product development by Dutch firms active in the meat substitute category. **We are interested in the innovation strategies of firms and particularly in how the meat substitute category guides their innovation efforts in terms of finding ways to resemble and replace meat.** We investigate the degree of resemblance to meat on five dimensions: ingredients, nutritional value and taste, physical appearance, naming, and marketing. To study product innovation strategies, we do not start with a predetermined definition of the meat substitutes category, as has been done in previous research (Lonkila and Kaljonen, 2022). Rather, we follow how a broad variety of producers in our data define it.

Based on our results, we position this emergence and establishment of a new category in a transition studies perspective. Specifically, we reflect on the implications of our case study and the categorization perspective for the theory on niche development. We engage with the framework developed by Smith and Raven (2012) who distinguish between processes making a new socio-technical niche competitive within an unchanged ('fit-and-conform') or changed ('stretch-and-transform') socio-technical regime.

Our results suggest that in the emergence and continuous development as a dominant category, meat substitute products 'fit and conform' to the meat regime in that these products tend to be produced and consumed in similar ways to, and as substitute of, meat products. We show that these products resemble their meat counterparts to a large extent. The rise of meat substitutes thus leaves most features of the downstream part of the meat product development and supply chain intact, i.e., in terms of production technologies as well as cooking practices, taste preferences and cultural meanings on the consumer side. On the upstream part, however, meat substitutes eliminate the need for livestock husbandry. The 'fit and conform' strategy provides incumbents a straightforward route for diversification into vegetarian products. At the same time, the meat substitute category is fluid, allowing new entrants to offer more radical meat alternatives that move away from resembling their meat counterparts. These more radical alternatives, which may for example be based on unconventional ingredients or have a different physical appearance and taste, come with their own challenges and may 'stretch and transform' the meat regime in the longer run. These products cause a fundamental shift on the part of consumers who may start to recognize these – often protein-rich – products as legitimate food sources and even as alternatives to meat. Our results thus provide more insights into how a combination of the strategies proposed by Smith and Raven (2012) may manifest itself through the opportunities that a hybrid category brings to producers. We show how niches can grow and institutionalize in ways that allow actors to both fit to existing regime structures and concurrently transform such structures over time.

2. Market categorization theory

The emerging meat substitutes category has the ambition to contribute to a transition to a more sustainable food system (Smetana et al., 2015). The new category and associated activities might be regarded as being part of a socio-technical niche that needs to relate to the existing food regime – where eating meat is the norm – to enable acceleration and diffusion. With regime, we mean "the semi-coherent set of rules that orient and coordinate the activities of the social groups that reproduce the various elements of socio-technical systems" (Geels, 2011: 27).

To understand the dynamics between the meat substitute niche and the meat regime, we will therefore build on work by transition scholars like Smith and Raven (2012). They define niches as protective spaces demarcated from extant regimes through processes of empowerment and legitimization (Boon et al., 2014). Such legitimization is partially the result of the establishment of a new market category (Vaskelainen et al., 2022), which is why we apply a categorization perspective. Furthermore, we are interested to see if categories can work as 'bridging devices' in transitions, as both incumbents as well as start-ups are active in the meat substitute category.

People need categories to make sense of social reality. The reality is simplified by not treating every item or practice as unique but

seeing them as a parts of a larger categories, which create hierarchies (e.g., a single box of cereal is part of cereal category which is a part of food category) (Rosch and Mervis, 1975). The theory on categories has recently been applied to market categorization, which examines how new categories are created for novel products and services and how audiences come to accept these categories (Navis and Glynn, 2010; Vergne and Wry, 2014).

With the emergence of an industry, category labels emerge to refer to new products and to distinguish them from existing product categories (Grodal et al., 2015). As these new products re-combine technologies and practices associated with existing products, constructing new labels to capture their core features is a complex process that is negotiated among many stakeholders (Granqvist et al., 2013). Multiple labels tend to emerge that, on the one hand refer to already established categories, but on the other to some novel aspect of the products in question (Alexy and George, 2013). Such references to established categories help audiences understand new products and form expectations about their use, while referring to novel aspects distinguishes products headed under the new category from the products subsumed under older categories.¹

The meat substitutes category is rather abstract and refers to food products that are supposed to replace meat in a regular meal consumed by households. Meat substitutes seem to refer to meat alternatives known as ‘vegetarian food’, with the vegetarian hamburger as the prototypical exemplar. At the same time, substitute as a verb is implicitly associated with meanings and practices concerning eating meat. Thus, one could argue that the new category of meat substitutes is recombinant, building on the two existing categories of ‘vegetarian food’ and ‘meat’. More specifically, the word substitute refers to meat in a negative sense, carrying a normative connotation that is critical towards meat consumption in a similar way as vegetarianism is. Yet, with the explicit reference to meat as the object to be substituted, audiences will still expect meat substitutes to have meat-like characteristics, leaving open which of the meat characteristics are retained and how they are dealt with. The meat substitute category is thus a special example of a hybrid category, straddling the existing categories of vegetarian and meat products in a critical way, bridging the gap between two categories (Hannan et al., 2007).

Hybrid categories are described in literature as not being particularly effective. Scholars have found that claiming membership in a single category tends to be beneficial for products because it allows communicating to the audiences (consumers, investors, regulators, critics) in an unambiguous manner (Zuckerman, 1999). A hybrid category, by contrast, may confuse audiences and lower their valuation of products belonging to them (Negro et al., 2010). When confronted with products from a hybrid category, consumers may still categorize products to one extant category and evaluate it according to the determinant attributes that they associate with this one category, a logic coined ‘single category belief’ (Rajagopal and Burnkrant, 2009; Nieroda et al., 2018).

The explicit reference to meat, however, can increase the legitimacy of meat substitutes, precisely because the label structures the expectations of audiences by referring to the familiar set of meat products and the dominant practices and meanings attached to them. The innovation challenge for firms is to develop meat substitutes that resemble meat products in particular ways. Research indeed has found that meat substitutes need to bear a resemblance to meat products for consumers to recognize them as an alternative. This similarity can manifest itself in appearance (e.g., hamburger shape), taste (e.g., juicy fat), or practices (e.g., eating a vegetarian hamburger with bread and ketchup) (Hoek et al., 2011). Additionally, it has been found that firms are most effective if they market meat substitutes as different, yet similar enough to fit into existing shopping and eating practices of consumers (Fuentes and Fuentes, 2017).

As a new and hybrid category, the meat substitute product category is still in its infancy (Sexton et al., 2019). The weak establishment of meat substitute products is evident from three observations. First, the meat substitute label itself has not become the de-facto standard, as others are currently also in use including “plant-based meat substitutes”, “meat alternatives”, “meat replacers” and “meat analogues” (Tziva et al., 2020; Smetana et al., 2015; Van Mierlo et al., 2017; Kumar et al., 2017). Second, meat substitute products are currently launched as explicit substitutes (alternatives, replacers, analogues) of meat, which means they by definition inherently refer to products they are meant to replace and have not yet established their right of existence without the extant meat category. Especially consumers who want to distance themselves from meat as much as possible might find this problematic. Third, the category is contested - meat lobbyists have gone to court to prohibit names for meat substitute products or brands that are hard to distinguish from the regular names or brands for meat products that they are meant to substitute (van Dinther, 2020; Obdeijn, 2020). While these court cases have not banned the usage of words like “hamburger” or “butcher” on meat substitute products, the legal battle exemplifies that meat substitute category has not yet become strongly established.

Considering the role of categories in transitions, we are interested in the dynamics between the meat substitute niche and the meat regime, in terms of categorization efforts by producers – both incumbents and start-ups – of meat substitute products. Particularly, we will discuss meat resemblance strategies, as these strategies illustrate how producers position their products in relation to the meat regime. We look at these resemblance strategies along five dimensions: ingredients, nutritional value and taste, physical appearance, naming, and marketing.

Choices made concerning these dimensions can be understood as strategic categorization, a process in which producers engage in struggles to influence the way that consumers understand market categories and subsequently how they categorize firms’ products (Rajagopal and Burnkrant, 2009). Strategic categorization mainly plays a role in new markets in which entrepreneurs strive to make their products the ‘cognitive referent’ of the emerging market category (Santos and Eisenhardt, 2009). Interestingly, as meat substitutes may resemble meat in no less than five dimensions, choices made by producers are strategic. They face questions like which dimension to focus on and whether more resemblance to meat always pays off in the marketplace.

¹ For example, early cars were called ‘horseless carriages’ referring to both the old category of carriages and, implicitly, to the novelty of using engine power instead of horsepower (Grodal et al., 2015).

Regarding new product development, we may expect that meat incumbents, embedded in the meat regime, choose different strategies than new entrants. Meat incumbents are more familiar with meat and meat consumers. Furthermore, because of their history, they are categorized as meat producers, making meat substitutes that closely resemble meat more congruent with their reputation and identity. By contrast, new entrants are probably punished less for deviating from the known category of meat and its canonical features in terms of ingredients, nutritional value and taste, physical appearance, naming, and marketing.

3. Methodological approach

3.1. Research design and case selection

To study the categorization strategies of meat substitute producers, we have adopted a qualitative abductive research approach. Abduction refers to “a creative inferential process aimed at producing new hypotheses and theories based on surprising research evidence” (Tavory and Timmermans, 2014: 5). This approach moves away from purely inductive approaches, allowing for dialog and iteration between theory and empirics (Dubois and Gadde, 2002).

We focused on the Netherlands as a ‘frontrunner’ country with one of the highest per capita consumption of meat substitutes in Europe (Bechtold and Will, 2021). Selection of interview candidates was done by examining the list of members of a Dutch umbrella organization (Green Protein Alliance²) and listing the producers of meat substitute products we observed in major supermarket chains. We then interviewed an expert on the industry working for the Dutch Nutritional Center (Voedingscentrum³) about the major players. We selected 15 firms for interviews out of which nine granted interviews with one to three interviewees.

Table 1 shows an overview of the firms we interviewed (divided into incumbent actors and start-ups, where firms were categorized as incumbents when they were founded before 2010), the year in which the firm was founded, and if the firm produces meat substitutes only, or alongside meat products. Between one and three interviews per firm were conducted, depending on the size of the firm and the availability of respondents with different functions.

In addition to the examination of these firms, we interviewed two renowned investors in the industry (#7 and #10) and two industry experts (#1 and #18) who provided us with valuable insights into the strategies of Dutch meat substitutes producers from an external perspective. This resulted in 18 interviews in total. The average duration of the interviews was 56 min, resulting in 1008 min of interview data.

3.2. Operationalization and data analysis

The interviews were semi-structured, building on insights from the previous section, while allowing for the emergence of novel topics. We created a list of interview questions based on indicators covering the five dimensions we associated with meat resemblance strategies. Table 2 shows an overview of these dimensions and related indicators.

We formulated an interview protocol (Appendix A) based on the concepts in Table 2. Additionally, we asked the respondents about the firms’ main mission and vision and to reflect on their expectations of the future of the meat substitutes category.

The initial coding was based on the indicators in Table 2, but we used an open coding approach alongside this, allowing for emerging codes to accommodate additional interesting insights from our respondents.⁴ We first delve into the five resemblance strategies (Section 4) after which we adopt a dynamic perspective to investigate if and how (e.g. in a transformative manner or not) our respondents expect the meat substitutes category to contribute to a transition towards more sustainable diets in the future (Section 5).

4. Resemblance strategies

4.1. Ingredients

Meat resemblance of meat substitutes in terms of ingredients may seem an oxymoron, as meat substitutes are supposed to replace meat as an ingredient. Nevertheless, a significant variety in ingredients for meat substitute products with different degrees of resemblance to meat exists. Most firms use plant-based protein (Sexton et al., 2019) and, accordingly, some past empirical studies tend to focus solely on such firms (Tziva et al., 2020; Lonkila and Kaljonen, 2022; Vaskelainen et al., 2022). The dominance of plant-based protein firms is also reflected in our sample, with all five incumbents and start-up 1 using plants as ingredients. Plant-based products are developed in a supply chain that consists of four basic steps: (1) protein crops are cultivated worldwide; (2) the crops are procured and processed into protein ingredients like protein concentrates; (3) these protein products are processed into intermediary products by producers in the food industry which can be developed into final meat replacing products; and (4) the plant-based products reach consumers through retail and food service (Tziva et al., 2022). Raw materials commonly used to produce plant-based products are legumes, oilseeds, soybean, wheat and cottonseed proteins (Joshi and Kumar, 2015).

In spite of the dominance of plant-based products, we also encountered ingredients that are less common, including insects (start-up 2), fruit (start-up 3), seaweed and algae (start-up 4) in our dataset. From our data, it seems that incumbents tend to focus on plant-

² <https://greenproteinalliance.nl>

³ <https://www.voedingscentrum.nl>

⁴ The interviews were coded using open-source NVivo software. The coding process commenced directly after the interviews.

Table 1
Overview of respondents.

Firm category and ID	Founding	Type of product	Respondents ID
Incumbent 1	1893	Meat substitutes only	#2, #3, #5
Incumbent 2	1998	Meat and meat substitutes	#6
Incumbent 3	2003	Meat and meat substitutes	#8, #16
Incumbent 4	1910	Meat and meat substitutes	#11, #12
Incumbent 5	1975	Meat and meat substitutes	#14, #15
Start-up 1	2018	Meat substitutes only	#4
Start-up 2	2018	Meat substitutes only	#9
Start-up 3	2018	Meat substitutes only	#13
Start-up 4	2013	Meat substitutes only	#17

Table 2
Meat resemblance dimensions and indicators.

Dimension	Indicators
Ingredients	Main ingredients per product
Nutritional value and taste	Concentration of ingredients, nutritional value, and texture
Physical appearance	Size, shape, and color of the product
Naming	References made to meat and other food products in product names
Marketing	Claims about taste, health, sustainability, animal welfare, other topics

based ingredients (illustrated by all incumbents in our dataset) while start-ups tend to be more innovative, experimenting with other ingredients that are less common within the meat substitute category (illustrated by three out of four start-ups in our dataset). We thus observed a clear divergence of producer strategies in relation to ingredients that were used.

We also encountered incumbent firms that experimented with products that combine meat and other ingredients. Known as ‘hybrid meat’, such products contain both meat and plant-based ingredients with the percentage of plant-based ingredients exceeding 25 percent (Grasso and Jaworska, 2020). While industry experts expect that hybrid meat products hold potential for the future, the products that have been brought to the market in the past represent only a small portion of meat alternatives available to consumers and have in many cases been discontinued (Janssen and Verkleij, 2021). It is noteworthy that two incumbents in our sample diversified into hybrid meats, yet not much later discontinued production. One interviewee explained this discontinuation because of confusion experienced by their consumers:

“Those hybrid products, they remain extremely difficult to explain to the consumer, when it actually is quite a nice way to lessen the consumption of meat. But people find it difficult to understand, they wonder ‘what am I eating exactly? I kind of want to eat meat, but this is some kind of diluted version of it.’ ” (Incumbent 1, respondent #2)

One can understand the confusion about hybrid meat: it is inconsistent with a strategy of meat resemblance, as it does not so much mimic meat but actually contains meat. Still, new hybrid meat products continue to be introduced by firms (Vleesmagazine, 2019), and industry watchers tend to express positive expectations about hybrid meat (Janssen and Verkleij, 2021; NOS, 2019; Vleesmagazine, 2020, 2021). The initial failures of hybrid meat, thus, do not preclude that such products may still become successful in the future.

4.2. Nutritional value and taste

The main innovation challenge for meat substitute firms as described by our respondents, is to develop food products that taste good. In this respect, it is common to differentiate between first- and second-generation products. First-generation products have been on European markets since 1990 and mainly rely on low-moisture cooking extrusion (Asgar et al., 2010; Tziva et al., 2020). Second-generation products reached Europe in the early 2000s and brought products to the market that performed better in terms of taste and texture (especially in mimicking meat) due to, among other examples, technological cooking developments like high-moisture cooking extrusion (Yao et al., 2004).

The technological challenges described by our interviewees mainly centered around creating the right recipes, doughs, and proportions to ensure a good texture, binding, and most importantly taste. Finding the right recipes to ensure good taste was deemed important by all interviewees. Most of the innovation and experimentation with regard to taste and texture happens in the companies’ development kitchens. The main challenge for most of our respondents seemed to be mimicking the taste and mouthfeel of meat products as closely as possible, which depends on the used ingredients and the textural properties of the products influenced by extrusion technologies (Schmid et al., 2022). Imitating fats and even blood that can be found in meat products poses challenges when creating the dough.

“A piece of hamburger contains between 10 and 20% fat (...) which makes it very juicy. Let’s be honest, the best burgers are the ones you bite in to causing the fat to drip down the corners of your mouth (...) but that is the most difficult to reproduce, because we work with vegan products only. That means we can’t use any milk fats or proteins.” (incumbent 3; respondent #8)

Additionally, as meat substitute products are generally sold via supermarkets, conservation is key. This creates further difficulties to achieve and maintain good flavors:

“It’s very difficult to get something tasty in a package in the supermarket (...) it needs to go through lots of machinery, it gets frozen and defrosted, it needs to be easily preservable. That’s a challenge.” (Start-up 4, respondent #17)

Achieving good taste was a strategy expressed by all our respondents, where most respondents defined a good taste as being similar to the taste of meat. Incumbent #1 and #2 however mentioned to additionally develop products that taste good without necessarily mimicking the taste of meat.

Being rich in protein, iron, and vitamin B12, meat is generally associated with high nutritional value. As part of their resemblance strategies, producers – incumbents and start-ups alike – focus on attempting to match the nutritional value of their products with that of meat. In this way, they aim to ensure their products are ‘adequate’ substitutes in terms of nutritional value – regardless of their taste mimicking meat or not.

The Netherlands Nutritional Center has created guidelines concerning the nutritional value that meat substitute products should adhere to. All of our respondents indicated to aim to abide to these guidelines and expressed that at times this was quite challenging. The oftentimes low concentration of iron, zinc and vitamin B12 in meat substitutes deviates substantially from meat products (Curtain and Grafenauer, 2019). Much of the recent innovative efforts of meat substitute producers is focused on resembling the nutritional value of meat:

“We find it important that our products are also suitable for vegetarians and even vegans when possible. And by suitable, I mean there should be a high amount of protein in the product, and we also try to add as much iron and B12 as possible.” (Incumbent 1, respondent #2)

The importance of nutritional value for meat substitute products can be exemplified by the case of Jackfruit sold to restaurants. Jackfruit was assessed as a weak substitute for meat by the Netherlands Nutrition Center, which categorized the product as a fruit instead of a meat substitute, because of low protein values (Voedingscentrum, 2020). The firm producing this fruit product – rather than allocating their product to a different food category – indicated that they aim to enhance the nutritional value of their products in the future:

“Jackfruit is indeed relatively low in protein, and since the beginning we have been talking with different parties that are working on protein enrichment (...) once we go to retail that becomes a more relevant question and, by that time, we hope to have protein ready to add to the product.” (Start-up 3, respondent #13)

An additional challenge with regard to the guidelines formulated by the Netherlands Nutritional Center, is limiting additives in terms of salt, sugar or spices. The guidelines state for example that meat substitute products should contain a maximum of 1 gram of salt.

“It’s difficult but there is the intention and the wish to get below 1 g of salt. It’s hard because you lose some taste, so especially for a transition product, which it is, that is hard. People start to complain that it doesn’t have enough hearty taste.” (start-up 4, respondent #17)

The maximum salt requirements particularly pose challenges to meat substitute producers. Yet, for meat substitute products the salt guideline plays out differently than for meat products due to different cooking practices. As one respondent said:

“Of course, there is a big difference between the meat you buy in the store and that you still have to marinate at home, and the meat substitute that is already marinated. If you look at the label, the meat contains less salt, but people still add this salt later in their kitchens.” (Incumbent 1, respondent #2)

What becomes clear is that the innovation strategies of meat substitute producers with regard to nutritional value are strongly guided by the criteria of the Netherlands Nutritional center, which is important to both start-ups and incumbents. With regard to taste we mostly observed convergence of strategies as well, however also acknowledging the efforts of incumbents #1 and #2 to create meat substitutes with tastes moving away from resembling meat.

Our data furthermore indicates that product criteria alone do not measure the nutritional value of the meal in which products are used. Indeed, in the cooking process the value can be further enhanced. That is, strict criteria for salt in products cannot avoid people adding salt in the cooking process. As this is common for meat products and much less for meat substitutes, the standards conceived by the nutritional center create additional challenges for meat substitute producers. Put differently, as the center has meat as reference for meat substitutes, the nutritional requirements for meat products are – at least partially – transferred to meat substitute products. Hereby, the center ignores differences in material substance and cooking practices between meat and meat substitutes, putting additional constraints on the development of new meat substitutes.

4.3. Physical appearance

Our data showed that a pronounced resemblance strategy that most firms follow is to mimic the physical appearance of meat. Indeed, most products have the size, shape, and color of well-known meat products, particularly looking like hamburgers, schnitzels or sausages.

“It’s logical that when you make a copy of meat that it will have the same shape as meat. Take for example a hamburger, we’re not going to make that rectangular or triangular. (...) We use all kind of machines and technologies that are usually used to produce meat. So, it mostly comes down to the mixing of ingredients and shaping of the products.” (Incumbent 1, respondent #2)

Interviewees indicated that they vary their products more often in color than in size and shape, as to be able to continue to make use of meat production lines and packaging systems that are tailored to standard shapes and sizes in the meat. One respondent said:

“Often the shapes are still the same as meat products, which has to do with the production locations. Most people are still meat-minded, and there are molding plates from the meat industry that are also used for vegetarian products (...) you can’t just say I’m going to make a triangle, because the product still has to fit in the production process and in standard packages.” (Incumbent 1, respondent #2)

This explains why diversifying incumbent firms that produce substitutes alongside meat products, tend to follow a resemblance strategy regarding size and shape, as using existing production facilities is convenient and cuts costs. However, some incumbents try to move away from mimicking the physical appearance of meat products. Incumbent 1, for example, distinguishes two product lines. Their ‘classics’ include products that mimic meat, while their ‘variations’ are experimental products with different shapes, colors, and tastes.

“If you think about the ‘variations’, you can choose a different shape, like for example a vegetable square.” (Incumbent 1, respondent #2)

The products stemming from the ‘variations’ line have more freedom with regard to main ingredients that may influence the color, shape and taste of the products, seeing as resembling meat is not the main goal. Another incumbent also experimented with a green burger based on algae and quinoa, but with less success.

“The algae-quinoa burger unfortunately didn’t survive, but I think that was also because it looked very green and healthy.” (Incumbent 2, respondent #6)

The example of the algae-quinoa burger indicates that when products look significantly different from meat products, it becomes more difficult for consumers to understand them. This is in line with the single category belief (Rajagopal and Burnkrant, 2009; Nieroda et al., 2018), that poses that audiences evaluate products from a hybrid category in accordance with the determinant attributes of one extant category (in this case the meat category). Thus, the lesser meat substitutes resemble meat counterparts, the more confusing they become for consumers. Additionally, products appearing “healthy” may refer to a stigma around vegetarian and vegan products that multiple respondents described (#7, #10, #13, #18). Producers worry that a large part of potential consumers, especially occasional meat eaters (‘flexitarians’) and male consumers, do not identify with meat substitutes that are promoted or appear to be ‘healthier’ than meat.

Using familiar ingredients, like vegetables and legumes, can help mitigate the confusion caused by alternative appearances of meat substitutes (incumbent 1, respondent #5). Reversely, we found that products based on more unconventional ingredients like insects, algae, seaweed and fruit, tend to mimic the physical appearance of meat. Start-up 2, producers of meat substitutes based on insects, for example deliberately mimics meat, partially based on advice they have received from consultants.

“Many people wish to invent a new category, but what new categories have we seen in the past 40 years? Only meat substitutes and sushi (...) every advisor we have spoken to has told us to not try to invent a new category of insects.” (Start-up 2, respondent #9)

The chosen strategy aims to increase the legitimacy of their products, which is challenging as many consumers are skeptical about eating insects.

It then appears that especially start-ups using unconventional ingredients apply the strategy of closely resembling meat in terms of physical appearance to increase their legitimacy. The majority of the incumbents stated to also resemble meat products in terms of physical appearance, in part due to their existing manufacturing facilities. We did observe an exception, where an incumbent applied both a resembling strategy as well as a diversifying strategy at the same time (incumbent 1).

4.4. Naming

It has been shown previously that the naming of products, and language more generally, plays an important role in market categorization (Granqvist and Siltaoja, 2020). Naming does not only help to communicate a new product to consumers, but also links to the identity creation of the producers in relation to other firms in an emerging product category. In contrast to earlier protein-rich vegetarian products, like tofu, tempeh and seitan, currently a common naming strategy for meat substitute products is to resemble the names of meat products. This can be understood as an act of category straddling, using the language of an extant category to legitimize another.

“Right now, we have ground beef, burgers, schnitzels etc., and we’re working on sausages and bacon as well. Yes, all meat terms that are used in many common dishes.” (Incumbent 3, respondent #8).

Using names for meat substitutes similar to meat products has caused backlash. Questions were raised in Dutch parliament whether such product naming was legal and whether it should be regulated. A proposition to render meat terms for substitute products illegal, did not reach a majority of votes (van Dinther, 2020; Obdeijn, 2020). Firms are aware of the tensions that their naming strategies caused. However, they do not intend to adapt their strategy:

In our opinion a burger is simply a shape, so let us just call it a burger, it just has a different ingredient, not with meat but with plant-based ingredients. The meat lobby perhaps can feel threatened, but we continue to do it.” (Incumbent 2, respondent #6)

We observed this naming strategy in almost all of the companies in our dataset, interestingly including those that also produce meat products. Less often, in the case of more experimental products, firms may not refer to meat in their naming. In particular, incumbent 1, which developed the previously mentioned ‘variations’ and ‘classics’ product lines, generally refers to the main ingredient and a country’s kitchen in their ‘variations’ product names.

“We look at the product, is it round, is it rectangular. But mainly we think “what’s in a name”, so what’s in the product, and we try to incorporate that in the name. Think for example of a Greek Cheeserondo, then you have the direction of taste – Greek – there is cheese in it and it is round.” (Incumbent 1, respondent #5)

This naming strategy makes clear to consumers what they are buying, instead of referring to the established meat category (even if the oftentimes used reference to burgers still adheres to the meat category). It thus stimulates and facilitates consumers to interpret and understand the products without evaluating them according to the determinant attributes of another category (meat). Aside from incumbent 1 (and only with regard to their ‘variations’ line), we observed that all producers in our dataset use references to meat in their naming strategies. Referring to meat indicates emphasizing a shift on a social dimension, in which category straddling through naming strategies is used to convince consumers that meat substitutes are as legitimate as a food source as their meat counterparts.

4.5. Marketing

Choices made concerning the ingredients, nutritional value and physical appearance of the products show clear linkages to the frames and narratives that producers aim to articulate in their marketing. For example, even though meat substitutes are often described as healthier and more sustainable than meat products, added sodium, sugar and saturated fats decrease the health claim that firms can make. It is, however, often the easiest way to make products taste good or taste like meat. Additionally, firms emphasizing the environmental impact of their products face heavier scrutiny, which leads to having to avoid, for example, ingredients like palm oil and plastic packaging.

Instead, all firms indicated making claims about taste to be their primary strategy in marketing, except for start-up 4 that focuses on promoting the nutritional value of plants. This exception may be explained by the fact that start-up 4 uses a relatively unconventional ingredients (seaweed and algae) and people may not be used to recognizing this ingredient as a source of nutrition. Our other cases show however, that while health and sustainability are sometimes used as secondary claims, emphasizing taste to increase sales is the dominant strategy:

“Benefits for people, animals and the planet are important, so we show that we make products that are really good in that sense. But taste is even more important.” (Incumbent 2, respondent #6)

Meeting the Dutch Nutritional Center guidelines concerning the desired nutritional value of meat substitutes, especially in terms of salt, sugar, and fat, is thus made subordinate to taste, even if firms continue to innovate to meet the center’s guidelines.

Several reasons why taste is the most important claim for consumers were observed. Incumbent 1 explained that the claims you can make about environmental impact and health are regulated:

“There’s a lot you’re not allowed to say, you can present a couple of facts about the environment, but we try to mainly showcase the taste (...) that’s what triggers people to buy it after all. And what comes secondary to that is that it is good for people, animals, and the environment, but that is not our main message (...) You can make very few claims in terms of health benefits, the quality department is strict about that, there are certain regulations. You can’t just call a product “a healthy burger,” the definition of healthy is very contested.”

Emphasizing taste over health and environmental benefits in addition seems to relate to the target group that producers aim for. All of our respondents consider the meat-eating population that occasionally do not eat meat, known as ‘flexitarians’, as the target market segment. Most respondents estimated flexitarians to value taste above other characteristics of their products. In essence, they are understood as looking for products that can match their experience of meat.

“About 3% of the population is vegan, 5% is vegetarian and 66% is flexitarian. That’s why you don’t see green leaves and the word “vegan”, or messages like ‘we are going to change the world’ on our website. No, when you see our website, you think ‘wow that looks tasty, I should try this sometime. Oh is it vegetarian?’” (Start-up 1, respondent #4)

We observed an additional reason why producers tend to shy away from using terms like “vegetarian”, “vegan”, “healthy” and “sustainable”. Firms may fear that (especially male) consumers do not want to identify themselves with these notions. More particularly, respondents point to certain stigmas associated with vegetarians and vegans, which they are careful to avoid.

“A couple of years ago you saw that producers of tofu and tempeh had a sort of vegan hippy, tree-hugging image, and what you see now is that successful companies like Oatly and Beyond Meat often don’t mention that their products are vegan, and when they do, they do it in very cool way, so that it also speaks to flexitarians.” (Investor, respondent #7)

“We’re imagining someone, like a tattooed bigger guy that loves his butcher and enjoys his burger and cannot be caught eating a vegetarian burger because oh my god that would be an embarrassment. But that’s the kind of audience we’d like to target at some point. Because it’s a big audience” (Start-up 3, respondent #13)

In this sense, we observed a radical change in the way meat substitutes are currently marketed as compared to how this was done in the earlier days of vegetarian and protein rich products, like tofu and tempeh. Producers now actively move away from the described stigma around such products – originating to a large extent from health and sustainability claims – by focusing in their marketing and naming on taste, referencing masculinity and comparing their products to meat. These efforts aim for a shift on the social dimension, in which meat eaters (especially flexitarians) recognize meat substitutes as a legitimate source of tasty food.

In addition to these conscious efforts to target flexitarians, the strong focus on taste in marketing meat substitutes might stem from the emergent stage the product category is in. As the new category is not yet legitimized and established in terms of ingredients and nutritional value, strong claims about health or sustainability may be risky. As such claims are contested empirically, appealing to health and sustainability may further delegitimize the new product category. Instead, by appealing to taste, meat substitute products follow the dominant marketing of meat products.

5. The future of the meat substitute category

We investigated our respondents’ perceptions regarding the future market prospects of the meat substitute category. Flexitarians form an appealing market because they make up a larger proportion of consumers than vegans and vegetarians. Moreover, they are seeking ways to replace meat with a product that closely resembles meat.

Nevertheless, several of our respondents expect that the resemblance to meat will become less pivotal in the future, also in the way the category’s label may appeal to flexitarians.

“We now see a demand for meat resembling products because we target the flexitarians. But when a new generation comes, I mean my children are now 4 and 6 and they are growing up differently, they will look at things from a different perspective (...) which will lead to a new kind of consumer (...) it may very well be that in 20 years from now we’ll have to change our machinery as well, because there won’t be any interest in such old-fashioned products.” (Incumbent 3, respondent #8)

Several of our respondents also reflected on the stability of the category of meat substitute itself. According to them, presenting products as substitutes for other products serves a purpose, especially at this point in the transition towards more plant-based diets where flexitarians are the dominant group of consumers. However, the category also poses certain challenges: substitutes will always be compared to their meat counterparts and consumers may interpret them as inferior. Therefore, multiple respondents expect the category of meat substitute to change in the future.

“To name another marketing challenge, finding a different name for this category. Meat substitute, that implies that it is a lesser version of the real category. And we should move away from that. But there isn’t really a good term for it yet... you now see the term plant-based coming up in the US and we use that ourselves as well. So I expect that could become more mainstream in Europe as well.” (Incumbent 1, respondent #2)

“Eventually the products have other benefits as well, in terms of health and environment, which makes them better than meat in my opinion. That’s why I’d rather speak of successors.” (Investor, respondent #7)

What is clear from the visions that respondents hold of the future of the meat substitute category, is that many expect the category not to last long; as people get more used to get proteins from products other than meat, the term meat-substitutes may dissolve. However, different opinions about the future label to use still exist among respondents. Some would refer to plant-based products, other to protein-rich products, and yet others to meat successors. A further observation holds that the meat substitute category may fork into two categories, one referring to products closely resembling meat and another referring to other protein-rich products. One firm (incumbent 3) articulated that meat substitutes could manifest themselves as a kind of superior meat in the future.

Despite these expectations regarding the future meaning and labeling of what we now know as meat substitute products, the meat substitutes category may persist for quite a while. Without an emerging consensus about a new categorization and labeling, individual firms have little incentive to deviate from the status quo. And, even though the label is negatively defined by referring to another category, it can actually become a rather stable category precisely because it refers to, and thereby benefits from, an established, dominant category. As a ‘substitute’ label, the category refers to what products should not be in the category, allowing firms to continue to develop new products which would benefit from categorization in the newly established category of meat substitutes, further enhancing the category’s use (Grodal et al., 2015).

6. Conclusion and discussion

Meat substitutes emerged as a new product category during the past decades. From a categorization perspective, the meat substitute category is a hybrid category as the word substitute raises expectations about meat-like features of food products that (generally) do not contain meat. In this sense, the category combines vegetarian (and vegan) products and meat products, but in a subtle negative manner.

Consistent with the hybrid nature of the meat substitute category, firms mostly tend to follow a meat resemblance strategy while developing products. Sticking closely to meat, they leverage the tendency of consumers to categorize products from a hybrid category

(meat substitutes) into one extant category (meat), and to evaluate products in accordance with the notion of ‘single category belief’ (Rajagopal and Burnkrant, 2009; Nieroda et al., 2018). Resemblance is sought both on the technical dimension regarding taste, nutritional value and physical lay-out, as well as on the social dimension, on which mimicking meat is achieved through naming and marketing strategies. However, usually the producers do not aim for resemblance in all dimensions. In some cases, a strong deviation from meat on one dimension tends to be compensated by a stronger resemblance on another dimension, as illustrated by products based on unconventional ingredients (e.g., insects, seaweed) with subsequent unfamiliar tastes strongly mimicking the physical lay-out, naming and marketing of meat. Additionally, emphasizing good taste in marketing, instead of health benefits or sustainability, clearly illustrates a strategy based on meat resemblance: meat is mostly associated with good taste and is, at present, incongruent with marketing claims around health and sustainability. Achieving good taste without meat ingredients often implies that products do not adhere to meat’s nutritional guidelines.

Arguably, the strong reference to meat products in production technologies, product features and marketing, reflects that meat substitute products conform to the existing meat regime. Evidently, meat products and meat-eating practices are part of the food regime in – and to a large extent beyond – Europe. By resembling meat and targeting meat consumers who may occasionally abstain from meat (‘flexitarians’), firms choose not to frame their meat substitute products as radically departing from the dominant meat culture. Instead, meat substitutes are framed as an occasional substitute in standard meals, leaving both the production and consumption logic of the meat regime intact.

However, our results also showed that meat substitutes seek to radically depart from and as such aim to stretch and transform the meat regime. First, the upstream part of meat substitutes supply chain is radically different from meat production, relying in most cases on the global cultivation of protein crops rather than livestock husbandry. This holds true for ingredients used for all types of meat substitutes we observed, but especially for the more experimental ones, such as insects, fruit, seaweed and algae, the upstream part of the supply chain is also radically altered. These upstream changes have downstream consequences: experimental ingredients come with textures and tastes unfamiliar to consumers, which may stretch and broaden their perception of taste and mouthfeel of meat substitutes.

Second, considering the physical lay-out of meat substitutes we also observed evidence, albeit only in the cases of incumbents #1 and #2, of radical departure from resemblance strategies. One line of products of incumbent #1 and an unsuccessful product of incumbent #2 deviated radically in terms of shape and color. If such products become more mainstream in the future, this would stretch and transform what, in terms of lay-out, consumers consider to be legitimate food items and alternatives to meat or sources of protein. It could subsequently influence cooking techniques, production facilities (e.g., the molds used in manufacturing), as well as packaging practices. Producers and industry experts expressed the expectation that such experimental products would gain more traction in the future.

Relatedly, we observed how the naming and marketing efforts of meat substitute producers influence the meat regime. Most substitute producers seek to resemble meat in their naming and marketing strategies. While these strategies aim to conform with the meat regime, they facilitate radical change within the food system on a social dimension in terms of mainstreaming vegetarian and vegan products. Meat substitute producers try to achieve this through specifically targeting meat eaters and ‘flexitarians’. As producers identify ‘flexitarians’ as the most promising market segment, they have to make vegetarian and vegan products attractive for it. To achieve this, they mimic meat in a technical sense as well as in naming their products. In doing so they also actively try to overcome the stigma that they associate with vegetarian and vegan products. By emphasizing taste in their marketing strategies, as opposed to health benefits and sustainability claims, they try to appeal to those consumers who would otherwise not be open to consuming vegetarian products instead of meat.

The case of meat substitutes as a hybrid category provides more insight into how both the fit-and-conform and stretch-and-transform strategies (Smith and Raven, 2012) can be applied by niche actors. Smith and Raven (2012) already expected to see a messy and dynamic empirical manifestation of the analytical dichotomy of fit-and-conform versus stretch-and-transform patterns and hypothesized that regime circumstances and actor networks may influence how niche actors interact with the regime. Our study demonstrates the stretch-and-transform strategy by highlighting how both incumbents and start-ups are actively experimenting on different kinds of products that can replace meat. However, by positioning their products under the category of meat substitutes, they fit-and-conform to the meat regime and leave its evaluation criteria and practices mostly intact. A hybrid category then seems to provide producers acting within the remit of the category the freedom to engage with both fit-and-conform as well as stretch-and-transform strategies. This does not mean that both strategies yield similar success, though. For now, meat resembling strategies seem the most fruitful for meat substitute producers, but our respondents expect this to change in the future.

The blending of fit-and-conform and stretch-and-transform patterns aligns with the findings by Mylan et al. (2019) who show how actors in the plant-based milk category are simultaneously culturally challenging the use of dairy-based milk, as well as adhering to the ways it is consumed. By introducing a categorical perspective on such patterns, we complement their findings by showing that companies mix the two patterns by managing what we call paradoxical expectations in product development. To succeed, companies in the meat substitute category must create products that resemble meat in multiple ways, but do not contain any meat (as shown by the poor success of hybrid meats).

These paradoxical expectations on a product level are also reflected on the level of incumbent organizations. The incumbents strive to ensure that meat substitutes cannot benefit from the legitimacy of meat, e.g., by trying to block the use of terms like “hamburger” for meat substitutes. Simultaneously, they try to succeed with their own meat substitutes, which often resemble meat more than those of the start-ups because they use existing meat processing machinery to save costs. This seemingly paradoxical behavior might be explained by the incumbents’ view on sustainability. When incumbents perceive sustainability claims as complex and contradictory, they often respond paradoxically: they simultaneously experiment on the sustainability-induced markets but in guarding their existing

business they tend to keep their sustainability-oriented innovations on a small scale (Hahn et al., 2014). Such behavior has also been observed in the oil and gas industry, where large incumbents diversified into renewables only marginally (Mäkitie et al., 2018) and in the mobility industry, where car manufacturing companies often entered the car sharing business hesitantly (Vaskelainen and Münzel, 2018). As such, our findings align with the organizational paradox approach (Smith and Lewis, 2011) to shed light on the meat incumbents' behavior.

For start-ups, the paradoxical expectations are particularly tricky because they cannot lean on established business like the incumbents. They feel the pressure to provide an alternative to meat, while adhering to its taste, texture, nutritional value, and even the way it is cooked. Arguably, this situation is not conducive to create radical innovations; it is quite difficult to develop entirely new kinds of food products if they are evaluated on the exact same criteria as the existing ones. In our data, this is well demonstrated by companies that use entirely new kinds of ingredients, such as jackfruit or insects. They do not perceive that they have the power to create categories of their own, and thus, they position their products within the meat substitutes category. In doing so, however, they must mimic meat, which is not an optimal market position to fully utilize the potential of their ingredients. Further evidence of the difficulties of the start-ups to create radical innovations in the meat substitute category is the fact that in our data the only company that has a product line that clearly tries to deviate from the requirements of the meat category is an incumbent.

The producers in our study uniformly expect that meat substitutes will be a transient category that disappears when consumers get used to eating more plant-based food. However, there is little evidence of any actor strongly leading this change. Instead, the actors expect a more established category to come from outside the Netherlands, e.g., from the US, to truly unleash the potential of the products. However, currently, nothing points towards a breakthrough from the US market, as there are signs of stagnating growth of meat substitutes (Young et al., 2022) and the flagship companies of the industry, such as 'Beyond Meat', recently experiencing significant financial difficulties (La Monica, 2022). Thus, while it is possible that new categories will emerge in the long run, which could unleash the potential of new plant-based protein sources, currently, there are no big and powerful companies strongly pushing for this change.

Based on our findings, we call for the adoption of the market categorization perspective in transition studies to study niche emergence. It is particularly well suited for observing market formation in fuzzy and hybrid categories, which do not clearly belong to any existing regime because it builds on producers' or consumers' perception of relatedness (Boon et al., 2022; Vaskelainen et al., 2022). Thus, it can capture how companies working with seemingly very different products must overcome similar challenges in their innovation pathways – e.g., try to create similar meat resembling texture using crickets or algae. It can also uncover regulatory barriers to innovation such as the requirement for low salinity of meat substitute products in this study. Additionally, we call for more research from the paradox perspective on incumbent companies. Understanding the paradoxical expectations that different stakeholders have of which goals incumbents should pursue, can increase understanding on how they relate to new sustainable niches, answering to the recent call for more nuanced understanding of incumbent strategies in sustainability transitions (Turnheim and Sovacool, 2020).

Funding

This work was supported by the Netherlands Organization for Scientific Research (NWO) [grant number 453–14–014].

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

Appendix A. Interview protocol

Personal questions:

- 1 Your role within company X is Y. Could you describe this role?
- 2 How long have you been an employee of company X?

Questions concerning the company:

- 1 Can you tell us something about the history of company X?
- 2 How would you describe the core business of company X? How has it developed over time?
- 3 Why and when did company X get involved with meat substitute production?
- 4 In your own words: how would you describe the company's mission and vision?
- 5 Who are the most important stakeholders for company X?

- 6 Are there actors who have taken a critical stance towards company X? If yes, how did they exert this and why do you think this happened?

Questions concerning products:

- 1 How would you describe your products to someone who is completely unfamiliar with them?
- 2 Which products does company X put on the market and which are most important to the company?
- 3 What are the most important ingredients used?
- 4 Which technologies are used for production? How have these technologies developed over time?
- 5 Are there guidelines or regulations that you try to follow when producing meat substitutes? If yes, which are they and how do you try to adhere to them?
- 6 To what extent does the malleability of the product affect its reputation?
- 7 On what grounds are the products designed in terms of physical features?
 - a Is there experimentation with different shapes, colors etc.?
- 8 On what grounds are the products designed in terms of taste?
 - a Is there experimentation with different flavors?
- 9 How is the name of a product determined? What is the reasoning behind it?
- 10 Has company X put meat substitutes on the market in the past that have been taken off the market again? If so, what happened?

Questions concerning marketing:

- 1 How are the products of company X marketed mainly? Which story do you tell? Do you put forward a certain message?
- 2 Do you target a specific consumer group? If so, which and how?
- 3 Have target consumer groups changed over time? If so, can you reflect on how and why?
- 4 Does company X emphasize specific characteristics of their products in the marketing? If so, which and how is this done?
- 5 What are obstacles that you have encountered with regard to marketing meat substitutes?
- 6 How is the price of the product determined?
- 7 Do you monitor how customers value your meat substitutes? If so, how?
- 8 Which lessons have been learned about marketing meat substitutes?

Questions related to the future of meat substitutes:

- 1 How do you see the future of company X? Specifically with regard to which products will be developed further and how they will be marketed in the future?
- 2 Are there any topics we have not covered during this interview that you wish to address?

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