



Aalto University
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THE ROLE OF INFORMATION SYSTEMS IN LIFESTYLE TRANSFORMATION

The Example of Plant-based Diet

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Abstract

Plant-based diets are not a new phenomenon but recently they have emerged to become more mainstream than before. Consumers are becoming more aware of the link between their diet choices and climate change, animal wellbeing and personal health. As demand for plant-based alternatives is rising, new products and innovations are entering the market with a rapid pace. Even activists who have worked for decades to make plant-based more mainstream, are stunned to see their local supermarket dedicate shelves for plant-based products and for McDonald's to launch McVegan.

This thesis explores the existing literature on how information systems aid and influence plant-based transformation. The aim is to explore the development from two perspectives. First, how do IT artefacts support consumers switching towards more plant-based diets? And second, how are information systems used to market niche products such as plant-based alternatives? The research objectives are to explore the current state of the plant-based market, identify the drivers of the growth and to study how important IT artefacts are in supporting plant-based transformation.

Keywords information systems, IT artefacts, plant-based diet, online communities

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1 Introduction

In recent years, vegetarian and vegan diets have become increasingly popular globally, especially in Nordic countries, Western Europe and the U.S.. Overall the amount of people with special dietary requirements has increased as information has become widely available (Piipponen, Rinta-Kiikka and Arovuori, 2018). Besides people adapting to a certain diet, many consumers have increased the amount of plant-based products in their diet while staying omnivores. These “flexitarians” are eating more vegetarian meals a week or substituting certain products in their diet, for example their dairy milk in coffee for a plant-based alternative.

The market for plant-based has grown and the selection of plant-based meats, dairy products and other alternatives with it. The surge of demand has not gone unnoticed as traditional meat and dairy companies have started launching plant-based alternatives of their products. For example Valio’s Oddlygood and Pouttu’s Muu products which are dairy and meat alternatives produced by prominent Finnish dairy and meat product producer. The shift has been visible in all of our daily lives as supermarkets have started carrying a growing selection of plant-based products. New products, brands and innovations seem to be popping up all the time and bigger stores now have dedicated plant-based shelves and isles.

Lifestyle and diet changes often require an experimental journey which involves processing information. Different information systems can make this process easier, for example by providing easily accessible information or a platform for information sharing among individuals. Furthermore, information systems are a valuable tool for companies in marketing their product and communicating with their customers.

1.1 Research questions and objectives

The thesis aims to answer the following questions:

1. How do IT artefacts and information systems support consumers switching to a more plant-based diet?
2. How are information systems used in marketing niche products plant-based food alternatives?

The research objectives for this thesis are the following:

1. To explore the current state of the global plant-based market and how it is perceived by consumers
2. To identify different drivers of the plant-based trend
3. To study how important IT artefacts are in supporting plant-based transformation

1.2 Scope of research

This study will look into the role information systems have in growing niche market of plant-based products from two points of views. First how information systems are utilized marketing plant-based products and secondly how information systems aid consumers in plant-based transformation. Additionally, this paper will go over the current state of the plant-based market, what draws consumers towards a more plant-based diet and where the trend can be seen. The research will focus in the recent years (approximately 2015-2022) as the growth of the market has been notable during this time. Veganism and shift towards plant-based products will be discussed as an universal phenomenon though many of the examples will have a Finnish or Nordic point-of-view.

1.3 Methodology

This thesis was conducted as a literature review. Common databases like Scopus and Google Scholar were covered and search words like “information systems”, “marketing” and “product development” were used together with “vegan” or “plant-based”. Recent publications from relevant journals such as MIS Quarterly were skimmed to find relevant research outside of the keywords. Many articles related to the topic were quite old (15+ years), but newer articles that had cited them were relevant to the research. The publication year of the articles is important for two reasons. The nature of information systems is everchanging and the thesis is looking into changes that have happened in recent years. Older articles covering basic principles and defining common terms in the field were included.

Information systems (IS) as a discipline studies individuals, groups, organizations and markets in connection to various IT artefacts, and in addition also IS development (Sidorova *et al.*, 2008). Although the rise of plant-based products is a new and little researched topic, studies about many similar topics exist. Insights from marketing, food sciences and psychology will also be covered in this thesis to reach a more profound understanding on what drives the growth and what is the role of information systems in it.

1.4 Structure of the research

This thesis is structured as follows. First general background about plant-based diet, the size of the market and pull factors of plant-based diets will be presented. Second, marketing plant-based products will be discussed, covering celebrity vegans and online environments. These two topics are the most prominent in current research. Third, the thesis will go over how ICT artefacts support plant-based transformation. Chapters 3 Marketing plant-based products and 4 ICT artefacts as tools in plant-based transformation both discuss online communities from different points-of-views. Finally, there is a general discussion on the conclusions and the limitations of this study.

2 General background

This chapter will go over the key concepts that play a vital role in understanding the world of veganism and plant-based products. The aim is to cover the growth of the plant-based market and the most obvious reasons for it as well as build a better understanding for the following chapters. Veganism is the moral practise of diminishing animal suffering resulting from one's lifestyle. This includes eating a plant-based diet as well as not purchasing leather, wool, and other animal-based commodities. According to the Oxford Dictionary (2022) a vegan is "A person who does not eat or use animal products". This simple definition is used broadly but ethical views on animal rights are often tied to the meaning. Some view ethics as inseparable from veganism (Dutkiewicz and Dickstein, 2021).

Niche markets are defined as focused markets with relatively few customers and competitors. Firm specialization, product differentiation, customer focus and relationship marketing are often included in such markets (Toften and Hammervoll, 2014). Benefits of niche markets include the ability to serve customers better and possibly acquire higher profits. Common difficulties are cost disadvantages associated with production and logistics, reduced flexibility and lack of detailed market information. The market for plant-based products is a niche market.

Ninety-four percent of Finnish people eat meat in some form (Piipponen, Rinta-Kiikka and Arovuori, 2018) but over 50% eat meat only 1-2 times a week or don't eat meat at all (Helldán and Helakorpi, 2014). A fifth of the adult population has reduced the amount of meat they consume over a couple of years but this has yet to show in the total consumption (Piipponen, Rinta-Kiikka and Arovuori, 2018).

2.1 Size of the market for plant-based products

In European markets, the biggest plant-based food groups are plant-based milks and meats. Milk has the biggest share in most countries, followed by plant meats. In Germany, the sales value of plant-based food grew 97% from 2018 to 2020,

with plant-based meats seeing a growth of 223% during the same period (Bechtold, 2020). Reports predict the growth to continue with the plant-based market. In EU and UK the market is forecasted to be 7.5 billion in 2025 compared to 4.4 billion in 2019 (ING, 2020). The stock market has seen big plant-based companies like Beyond Meat and Oatly having their initial public offerings and getting listed (CNBC, 2019, 2020). Plant-based companies are finding success in getting funding elsewhere too. The Vegetarian Butcher, Dutch-founded company producing plant-based meats, crowdsourced over 2,5 million euros in only three weeks to build a new production facility back in 2015 (NL Times, 2015).

Although the market for plant-based products is booming, vegans and vegetarians stay a relatively small segment. Vegans and vegetarians account for 4 and 6 percent of the global population respectively. Flexitarians account for a much larger share at 42% of the population (Euromonitor, 2021). Vegan transformation in this thesis refers to the practice of adoption a more plant-based diet as well as going strictly plant-based.

2.2 Pull factors of plant-based diets

To better understand why consumers are increasingly interested in plant-based products, we will go over the main points that make them attractive. The benefits can be divided to three major categories: health, environment and being cruelty-free. Research on the health effects of animal products and plant-based food has been progressively conducted in the last decade. Eating meat has been linked with cancer, obesity and diabetes (Satija and Hu, 2018). Together with research showcasing the negative effects meat production has on our Earth and consumers having growing anxiety about climate change, many have made the decision to eat less animal products.

Plant-based is often linked with weight loss and better health. Especially the relationship between plant-based diet and cardiovascular health has been studied recently (Kahleova, Levin and Barnard, 2017; Satija and Hu, 2018; Joshi, Ettinger and Liebman, 2019). The reality in Western countries is that an average

citizen is consuming too much animal-based products and their health would increase by substituting (some of) them with plant-based alternatives.

Climate change has been a significant issue for decades. With the rising amount of news about the topic, consumers are experiencing eco-anxiety and looking for ways to relieve it (Kurth and Pihkala, 2022). In the summer of 2022, many European countries have experienced forest fires and drought. Water supplies have been regulated as countries like France have municipalities left with no drinking water (BBC, 2022). Animal agriculture is extremely water intensive and animal manure pollutes fresh water supplies.

World's population is growing by the minute and so is the demand for meat and other animal products. The problem with animal-based food lies in their inefficiency to produce which makes it difficult to match the growing demand for low-cost produce. Raising the maximum number of cows, hogs or chickens possible can lead to impaired living conditions for the animals. Because these animal-products have been staples of western diets for a while now, some find it difficult to replace them. New innovations and product development has made this easier as the market has a larger variety of plant-based products, some of them imitating meat, dairy and eggs. Consumers do not have to sacrifice to lead a more cruelty-free and sustainable life.

2.3 Perceived and structural barriers of plant-based diets

Many social and cultural norms and structures are upholding the consumption of animal-based products. These norms and structures influence all kinds of behavior from exercise to blood donation and binge drinking. Consuming meat and other animal-based products is the norm in many cultures, hence the social influence process is very evident (Nguyen and Platow, 2021).

Animal-based diets are the norm, but meanings associated with eating meat go beyond that. Studies on men, masculinity and food have been increasing lately and many studies have supported the idea that men use food to subscribe to and

enforce the norms, expectations and behavior of their gender. Eating meat is often associated with masculinity whereas restrictive eating such as not eating meat can be considered feminine (Greenebaum and Dexter, 2018).

Besides perceived barriers such as social norms, there are plenty of societal structures that promote consumption of animal-based products. The European Union (EU) promotes the consumption of milk, vegetables and fruit in school through the School Scheme. Through the scheme milk has become as staple in the diets of children across EU but plant-based milks are not supported (European Commission, 2017). The scheme supports not only milk but milk-derived products such as yogurt and cheese (European Commission, 2022). The availability of plant-based products in childhood and adolescence is a key factor in plant-based transformation on the population level as higher familiarity with plant-based products is consistently associated with higher acceptance (Giacalone, Clausen and Jaeger, 2022).

3 Marketing plant-based products

Information needed for marketing activities can be collected through various tools. A resource-based view argues that competitive advantage emerges from unique combinations of resources that are economically valuable, scarce and difficult to imitate (Barney, 1991). With the amount of information and datapoints collected getting enormous, how companies utilize this information to gain competitive advantage has become relevant for big corporations and small companies alike. In the case of entry strategies, the most logical approach in entering a market has been gaining popularity amongst the highly enthusiastic consumers – ‘innovators’. In the case of plant-based products this group is often vegans (Dedehayir *et al.*, 2017). Modern consumers are seen as active participants in the discussion, rather than passive recipients of marketing information. This shift has heightened the importance of brand and consumption communities, which have often formed online.

3.1 Celebrity vegans

Many factors have contributed to the construction of the multi-niche market or the mass market of alternatives we have today. Historically, veganism has been stigmatized in the mainstream media, vegans have been called “ridiculous”, they have been characterized as hostile and veganism has been described as difficult or impossible to sustain (Cole and Morgan, 2011). Meat and dairy products have been presented as an integral part of a healthy diet and most official dietary advice has ignored plant-based diets until recently. For example, the Finnish ‘plate model’ (fin. lautasmalli) published by the Finnish Food Authority, added the vegan model only in 2019. At the same time they declared that a carefully composed vegan diet is healthy for adolescents, pregnant women, breast-feeding women and children (Finnish Food Authority, 2019).

In recent years the discourse has become increasingly favorable of vegan ethics, which are now presented as kind and compassionate. More celebrities now

identify as vegan or eat plant-based and share their lifestyle to their fans and followers in different ways. Some base their public personas on veganism, like Alicia Silverstone who has her Kind Life brand and community. Others like Ellen DeGeneres, display veganism as a part of their persona (Doyle, 2016). Consumers have a greater chance to change their eating habits if the celebrity endorsers motivation for being vegan matches their own thoughts (Phua, Venus Jin and Kim, 2020).

In the early 2020's, social media influencers are one type of celebrities. Social media influencer refers to an individual who has a substantial following on their online platforms, which allows them to influence consumer behavior through promoting products (Lamba and Malik, 2022). These promotions can be organic or through a collaboration with a company where the influencer receives benefits like products or money, in exchange for promoting the product on the platform(s). According to Goodman and Jaworska (2020) social media influencers have replaced traditional food experts as a source of advice and recommendations, especially related to eating healthier foods.

3.2 Online environments

In online communities, such as Sipsikaljavegaanit or Vegaanihaaste (discussed later in 4.2 Online communities), the information shared is seen as reliable (Dickinger, 2011). By following these channels, a company can gain valuable feedback. As ways to recognize and summarize opinions by using emotion cognition and convolutional neural networks are being developed (Wu et al., 2019), the possibilities of utilizing these communities for marketing and product development purposes are only growing.

The consumption communities that have risen around plant-based products resemble brand communities (Hungara and Nobre, 2022). Many brands are also present in these communities. Besides participating in the discussions about their products, many have faced issues with legislation which have been discussed in these communities. Despite their negative effects on health and climate, animal-

based products seem to be favored because of their longer history. In 2022, Finnish Food Authority banned Mö Foods from calling their greek-style vegan cheese Mö Kreikkalainen (eng. Mö Greek) as the term “kreikkalainen” is misleading (Yle, 2022). Many communities were outraged, and the discussion gave visibility for the product that it would not have otherwise had. Besides naming practices, public programs and funding are often skewed towards favoring animal-products. One of the biggest plant-based companies, Oatly, has taken a large stance against these skewed views and lobbies to include plant-based milks in the school milk program by EU (Oatly, 2022). This is an example of how plant-based companies are using online environments to combat structural biases towards animal-based products.

4 ICT artefacts as tools in plant-based transformation

In heavily 'carnist' cultures, where eating meat every day is the norm, there are many perceived barriers in plant-based transformation. These barriers are often lowered by the usage of ICT artefacts. From veganism to flexitarianism, ICT helps consumers make the change with barcode applications, recipe banks and other important resources. Vegans can quickly check if the new product they are about to purchase is plant-based with a barcode application and flexitarians can find new plant-based recipes to easily train their taste buds. This has allowed many of those to change their diet, who otherwise wouldn't have due to the lack of know-how or support in their social circle.

4.1 Online resources

Consumers switching towards a plant-based or more plant-based diet often involves a catalysator experience. This experience can be reading about animal welfare or watching a documentary online. The effect the experience has is dependent on two factors. The availability of such resources which educate on animal welfare and the environmental and health impacts of animal agriculture, as well as the consumer's view of their credibility (Wang and Hickerson, 2016).

Streaming is the new normal for consuming television shows, series, and movies. In the era of information overflow, recommender systems play a role in defining and refining user's interests. Major companies such as Facebook, Netflix, Amazon and Spotify use recommender systems within their services (Del Carmen Rodríguez-Hernández and Ilarri, 2021). As many get the first nudge to try a more plant-based diet or go vegan from a documentary, video or a podcast, their visibility on major platforms is valuable. *Seaspiracy*, a documentary about the fishing industry and sea life, was published in March 2021 on Netflix. It immediately went on Top10-lists in several countries such as Finland, Sweden, UK, Canada and the US and stayed in Top 10 movies in the United Kingdom for 41 days (*Seaspiracy Top 10*, 2022).

Once the consumer's initial interest has sparked, they often look for more information regarding the vegan diet. The resources needed for the transformation have not been at hand in society (Hungara and Nobre, 2022). This information is often provided by several online sources such as YouTubers, eBooks and online communities. Restaurant applications aid in finding places to eat as many of them have filters for vegan food. Websites such as HappyCow help the user find vegan, vegetarian or vegan-friendly restaurants near them or in specific locations. Online recipes make cooking more accessible to anyone. The availability of vegan recipes and cooking videos support the learning of competences required to follow the vegan diet (Lawo *et al.*, 2020).

4.2 Online communities

In the age of social media and Facebook, there is an online community for nearly everything. Examples of Finnish online communities for vegans and people interested in vegan food are Sipsikaljavegaanit (eng. Chips&Beer-Vegans) on Facebook and Vegaanihaaste (eng. Vegan Challenge). Sipsikaljavegaanit is a Facebook group dedicated for vegan junk food. Pictures, reviews and recipes are shared daily. Knowledge about new products or new restaurants is quickly shared. The communities can be divided to those bound by geography and those not bound by geography. Veganism is a universal practice but some of the communities are bound geographically to share relevant tips about local restaurants, products found in local shops and local events.

Many find social aspects difficult when going vegan or making their diet more plant-based. What you choose and choose not to eat often stems from complex social and cultural structures. Many fear the risk of social exclusion or rejection and facing social prejudice when their eating habits differ from the norms in the social network (Daly, 2020). Online communities provide peer-support and knowledge on cooking, nutrition, ethics and other relevant topics.

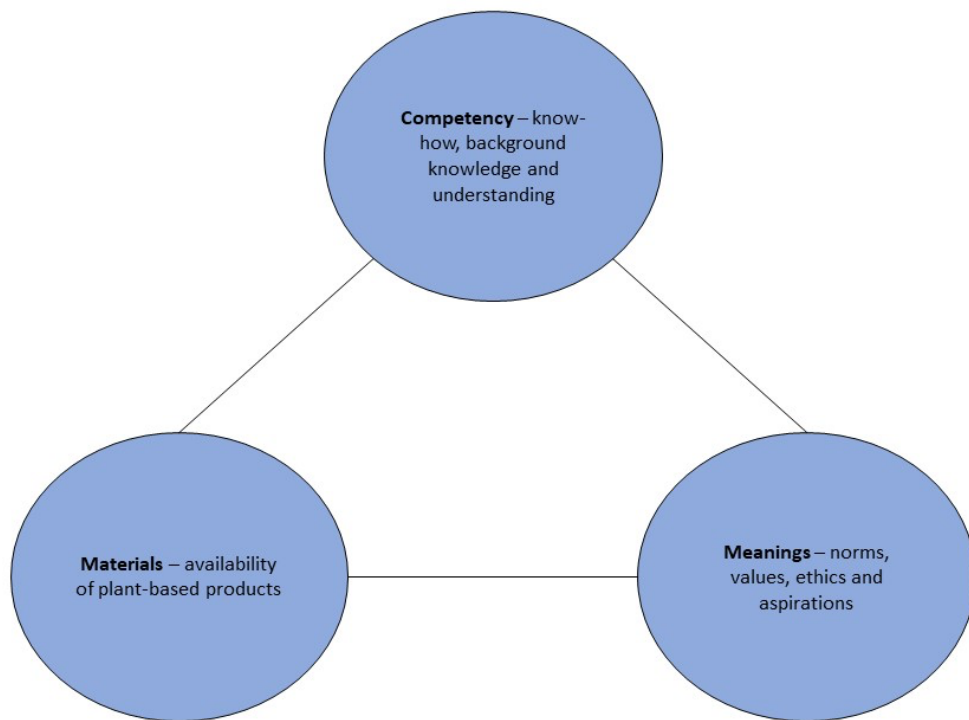


Figure 1: Social practice theory framework, source: White et al. (2022)

Social practice theory (SPT) explores how practices (types of routinized behavior) are executed in different social, spatial or temporal settings. The framework (Figure 1) consists of competency, materials and meanings (White et al., 2022). According to White, Ballantine and Ozanne (2022) most important materials related to plant-based diets are the products themselves. Besides products and distribution infrastructures related to them, information infrastructures are mentioned as crucial. Sharing information of (new) products and availability in online communities is an essential part of plant-based transformation for many. Community members post tips on how to prepare products or recipes and others share their experiences. This helps new and old community members to develop or acquire the skills and knowledge required for plant-based diet which constitute the competency in the framework. Sharing of norms, values and ethics with others is important for many. Possessing deviant beliefs can cause distress on individuals. Online communities where these beliefs can be shared with others

are especially important to those with no other vegans, vegetarians or vegetarians in their social network.

Vegaanihaaste is a one-month challenge designed for starting your vegan journey. If you accept the challenge, you will receive daily emails with information about different themes. Examples of these themes are quick and easy vegan foods, cheap vegan food, vegan cheeses and plant-based proteins. Participants can get a free tutor who can answer all their questions and help them and there is a Facebook group for all of the people who have accepted the challenge during the year. The challenge was organized for the first time in 2013 and over 130 000 people have participated over the years (Vegaanihaaste, 2022). The challenge touches all three aspects of SPT. Daily newsletters, tutor and the Facebook group all contribute to competency. The recipes and posts itself do not make plant-based products available but information on their availability is shared and naturally an increasing demand calls for increasing availability. The sense of community is often praised in the feedback given after completing the challenge, allowing the sharing of values and other meanings with others.

5 Discussion and conclusions

Current trends have had a considerable effect on plant-based products becoming popular, but a major shift has been massively aided by information systems. Information systems are involved in the development, launching and marketing of plant-based products but more importantly they support consumers in shifting towards a plant-based diet and consuming plant-based products. The effect is notable as most Western companies these days rely heavily on information systems in their daily operations. The consumers interested in the plant-based diet are finding resources, information and peer support online. The growing communities and amount of information draws in more people and creates a positive cycle.

Why the market is experiencing drastic growth now is a sum of many factors. Public discourse has shifted to be more favourable, climate change is seen as a growing threat and supporting online communities have emerged. The interest has been visible for incumbent companies through social media and research. As many traditional companies producing animal-based food products have taken the initiative to develop plant-based products, increasing their availability, interest has grown further. A positive feedback loop has been developed and plant-based products are profitable.

Although consumers throughout the globe show interest towards plant-based products, clusters exist. Some cities, towns and areas have a wider selection of vegan or vegan-friendly restaurants and products. There are two major reasons for these clusters; like-minded people moving in similar cities and neighbourhoods and people having a strong natural urge to act the same way as others (White, Hardisty and Habib, 2019).

As discussed in the online communities chapter, people also have a strong need to share and discuss their practises with their peers. Online communities are tackling the social influence processes putting pressure on consumers to consume animal-based products. They are providing a social context where information about meanings, materials and competencies related to plant-based diets are shared. They especially help those in rural areas with no one in their social network to share this information with. Naturally convenience and availability will always play a part as well on how consumers compose their diets.

The stigma around veganism and femininity has been fading. In interviews, multiple men cited the emerge of vegan athletes (celebrities) as a major reason for reduced stigma towards vegan men (Greenebaum and Dexter, 2018).

The transformations discussed in this thesis are heavily based on consumers switching to plant-based products due to their own interest in them. However, to achieve the kind of results that are urgently needed in the fight against climate change, public policies and education needs to be altered. Public funds should

be directed towards plant-based food production and innovation, rather than animal agriculture. Plant-based cooking should be included in schools, public diet information and culinary school curriculums. Beyond animal welfare, switching to a more plant-based diet is beneficial for food security, environment and human health.

In sum, information systems have contributed to the shift towards more plant-based diets and helped many in their personal plant-based transformation. Most important factors recognized in the literature are the ability to store and share information and to provide communities for information sharing. Online resources and communities as well as the presence of vegan celebrities, have all influenced different aspects of the transformation. As the growth of plant-based markets continues, they can no longer be considered niche. Cruelty-free and green has gone mainstream.

6 Limitations of the study and suggestions for future research

The biggest limitation to this literature review is the limited literature on plant-based food products and information systems. The amount of literature related to the plant-based diet is scarce, however quite unanimous on the climate and health implications. Another limitation is the low number of participants in the existing studies. This thesis would have benefitted from the inclusion of interviews as a way of presenting additional perspectives not present in the current research. Plant-based companies are likely using ICT and social media to spread their message and to reach their customers, but bulk of this information is not easily available publicly. Some information is available on company websites and social media campaigns but there is few research and complete sets of data available.

Limited existing literature has one upside, there are plenty of intriguing and significant research topics and questions for the future. What are the biggest barriers to reach the consumers that haven't adopted a flexitarian or plant-based diet yet? What kind of challenges lie in scaling up the production to match quantities needed to satisfy the needs of a larger consumer segment? How do developing markets differ from developed markets, especially as meat consumption is often seen as a sign of wealth? Hopefully we will have answers to these questions and many more in the future as our food system is in a dire need of change. Simply put, our globe can't sustain our eating habits and we must adapt.

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