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Would you eat it? An investigation of how perceived sustainability and perceived risk influence consumer acceptance of edible food packaging.

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Summary

One of the recent innovations for food packaging materials is edible packaging which is initiated to deal with environmental issues. However, research into edible food packaging is still in its infancy, especially in terms of consumer perception and acceptance toward it. Therefore, the overall research question is how will consumers accept edible food packaging? In this thesis we focus on two main aspects which are perceived sustainability and perceived risk. We tested acceptance of the three products (edible water bottle, edible coffee cup, edible cupcake case) that vary in terms of perceived sustainability and perceived risk. The total number of participants is 120 which were recruited by a convenient sampling method. The results indicate that perceived sustainability was positively associated with consumer acceptance of the product. In contrast, perceived risk was negatively associated with the acceptance. Specifically, only health-related risk influenced consumer acceptance, which represented the physical risk dimension. Additionally, the mean differences of consumer acceptance among the three tested products were not all significant. The mean acceptance of edible cupcake case was significantly higher than edible water bottle and edible coffee cup.

1.0 Introduction

The benefits of plastic are undeniable. Plastics are particularly effective in packaging applications due to their lightweight nature, flexibility, and durability. Over a third of plastic material demand is for plastic packaging applications (PlasticsEurope, 2019). However, the short-lived nature of plastic packaging creates huge negative impacts and causes environmental problems. The amount of plastic waste has been a huge concern during this century. Around the world, one million plastic drinking bottles are purchased every minute, while up to 5 trillion single-use plastic bags are used worldwide every year. In total, half of all plastic produced is designed to be used only once, and then thrown away (UN Environment, 2019).

Apparently, about 300 million tons of plastic waste is produced every year. That huge number is nearly equivalent to the weight of the entire human population. Some of it can be recycled, but the majority of it ends up in the environment whether a river, an ocean, or on land (Schmidt, Krauth & Wagner, 2017). This is obviously not good for the environment since most plastic items cannot fully disappear, and they create a lot of negative consequences. Many of these tiny plastic particles have been mistakenly swallowed by farm animals or fish perceiving them for food. These tiny plastic particles have also been found in a majority of the world's tap water (UN Environment, 2019). These are just some examples of how plastic waste makes a bad impact on the environment, animals, and humans.

Because the use of plastics continues to grow following economies growth and consumption booms, the environmental impacts caused by packaging production, which generates solid wastes, industrial effluents, atmospheric emissions, noise, and vibrations have increased (Riegel, Staudt & Daroit, 2011). The world is therefore waking up to these problems. Governments around the world are increasingly awake to the scale of plastic pollution. More than 60 countries have adopted policies to reduce the use of disposable plastics (UNEP, 2018). This directly links to the packaging industry in terms of reducing packaging waste.

In developed countries, food packaging represents 60% of all packaging (Northwood & Oakley-Hill, 1999). Food packaging can hence become the most obvious source of litter generated by the public. This has caused increasing environmental concerns, resulting in strengthening of European Packaging and Packaging Waste Directive 94/62/EEC and The Packaging Essential Requirements Regulations (2003) in order to reduce amounts of packaging waste (Davis & Song, 2006). In recent years, development of biodegradable packaging materials from renewable natural resources has received widespread government support in EU countries. Also, many national and international organizations have been established to facilitate the development in this area, not only to reduce plastics, but packaging waste in general (Davis & Song, 2006).

The development and innovation of food packaging has improved continuously to better the world coping with climate change issues. One of the recent innovations for food packaging materials is edible packaging. The edible packaging is mainly driven by the design to reduce packaging waste. Currently, edible packaging is an interesting topic that many food packaging enterprises have highlighted. A report published by Allied Market Research shows that the edible packaging market accumulated \$697 million in 2016 and is expected to accrue a sum of \$1,097 million by 2023, at a Compound Annual Growth Rate of 6.81%.

There are many enterprises that have invented the innovation of edible food packaging. The US startup, Loliware, launched a “biodegr(edible)” straw called Lolistraw. It is made from Loliware’s patent-pending, seaweed-based material technology and is 100% plastic-free, hyper compostable, marine-degradable, and non-GMO. It was the world’s first edible, hyper compostable straw aimed at replacing plastic straws (Loliware, 2019). Another great example of a business that has jumped into this industry is a London-based startup, Skipping Rocks Lab. They developed natural and biodegradable packaging for liquids made from seaweed extract. The product is called “Ooho!”, the edible water bottle alternative to plastic bottles, which was first introduced and got a lot of attention in the London Marathon 2019 (Notpla, 2019). The Ooho! capsules can be bitten to release the liquid inside, and the cover can also be swallowed. If it does not get consumed, the cover is designed to biodegrade within six weeks, compared to the 450 years it takes for

plastic bottles to decompose. The organizer estimated that the event in 2019 decreased the number of plastic bottles down by 215,000 (Young, 2019).

Many businesses have initiated innovation mentioned above not only to deal with plastics waste/package waste concerns, but also to serve modern-day consumers. Their behaviors have been changed since issues pertaining to sustainability, environment, ethics, food safety, food quality and product cost are all becoming increasingly important factors for them when purchasing food products (Newfoodmagazine, 2018). Enterprises are therefore increasingly designing more sustainable goods (i.e. goods having less negative environmental impact) in order to build a competitive advantage and capture customers' value (Magnier & Crié, 2015).

However, research into edible food packaging is still in its infancy, especially in terms of consumer perception and acceptance toward it. It is important for manufacturers to know how consumers will accept this new food innovation, and what are the factors affecting their acceptance. Moreover, since this packaging is edible, it means that it is supposed to be eaten in order to reduce waste in the environment. But it is unknown if consumers would consider eating this type of packaging or not and if there are any concerned topics like food safety when consumers consider eating it.

For firms, there is a whole host of requirements and restrictions that are in place to ensure the consumer health and safety, and that creates a lot of barriers for them that try to make edible food packaging a reality and get it into the mainstream. With the knowledge about consumer acceptance, firms can adapt their products to better match consumer behavior and improve their communication to better target the potential customers. Knowing this will help to foster the growth of the edible packaging in the market.

In this frame, the purpose of this thesis is to investigate consumer acceptance toward edible food packaging. Plenty of studies have focused on different materials used in producing it, different methods and technology producing it, but to our best knowledge, the consumer acceptance of edible food packaging has been scarcely investigated. Hence, the overall research question is:

How will consumers accept edible food packaging?

This thesis is structured as follows: the next chapter presents definitions of topics used in this research, specifically, sustainable packaging and edible food packaging. Further on, the third chapter describes literature on consumer acceptance which provides the conceptual framework of this study and includes hypotheses development. Chapter four explains the methodology applied in order to present the empirical approach used to test the relationship between consumer acceptance and edible food packaging. The results are presented in chapter five. Finally, chapter six provides the general discussion which contains managerial implications, limitations, and further research.

2.0 Definitions of topics

More and more companies have figured out that they can create value for customers through successful food packaging. The value can take many forms, including improving food freshness, increasing a product's ease of use, and keeping it protected. However, brands and consumers continue to list sustainability as a top value, hence packaging manufacturers have had to surmount a substantial challenge (Francer, 2017). Along with that, the waste production from plastic packaging causes serious environmental problems and resource issues. Considering that packaging materials represent a major of solid waste, sustainable packaging will be necessary for the success of the overall environmental program (Wang & Wang, 2017). In the light of both consumer and environmental aspects, there is clearly a need for sustainable packaging. The next part starts with defining what characterizes a sustainable packaging, followed by introducing the term edible food packaging.

2.1 Sustainable packaging

There are many different terminologies on sustainable packaging that appear in previous literature. Researchers refer to everything from eco-friendly packaging, green packaging design, sustainable design, eco-design, design for the environment to environmentally conscious design (Magnier & Criè, 2014). However, all these different terminologies revolve by having the same meaning. In the attempt to define sustainable packaging, most of the researchers refer to the findings of the *Sustainable Packaging Alliance (SPA)* of 2002 or the *Sustainable Packaging Coalition (SPC)* of 2005 (Jerzyk, 2015). SPA originally identified sustainable packaging by the four principles: effective, efficient, cyclic and clean. The first principle effective is handling the functionality of the packaging. The second principle is that the packaging-product system is designed to use materials and energy most efficiently throughout the whole product life cycle. The third principle is that the packaging materials used in the system are cycled. The fourth principle is that all the packaging components used in the system do not propose any risk to humans or ecosystems (Lewis, Fitzpatrick, Verghese, Sonneveld & Jordon, 2007).

On the other hand, GreenBlue, the environmental nonprofit that founded the SPC suggested that sustainable packaging needs to meet eight different criteria. Firstly, a sustainable packaging is made from materials deemed safe and healthy for individuals and communities through its lifecycle. Secondly, it should meet market criteria performance and cost. Thirdly, a sustainable packaging is sourced, manufactured, transported, and recycled using renewable energy. Further on, it should be constructed using clean production technologies and best practices, along with causing minimal impact on the environment from cradle to grave. It should also be designed to optimize materials and energy used. Additionally, sustainable packaging materials are recovered and used in biological and industrial closed-loop cycles, which means that the materials can be recycled and reclaimed one or numerous times. Finally, GreenBlue and SPC strongly believe sustainable packaging materials must perform and be “cost comparable” to traditional products used for the same purpose (Wilson, 2018).

2.2 Edible food packaging

The rise of new food innovations relating to packaging has evoked in order to be more sustainable. Many manufacturers have tried to come up with new innovations in food packaging. A common type of sustainable food packaging is using biodegradable materials. For ages, biodegradable packaging materials have been focused on since it contributes to the environment, namely for greenhouse gas balances and other environmental impacts over whole life cycles (Song, Murphy, Narayan & Davies, 2009). The development of food packaging has continued to grow. Currently, the new food packaging innovation called “edible food packaging” has granted a lot of attention. There is previous literature about this type of packaging, but mainly in the sense of edible coatings and films. The use of edible packaging in the form of coatings and films have reached intensive and complex synthesized biomaterials from the humble beginnings. It all started with the use of wax to delay dehydration of citrus fruits, and edible coatings to prevent meat shrinkage to a series of discoveries and inventions which have led to a multitude of edible synthetic polymer packaging biomaterials (Mkandawire & Aryee, 2018). Edible films and coatings are thin layers of material (their thickness is generally less than 0.3 mm) used for enrobing the food product to replace or fortify the natural

layers and can be consumed as a part of the product or with further removal (Parreidt, Müller & Schmid, 2018).

However, most of the literature is related to the coatings and films, and the materials that are used to produce them. There is no literature stating exactly what edible food packaging is. Therefore, it is essential to define what edible food packaging is for investigating. In this thesis, edible food packaging has the same characteristics as a food packaging. It is a packaging that protects food from outside influence and damage, contains the food, and increases the importance of convenience (Marsh & Bugushu, 2007). Moreover, the edible food packaging is considered as a sustainable packaging since it achieves the four criteria effective, efficient, cyclic, and clean from SPA. The crucial part that makes edible food packaging stand out is obviously that it can be eaten along with food.

3.0 Literature review

Consumer acceptance is crucial to develop a successful food product because most new food products turn out to fail in terms of product acceptance (MacFie, 2007). Therefore, it is vital to know what factors facilitate consumer acceptance. From the 1990s onwards, substantive research has been undertaken to analyze consumer buying behavior of environment friendly products (Biswas & Roy, 2014). Consumers play a central role in the green revolution since green consumption not only has a positive effect on the environment, the economy, and society, but is also essential for sustainable development (Müller, 2014).

3.1 Theory of Reasoned Action (TRA)

When it comes to theory explaining consumer behavior, it is often that Theory of Reasoned Action (TRA) is referred to. Also, in the study of consumer behavior relating to green product acceptance, many scholars have broadly mentioned this theory as a framework (Han & Kim, 2010; Han, Hsu & Sheu, 2010; Vazifehdoust, Taleghani, Esmailpour, Nazari & Khadang, 2013). TRA is originally from Ajzen and Fishbein (1980). It describes consumer motivation to exert an effort in performing a specific behavior. Consumers make their decision based on making reasoned choices among alternatives. In terms of the effectiveness of TRA, the model accurately predicts individuals' decisions and behaviors when applied in any situation or to any activity (Sheppard, Hartwick & Warshaw, 1988). The model has therefore been widely utilized in the areas of marketing and consumer behavior (Han & Kim, 2010). According to TRA, behavioral intention is a function of two factors: attitude toward performing the behavior and subjective norm (Han et al., 2010). Put simply, if people evaluate a behavior as positive (attitude), and if they think their significant others want them to perform the behavior (subjective norm), this results in a higher intention and they are more likely to do so.

Regarding TRA, attitudes play an important role in influencing consumer behavior. Attitudes are sets of beliefs about a certain object or an act, which impact behavior intention (Ramayah, Lee & Mohamad, 2010). Attitudes are the favorable or unfavorable evaluation of a specified behavior. The more favorable the attitude, the bigger the intention to perform the behavior will be (Vazifehdoust et al., 2013). Attitudes toward a product is considered an important predictor and descriptor of behavior intention (Chen & Hung, 2016). In this light, it can be implied that consumers can form positive or negative attitudes toward an edible food packaging which will consequently enhance or diminish their acceptance of the product.

3.2 Perceived sustainability and consumer acceptance

3.2.1 Environmental consciousness

One important perspective that affects consumer attitude, which subsequently predicts consumer behavior toward green products is environmental consciousness. It is defined as a concept about cognitions, perceptions, concerns, and sensibilities regarding environmental problems (Chen & Hung, 2016). It has been proved to have a significant positive association with consumer intention to use green products since it is often cited as a strong motivator for purchasing the product (Mayer, Ryley & Gillingwater, 2012; Vazifehdoust et al., 2013). Consumers with strong environmental consciousness are more likely to engage in environmentally friendly activities (Bansal, 2011). In addition, environmental consciousness positively influences the attitude toward buying organic products (Kim & Chung, 2011). Therefore, previous research agrees that growing environmental consciousness profoundly affects consumer attitudes of green products which directly impacts consumer acceptance. Connecting to the thesis, environmental consciousness is important regarding consumer acceptance of edible food packaging. Therefore, consumers with higher environmental consciousness are more likely to accept the edible food packaging.

There is plenty of evidence showing why consumers become more environmentally conscious. One of the reasons is that many consumers are highly involved in protecting the environment in general, more specifically, environmental, and/or ethical issues related to consumption (Dunlap, 2002; Vermeir & Verbeke, 2006). They basically want to contribute something to the environment.

3.2.2 Perceived values

It is not only consumer personal values that enhance their product acceptance. Nowadays, customer perceived value becomes one of the most powerful forces (Patterson & Spreng, 1997) which is the fundamental basis for marketing activities (Koller, Floh & Sauner, 2011). It is vital to understand how consumers perceive a certain product or service. Perceived value is defined as a consumer overall evaluation of the net benefit of a product or service based on their assessment (Bolton & Drew, 1991; Chen & Chang, 2012). This means that perceived value can enhance and dictate the positive attitude of consumers toward a product or service. Moreover, it has a positive effect on marketing performance (Sweeney, Soutar & Johnson, 1999). Firms can increase consumer purchase intentions through product value (Steenkamp & Geyskens, 2006). Perceived value also plays a crucial role in impacting purchase intention (Zhuang, Cumiskey, Xiao & Alford, 1997).

3.2.3 Perceived sustainability

Perceived sustainability, also known as green perceived value, is defined as “consumer overall appraisal of the net benefit of a product or service between what is received and what is given based on the consumer environmental desires, sustainable expectations and green needs” (Patterson & Spreng, 1997).

Perceived sustainability of consumers can be enhanced by firms’ green product positioning. Green product positioning is an important aspect that has a significant impact on consumers in terms of fulfilling their needs and requirements (Aaker & Joachimsthaler, 2002; Hartmann & Apaolaza Ibáñez, 2006; Rios, Martinez, Moreno & Soriono, 2006). A green positioning represents the green or sustainable image as

perceived by the public. It is characterized as a subset of quality, profits, and ecological values that affects consumer dependence on green products (Hartmann & Apaolaza Ibáñez, 2006; Saha & Darnton, 2005). The firms must position the product to meet consumer expectations, so that consumers can relate themselves with the valuable product attributes (Wang, 2016). In addition, consumers with some environmental knowledge and positive past experience from green product purchases have a high tendency to exhibit strong intentions to purchase due to the product attributes and successful green brand positioning (Lin & Chang, 2012; Norazah, 2013). The positioning of green products can be strengthened through active communication campaigns related to green attributes (Mohd Suki, 2016). Earlier scholars illustrate that green product positioning significantly affects product's acceptance in terms of purchase intention since it affects consumer attitude toward the product (Huang, Yang & Wang, 2014; Mostafa, 2009; Patrick, Ibanez & Sainz, 2005).

Many previous studies considerably show that consumer attitude toward green behavior significantly influences their green purchase intention (Barber, Taylor & Strick, 2009; Chen & Hung, 2016; Flamm, 2009; Paul, Modi & Patel, 2016). These findings are consistent with the research of Mostafa (2009), Teng (2009) and Vazifehdoust et al. (2013) who suggest that consumers with a positive attitude toward green products tend to have a stronger purchase intention. Correspondingly, this result is comparable to the research of Yadav & Pathak (2016), which also states that consumer attitude toward green products significantly influences his or her green purchase intention.

According to these literatures, they indicate that if consumers perceive that something has favorable results, they are more willing to perform that behavior (Chen & Hung, 2016). More specifically, if consumers perceive a product as sustainable, they will have a favorable or positive attitude toward the product. Consequently, this enhances their acceptance of the product. Connecting it to this thesis, it can be assumed that if edible food packaging is perceived to be a sustainable product, it should enhance the likelihood of consumer acceptance of the product. Therefore, the hypothesis below is formed to test this assumption.

H1: Perceived sustainability is positively associated with consumer acceptance of edible food packaging.

However, some scholars explain that despite the perceived sustainability, many green products have not achieved the level of acceptance or been successful in the market (Wong, Turner and Stoneman, 1996). This represents that consumers do not always accept green products based on its perceived sustainability alone. Previous literature explains some reasons why the green products are not successfully accepted. They mentioned that the more consumers are engaged with individual consequences of purchasing and using green products, the less they would want to buy the green product (Follows & Jobber, 2000; Ramayah et al, 2010; Sidique, Lupi & Joshi, 2010). Some examples of these consequences are perceived inconvenience, additional cost involved and making an extra effort to recycle.

The consumer decision process often incorporates a complex variety of motivations that complicates an understanding of a particular behavior. Specific attitudes may suggest a specific behavior when taken in isolation, but additional attitudes can occur to moderate behavior, dilute the impact of initial attitudes, and result in an alternative outcome (Vermeir & Verbeke, 2006). Although consumer interest in sustainability (environmental consciousness) increases and consumer attitudes are mainly positive, behavioral patterns are not consistent with attitudes. This indicates that despite consumer environmental consciousness and positive perception of edible food packaging, consumers may not accept the product. There might be other additional perceptions that dilute the impact of positive attitudes which will therefore influence their acceptance.

Consumer ultimate consumption decision results from a trade-off between consumer perceptions of the benefits and costs (Luce, Payne, & Bettman, 1999). Correspondingly for the green product, in the process of consumer willingness to pay, consumers usually trade off the benefits and risks (Ayadi & Lapeyre, 2016). They likely assess both positive and negative aspects. Therefore, it is necessary to understand other aspects that may negatively impact consumer acceptance of edible food packaging as well.

3.3 Perceived risk and consumer acceptance

3.3.1 Risk perception

Risk perception is defined as consumer beliefs about their vulnerability to danger or harm. Risk perception is assessed by consumer judgments of the likelihood of experiencing negative outcomes (Sheeran, Harris & Epton, 2014). Perceived risk has been in the interest of practitioners and academics in examining consumer behavior, since it plays a role in facilitating marketers visualizing everything through customers' eyes (Mitchell, 1999). It is one of the fundamental constructs that has significant impact in examining consumer behavior (Veloutsou & Bian, 2008), more specifically, in consumer buying decisions, since it can be explained as consumers' doubt on the results of their buying decisions (Schiffman, Kanuk & Wisenblit, 2010). Additionally, uncertainty always plays a role during consumers' purchasing process (Ray & Sahney, 2018).

Perceived risk generally has a negative impact on consumer perceptions and purchase intentions (Dowling 1986; Nordgren et al. 2007). This is consistent with Siegrist (2008) who states that perceived risk is negatively associated with willingness to buy a product. If consumers foresee negative consequences, their expected value for the product declines, as does their level of acceptance. Applicable for green products, despite this emerging environmental trend, when it comes to purchase and usage of green products, consumers are skeptical and perceive a high level of risk (Ray & Sahney, 2018). This negative perception thereby affects their acceptance of the product.

For firms, reducing the perceived risk of the customer in green products may help to lower customer skepticism and increase their trust (Hsin & Wen, 2008). In addition, by accounting for the perceived risk, firms are able to increase both short and long-term profits, and target more profitable customers (Petersen & Kumar, 2015).

3.3.2 Dimensions of risk

Researchers have identified the key dimensions of perceived risk (Bauer, 1960; Jacoby & Kaplan, 1972). The recognized types of perceived risk are as follows: functional/performance, physical, financial, social, and psychological.

Functional/performance risk is consumers' concern that products will not perform as anticipated or that a product will not perform to its promised abilities (Hirunyawipada & Paswan, 2006). It is an uncertainty that the outcome of a product purchase will not meet consumer expectations. Arslan, Geçti & Zengin (2013) also explain that if consumers purchase a product for the first time, they do not have enough information about the product, therefore, functional risk is expected to increase. Since edible food packaging is not widely commercialized in the market, many consumers might have no experience or have little information about the product. In addition, edible food packing uses a new type of food packaging material which might create consumer concern about performance of the packaging when compared to traditional packaging. Therefore, consumers might expect functional/ performance risk from the edible food packaging.

Physical risk is the perception that products will be harmful to consumers (Arslan et al., 2013; Hirunyawipada & Paswan, 2006). In other words, it is consumer fear that certain products can damage their health or physically injure them. With respect to edible food packaging, it is a product supposed to be eaten, it can therefore be considered as a food product. As with all food products, the physical risk involved is that the product may contain toxic substances that may be harmful to consumers' health if eaten (Mitchell & Boustani, 1992). This is similar to the food safety concept which represents consumer concerns regarding residues in food resulting from chemical sprays, fertilizers, artificial additives and preservatives (Michaelidou & Hassan, 2008). In this sense, consumers might be skeptical whether the edible food packaging contains dangerous materials or bacteria in the process when consuming it, which can potentially harm their health. For example, skepticism can occur from how the product is handled to consumers.

Financial risk captures the financially negative outcomes for consumers after they adopt products (Arslan et al., 2013; Hirunyawipada & Paswan, 2006). Put simply, it is consumers' concern of having poor purchase choice or losing money by purchasing the product. Since consumers consider green products as more expensive than traditional products, it is likely that price discourages consumers to buy them (Gleim, Smith, Andrews & Cronin, 2013). Consumers are price-sensitive when it comes to green products and they are not willing to pay a higher price for the products (D'Souza, Taghian, Lamb & Peretiatkos, 2006). It is expected that the more expensive a product is, the higher financial risk is (Arslan et al., 2013). Furthermore, consumers need more information about green products, thus, they put more time and effort to evaluate and search for the products (Gleim et al., 2013). This represents that consumer perception of higher price and higher cost enhance their financial risk perception which can obstruct their consumption of green products. Hence, consumers might be concerned about the financial risk when it comes to edible food packaging as well.

Social risk has to do with the negative responses from consumer social networks. It is related to how society influences consumer decisions (Arslan et al., 2013; Hirunyawipada & Paswan, 2006). It is a possible perceived loss of image or status through the purchase of a particular brand or product. Since edible food packaging is a quite new innovation, consumers might think that not many people use this product which thus affects their decision. In other words, they might be afraid that their dissimilarity from the majority of people will impact them negatively. Hence, social risk could occur when consumers consider the edible food packaging.

Psychological risk is the nervousness arising from the anticipated post-purchase emotions (Dholakia, 2001). It is a consumer's disappointment in making a poor product or service selection (Arslan et al., 2013). Psychological risk emerges when the purchase of a product appears to be different from what consumers expected, and it results in feelings of discomfort, frustration, and disappointment (Derbaix, 1983). Consumers might set their expectations toward edible food packaging higher than what the product can offer, for instance, the taste of the product, which can lead to regret or disappointment after experiencing it.

However, perceived risk is considered to be multidimensional in nature. Not all the dimensions are going to be salient in all product purchase contexts (Hirunyawipada & Paswan, 2006). It indicates that only some dimensions may be salient in driving consumer perceived overall risk in edible food packaging context. Furthermore, a meta-analysis of Sheeran et al., 2014 concludes that although risk perceptions have significant associations with both intentions and behavior, the significance is small. From these two findings, we are interested in whether perceived risk of consumers will significantly affect their acceptance of edible food packaging or not.

Based on that many researchers strongly agree that perceived risk negatively affects consumers' intention, and consumers might perceive some possible dimensions of risk associated with edible food packaging, it is assumed that risk perception will have a negative effect on consumer acceptance of the product. Therefore, the hypothesis below is formed.

H2: Perceived risk is negatively associated with consumer acceptance of edible food packaging.

4.0 Methodology

4.1 Sampling and data collection

The data were collected in March 2020 through an online survey. The sampling method is convenience sampling. There were 151 Norwegian respondents who performed the survey, and only 124 people completed all the survey questions. Then the 121 respondents who accepted the terms and condition of the survey were included. There was one outlier, the respondent who was 99 years old. After removing this respondent, the statistical pattern was better. The final sample was composed of 120 respondents. The majority of the respondents were females which accounted for 73% (n = 88), 24% of them were males (n = 29), and the rest 3% of them did not want to specify the gender (n = 3). In terms of age, the age range was quite wide. The youngest respondent was 16 years old and the oldest was 71 years old. The highest proportion of age group was between 15-29 years old accounting for 62 % (n = 75). Respondents who were between 30-44 (n = 26), 45-59 (n = 13), 60-74 (n = 6) years old were accounted for 22%, 11%, and 5% respectively. *Figure 1* provides an overview of the respondents gender and age frequency distribution.

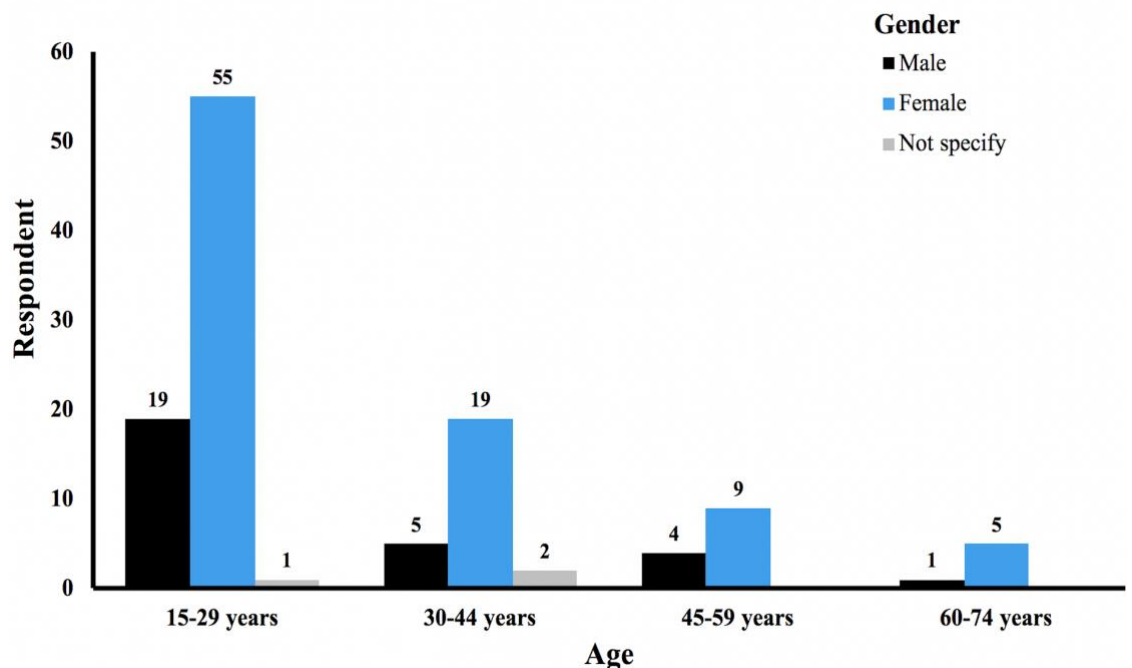


Figure 1: Gender and age frequency distribution

By following the guidelines from Norwegian National Research Ethics Committees (2014), the respondents were assured of anonymity and confidentiality. The answering time for the survey was approximately 8 minutes. The survey consisted of 23 questions in Norwegian (Appendix 1). All the constructs and measures were translated into English in Table 1.

The reason to conduct the survey in Norwegian was to ensure that all respondents are Norwegians, which strengthened the validity of the study in terms of representing the Norwegian market. The survey was structured into four different main sections. The first section was conducted to elicit participants' acceptance toward edible food packaging in different product categories. The second section was created to elicit their perception about perceived sustainability toward the different product categories. The third section was intended to represent their perceived risk toward edible food packaging. Lastly, the respondents were asked to provide their information about age and gender.

Table 1: Variables description

Variable Name	Scale	Description
Gender	Discrete	1 = Male, 2 = Female, 3 = Not specify
Age	Discrete	
Product	Discrete	1 = Water bottle, 2 = Coffee cup, 3 = Cupcake case
Acceptance	Continuous	"How likely is it that you want to eat this product?"
Sus_Q1	Continuous	<i>Label environmentally friendly:</i> "To what extent does the product deserve to be labeled 'environmentally friendly?'"
Sus_Q2	Continuous	<i>Environmental choice:</i> "To what extent do you think purchasing this product is a good environmental choice?"
Sus_Q3	Continuous	<i>Environmental purchase intention:</i> "To what extent a person who cares about the environment would be likely to buy this product?"
Sus_Q4	Continuous	<i>How green:</i> "How environmentally friendly or green is this product?"
Risk_Q1	Continuous	<i>Health damage:</i> "How likely is it that your health will be damaged by eating the following products?"
Risk_Q2	Continuous	<i>Prob of Harm:</i> "How many people are likely to have their health harmed by eating the following products? "
Risk_Q3	Continuous	<i>Risk aware:</i> "How aware are people who eat the following products of any potential risks to their health?"
Risk_Q4	Continuous	<i>Inadequate law:</i> "How adequate are government laws and regulations in protecting people from any health risks associated with the following products?"
Risk_Q5	Continuous	<i>Harmful quantity:</i> "Is the potential harm to your health from the following products dependent upon how much of them you eat?"
Risk_Q6	Continuous	<i>Control overexpose:</i> "How much control do people have over whether they eat the following products?"
Risk_Q7	Continuous	<i>Delayed effect:</i> "Would any damage to your health from the following things be immediately apparent, or would it only become apparent at a later date?"
Risk_Q8	Continuous	<i>Man made:</i> "To what extent are the risks to your health from the following products natural or the fault of mankind? "
Risk_Q9	Continuous	<i>Serious harm:</i> "How seriously do you think the following things may harm your health?"
Risk_Q10	Continuous	<i>Cost to avoid:</i> "How costly in terms of time, effort, and money would it be for people to avoid potential health risks associated with the following products?"
Risk_Q11	Continuous	<i>Pleasure eating:</i> "How great is the pleasure associated with eating the following products to you personally?"
Risk_Q12	Continuous	<i>Eaten by many:</i> "How many people in Norway eat the following products? How easy is it for you to tell if foods like those listed"
Risk_Q13	Continuous	<i>Easily identified:</i> "How easy is it for you to tell if foods like those listed below contain a risk to your health?"

4.2 Survey and variables description

The first section of the survey focused on individual acceptance toward edible food packaging in general since this is the main purpose of this study. In this section there were three different product categories which are edible water bottle/sack, edible coffee cup and edible cupcake case/wrapper. Since this type of food packaging has not been widely commercialized yet, the selected product categories are therefore limited. Therefore, the selection was based on what is available in the market. Further on, more details about the reason why these product categories were selected to test are provided. Note that the following products were randomly tested.

The edible water bottle/sack was one of the chosen products. As mentioned in the introduction it was first introduced and got a lot of attention under the London Marathon in 2019. The edible water bottle/sack is a blob-like water container made from seaweed extract, which makes the product a great environmentally friendly option. The intention of this



Figure 2: Edible water bottle/sack

product is to replace single-serving plastic bottles. Because of the increasing trend for this product outside of Norway, we thought it would be interesting to test the acceptance of this product among Norwegian consumers (Figure 2). The following description of the product provided in the survey was “it is a blob-like water container made from seaweed extract. This product can be bitten to release the liquid inside, and the cover can also be swallowed”.

Another product was the edible coffee cup. This is a coffee cup made from biscuit meaning that once consumers are done with a hot drink, they can eat the cup. The idea behind this product is that it will reduce the amount of waste caused by coffee cups. The edible coffee cup was originally produced by a company called Twice, and it has been used in several coffee shops. The product however got a lot of attention in October 2019 when the New Zealand airline introduced the cups on

board. The reason why this product was selected is that we see a huge potential for this product in Norwegian market in terms of possibility and ease to produce and commercialize it in the market. In addition, it is a product that consumers can easily imagine themselves consuming, no matter if they have not experienced this type of food packaging before (Figure 3). The following description of the product provided in the survey was “it is a coffee cup made from biscuit or cookie dough meaning that once you are done with your hot drink you can just eat the cup”.



Figure 3: Edible coffee cup

The edible wafer cupcake case was also chosen. This product is made of “wafer” paper. Therefore, the consumers can eat the entire cupcake, which contributes to reducing the amount of waste. This product was introduced by Dr. Oetker in 2014 (Writer, 2014). Besides that, this product is from a different product category compared to the other two products mentioned above, the reason why this product was selected is that it is interesting to study how consumers think about a product that once was commercialized in the market (Figure 4). The following description of the product provided in the survey was “it is a cupcake wrapper you can eat. You can pop a whole cupcake in your mouth without peeling the cupcake wrapper”.



Figure 4: Edible cupcake case

The second section of the survey contained questions meant to elicit the participants’ level of perceived sustainability toward the edible food packaging. The green product evaluation from Gershoff & Frels (2015) was adapted to use in this section. To measure the extent to which participants evaluated the products as green, environmentally friendly, or sustainable, they were asked for their level of agreement with different questions.

The third section of the survey contained questions meant to elicit the participants' level of perceived risk of the edible food packaging. The variables used to measure perceived risk in this study were originally introduced by Fife-Schaw and Rowe (1996) in their classic study of food safety risk perception. There are 13 questions which are semantic differential variables.

The final section of the survey focused on socio-demographic characteristics (age, gender). Table 1 showed the original variable names used in the SPSS, what question each variable represented and the new label for each variable.

4.3 Procedure

Before launching the survey, it was pre-tested by a few participants to get some feedback to improve the quality of the survey. After finalizing the survey, the participants received the survey by a link. First of all, they were asked to accept terms and conditions of the study. Participants who did not accept were brought to the end of the survey and excluded in the study. The participants who accepted were brought to the first section of the survey.

In the first section of the survey participants were presented with the three different product pictures, one product at a time. In order to educate the participants, there was a short description explaining each product as mentioned above. The order of appearance of the products was randomized to avoid the potential bias resulting from the order of items in the survey.

After seeing each picture with description, they were asked to evaluate their acceptance toward the product "How likely is it that you want to eat this product?" using a 5-point Likert scale where 1 was (extremely unlikely) and 5 was (extremely likely) (Malhotra, 2010, p.276). The intention of this section was to investigate consumer acceptance toward edible food packaging.

Next, participants went to the perceived sustainability section. First, they were informed that there will be four questions asking about how they think of the products as green, environmentally friendly, or sustainable. They were also reminded to pay attention to each question and product. The four questions adopted from Gershoff & Frels (2015) were “To what extent does the product deserve to be labeled ‘environmentally friendly?’”, “To what extent do you think purchasing this product is a good environmental choice?”, “To what extent a person who cares about the environment would be likely to buy this product?” and “How environmentally friendly or green is this product?” The order of appearance of the questions was randomized to avoid potential bias. For each question, the participants had to rate their sustainability perception using a 5-point Likert scale where 1 was (not at all) and 5 was (extremely) for the three products provided with pictures. The order of the product pictures was also randomized.

After that, participants were informed that they will be asked to answer the questions relating perceived risk toward the presented products. They were also reminded to pay attention to each question and product. There were thirteen questions adopted from Fife-Schaw and Rowe (1996), some examples are, “How likely is it that your health will be damaged by eating the product”, “How many people are likely to have their health harmed by eating the product?” and “How aware are people who eat the following products of any potential risks to their health?” (See Appendix 1 for all the questions). The order of appearance of the questions was randomized. For each question, the participants had to rate their perceived risk using a 5-point Likert scale for the three products provided with pictures. The order of the product pictures was again randomized. Lastly, the participants went to the socio-demographic characteristics section. They were asked to specify their age and gender.

4.4 Data analysis

A multiple-level data analysis was employed under IBM SPSS 26. Firstly, an explorative analysis of the characteristics of the sample was performed. Secondly, a factor analysis was conducted. The factor analysis is a general name denoting a class of procedures primarily used for summarization (Malhotra, 2010, p.604). The

purpose of this analysis was to group variables measuring the similar topics which potentially cause correlations among the variables into important factors affecting consumer acceptance of edible food packaging. In this analysis the Principal Component Analysis (PCA) was performed using the rotation method Varimax with Kaiser Normalization. The PCA was chosen because the primary concern is to determine the minimum number of factors that will account for maximum variance in the data for use in subsequent analysis (Malhotra, 2010, p.611). Moreover, PCA is computationally simpler than common factor analysis and therefore requires less computer memory and processing time (Fabrigar et al.,1999). The factors resulting from this analysis were used for further analysis.

Thirdly, the Linear Mixed Model (LMM) method was used to analyze data. An LMM is an extension of a simple linear model to allow both fixed and random effects and are particularly used when there is no independence in the data. Like a simple linear model, it analyzes associative relationships between a dependent variable and one or more independent variables. It is also used to explain significant variation in the dependent variables and if there is a relationship between them (Malhotra, 2010, p. 536). In an LMM framework, both fixed and random effects are accommodated. The “fixed” effects of the LMM are analogous to linear predictors from standard ordinary least squares (OLS). The “random” effects are assumed to be distributed according to an empirically derived probability density function (Baird, Geylani, & Roberts, 2012).

The benefit of the LMM for this study was its capacity to account for variance among consumers’ initial conditions within the framework of the fixed parameter estimates (Baird, Geylani, & Roberts, 2012). Thus, the LMM allowed us to account for variation in consumers’ initial conditions without requiring estimation of a large number of consumer fixed effects. Moreover, the LMM allowed fine grain control over the structure of the model error variance–covariance matrix. This test provided results of which factors significantly impacted consumer acceptance of edible food packaging. In addition, it was to discover which direction significant factors influenced consumer acceptance. Lastly, the Pairwise Comparison test was performed to explain whether there were differences in consumer acceptance across product categories.

5.0 Results

5.1 Exploratory data analysis

From the explorative analysis the descriptive statistic was provided in Table 2. This table illustrated an overview of the data collected for the study; n, min, max, mean and standard deviation for all the variables divided into three different product categories. In general, the average acceptance of the three products among Norwegian participants was more than 3 (Water bottle = 3.19, Coffee cup = 3.37, Cupcake case = 4.00). The mean acceptance and the standard error of the three products from table 2 were visualized to get a better understanding of the data (Figure 5).

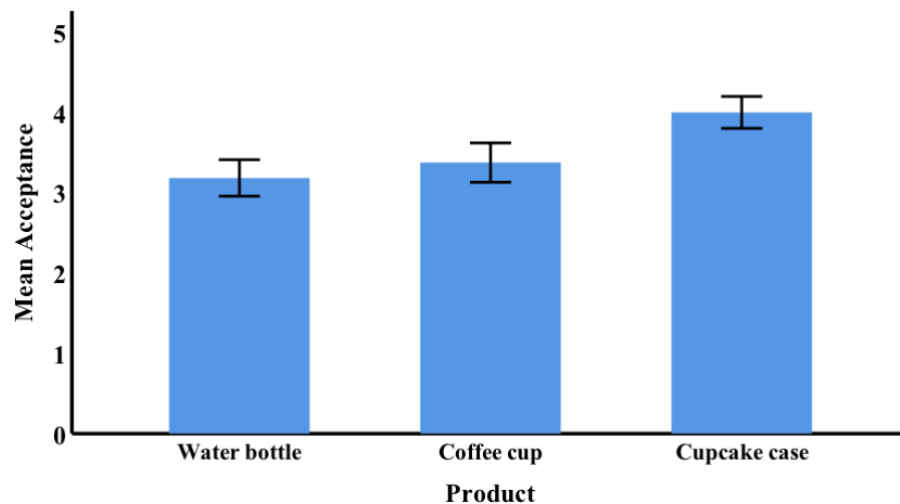


Figure 5: Simple bar mean of acceptance by product with error bar: 95% CI.

Overall, the mean acceptance of the edible cupcake case was higher than the edible water bottle and the edible coffee cup. Predictably, the edible water bottle clearly had the lowest mean acceptance. However, it cannot be concluded yet if these differences are significant. Later in this thesis, this will be tested. In addition, the consumer perceived the three products quite sustainable since the average score for each product was almost 4 for every aspect (Label environmentally friendly, Environmental choice, Environmental purchase intention, How green) related to perceived sustainability. However, the products were not clearly perceived risky since the average score of the variables related to perceived risk aspects was between 2 to 3 (Table 2).

Table 2: Descriptive Statistics

Variable name	Product	Descriptive statistics				
		N	Min	Max	Mean	Std Dev.
Gender		120	1	3	1.78	0.47
Age		120	16	71	31.87	12.04
Acceptance	Water bottle	120	1	5	3.19	1.26
	Coffee cup	120	1	5	3.37	1.35
	Cupcake case	120	1	5	4.00	1.10
Label environmentally friendly	Water bottle	120	1	5	4.21	1.04
	Coffee cup	120	1	5	4.09	0.94
	Cupcake case	120	2	5	4.04	1.03
Environmental choice	Water bottle	120	1	5	4.13	1.13
	Coffee cup	120	1	5	3.86	1.10
	Cupcake case	120	1	5	3.82	1.09
Environmental purchase intention	Water bottle	120	1	5	3.88	1.20
	Coffee cup	120	1	5	3.97	1.20
	Cupcake case	120	1	5	3.96	1.11
How green	Water bottle	120	1	5	4.07	1.15
	Coffee cup	120	1	5	3.93	1.00
	Cupcake case	120	2	5	3.78	0.97
Health damage	Water bottle	120	1	5	2.26	1.15
	Coffee cup	120	1	5	2.21	1.10
	Cupcake case	120	1	5	2.27	1.08
Prob of harm	Water bottle	120	1	5	2.29	1.16
	Coffee cup	120	1	5	2.33	1.02
	Cupcake case	120	1	5	2.40	1.07
Risk aware	Water bottle	120	1	5	2.73	1.15
	Coffee cup	120	1	5	2.67	1.12
	Cupcake case	120	1	5	2.70	1.13
Inadequate law	Water bottle	120	1	5	2.70	1.14
	Coffee cup	120	1	5	2.75	1.09
	Cupcake case	120	1	5	2.78	1.09
Harmful quantity	Water bottle	120	1	5	2.69	1.11
	Coffee cup	120	1	5	2.89	1.06
	Cupcake case	120	1	5	2.89	1.05
Control overexpose	Water bottle	120	1	5	2.58	1.31
	Coffee cup	120	1	5	2.47	1.22
	Cupcake case	120	1	5	2.55	1.20
Delayed effect	Water bottle	120	1	5	2.74	1.28
	Coffee cup	120	1	5	2.45	1.07
	Cupcake case	120	1	5	2.41	1.10
Man made	Water bottle	120	1	5	3.07	1.41
	Coffee cup	120	1	5	3.14	1.24
	Cupcake case	120	1	5	3.52	1.24
Serious harm	Water bottle	120	1	5	2.19	1.12
	Coffee cup	120	1	5	2.22	1.06
	Cupcake case	120	1	5	2.28	1.11
Cost to avoid	Water bottle	120	1	5	2.32	1.12
	Coffee cup	120	1	5	2.42	1.14
	Cupcake case	120	1	5	2.39	1.12
Pleasure eating	Water bottle	120	1	5	3.18	1.37
	Coffee cup	120	1	5	3.19	1.38
	Cupcake case	120	1	5	3.03	1.38
Eaten by many	Water bottle	120	1	5	4.00	1.18
	Coffee cup	120	1	5	3.71	1.21
	Cupcake case	120	1	5	3.79	1.11
Easily identified	Water bottle	120	1	5	3.53	1.28
	Coffee cup	120	1	5	3.43	1.23
	Cupcake case	120	1	5	3.42	1.26

5.2 Factor analysis - Principal component analysis

To begin, a correlation matrix was constructed to find the correlations among variables. There were many variables that correlated with each other (Appendix 2). Moreover, Bartlett's test of sphericity was used to test the null hypothesis that the variables are uncorrelated in the population. In this study, the result of Bartlett's sphericity test showed that the p-value was lower than 0.001 which indicated that it was significant, meaning that the null hypothesis was rejected (Table 3). In other words, the variables were correlated. Another statistical result is the Kaiser-Meyer-Olkin test (KMO), it shows adequacy of the sample for a factor analysis. The ideal values for this test are between 0.5 and 1.0. In this study, the KMO value was 0.804 (80.4%) indicating that a factor analysis was appropriate (Table 3).

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.804
Bartlett's Test of Sphericity	Approx. Chi-Square	1776.845
	df	136.000
	Sig.	0.000

As mentioned previously, the appropriate type of a factor analysis for this study was a Principal Component Analysis (PCA). The PCA was conducted containing 17 variables, 4 variables relating to perceived sustainability and 13 variables relating to perceived risk (Table 1). The communalities in Table 4 indicated which variables to include and exclude for further analysis.

The three variables pleasure eating, control overexpose and risk aware were excluded based on low communalities (< 0.5). However, the variable harmful quantity was included despite having communality lower than 0.5 (0.492). This was because it was close to 0.5 and correlated with many of the other variables. Furthermore, the variable delayed effect was excluded even though it had more than 0.5 (0.607). The rationale behind this was that it did not correlate with any of the variables in the group that it was assumed to be with in the correlation matrix (Appendix 2).

Table 4: Communalities

	Initial	Extraction
Label environmentally friendly	1	0.752
Environmental choice	1	0.785
Environmental purchase intention	1	0.534
How green	1	0.787
Health damage	1	0.708
Prob of Harm	1	0.632
Risk aware	1	0.488
Inadequate law	1	0.591
Harmful quantity	1	0.492
Control overexpose	1	0.455
Delayed effect	1	0.607
Man made	1	0.519
Serious harm	1	0.730
Cost to avoid	1	0.555
Pleasure eating	1	0.454
Eaten by many	1	0.584
Easily identified	1	0.552

Extraction Method: Principal Component Analysis.

The next step was to decide the number of factors. There are several approaches to consider when determining the number of factors. The first determination was based on the scree plot, and by looking at Figure 6 the maximum number of factors should be two based on where the curve begins to straighten out. The second determination was based on eigenvalues. Theoretically, the number of factors is determined by having eigenvalue greater than 1.0. According to Table 5, the maximum number of factors should therefore be four. This was supported by using the determination based on percentage of variance, where it is recommended that the factors extracted should account for at least 60% of the variance (Malhotra, 2010, p. 612). The cumulative percentage of variance of the four factors accounted for 64.28% of the total variation of the data (Table 5). Since two out of three determination criteria explained the same result, the appropriate number of factors were decided to be four. Additionally, as to our prior knowledge about the data it was more applicable to have four factors than two.

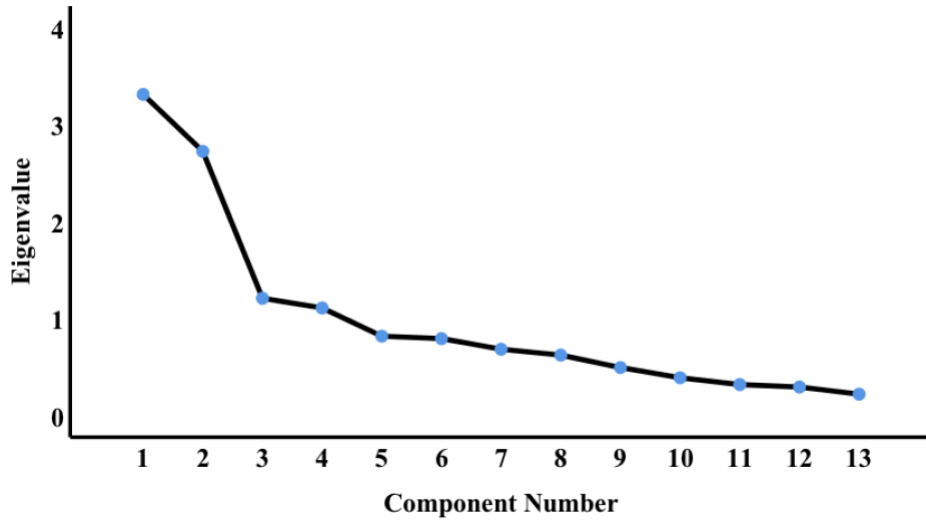


Figure 6: Scree plot

Table 5: Total Variance Explained

Component	Initial Eigenvalues		Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.311	25.471	3.311	25.471	25.471	3.03	23.307	23.307
2	2.724	20.957	2.724	20.957	46.428	2.91	22.388	45.696
3	1.21	9.309	1.21	9.309	55.737	1.212	9.32	55.016
4	1.11	8.54	1.11	8.54	64.276	1.204	9.26	64.276
5	0.819	6.302			70.579			
6	0.794	6.11			76.688			
7	0.684	5.265			81.953			
8	0.624	4.799			86.751			
9	0.495	3.811			90.562			
10	0.391	3.004			93.566			
11	0.32	2.462			96.028			
12	0.295	2.27			98.298			
13	0	1.702			100			

Extraction Method: Principal Component Analysis.

Then a varimax procedure of rotation was conducted, which is an orthogonal method of rotation that minimizes the number of variables with high loadings on a factor (Malhotra, 2010, p. 613). Table 6 provided the cross loadings for all the variables, which explained what variables should be grouped into the same factor based on high loadings (> 0.5).

Table 6: Rotated component matrix

	Component			
	1	2	3	4
Label environmentally friendly	0.864	-0.125	0.022	-0.052
Environmental choice	0.890	-0.011	-0.038	-0.047
Environmental purchase intention	0.709	-0.124	-0.134	-0.025
How green	0.883	-0.015	-0.069	0.043
Health damage	0.006	0.844	0.085	0.070
Prob of Harm	-0.125	0.787	0.028	-0.015
Inadequate law	-0.042	0.181	-0.043	0.736
Harmful quantity	-0.203	0.643	-0.044	0.028
Man made	0.030	0.332	0.665	-0.102
Eaten by many	-0.165	-0.078	0.767	0.103
Easily identified	-0.125	-0.370	0.198	0.646
Serious harm	0.012	0.838	0.147	0.014
Cost to avoid	0.325	0.382	-0.288	0.458

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

For the first factor, the variables label environmentally friendly, environmental choice, environmental purchase intention and how green had high positive coefficients ($>70\%$). This factor was therefore labeled “Perceived Sustainability” since it included all the questions concerning the environmental aspects of the edible food packaging.

Factor 2 was highly related with the variables; health damage, prob of harm, harmful quantity, and serious harm. These variables were associated with health-related risk that one can get from the edible food packaging, thus the second factor was labeled “Perceived Harm”.

Factor 3 was highly related with the variables; man made and eaten by many. These variables included the questions associated with how other people or human action affects consumer thoughts. Thus, the third factor was labeled “Human Influence”.

Finally, factor 4 was highly related to the variables; cost to avoid, easily identified and inadequate law. Thus, the fourth factor was labeled “Perceived information” since it included the questions associated with how much information consumers know about the edible food packaging. Table 7 summarized the factor descriptions and the variables that each factor included. To conclude, the total number of 13 variables were grouped into four factors. These four factors were used for further analysis.

Table 7: Factor descriptions

Factor description	Variable
1. PerceivedSustainability	Label environmentally friendly Environmental choice Environmental purchase intention How green
2. PerceivedHarm	Health damage Prob of Harm Harmful quantity Serious harm
3. HumanInfluence	Man made Eaten by many
4. PerceivedInfomation	Cost to avoid Easily identified Inadequate law

5.3 Linear mixed model

To test the impact of potential variables on the consumer acceptance of edible food packaging, a linear mixed model (LMM) was chosen. Put simply, the objective of this analysis was to confirm or reject the two hypotheses mentioned previously; H1: Perceived sustainability is positively associated with consumer acceptance of edible food packaging and H2: Perceived risk is negatively associated with consumer acceptance of edible food packaging.

A linear mixed model was estimated in order to ensure that participants sufficiently discriminated between the 3 products and did not use the 13 dimensions (grouped into 4 factors) in a uniform manner (Veflen, Scholderer & Langsrud, 2020). The fixed effects were tested by building factorial designs. The sum of squares Type 1 was selected. It was sequential meaning that the variables were tested in the order that they were listed in the model. Factors (Perceived Sustainability, Perceived Harm, Human Influence, Perceived Information) and product were specified as fixed factors. Respondents were specified as a random factor.

First, all the variables were included to see if they significantly impact consumer acceptance of edible food packaging. Table 8 provided the information criteria, which displayed fit indexes. For each index, the lower the number, the better the model fits the data. The Schwarz's Bayesian Criterion (BIC) was considered in this study. It is a criterion for model selection among a finite set of models and has been widely used for model identification in linear regression. The BIC was 1,138.302 which was later used to compare models.

Table 8: Information Criteria^a

-2 Restricted Log Likelihood	1132.430
Akaike's Information Criterion (AIC)	1134.430
Hurvich and Tsai's Criterion (AICC)	1134.442
Bozdogan's Criterion (CAIC)	1139.302
Schwarz's Bayesian Criterion (BIC)	1138.302

The information criteria are displayed in smaller-is-better form.

a. Dependent Variable: Acceptance.

The results of the fixed effects tests (Table 9) revealed that the main contributors toward consumer acceptance appeared to be Perceived Sustainability ($p = 0.00$) and Perceived Harm ($p = 0.00$) at the 0.95 confidence level. This was also supported when interpreting the estimates of fixed effects (Table 10). The results showed that Perceived Sustainability had positive significant effect and Perceived Harm had negative significant effect on Acceptance ($p < 0.05$). However, Human Influence had a positive effect on acceptance, but it was insignificant ($p = 0.273$). This positive effect was also not in line with our expectations. This variable was expected to provide a negative impact on consumer acceptance since all the questions that

belong to this variable were about risk. Therefore, it was reasonable to exclude this variable from the model. In addition, the variable, Perceived Information, had a negative impact on consumer acceptance of edible food packaging, but it was insignificant ($p = 0.108$). The reason that this variable was not significant was that the information the consumer perceived about the product did not influence their acceptance. Thus, to improve the model, Human Influence and Perceived Information were excluded from the model.

Table 9: Type I Tests of Fixed Effects^a

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	355	3394.210	0.000
PerceivedSustainability	1	355	74.218	0.000
PerceivedHarm	1	355	18.862	0.000
HumanInfluence	1	355	1.364	0.244
PerceivedInfomation	1	355	2.595	0.108

a. Dependent Variable: Acceptance.

Table 10: Estimates of Fixed Effects^a

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	2.242	0.475	355	4.723	0.000	1.309	3.176
PerceivedSustainability	0.540	0.068	355	7.977	0.000	0.407	0.673
PerceivedHarm	-0.309	0.072	355	-4.312	0.000	-0.450	-0.168
HumanInfluence	0.073	0.067	355	1.098	0.273	-0.058	0.205
PerceivedInfomation	-0.134	0.083	355	-1.611	0.108	-0.298	0.030

a. Dependent Variable: Acceptance.

Consequently, the significant variables that contributed to consumer acceptance of the edible food packaging were only Perceived Sustainability and Perceived Harm. When the overall effect was significant, the next step was to examine the significance of the interaction effect. The interaction between Perceived Sustainability and Perceived Harm was tested by mean centering to enhance the interpretability of data and to diminish multicollinearity, especially between the interaction effect and its constituent main effects. The interaction variable was then

created and named PerceivedSus_PerceivedHarm. It was calculated by the formula below:

$$\text{PerceivedSus_PerceivedHarm} = (\text{PerceivedSustainability} - \text{Mean}(\text{PerceivedSustainability})) * (\text{PerceivedHarm} - \text{Mean}(\text{PerceivedHarm}))$$

The interaction term was included in the model. It was clearly seen that the interaction term of Perceived Sustainability and Perceived Harm was not a significant contributor to consumer acceptance of edible food packaging since the P-value was 0.712 (Table 11, 12). Therefore, there was no significant interaction effect toward consumer acceptance. The interaction term was then removed from the model.

Table 11: Type I Tests of Fixed Effects^a

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	356	3367.532	0.000
PerceivedSustainability	1	356	73.634	0.000
PerceivedHarm	1	356	18.714	0.000
PerceivedSus_PerceivedHarm	1	356	0.137	0.712

a. Dependent Variable: Acceptance.

Table 12: Estimates of Fixed Effects^a

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	2.163	0.344	356	6.281	0.000	1.485	2.840
Perceived Sustainability	0.524	0.067	356	7.807	0.000	0.392	0.657
Perceived Harm	-0.301	0.071	356	-4.243	0.000	-0.441	-0.162
PerceivedSus_PerceivedHarm	0.025	0.067	356	0.370	0.712	-0.107	0.156

a. Dependent Variable: Acceptance.

Finally, the only significant predictors that affected consumer acceptance of edible food packaging were Perceived Sustainability and Perceived Harm. The first concern was the quality of the model, specifically how well the data fit the final model. To determine this, the Schwarz's Bayesian Criterion (BIC) was considered again and compared to the full model. It was 1,135.553 (Table 13) which was lower than the previous one from the full model 1,138.302 (Table 8). This represented that the data fit the final model better.

Table 13: Information Criteria^a

-2 Restricted Log Likelihood	1129.676
Akaike's Information Criterion (AIC)	1131.676
Hurvich and Tsai's Criterion (AICC)	1131.687
Bozdogan's Criterion (CAIC)	1136.553
Schwarz's Bayesian Criterion (BIC)	1135.553

The information criteria are displayed in smaller-is-better form.

a. Dependent Variable: Acceptance.

Table 14: Estimates of Fixed Effects^a

Product		Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Water bottle	Intercept	1.624	0.547	117	2.970	0.004	0.541	2.707
	Perceived Sustainability	0.547	0.104	117	5.260	0.000	0.341	0.753
	PerceivedHarm	-0.284	0.109	117	-2.610	0.010	-0.499	-0.068
Coffee cup	Intercept	1.453	0.638	117	2.279	0.024	0.190	2.716
	Perceived Sustainability	0.692	0.123	117	5.646	0.000	0.449	0.935
	PerceivedHarm	-0.340	0.133	117	-2.565	0.012	-0.603	-0.077
Cupcase case	Intercept	3.156	0.502	117	6.288	0.000	2.162	4.150
	Perceived Sustainability	0.425	0.103	117	4.111	0.000	0.220	0.630
	PerceivedHarm	-0.331	0.105	117	-3.143	0.002	-0.540	-0.122

a. Dependent Variable: Acceptance.

Since there were three product categories, the final model was therefore created separately. Overall, the predictors in the three models gave the same directions. The model for each product was presented in Table 14.

It was obvious that without any effect from other variables, on average the consumer acceptance of the edible cupcake case was considerably higher than the other two products. The effect of Perceived Harm and Perceived Sustainability on consumer acceptance of the edible food packaging for each product was illustrated in Figure 7. It was clearly seen that the two significant variables affected consumer acceptance in the opposite directions.

To summarize the LMM test, Perceived Sustainability significantly affected consumer acceptance of edible food packaging in a positive direction. Therefore, the first hypothesis stating that Perceived sustainability of edible food packaging is positively associated with consumer acceptance was supported. Furthermore, Perceived Harm significantly affected consumer acceptance of edible food packaging in a negative direction. Perceived Harm is the factor relating to health damage, probability of harm, quantity of harm, and how serious the harm that consumer could get from consuming the edible food packaging. In other words, Perceived Harm represents the risk that consumers think of. Therefore, the second hypothesis stating that perceived risk is negatively associated with consumer acceptance of edible food packaging was supported. In terms of Human Influence and Perceived Information, they did not have a significant effect on consumer acceptance of edible food packaging.

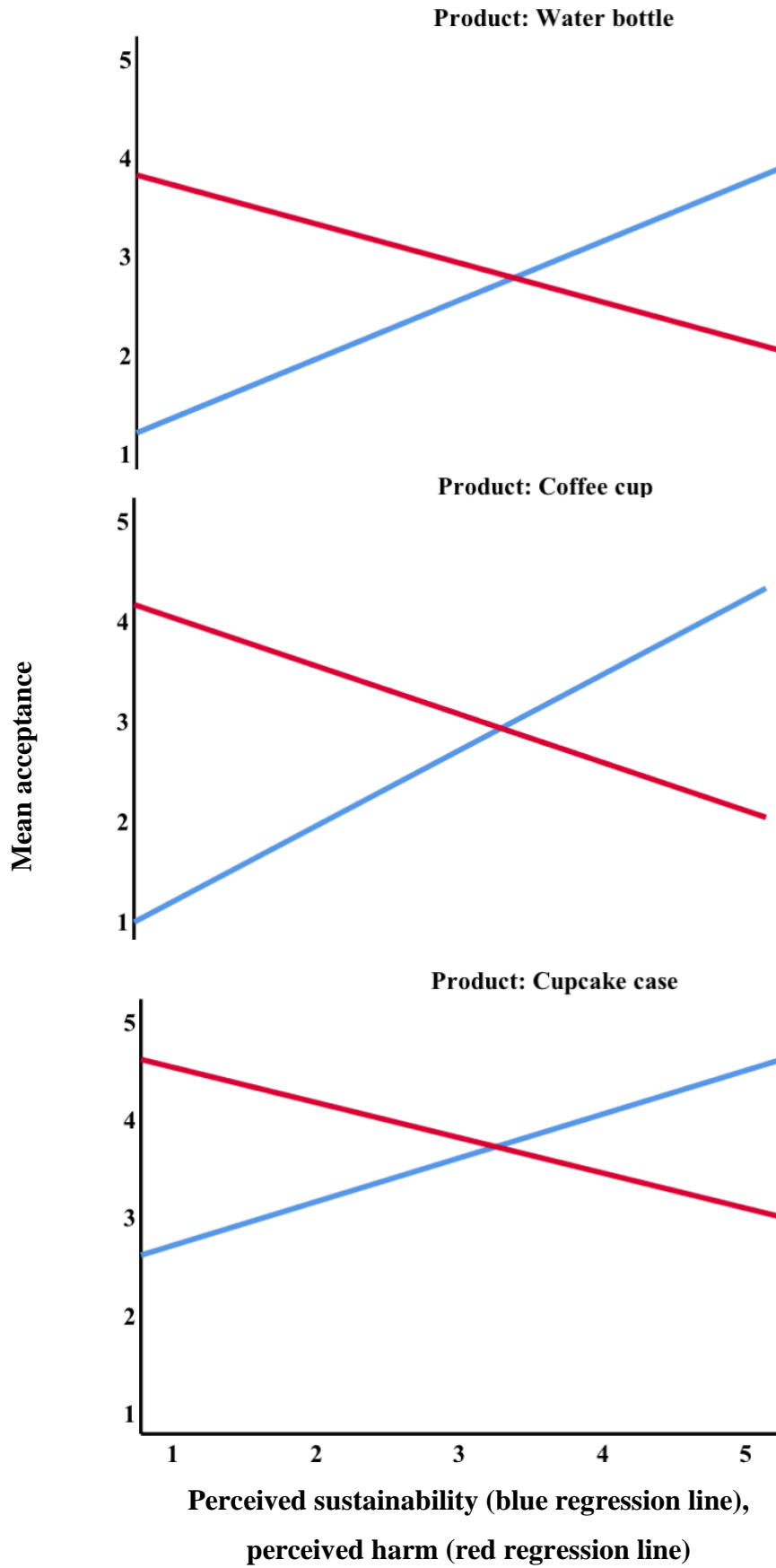


Figure 7: Within-condition regressions of Perceived Sustainability (blue regression lines), Perceived Harm (red regression lines) for three products.

5.4 Pairwise comparison

The next analysis was to test if consumer acceptance varies across different product categories. The mean of the three products was obviously different (Table 15). The mean acceptance of the edible cupcake case was 4 which was the highest. The second highest mean acceptance was from the edible coffee cup (3.375) followed by the edible water bottle (3.183).

Table 15: Product Estimates^a

Product	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
Water bottle	3.183	0.113	357	2.96	3.406
Coffee cup	3.375	0.113	357	3.152	3.598
Cupcake case	4	0.113	357	3.777	4.223

a. Dependent Variable: Acceptance.

However, the mean differences among the three products were not all significant. The pairwise comparison was conducted to explain this (Table 16). The Bonferroni comparison was chosen. The mean difference between the edible water bottle and the edible coffee cup was not significant at a 0.95 confidence level since the p value was 0.697 which was higher than 0.05. In contrast, the mean differences between the edible cupcake case and the other two products were significant at a 0.95 confidence level as the p values were lower than 0.01. To conclude this test, consumer acceptance of the edible food packaging partially varies across product categories.

Table 16: Pairwise Comparisons^a

(I) Product	(J) Product	Mean Difference (I- J)	Std. Error	df	Sig. ^c	95% Confidence Interval	
						Lower Bound	Upper Bound
Water bottle	Coffee cup	-0.192	0.16	357	0.697	-0.577	0.194
	Cupcake case	-.817*	0.16	357	0.000	-1.202	-0.431
Coffee cup	Water bottle	0.192	0.16	357	0.697	-0.194	0.577
	Cupcake case	-.625*	0.16	357	0.000	-1.01	-0.24
Cupcake case	Water bottle	.817*	0.16	357	0.000	0.431	1.202
	Coffee cup	.625*	0.16	357	0.000	0.24	1.01

Based on estimated marginal means

* The mean difference is significant at the .05 level.

a Dependent Variable: Acceptance.

c Adjustment for multiple comparisons: Bonferroni.

6.0 General discussion

In this research, we investigated how Norwegian consumers perceived edible food packaging and what influenced their acceptance of the product. We mainly focused on how perceived sustainability and perceived risk influence consumer acceptance.

6.1 Perceived sustainability

In general, the consumers perceived edible food packaging as a sustainable product. Specifically, they perceived that the products deserved to be labeled environmentally friendly, they thought purchasing this product is a good environmental choice, they agreed that a person who cares about the environment would be likely to buy this product, and that the product was environmentally friendly or green. The results explained that hypothesis 1 was supported showing that consumer perceived sustainability of the product influences how they accept the product positively. The finding is correspondingly comparable to previous literature saying that consumer attitude toward green products significantly influences his or her green purchase intention (Barber, Taylor & Strick, 2009; Chen & Hung, 2016; Flamm, 2009; Mostafa ,2009; Paul, Modi & Patel, 2016; Teng ,2009; Vazifehdoust et al., 2013; Yadav & Pathak, 2016). In other words, consumers will have a higher acceptance of edible food packaging if they perceive the product as sustainable.

6.2 Perceived risk

Furthermore, the results are also in line with Ayadi & Lapeyre (2016) and Luce, Payne, & Bettman (1999) mentioning that in the process of consumer willingness to pay, they usually trade off benefits and risks, since risk perception has a significant influence on consumer acceptance of edible food packaging. This represents that consumers assess negative aspects as well.

The result relating to perceived risk of consumers toward edible food packaging is that consumer perceived risk of the product influences how they accept the product negatively, which means that hypothesis 2 was supported. This is in line with previous literature stating that perceived risk generally has a negative impact on consumer perceptions and purchase intentions (Dowling 1986; Nordgren et al. 2007; Sheeran et al., 2014; Siegrist, 2008). The result also corresponds to Ray & Sahney (2018) who reveal that consumers are skeptical and perceive a high level of risk when purchasing and using green products.

In terms of risk dimensions, the results showed that not all dimensions influenced the acceptance of edible food packaging. This confirms the findings of Hirunyawipada & Paswan (2006) saying that perceived risk is multidimensional, and not all the dimensions are going to be salient in every product purchase context. Our result illustrated that only health-related risk influenced consumer acceptance, which represented the physical risk dimension. More precisely, they were concerned that their health would be damaged by eating the edible food packaging. Secondly, they thought that many people would have their health harmed by the product. Thirdly, they were afraid that their health would be harmed depending on how much they eat. Finally, they thought that the product would seriously harm their health.

On the other hand, the two factors associated with risk perception: perceived information and human influence, turned out to be insignificant in affecting consumer acceptance. Perceived information factor generally covers consumer attitude about cost to avoid negative consequences, difficulty to get information, and adequation of laws and regulations. This factor represents financial risk which did not significantly influence consumer acceptance of the edible food packaging. The human influence factor covers two topics. First of all it covers how many people who eat this product in Norway. This topic can be linked to the social risk dimension. This showed that how many people eat this product will not affect one's decision to accept the product. Another topic is related to health damage from mankind which is considered as functional risk. The result explained that the possible fault of mankind from the product is not significant in impacting consumer acceptance.

Overall, the finding from the study supports the previous studies saying that attitudes toward a product is considered an important predictor and descriptor of behavior intention (Chen & Hung, 2016). This is because perceived sustainability and perceived risk impact consumer attitudes which can describe their behavior intention. More precisely, perceived sustainability enhances positive attitude which consequently predicts acceptance of edible food packaging. In contrast perceived risk enhances negative attitude which discourages consumers to accept the product.

6.3 Acceptance of different product categories

In addition to the two hypotheses, we also tested if consumer acceptance of edible food packaging varies across different product categories. The results indicated that only the average acceptance between the edible cupcake cases and the two other products was significantly different. To be exact, the mean acceptance of the edible cupcake case was higher than the other two products. There might be many possible reasons for this occurrence. Firstly, this could be affected by the product familiarity. Consumers might be more familiar with the edible cupcake case than the edible coffee cup and the edible water bottle since they are new and not widely commercialized in the market. Additionally, consumers might have no experience with these types of products compared to the edible cupcake case.

6.4 Managerial implications

Nowadays, the rise of alternative food packaging is continuously increasing along with intention to tackle food packaging waste issues, especially plastic waste. As mentioned in the beginning of this research the invention of edible food packaging aims to help this issue. Overall from the research, the edible food packaging has a market potential in the future, since consumers accepted the product. Still, there were other factors that need to be considered when developing this type of product. The research presented here has certain implications for businesses or manufacturers targeting consumers.

In the present, consumers have become more environmentally conscious and this subsequently enhances consumer behavior toward green products. Therefore, the consumers who have this preference should be firms' target customers. They have a strong motivator for purchasing green products. Nevertheless, consumers preferences or interests alone are not enough to make well-accepted products in the market. The firm strategies are also crucial. According to the findings, firms should maximize consumer perceived sustainability and minimize perceived risk of the edible food packaging. Basically, they should encourage consumers to perceive more benefits than risk in their assessment process.

In terms of enhancing the sustainability perception, having an effective green positioning is vital. The firms must have the right positioning to meet consumer expectations (Wang, 2016), because it significantly affects positive attitudes and therefore influences product acceptance (Huang, Yang & Wang, 2014; Mostafa, 2009; Patrick, Ibanez & Sainz, 2005). A recommendation for marketers is to strengthen their green positioning through a good communication strategy. They should create a product message that highlights the green attributes and explain how consumers can contribute to the environment by using the edible food packaging. For instance, marketers can implement comparative advertising to communicate the green benefits of the edible food packaging compared to substitute products such as plastic food packaging. They can provide information such as how long the edible food product takes to degrade compared to the plastic food packaging. By providing information about green or sustainable attributes, consumers can understand the essential role of the product's functionality and they are more likely to judge the entire product as green or sustainable (Gershoff & Frels, 2015).

Regarding the risk perception, the critical dimension of risk that firms should minimize is physical risk. Therefore, firms should assure consumers that consuming edible food packaging will not impact their health negatively. Managers can lower physical risk perception through product handling. To get a clearer picture, with the existing products like the edible water bottles in the London Marathon 2019, the products were handed to participants by hand, and many products were stored in one large plastic box. In this sense, consumers might be skeptical about touching and eating the product. Therefore, firms have to make sure that consumers feel safe

when eating the product. To be specific, they should not feel that the product is contaminated with bacteria or harmful substances when the product is handled to them, how the product is stored, and when they touch it. The way that the host of the London Marathon event did is that people who handled the product wore single-use gloves which could help to minimize the fear of consumers. However, consumers may still be afraid to use their bare hands when receiving the product and eating it. Thus, firms should think thoroughly how to prevent this concern. Another possible way to diminish physical risk is through communication. For example, marketers can use informative creative appeal to provide details about the product ingredients which are natural and safe to consume.

6.5 Limitations and future research

The present study has some limitations that should be acknowledged. First of all, by using a convenient sampling method, although useful results were obtained, the selection bias occurs because of inability to control the participants who took part. This resulted in a skewed age distribution. Also, this type of non-probability sampling method prevents us from generalizing the results to the Norwegian population.

Moreover, by conducting an online survey, the ecological validity dropped down. The online survey gave no control over participants during the study, which could engage participants not to answer the survey properly. The online survey also could not represent real buying behavior since the study was to investigate the acceptance of the product. We could only predict the purchase intention of consumers, but not their actual purchase behavior.

In terms of generalizability for the product category, the study tested only three different product categories. The result may not be able to represent other product categories. Furthermore, since the world was facing a pandemic (COVID-19) during the data collection, it is likely to believe that this impacted the results of the study. In this light, the magnitude of perceived risk could be altered as the pandemic can reduce demand for goods (Fox, Hayes & Shogren, 2002). Despite these limitations the result of this research gives a great understanding of how perceived

sustainability and perceived risk can influence consumer acceptance of edible food packaging.

A suggestion for further research would be to conduct an experiment where consumers are provided with the actual products in a real shopping context. This will allow consumers to experience the real product. Also, it imitates the actual shopping environment which could represent real purchase behavior. In addition, future research should investigate edible food packaging from other products categories in order to compare or confirm the results. In terms of generalizing the results, future research can be conducted as cross-country studies to see how consumers from different geography perform their behavior.

7.0 References

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Appendixes

Appendix 1: Survey

Brukerundersøkelse

Vi skriver vår masteroppgave i strategisk markedsføringsledelse på Handelshøyskolen BI, og håper du ønsker å hjelpe oss ved å svare på noen spørsmål. Formålet med undersøkelsen er å kartlegge forbrukernes adferd og holdning relatert til spiselig emballasje.

Denne undersøkelsen tar ca. 10 minutter, og det finnes ingen rette eller gale svar. All data vil bli anonymisert og behandlet konfidensielt, og resultatene vil kun bli brukt i masteroppgaven.

På forhånd, tusen takk for at du satt av tid til å svare på denne undersøkelsen! Har du noen spørsmål i forbindelse med undersøkelsen, vennligst kontakt oss på:

bright.apichaya@gmail.com

katrine.furulund@gmail.com

Ved å klikke "Jeg aksepterer" nedenfor indikerer du at du har lest og forstått vilkårene og betingelsene, og aksepterer dermed at du ønsker å ta del i studiet.

- Jeg aksepterer
- Jeg ønsker ikke å delta

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En spiselig vannflaske er en boblelignende vannbeholder laget av tang. Det går an å bite hull på boblen for så å drikke vannet og å svelge boblen hel.

Hvor sannsynlig er det at du vil spise dette produktet?

- 1-Svært usannsynlig
- 2- Lite sannsynlig
- 3-Ikke sikker
- 4-Ganske sannsynlig
- 5- Svært sannsynlig

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En spiselig kaffekopp er en kaffekopp laget av kjeks, og du kan dermed spise koppen når du er ferdig med å drikke innholdet.

Hvor sannsynlig er det at du vil spise dette produktet?

- 1- Svært usannsynlig
- 2-Lite sannsynlig
- 3- Ikke sikker
- 4- Ganske sannsynlig
- 5- Svært sannsynlig

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En spiselig muffinsform er laget av "wafer papir". Det er som å spise en muffins uten å ha noe papir på kaken.

Hvor sannsynlig er det at du vil spise dette produktet?




- 1- Svært usannsynlig
- 2- Lite sannsynlig
- 3- Ikke sikker
- 4- Ganske sannsynlig
- 5- Svært sannsynlig

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Nå kommer det 4 spørsmål for å kartlegge hvor miljøvennlig du syntes produktene vi nettopp introduserte deg for er. Vi ønsker at du følger nøye med på produktene og spørsmålene vi stiller.




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Fortjener følgende produkter å bli merket som "miljøvennlig"?

	1-Sterkt uenig	2	3	4	5-Svært enig
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>




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Ser du på følgende produkter som et miljøvennlig kjøp?

	1-Sterkt uenig	2	3	4	5-Svært enig
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>




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Tror du at en person som bryr seg om miljøet er villig til å kjøpe følgende produkter?

	1-Ikke kjøpe produktet	2	3	4	5-Definitivet kjøpe produktet
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Hvor miljøvennlig synes du følgende produkter er?




	1-Ikke i det hele tatt	2	3	4	5-Ekstremt
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Nå kommer det en rekke spørsmål for å kartlegge risikoen du opplever ved å spise produktene vi introduserte deg for. Vi ønsker at du følger nøye med på produktene og vurderer den opplevde risikoen hvert av spørsmålene spør om.




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Hvor sannsynlig tror du det er at spising av følgende produkter kan skade deg?

	1- Ikke sannsynlig i det hele tatt	2	3	4	5-Ekstremt sannsynlig
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>




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Hvor mange personer vil sannsynligvis få helseskader fra å spise følgende produkter?

	1- Ingen	2	3	4	5- Veldig mange
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>




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Er folk som spiser følgende produkter klar over at de kan utgjøre en risiko for deres helse?

	1-Overhode ikke klar over risikoen	2	3	4	5- Fullstendig klar over risikoen
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>




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Hvor gode er dagens lover og regler til å beskytte folk mot all helserisiko forbundet med følgende produkter?

	1-Svært gode	2	3	4	5-Svært dårlige
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>




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Er den potensielle helseskaden fra følgende produkter avhengig av hvor mye du spiser?

	1-Skadelig i veldig små mengder	2	3	4	5-Ikke skadelig i det hele tatt
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>




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Hvor stor kontroll har folk over hvor mye de spiser av følgende produkter?

	1-Ingen kontroll	2	3	4	5-Total kontroll
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>




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Vil helseskade fra følgende produkter inntreffe med en gang eller senere?

	1-Skaden inntreffer med en gang	2	3	4	5-Skaden inntreffer etter lang tid
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>




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I hvilken grad er helserisikoen fra følgende produkter naturlig eller menneskeskapt?

	1- Naturlig	2	3	4	5- Menneskeskapt
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>




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Hvor alvorlig tror du følgende produkter kan skade din helse?

	1-Ikke alvorlig i det hele tatt	2	3	4	5-Svært alvorlig
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>




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Hvor krevende (tid, innsats, penger) vil det være for folk å unngå potensielle helseskader fra følgende produkter?

	1-Ikke krevende	2	3	4	5-Svært krevende
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>




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Hvor stor er nytten/ gleden over å spise følgende produkter for deg personlig?

	1-Ingen nytte/glede	2	3	4	5-Svært stor nytte/glede
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>




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Hvor mange i Norge spiser følgende produkter?

	1- Ingen	2	3	4	5- Alle
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Hvor lett er det for deg å se om følgende produkter kan utgjøre en risiko for din helse eller ikke?

	1- Umulig	2	3	4	5-Kan alltid se det
En spiselig vannflaske 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig kaffekopp 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En spiselig muffinsform 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Hvilket kjønn er du?

- Mann
- Kvinne
- Ønsker ikke å oppgi

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Alder?

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Appendix 2: Correlation matrix

Correlation Matrix

	Label environmentally friendly	Environmental choice	Environmental purchase intention	How green	Health damage	Prob of Harm	Risk aware	Inadequate law	Harmful quantity	Control over expose	Delayed effect	Man made	Serious harm	Cost to avoid	Pleasure eating	Eaten by many	Easily identified
Label environmentally friendly	1	0.687	0.546	0.706	-0.123	-0.184	0.155	-0.087	-0.203	-0.107	-0.1	-0.015	-0.095	0.184	-0.375	-0.14	-0.077
Environmental choice		1	0.555	0.764	-0.005	-0.13	0.19	-0.053	-0.152	-0.027	-0.109	-0.052	-0.01	0.228	-0.399	-0.15	-0.144
Environmental purchase intention			1	0.494	-0.1	-0.115	0.125	-0.06	-0.169	-0.213	-0.096	-0.094	-0.111	0.114	-0.352	-0.216	-0.007
How green				1	-0.004	-0.138	0.13	-0.004	-0.168	-0.017	-0.092	-0.077	-0.008	0.28	-0.412	-0.17	-0.102
Health damage					1	0.595	-0.012	0.18	0.433	0.176	0.015	0.228	0.679	0.263	0.174	0.038	-0.226
Prob of Harm						1	0.092	0.085	0.409	0.189	0.048	0.242	0.598	0.193	0.132	-0.032	-0.161
Risk aware							1	-0.015	-0.069	-0.098	-0.064	0.062	0.083	0.107	-0.18	-0.178	-0.24
Inadequate law								1	0.087	0.107	-0.127	0.022	0.132	0.168	0.143	-0.007	0.118
Harmful quantity									1	0.183	0.107	0.134	0.434	0.17	0.188	0.03	-0.133
Control over expose										1	0.016	0.06	0.21	0.225	0.053	-0.023	0.073
Delayed effect											1	-0.009	0.014	-0.066	0.08	0.117	0.042
Man made												1	0.291	-0.028	0.129	0.143	-0.057
Serious harm													1	0.217	0.215	0.023	-0.205
Cost to avoid														1	-0.141	-0.15	0.002
Pleasure eating															1	0.188	0.085
Eaten by many																1	0.123
Easily identified																	1