

How UK SME Food Manufacturers Can Benefit from Sustainability Efforts

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Preface:

This bachelor's thesis has been written as a requirement of the 4th year for the dual-degree bachelors' study "International Food Business" at the Aeres University of Applied Sciences, and Dalhousie University. My name is Austin Hurst Nelson, and I am a 23-year-old American from Colorado in the 4th and final year of my bachelors' study. This bachelor's thesis gives insight into how environmental sustainability efforts can benefit SME food manufacturers operating in the UK. The findings can be used to assess whether or not an organization is able to incorporate specific sustainability efforts into their business model, and to what extent such efforts might benefit their company. I would like to thank Frano Pasalic, my work colleague, for helping me develop a suitable research topic and survey. Furthermore, I would like to thank Cynthia Akkermans, my thesis coach, for consistently supporting me in meeting deadlines, and providing crucial feedback along the way. Finally, I would like to thank my parents for supporting me greatly not only during the thesis period, but throughout my entire study.

I would also like to thank the 1st, 2nd and 3rd assessors of the thesis, and indicate that changes have been made based on their suggestions provided in previous assessment periods. Based on feedback from the 1st assessor, question 5 of the survey was further explained in the materials and methods, and a greater distinction was made between the independent and dependent variables. Based on feedback from the 2nd assessor, sub-question 3 was improved by referring specifically to the research of marketing channels, as opposed to "marketing" in general. Furthermore, a figure was added to section 1.4 to give one of the studies a visual representation, "the knowledge gap" was added as a subheading to the introduction, and further research was added to section 1.6 regarding UK consumers and their involvement with food SMEs. Finally, reference to the student's internship company was removed from the paper, as suggested by the 3rd assessor.

Table of Contents

<i>Preface:</i>	<i>II</i>
<i>Summary:</i>	<i>VI</i>
1. Introduction	1
1.1. Sustainability and the food industry	1
1.2. Sustainability from a global perspective	1
1.3. Sustainability and SMEs	3
1.4. Sustainability and consumers	4
1.5. Sustainability and manufacturing.....	6
1.5.1. Ways food manufacturers can be more environmentally sustainable	6
1.5.2. Ways manufacturers can communicate these efforts.....	8
1.6. Sustainability in The United Kingdom	9
1.7. Knowledge gap: Sustainability efforts and benefits for food manufacturers	10
2. Materials and Methods	12
3. Results	15
3.1. General overview	15
3.2. Most attractive environmental sustainability efforts	16
3.2.1. Age.....	17
3.2.2. Education	18
3.2.3. Gender.....	19
3.3. Percent extra willing to be paid.....	20
3.3.1. Age.....	22
3.3.2. Education	22
3.3.3. Gender.....	23
3.4. Top marketing channels.....	24
3.4.1. Age vs. currently learn/hear.....	25
3.4.2. Education vs. currently learn/hear	26
3.4.3. Gender vs. currently learn/hear.....	27
3.4.4. Age vs. like to hear/learn	27
3.4.5. Education vs. like to hear/learn	28
3.4.6. Gender vs. like to hear/learn	29
4. Discussion of results	30
4.1. General overview	30
4.2. Most attractive environmental sustainability efforts	31
4.3. Percent extra willing to be paid.....	32
4.4. Top marketing channels.....	33
4.5. Benefits to SME manufacturers	35
5. Conclusion and recommendations	38
5.1. Conclusion	38

5.2. Recommendations.....	39
5.2.1. Short-term recommendations.....	39
5.2.2. Long-term recommendations	39
<i>List of References.....</i>	<i>41</i>
<i>Appendices.....</i>	<i>48</i>
Appendix #1: Survey	48
Appendix #2: SPSS Outputs	54

Table of figures

Figure 1: Attention paid to environmental impact of food choices per EU country (BEUC, 2020).	5
Figure 2: Age of UK respondents.	15
Figure 3: Education level of UK respondents.	15
Figure 4: Answers of respondents (in %) indicating if they were more likely to purchase a food product if they knew it were good for the environment.....	16
Figure 5: Level of attractiveness indicated for the top three sustainability efforts in the form of a percentage.	17
Figure 6: Mode of % extra willing to be paid for product with locally sourced ingredients.	20
Figure 7: Mode of % extra willing to be paid for product with biodegradable packaging.	21
Figure 8: Mode of extra willing to be paid for one tree planted alongside every product sold purchased.	22
Figure 9: Indication of respondents wanting to be informed of environmental sustainability efforts by count.	24
Figure 10: Marketing channels respondents currently hear and would like to hear about environmental sustainability efforts from.	25
Figure 11: Year-to-year UK advertising revenue distribution by respective marketing channel (Media Nations, 2020).	37

Table of tables

Table 1: Sustainability efforts rank by mean.	16
Table 2: Age vs. sustainability efforts attractiveness, showing the average response per effort on a scale of 1 to 5, Kruskal-Wallis test value and level of significance expressed as p value.....	18
Table 3: Education vs. sustainability efforts attractiveness, showing the average response per effort on a scale of 1 to 5, Kruskal-Wallis test value and level of significance expressed as p value	19
Table 4: Gender vs. sustainability efforts attractiveness, showing the average response per effort on a scale of 1 to 5, Mann-Whitney U test value and level of significance expressed as p value.	19
Table 5: % extra willing to be paid ranked by mean percentage.	20

Table 6: Age vs. % extra willing to be paid per sustainability effort, showing the average percentage per effort, Kruskal-Wallis test value and level of significance expressed as p value.	22
Table 7: Education vs. % extra willing to be paid per sustainability effort, showing the average percentage per effort, Kruskal-Wallis test value and level of significance expressed as p value.	23
Table 8: Gender vs. % extra willing to be paid per sustainability effort, showing the average percentage per effort, Mann-Whitney U test value and level of significance expressed as p value.	23
Table 9: Age vs. respondents currently hearing about environmental sustainability efforts from social media, showing the realized count and expected counts as a percentage of total social media selections, Chi-Squared test value and level of significance expressed as p value.	26
Table 10: Education vs. respondents currently hearing about environmental sustainability efforts from product packaging, showing the realized count and expected counts as a percentage of total product packaging selections, Chi-Squared test value and level of significance expressed as p value.	26
Table 11: Gender vs. respondents currently hearing about environmental sustainability efforts from TV, radio, podcasts, etc., showing the realized count and expected counts as a percentage of total TV, radio, podcasts, etc. selections, Chi-Squared test value and level of significance expressed as p value.	27
Table 12: Age vs. respondents wanting to hear/learn about environmental sustainability efforts from TV, radio, podcasts, etc., showing the realized count and expected counts as a percentage of total TV, radio, podcast, etc. selections, Kruskal-Wallis test value and level of significance expressed as p value.	28
Table 13: Education vs. respondents wanting to hear/learn about environmental sustainability efforts from product packaging, showing the realized count and expected counts as a percentage of total product packaging selections, Kruskal-Wallis test value and level of significance expressed as p value.	28
Table 14: Gender vs. respondents wanting to hear/learn about environmental sustainability efforts from social media, showing the realized count and expected counts as a percentage of total social media selections, Kruskal-Wallis test value and level of significance expressed as p value.	29

Summary:

As sustainability is a huge topic of discussion in the modern world, businesses and consumers alike are looking for ways to be more sustainable in their daily existences. The food industry is particularly important in the future of sustainability, in which SMEs and manufacturers are crucial actors. Moreover, the UK can be seen as a key market for environmentally sustainable SMEs, and as a global market in general. While there's research available regarding consumer's environmental sustainability attitudes in the UK, it is never geared towards a specific industry, and does not provide useful insights to manufacturers regarding how sustainability efforts can help their organizations. Thus, the goal of the research was to discover how consumers attitudes towards SME environmental sustainability efforts can benefit food manufacturers selling packaged goods in the UK. A survey was then created, and 176 responses were gathered from UK residents who were 18 or older and had at the very least a secondary school education.

The research found the top three most attractive environmental sustainability efforts are biodegradable packaging, reducing food waste, and planting one tree for every product sold. Those in the 18-29, 40-49 and 50-59 age groups found vegan products the most attractive, while those aged 60+ found them the least. Furthermore, women found eco delivery options to be more attractive than men. It was also found that consumers are willing to pay 6.6% extra for local ingredients, 6% for biodegradable packaging, 5.9% for planting a tree, 5.6% to reduce food waste, 4.8% for eco delivery, and 4.7% for vegan products. No statistical significance was found in relation to percentage and the demographic factors. Finally, it was found that the most attractive marketing channels for such efforts are the product packaging, social media and TV, radio, podcasts, newspapers, magazines and news websites. Moreover, 18-29-year-olds were found to be more likely to currently hear about sustainability efforts from social media. The attitudes towards biodegradable packaging, sourcing local ingredients and planting a tree for every product sold indicate these efforts can be most beneficial to SME manufacturers, and should be marketed via the top channels: product packaging, social media and TV, radio, etc. It's then recommended that manufacturers prioritize biodegradable packaging but choose whichever of these three efforts is most feasible. Manufacturers should then most importantly invest and market via the product packaging and social media and, as a third choice, TV, radio, podcasts etc.

1. Introduction

1.1. Sustainability and the food industry

As various issues such as climate change and overpopulation become ever more pressing in the modern world, the word “sustainability” is often used when discussing the future. It can be easily observed that consumers and businesses alike are making efforts to be more sustainable, but these efforts are often subjective. Furthermore, how these efforts are received by the general public is unclear, especially when looking specifically into different industries, products, and services. With this, the research will determine how consumers attitudes towards small-medium enterprises (SMEs) environmental sustainability efforts can benefit food manufacturers selling packaged goods in the UK. The food industry is particularly important to focus on when discussing environmental sustainability, as the global food supply chain creates 13.7 billion metric tons of carbon dioxide equivalents (CO₂eq), which results in 26% of total human related greenhouse gas emissions (GHG) (Poore & Nemecek, 2018). Moreover, manufacturers and consumers play increasingly important roles in environmental sustainability and climate change, as manufacturers influence the supply of the market, and consumers influence the demand.

While manufacturers in general are a large player in the food industry, the research will focus primarily on SME food manufacturers. SMEs, ventures which have less than 500 full-time employees and less than 20 years of existence, play a crucial role in environmental sustainability (Arend, 2014). Research shows that SMEs make up 90% of worldwide businesses and are reported to contribute to approximately 70% of global pollution (Bakos, Siu, Orengo, & Kasiri, 2020). The UK is an attractive market for such research to be conducted, as it is the country with the highest percentage of research available on environmentally sustainable SMEs, indicating a presence of such organizations (Jaramillo, Sossa, & Mendoza, 2018). Furthermore, the UK is a relevant market due to its sheer size, as it is the 5th largest economy in the world, with a GDP of \$2.9 trillion in 2019 (US Department of Commerce, 2020).

1.2. Sustainability from a global perspective

In general, sustainability means “the ability to be maintained at a certain level”, but this word has become almost exclusively used in relation to the environment (Kreisel, 2018). Formulations of sustainability can be quite vague, but they generally try and convey that human beings must ensure its material reproduction in a way that does not negatively impact future generations (Warde, 2011). As the important role that the food industry plays in sustainability has been previously articulated, it is crucial to understand what sustainable food production is, and how this is necessary in creating a sustainable future for all. Sustainable food production can be defined as, “a method of production using processes and systems that are non-polluting, conserve non-renewable energy and natural resources, are economically efficient, are safe for workers, communities and consumers, and do not compromise the needs of future generations” (Foresight, 2011). As the global population is anticipated to reach nearly 9 billion by 2050, resources such as land, water and energy seem to be growing ever so scarce with the effects of climate change becoming increasingly apparent (Foresight, 2011). In these regards, it is ever so

important that sustainable food production methods are practiced and frequently discussed among all players in the global food supply chain.

As sustainable food production has made it into the global mainstream, efforts towards achieving environmental sustainability can be recognized from a variety of key players. Examples of proactive behavior in these issues are frequently seen in modern politics, business and society. In 2015, all member states of the United Nations adopted “The 2030 Agenda for Sustainable Development”, which includes 17 sustainability development goals (SDGs) to be achieved by 2030 (United Nations, 2021). While not all goals focus directly on environmental sustainability, many of which do, including: clean water and sanitation, affordable and clean energy, sustainable cities and communities, responsible consumption and production, climate action, life below water and life on land (United Nations, 2021). Furthermore, many of the SDG goals address sustainability issues in the food industry. Some relevant SDGs in the food industry will be outlined as follows:

Goal 12: Responsible consumption and production

This goal has many targets which focus primarily on sustainability in the food industry, for example attempting to halve per capita global food waste at the retail and consumer levels, and reduce food losses along the entire supply chain (United Nations, 2021). Other targets strive to achieve an environmentally sound usage of chemicals, and reduce waste generation, both of which are closely linked with production and consumption in the food industry (United Nations, 2021).

Goal 14: Life below water

This goal is specifically related to sustainability in the food industry as well, as targets were set to effectively regulate harvesting and end overfishing by 2020 (United Nations, 2021). As at February 2020, the number of parties involved in the Agreement on Port State Measures to prevent and eliminate Illegal, Unreported and Unregulated Fishing increased to 66% (including the European Union) from 58% in the previous year, and nearly 70% of countries reported scoring high on the implementation thereof (United Nations, 2021).

Goal 15: Life on land

Forest areas continue to decline at an alarming rate, which is driven primarily by agricultural expansion, and each year, 10 million hectares of forest are destroyed (United Nations, 2021). Therefore, one of the targets set for this SDG is to promote the implementation of sustainable forest management, halt deforestation, restore degraded forests and substantially increase reforestation efforts by 2020 (United Nations, 2021). It can be seen that forest areas continue to decline, but global efforts are gaining traction, and are having positive effects in terms of sustainable forest management (United Nations, 2021). Moreover, from 2000 to 2020, forest area increased in Asia, Europe and Northern America, while significantly decreasing in Latin America, sub-Saharan Africa and South-Eastern Asia, mainly driven by land conversion to agriculture (United Nations, 2021).

Another clear example of a global environmental sustainability effort made on a political level includes the Paris Agreement. The Paris Agreement is a legally binding international treaty on climate change, which was adopted by 196 parties in December of 2015 and entered into force in November of 2016 (United Nations Climate Change, 2021). With Joe Biden now holding office as President of the United States, he has initiated the ratification of the Paris Agreement, thus increasing the global scope of the agreement (The White House, 2021).

1.3. Sustainability and SMEs

As global sustainability efforts can be seen on a political level, such efforts can also be recognized in the business world. It is clear that companies of all sizes are eager to promote their sustainability practices and show their stakeholders that they are responsibly entities, who want to contribute to that of a brighter future (Eweje, 2015). As more and more organizations shift their business models in a sustainable direction, this incentivizes organizations to follow suit for competitive purposes, creating a domino effect (Stoekl, 2013). As large businesses contribute to only 30% of global pollution and have more resources to achieve environmental sustainability, SMEs become particularly important when discussing sustainability in the business world (Bakos et al., 2020). As crucial as it is for large and powerful firms to invest in sustainability, it is just as important that SMEs develop a sense of responsibility and recognize that their power is held in that of strength in numbers. There are both drivers and barriers to SMEs becoming more sustainable which are important to consider. The most common drivers can be seen as financial gains, government regulations and availability of resources (much like large businesses), while the barriers can be seen as a lack of resources, lack of management commitment, lack of governmental support, and a lack of consumer demand (Bakos et al., 2020).

When looking at the participation of SMEs in environmental sustainability, the research shows that the majority of studies and information provided are coming from Europe, making up 41% of the research available (Bakos et al., 2020). This is followed by Asia at 22%, and South America at 19% (Bakos et al., 2020). When looking specifically at the research provided per country, it can be seen that the United Kingdom provides the highest percentage of the total published papers (12%), followed by Germany (9%) and Italy (7%) (Jaramillo et al., 2019). Disturbingly enough, The United States only accounts for 4% of the research, while China accounts for 2% (Bakos et al., 2020). This is highly problematic as the United States produces 30% of the earth's waste and consumes 25% of the planet's natural resources (Davis, Caldiera & Matthews, 2010). Furthermore, the United States and China are the two largest emitters of carbon dioxide (Bakos et al., 2020). The lack of research is not a consequence of a lack of SMEs present in the respective countries, as 97% of all Chinese firms are SMEs, accounting for 80% of urban employment (OECD, 2016). Moreover, small business (classified as 500 employees or less) in the United States account for 99.9% of all firms (OECD, 2016). With the clear presence of SMEs in China and the United States, yet a serious lack of research available, it is clear that SMEs making such efforts are more abundant in European countries. As it is apparent that European SMEs are participating in environmental sustainability, it is imperative to then understand how these efforts are making an impact, and how they are received by the general population.

1.4. Sustainability and consumers

Consumers are a third party that play a crucial role in creating a sustainable future, as consumers dictate demand, thus, heavily influencing supply. With the introduction of the World Wide Web, a shift transpired in which ordinary consumers were given access to information and power that was not previously available (Labrecque et al., 2013). With this, consumers were able to not only easily dictate their own lives, but also marketplaces (Labrecque et al., 2013). It can be seen in numerous key global markets that there is a desire for sustainable products, and in some cases, an increase in the purchasing of these products. Recent data shows that in the United States, products with a sustainability claim on the packaging accounted for 16.6% of the market in 2018, an increase from 14.3% in 2013 (Whelan & Kronthal-Sacco, 2019). This resulted in nearly \$114 billion in sales, which was a 29% increase from 2013 (Whelan & Kronthal-Sacco, 2019). As a result of this increase in sales, sustainable products were found to grow 5.6 times faster than those that were not (Whelan & Kronthal-Sacco, 2019). Another study conducted by IBM in conjunction with the National Retail Federation attempted to better understand how consumers preferences and priorities are changing (Haller, Lee, & Cheung, 2020). The study examined 18,980 consumers across 28 countries, covering every continent with the exception of Antarctica (Haller et al., 2020). Moreover, the primary chunk of responses came from the United States, China, Japan, Canada and the UK (Haller et al., 2020). The study found that nearly six out of 10 consumers are willing to change their shopping habits to reduce environmental impact, and approximately eight out of 10 consumers say sustainability is important to them (Haller et al., 2020).

To further highlight consumer trends in sustainability, The European Consumer Organization (BEUC) released a report in June of 2020, focusing more on consumers and the transition to sustainable food (BEUC, 2020). The research surveyed just over 1000 respondents each, from 11 EU countries including: Austria, Belgium, Germany, Greece, Italy, Lithuania, the Netherlands, Portugal, Slovakia, Slovenia and Spain (BEUC, 2020). The research found that over half of the consumers say that sustainability has some influence (42.6%) or a lot of influence (16.6%) on their eating habits (BEUC, 2020). The distribution of answers per country can be seen in figure 1.

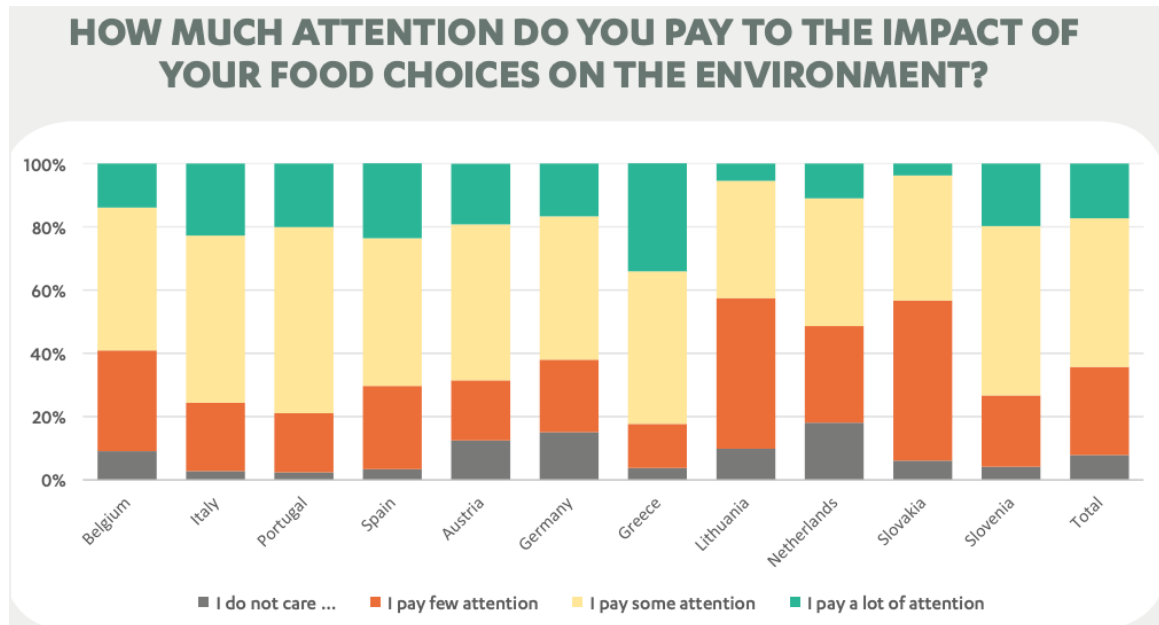


Figure 1: Attention paid to environmental impact of food choices per EU country (BEUC, 2020).

The research also found that 2/3rd of consumers are open to changing their eating habits for environmental reasons (BEUC, 2020). Interestingly, it was found that 48.6% of consumers automatically associate “sustainable food” with “low environmental impact” (BEUC, 2020). This indicates that when consumers think about sustainable food, they automatically associate it with environmental impact, as opposed to other sustainability factors, for example food insecurity. This is useful knowledge as this research will focus solely on the environmental sustainability efforts of SME food manufacturers.

Another clear example of consumers focus on environmental sustainability in relation to food is the global vegan trend. It has been found that the consumption of animal products is more taxing on the environment, as it leads to more pollution, greenhouse effect and resource waste (Baroni, Berati, Candilera & Tettamanti, 2014). There are many reasons consumers choose to be vegan, and environmental sustainability is a big one (The Vegan Society, 2021). As a result, current data shows that the number of vegans continues to rise at an accelerated rate (Meyer, 2021). In the United States, the percentage of vegans has grown from 0.4% to 3.5% in approximately the last two years (Meyer, 2021). Furthermore, the number of vegans in the UK has quadrupled over the past five years, and Google searches for “veganism” have increased 580% over the same time frame (Meyer, 2021).

As consumer trends in veganism seem to be growing, growth can also be seen in the demand for sustainable packaging. A survey conducted by Boston Consulting Group which includes responses from more than 15,000 American, European and South American consumers has found that nearly ¾ of consumers are willing to pay more for sustainable packaging (Holbrook, 2020). Moreover, nearly ¼ of this group are willing to pay 10% or more for such packaging alternatives (Holbrook, 2020). In light of this trend, the US molded pulp packaging market is forecast to grow 6.1% annually, reaching \$1.3 billion in 2024, and having the largest

impact on the food industry (Holbrook, 2020). Another study conducted by Accenture Strategy in 2018 surveyed 29,530 consumers in 35 different countries in regard to their attitudes towards sustainable brands (Barton, Ishikawa, Quiring, & Theofilou, 2018). This study found that 62% of consumers will purchase one brand over the other (when looking beyond price and quality) if the brand believes in reducing plastic waste and improving the environment (Barton, Ishikawa, Quiring, & Theofilou, 2018).

A final key sustainability trend in the food industry is the consumption of locally produced food products, as this can minimize food loss, enhance food security and reduce GHGs (Jarzębowski, Bourlakis, & Bezat-Jarzebowska 2020). With the recognition of these benefits, consumers are seen to be making more local food choices in key markets globally. Local food sales in the US grew from \$5 billion to \$12 billion between 2008 and 2014 and were predicted to reach \$20 billion by 2019 (Hesterman & Horan, 2017). In light of the COVID-19 pandemic, the relationship between sustainability, local supply chains and consumers has become even more relevant, as consumers across Europe have turned to their local farmers and food shops (BEUC, 2020). A recent Swiss study which looked into consumer behavior during the pandemic found that there is a clear increase in the consumption of local products, and that this is not anticipated to end as the pandemic improves (BEUC, 2020). Furthermore, 59.5% of European consumers say they are willing to buy primarily seasonal fruits and vegetables, which often indicates that these products are local (BEUC, 2020).

1.5. Sustainability and manufacturing

As the food industry is very large, there are many different ways the industry can be used to promote sustainability. As manufacturers are the creators of products being sold on the market, they have numerous opportunities to invest in sustainability and thus have a lot of influence in the grand scheme.

1.5.1. Ways food manufacturers can be more environmentally sustainable

Biodegradable packaging

One of the biggest environmental sustainability issues the planet faces is the amount of plastic polluting our oceans, as at least 8 million tonnes of plastic enter the ocean on a yearly basis (Magnier et al., 2019). Furthermore, it has been discovered that the majority of the plastic-waste found in the ocean are food wrappers and beverage bottles, which is a consequence of poor sustainability efforts in the food industry, with manufacturers being held largely accountable (NOAA, 2020). A good example of this is Prodigy Snacks, the UK based food start-up who are selling vegan chocolate bars packaged in a 100% compostable foil (Prodigy Snacks, 2021).

Sell vegan products

Another way that manufacturers can be more sustainable is avoiding animal-based ingredients in their products. One kilo of beef emits 60 kg of GHGs, lamb and cheese emit more than 20 kg per kilo, poultry and pork emit around 6-7 kg per kilo, while one kg of peas emits just one kilo (Ritchie, 2020). In general, animal-based foods use more water and land than plant-based foods as well (Ranganathan, 2016). For these reasons, manufacturers can nudge consumers to develop more sustainable eating habits by creating enjoyable plant-based food products.

Partner with an NPO

Some manufacturers are partnering with Non-Profit Organizations (NPOs) and contributing a certain percentage of sales to the cause they are fighting for. An example of this is “Trinity Oaks”, a California based wine company, who are planting one tree for every bottle they sell (Trinity Oaks, 2021). The company has planted over 23 million trees since July of 2008 with the help of their NPO partner, “Trees for the Future” (Trinity Oaks, 2021). This is a great way to give back to the environment and has potential to bring attention to a business’ products, mission and vision.

Fight food waste

Manufacturers can also be more environmentally sustainable by focusing on food waste. This can be done in a number of ways, one of which during the production process. Manufacturers can minimize food waste by investing in high quality machinery (or partnering with a co-packer who has high quality machinery), having regular maintenance checks on the equipment, and mapping processes to maximize the available ingredients (North Scope, 2019). Manufacturers can also minimize food waste by sourcing ingredients that would have otherwise been wasted. As an example, Veggihap, a Dutch based food company, is making pasta by using imperfect and surplus vegetables that would have never made it to the market (Veggihap, 2021). This not only minimizes food waste but is also beneficial from a financial standpoint.

Distribute sustainably

Whether it is shipping by freight, plane, truck or train, it is the manufacturers choice as to which transportation partners they work with. In doing so, manufacturers can choose the most sustainable method available, and make sure that the packaging used by the shipping partner is sustainable. When shipping overseas, manufacturers should try their best to ship by sea, as airplanes pollute an average of 20-30 times more than ships (Kennemer, 2020).

Source locally

As 16.2% of total GHGs come from transportation, it is important to try to shorten supply chains whenever possible (Ritchie, 2020). In 2017, the UK imported around 50% of their food, a lot of which could have been grown or produced locally by farmers and suppliers all-year-round (Nisbets, 2021). With this, manufactures can reduce their carbon footprint by sourcing ingredients that are as close to home as much as possible.

1.5.2. Ways manufacturers can communicate these efforts

There are many different ways in which manufacturers who are making an effort to be more sustainable can communicate this information. The various marketing channels can be seen as follows.

The products packaging

One effective way for manufacturers to communicate their sustainability efforts is on the packaging of their products. It is no secret that many brands are communicating their eco and social certifications on their packaging. Common examples of such certifications on packaging labels include Fairtrade, Rainforest Alliance, Carbon Neutral, Organic, Carbon Reduction, Water Reduction and Forest Stewardship Council (FSC) (Upton, 2016). A study in the UK asked 2,000 consumers where they look for, or find, information about a business' environmental credentials, and 36% of the respondents said the products packaging (E.ON, 2020).

Company website

A company's own website is a great place for them to market their sustainability efforts, and websites can be used as a very effective marketing tool (Chris, n.d.). Obviously, a website is a comprehensive representation of a company on the internet, and can be the perfect place to thoroughly inform consumers about their efforts, values and story (Chris, n.d.). In the previously mentioned consumer study by E.ON, it was found that 40% of consumers learned about a company's environmental credentials from their website, which was the largest percentage of any communication platform (E.ON, 2020).

Social media

As consumers, employees and investors are increasingly understanding the value of sustainability in the modern world, social media is a good spot for communicating sustainability efforts in a quick and playful manner (Leiderman, 2020). A recent survey found that 79 percent of business-to-business (B2B) marketers rated social media as their most effective marketing channel (Leiderman, 2020). Not only can it quickly catch the viewers' attention and provide them with a brief idea of the business' products and endeavors, but it can also lead to consumers learning more about the brand on the company's website.

Product review sites

It has been found that 25% of UK consumers look for, or find, information about a business' environmental credentials through product review sites (E.ON, 2020). An example of a product review site is Trustpilot, which allows consumers to voice their opinions about an organization to the general public (Trustpilot, 2021). This allows for people to learn about the brand from other consumers who have tried their products. Furthermore, companies can respond to comments made by consumers, creating a dialogue that can be helpful in sharing a company's environmental sustainability efforts to the general public (Trustpilot, 2021).

Outdoor advertising

Outdoor advertising includes large posters, banners, billboards or flyers (Bhasin, 2021). With the rise of digital marketing, people tend to assume that outdoor marketing is dated and no longer useful (Allouch, 2020). With that being said, it is estimated that people engage in outdoor activities for an average of around eight hours a day, making outdoor advertising an effective way to inform consumers of your brand and environmental sustainability efforts (Allouch, 2020).

TV, radio, podcasts, magazines, newspapers and news websites

These are all potential advertising platforms that fall into the category of editorial media. As streaming platforms such as Netflix have become more popular in the last decade, TV advertising has become less impactful, but can still be useful (Bhasin, 2021).

1.6. Sustainability in The United Kingdom

It has been mentioned that the United Kingdom is a relevant market for sustainable SMEs, as 12% of the total research found on this topic has been conducted in the UK, the most of any country in the world (Bakos et al., 2020). This not only suggests that there is a high number of sustainability focused SMEs in the UK, but that there is some level of demand for sustainable products as well. Furthermore, there are around 7,130 SMEs in the UK food and drink sector with a turnover of approximately £21 billion in 2019 (Department for Environment, Food and Rural Affairs, 2020). Moreover, the agri-food sector contributed £120.2 billion or 9.4% to the national Gross Value Added in 2018, further solidifying the relevance of conducting a study related to food SMEs in the UK (Department for Environment, Food and Rural Affairs, 2020).

In 2015 the UK government committed to achieving the UN's sustainable development goals (SDGs), which aim to tackle a variety of issues, many of which relating to environmental sustainability (Lunn, 2019). In one of the most recent updates given on the SDGs, the UK reported progress made on climate and environmental goals, making it clear that the country is investing time and effort into these issues (Lunn, 2019). Much like the government, UK consumers are trying their best to be more sustainable, as ethical consumption has grown tremendously in 2019 (Smithers, 2019). The total market for ethical food, drinks, clothing, energy and travel increased to over £41 billion, with food and drinks handedly being the largest segment, valued at £12 billion, compared to £1 billion in 1999 (Lunn, 2019). Moreover, a recent study of 1,000 consumers in the UK has found that 85% of consumers feel there is some level of importance for retailers to stock sustainable and ethical foods (Lloyd's Register, 2019). More specifically, 49.7% of consumers feel this is fairly important, while 35.3% feel this is very important (Lloyd's Register, 2019).

Another study of 2,000 UK residents discovered that 65% of consumers think it is important that the products and services they purchase do not harm the environment (E.ON, 2020). Interestingly enough, the study also found that 51% of consumers feel the environmental credentials of a product or service are now just as important as the price they pay for it (E.ON, 2020). The research also found

that these desires are especially applicable for SMEs in the food and drink manufacturing sector, where 1/3rd of consumers said environmental credentials influenced their purchasing decisions the most (E.ON, 2020). In light of the COVID-19 pandemic, these desires have increased even further, with 36% of consumers having started to buy more sustainable products and services from companies with strong environmental credentials since the initial lockdown (E.ON, 2020). It is also clear that these environmental efforts can have a positive impact on sales, as 34% of consumers have knowingly paid extra for a product or service since the initial lockdown, because they knew the product or service had strong environmental credentials (E.ON, 2020). While it's not a groundbreaking percentage, it has been found that on average, consumers are willing to pay 3.39% extra for an environmentally friendly product or service (E.ON, 2020).

When looking at UK consumers and their involvement with SMEs, it can be seen that SMEs accounted for 52% of private sector turnover in 2020, indicating a fairly even split between SMEs and larger organizations (Merchant Savvy, 2021). Prior to the COVID-19 pandemic, an IRI study found 55% of UK consumers prefer to buy from local brands to help support local and small producers (Wells, 2018). A separate study found this percent to be 40% prior to the pandemic, but states that 60% of consumers intend to support local shops post pandemic, as consumers grew accustomed to shopping locally due to strict lockdown restrictions (Grant, 2021).

While sustainable practices are clearly becoming more common in the UK, there was a lot of concern that Brexit would have a negative impact on the environment and future sustainability measures. Consumers were concerned that if the EU were no longer regulating the environmental laws imposed, the UK government would leave sustainability on the backburner, and environmental policies would begin to look similar to that of the Trump Administration (Herbert, 2018). With Brexit having been finalized, there is no sign of plans for Britain to diverge from EU sustainability requirements (Keating, 2021). The Department for Business, Energy and Industrial Strategy (BEIS) on sustainability standards has thus far identified very few changes or plans to change current environmental regulations (Keating, 2021). At this point in time, the majority of changes being made are the names. For example, the "EU Emissions Trading System" has been changed to, "The UK Emissions Trading System". Regardless of the matter, Brexit has sparked further sustainability discussion in the UK, making it an interesting location to carry out a consumer-focused study involving sustainability.

1.7. Knowledge gap: Sustainability efforts and benefits for food manufacturers

While information is already available on sustainable products and services in the UK, the available research is quite vague, as it often mentions both products and services, and does not focus on a specific sector. As sustainability efforts are being made in an array of industries, it is hard to draw conclusions for specific companies when the data is reporting on both products and services, with no specific sectors in mind. Therefore, it is unclear to food manufacturers how consumers perceive such environmental sustainability efforts, and how these attitudes can benefit their organizations. The importance of the food industry in relation to environmental sustainability has been previously highlighted, as well as the roles of SMEs and manufacturers alike. As it has also been made clear that the UK is a relevant market for not only sustainable

SMEs, but food companies as well, the primary research question is as follows: **How can consumers attitudes towards SME environmental sustainability efforts benefit food manufacturers selling packaged goods in the UK?** In order to answer the main question, the following sub-questions were developed:

1. Which kinds of environmental sustainability efforts are most attractive to consumers in the UK?
2. To what extent are the consumers in the UK willing to pay extra for these environmental efforts?
3. Which are the best marketing channels for consumers to learn about such efforts?

The data collected from the consumer survey was primary quantitative and qualitative data, which can then be used by SME food manufacturers operating in the UK as knowledge to improve their businesses as a result of the findings. This information is also relevant to companies who are not currently operating in the UK, as well as companies who don't invest in environmental sustainability yet. The results could therefore lead to improvements in sustainability efforts, or perhaps sales and marketing. As certain environmental sustainability efforts were found to be more attractive to UK consumers than others, a given manufacturer can implement these efforts into their business strategy in order to gain more attention, and possibly increase sales. Furthermore, now that it is understood to what extent consumers in the UK are willing to pay extra for these environmental efforts, the sales price can be adjusted accordingly, and the sales strategy can be re-evaluated. Finally, since it is understood how food manufacturers can best market these efforts based on where consumers would most prefer to learn about them, marketing strategies can be adjusted to ensure consumers are learning about these efforts in ways that are most convenient to them.

2. Materials and Methods

To understand how environmental sustainability efforts can benefit SME food manufacturers selling packaged goods in the UK, primary data was collected from consumers in the form of a survey. As the research results are intended to be useful to any SME food manufacturer selling packaged goods in the UK, the survey was meant for the general public, and targeted consumers from the age of 18 and older. Due to the ongoing pandemic and other convenience related factors, it was not feasible for the survey to be distributed in person, therefore it was distributed online. As the survey was meant for the general public, it was simply shared on various social media platforms such as Facebook, LinkedIn, Whatsapp and numerous survey sharing platforms, such as Survey Circle, Survey Swap and Survey Tandem. Participants were also asked to share the survey in order to recruit more respondents and create a snowball effect. In order to incentivize consumers to participate in the study and ensure an ample number of responses in a timely manner, respondents were given the chance to win one of two €25 Amazon gift cards.

As 78.8% of the UK population is aged 18 or over, this results in a population of 52,635,883 consumers (Office for National Statistics, 2021). To further specify the target group yet maintain a solid portion of the general adult population, respondents were required to have graduated from secondary school, of which the UK has a 94% graduation rate (Bada, 2020). This resulted in a population of 49,477,730. As it has been previously highlighted that sustainable consumption is becoming more mainstream, this further supported the motivation to collect data from the general public, as in consumers over the age of 18 with at least some level of proper education. This was done opposed to, for example, targeting consumers who frequently shop at health food stores, as it is likely this demographic would be more excited about sustainability efforts, and the findings might be less useful. Furthermore, the survey asked respondents to disclose their gender, as well as the part of the UK they are living in. In asking these questions, useful information was gathered by making connections between gender, country of residency, age, education and the findings of the research. By collecting data relating to gender, it was then possible to determine if men or women found eco-friendly delivery to be more appealing, for example. The original goal was to achieve a confidence level of 95% as well as a margin of error of 7%, thus requiring a minimum of 196 responses (Survey Monkey, 2021). Due to time constraints, the survey was closed early, and 176 valid responses were received, resulting in a confidence level of 95%, and a margin of error of 7.4% (Survey Monkey, 2021).

After collecting demographic data in questions 1-4, consumers were asked in question 5 to indicate how likely they would be to purchase a food product if they knew it were good for the environment. This question was used as a general precursor in answering sub-questions 1-3, as it gave an overarching indication of what percentage of the respondents were already considering environmental sustainability alongside their food choices. Consumers were then asked to indicate how pleased they would be if their favorite packaged food product started displaying specific environmental sustainability efforts in questions six through 11. These environmental sustainability efforts were: 100% plant-based ingredients, biodegradable packaging, reducing food waste, planting one tree for every product sold, eco-friendly delivery options and locally sourcing ingredients. In having this knowledge, businesses are now one step closer to understanding how environmental sustainability efforts can benefit their organizations, as they will understand which efforts are most attractive to consumers, and how they can adjust their

investments in sustainability accordingly. Often times, the available research is very vague in not only mentioning “products and services” in a broad context, but by also frequently using the term “sustainable products”. Sustainability is a wide-ranging topic, and there are numerous ways a manufacturer can make efforts to be more environmentally sustainable. In many cases, the research does not mention a specific sector for such “products and services”. In the survey, consumers were asked to think about their favorite packaged food product in hopes of receiving more genuine and thoughtful feedback, as opposed to if they were answering the questions in a general sense, with no specific product in mind. As the respondents answered questions on the basis of a product that they genuinely cared about, it is hoped that this resulted in higher quality responses. Of the 178 responses received, only two were invalid, as one respondent filled the questionnaire in twice in hopes of better odds at winning an Amazon gift card. All the other responses were fully completed and of high quality.

Much like demand, the available data in relation to the impact environmental efforts have on sales is unclear and needs to be further established in regard to a specific industry. Sub-question 2 followed sub-question 1 in discovering how much extra consumers would pay for the respective environmental effort that they value most. This was carried out in questions 12-17. Furthermore, if food SMEs have a better understanding of how much more consumers will pay for their products as a result of environmental efforts, they can adjust their sales price accordingly, and reevaluate their current environmental strategy.

In relation to sub-question 1, different environmental efforts can be marketed via different channels, and it is helpful to understand where it is best to market a given sustainability effort. In order to answer sub-question 3, consumers had the opportunity to choose where they **currently** hear about such efforts, and where they would **like** to hear about them. These responses were given in questions 18-20. A maximum of three choices were allowed for each question from the following channels:

- The product packaging
- the company website
- Social media
- Product review sites
- Billboards, posters and flyers
- TV, radio, podcasts, newspapers, magazines and news websites
- Word of mouth
- Nowhere

It is helpful to understand where consumers would **like** to receive this information, rather than where they **currently** receive it, specifically in relation to food products, as there could have been a contrast between the two, or no contrast at all. As clear data will be provided on where specific environmental efforts should be marketed based on the sheer preferences of the consumer, this will help understand how environmental efforts can benefit SME food manufacturers.

The survey collected data with the use of descriptive survey questions. The primary variables included the given environmental sustainability effort described, the extra percentage

consumers were willing to pay for such efforts (if any), and where consumers currently hear and would like to hear about such efforts. Therefore, the survey incorporated information from the theoretical framework regarding the various environmental sustainability efforts and various marketing channels of manufacturers. Questions 5-11 regarding environmental sustainability efforts were presented in the form of a five-point Likert scale, ranging from “1=Totally disagree” to “5=Totally agree”. The attractiveness of each individual sustainability effort was then analyzed by calculating the mean of each variable, as well as looking at the percentages and counts of “agree” and “totally agree” responses, versus “disagree” and “totally disagree”. Furthermore, percentages of how much consumers would pay for such efforts were collected, and the means and modes were calculated for each variable. Respondents were able to choose from six different options: 0%, 0-5%, 5-10%, 10-15%, 15-20%, +20%. The mean was then calculated by taking the median of a given percentage range (i.e 2.5% for 0-5% responses) and calculating the average of all the responses provided for that given sustainability effort. Finally, the various communication methods were presented and selected via multiple choice, which were then be interpreted by looking at the number of counts for each marketing channel and comparing differences between where respondents currently hear and would like to hear about such efforts. The research units remained constant throughout the study, which were British adults aged 18 or older, who had graduated from secondary school or higher. The survey was created and distributed with Google Forms, and the data was analyzed in Excel and SPSS.

The independent variables can be seen as the various demographic factors such as age, gender, country of residence and education level. The dependent variables can be seen as the level of attractiveness of each environmental sustainability effort, the amount extra willing to be paid for such efforts, and the channel of marketing communication. In analyzing relationships between the independent and dependent variables from sub-questions 1 and 2, the Mann-Whitney U and Kruskal-Wallis tests were used, as both the independent and dependent variables are categorical, the independent variables of country of residence and sex being nominal, and the age and level of education being ordinal. The Mann-Whitney test was used when comparing gender to the dependent variables, as there are only two groups involved, male and female. When comparing the other independent variables such as age, country of residence and education, the Kruskal Wallis test was used, as there are more than two groups present in each independent variable. Furthermore, the dependent variables for sub questions 1 and 2 are ordinal as well, further justifying the use of Kruskal Wallis and Mann-Whitney U tests (Bevans, 2020). The analysis was carried out by comparing the responses from demographic questions 1-4, and questions 6-17. In analyzing the relationships between the independent variables and questions 18-20 in sub-question 3, the Chi-Square test was used, as the dependent variables are nominal.

3. Results

3.1. General overview

The survey was available online for three and a half weeks from the 15th of April until the 10th of May, which resulted in 176 valid responses. Of these 176 respondents, 67.05% were women, 32.39% were men, and 0.57% identified as “other” (one respondent). Furthermore, 90.34% live in England, while 3.98% live in Wales, 3.41% live in Scotland, and 2.27% are from Northern Ireland. As seen in figure 2, the majority of respondents were in between the ages of 18-39, as 41.48% were 18-29, 34.09% were 30-39, 11.36% were in their 40’s, 5.68% in their 50’s, and 7.39% 60 or older.

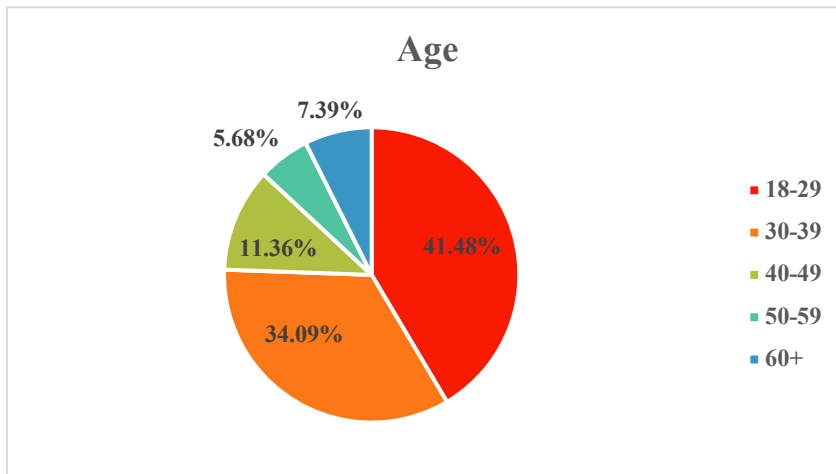


Figure 2: Age of UK respondents.

It was also found that 92.05% of respondents had completed their A-levels or higher. Figure 3 shows that 7.95% had only graduated from secondary school, 22.73% had completed their A-levels, 49.43% had a bachelor’s degree, and 19.89% had done their master’s or PHD.

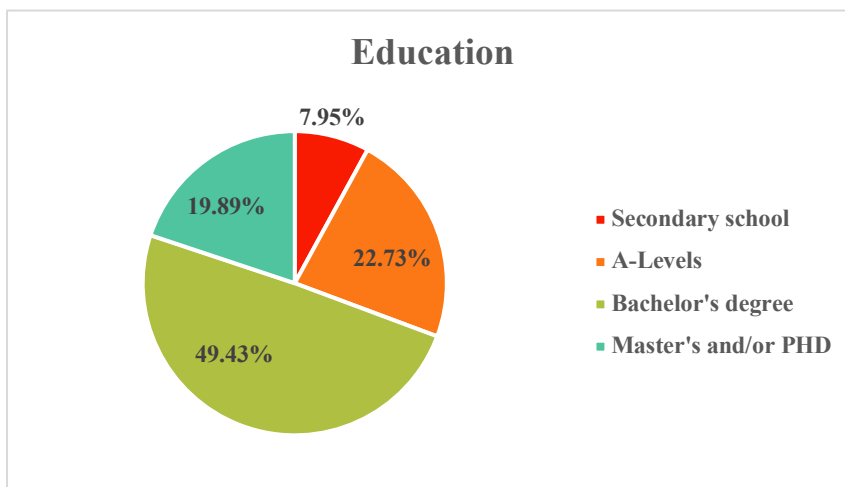


Figure 3: Education level of UK respondents.

Participants were then asked to indicate if they were more likely to purchase a product having known it is good for the environment. Figure 4 displays that 76.31% selected agree, or totally agree, 17.61% having chosen totally agree, while 58.52% chose agree.

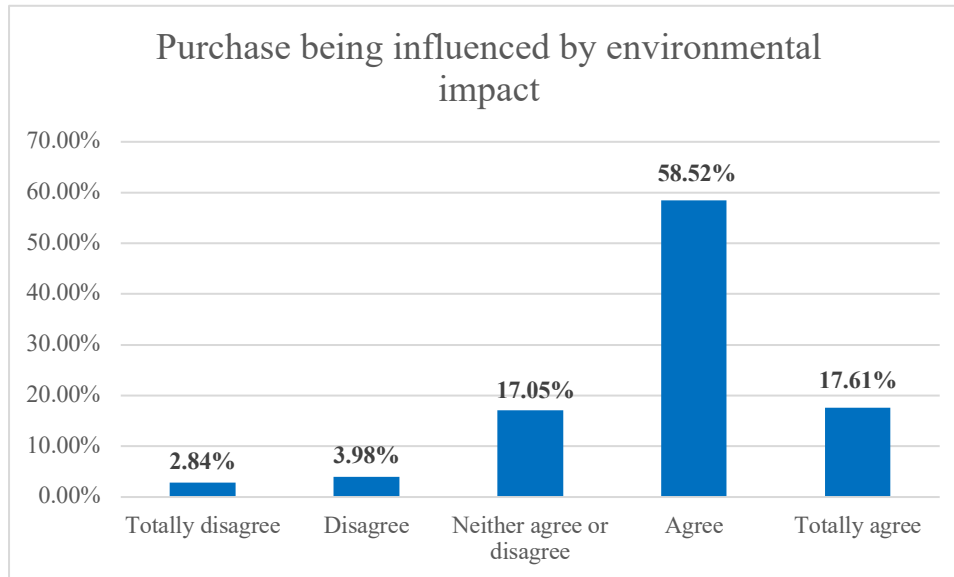


Figure 4: Answers of respondents (in %) indicating if they were more likely to purchase a food product if they knew it were good for the environment.

The survey was open for three and a half weeks and closed at 178 responses. As two of the 178 respondents filled in the questionnaire twice with separate emails, the number then dropped to 176 valid responses. Due to time constraints, the target 196 responses was not achieved. The 176 responses then resulted in a confidence level of 95%, with a margin of error of 7.4% (a .4% increase from the previous goal).

3.2. Most attractive environmental sustainability efforts

Questions six through 11 were used in order to answer sub-question 1 and determine which environmental sustainability efforts are most attractive to consumers in the UK. The six questions addressed the previously mentioned environmental sustainability efforts: 100% plant-based ingredients, biodegradable packaging, reducing food waste, planting trees, eco-friendly delivery options and locally sourcing ingredients. The efforts were ranked from totally disagree (1) to totally agree (5). Table 1 shows the mean response per effort.

Table 1: Sustainability efforts rank by mean.

Rank:	Effort:	Mean:
1	Biodegradable packaging	4.44
1	Reduce food waste	4.44

2	One tree for every product	4.24
3	Local ingredients	4.20
4	Eco-friendly delivery	3.91
5	100% plant based (Vegan)	3.68

Biodegradable packaging was tied for first place with the highest mean of 4.44 and as seen in figure 5, received the highest percentage of “totally agree” responses, at 56.82%. Moreover, 36.36% indicated “agree” summing up to 93.18%. When looking at food waste which was also tied for first place, 53.41% selected “totally agree” and 40.91% chose “agree”, summing to a total of 94.32%. One product for one tree received the third highest percentage of “totally agree” responses with 44.89%, and 40.34% indicating “agree”, totaling to 85.23%. Furthermore, one tree for every product sold had the second highest mean of 4.24. Finally, sourcing local ingredients had the third highest mean of 4.20, and 86.36% of respondents indicated “totally agree” and “agree”. For eco-friendly delivery, this percentage was 75.57%, and 63.63% for vegan products. The means were respectively 3.91 and 3.68.

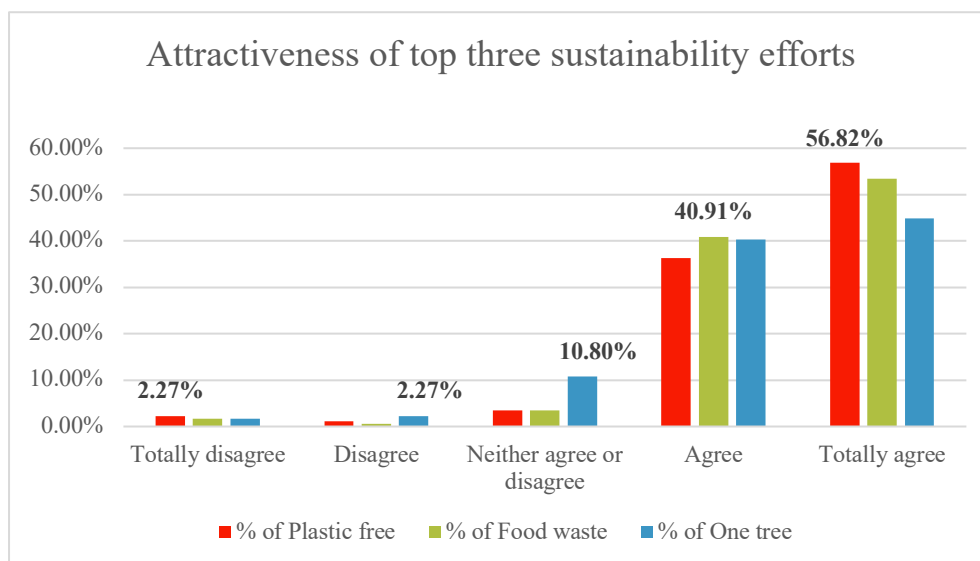


Figure 5: Level of attractiveness indicated for the top three sustainability efforts in the form of a percentage.

In the following sections, the demographic variables of age, education and gender are compared to the responses obtained for attractiveness of the sustainability efforts. Residency will not be included in the analysis, as there were not enough responses provided for Wales, Scotland and Northern Ireland. Furthermore, the analysis solely addressed men and women, as only one “other” response was given.

3.2.1. Age

Table 2 displays the average response for the attractiveness of each sustainability effort in relation to the age groups, in which the averages are indicated in bold. Furthermore, the counts of each age group, test value and P-value are indicated. It can be seen that the most responses were provided for the 18-29 age group with 73, then decreasing to 60 with 30-39. Moreover, 20

answers were provided for 40-49, 10 for 50-59, and 13 for 60+. It can be seen that the highest averages were often indicated by the 50-59 range, with 4.90 for biodegradable packaging, 4.70 for food waste, 4.60 for tree planting and 4.50 for local ingredients. Furthermore, the highest average was 4.90 in relation to biodegradable packaging in the 50-59 range, and the lowest was 2.92, provided by the 60+ group in relation to vegan products. When looking at vegan products, it was found that the age groups of 18-29, 40-49 and 50-59 had the highest means, with 3.85 for 18-29, and 3.80 for both 40-49 and 50-59. The Kruskal-Wallis test was used to analyze if the observed differences between age and efforts are significant or not. The analysis found that the only variable that had a statistical significance was vegan products ($\chi^2(4) = 9.873$, $p = 0.043$). This means that there is a significant correlation between age and the sustainability effort “100% plant based”. The highest age category (60+) was on average neutral with 2.9 (neither agree nor disagree) regarding the attractiveness of this effort, while the other age categories showed more appreciation for “100% plant based” (average of 3.5 to 3.9). Furthermore, there was no significant correlations found between age and the other efforts.

Table 2: Age vs. sustainability efforts attractiveness, showing the average response per effort on a scale of 1 to 5, Kruskal-Wallis test value and level of significance expressed as p value.

Count		Vegan	Biodegradable	Food waste	One tree	Eco delivery	Local ingredients
73	18-29	3.85	4.44	4.44	4.33	3.96	4.26
60	30-39	3.57	4.38	4.40	4.18	4.07	4.08
20	40-49	3.80	4.50	4.50	4.15	3.75	4.35
10	50-59	3.80	4.90	4.70	4.60	3.80	4.50
13	60+	2.92	4.31	4.31	3.92	3.31	4.00
	Test value	9.873	8.478	3.875	7.376	7.473	5.623
	P-value	.043	.076	.423	.117	.113	.229

Mean=**bold**

Highlight=statistical significance

3.2.2. Education

Comparisons were also made between level of education and the attractiveness of the various environmental sustainability efforts, once again using the Kruskal-Wallis test, as there were four levels of education: Secondary school, A-levels, bachelor's, and master's and/or PHD. Table 3 displays that 87 of respondents had their bachelor's degree, next followed by 40 having completed their A-levels, 35 having done a masters or PHD, and only 14 having solely graduated from secondary school. Those with a master's or PHD found vegan products (3.8) and one tree planted for every product sold (4.3) the most attractive out of the various education groups, while those with a bachelor's averaged higher for biodegradable packaging, food waste and eco-delivery. Finally, those who had only graduated from secondary school found local ingredients to be the most attractive. With that being said, it was found that the P-value of each dependent variable was higher than 0.05, therefore concluding that there is no statistical significance between education and the attractiveness of the sustainability efforts.

Table 3: Education vs. sustainability efforts attractiveness, showing the average response per effort on a scale of 1 to 5, Kruskal-Wallis test value and level of significance expressed as p value .

Count		Vegan	Biodegradable	Food waste	One tree	Eco delivery	Local ingredients
14	Secondary school	3.21	4.36	4.29	4.21	3.57	4.57
40	A-levels	3.63	4.33	4.33	4.15	3.75	4.05
87	Bachelor's	3.72	4.51	4.51	4.26	4.06	4.20
35	Master's and/or PHD	3.80	4.46	4.46	4.31	3.89	4.26
	Test value	3.325	1.330	1.947	.334	6.793	6.228
	P-value	.344	.722	.583	.954	.079	.101

Mean=**bold**

3.2.3. Gender

As seen in table 4, the survey received 118 responses from women and 57 responses from men, in which women had a higher average than men for every sustainability effort. The highest average was 4.53 for biodegradable packaging, and the lowest was 3.60 for vegan products, as indicated by men. When comparing male and female respondents to the various dependent variables, the Mann-Whitney U test was used, which indicated that the only dependent variable with statistical significance was eco-friendly delivery, with a test result of $X(1)=2556.5$ and a P-value of .006. Therefore, women (average score of 4.06) find this aspect more attractive than men (average score of 3.63).

Table 4: Gender vs. sustainability efforts attractiveness, showing the average response per effort on a scale of 1 to 5, Mann-Whitney U test value and level of significance expressed as p value.

Count		Vegan	Biodegradable	Food waste	One tree	Eco delivery	Local ingredients
57	Male	3.60	4.26	4.32	4.07	3.63	4.05
118	Female	3.73	4.53	4.49	4.32	4.06	4.28
	Test value	3323.000	2945.000	3025.500	2885.500	2556.500	2866.500
	P-value	.894	.129	.224	.098	.006	.083

Mean=**bold**

Highlight=statistical significance

3.3. Percent extra willing to be paid

In order to answer sub question 2, the extra percentages consumers would be willing to pay for a given sustainability efforts were analyzed. Table 5 shows that the efforts with the highest means (in ranking order) are:

Table 5: % extra willing to be paid ranked by mean percentage.

Rank:	Effort:	Mean (% extra)	Mode
1	Locally sourced ingredients	6.6	5-10%
2	Biodegradable packaging	6	0-5%
3	One tree for every product	5.9	0-5%
4	Food waste	5.6	0-5%
5	Eco delivery	4.8	0-5%
6	Vegan	4.7	0-5%

Respondents were found to be willing to pay on average 6.6% extra for locally sourced ingredients, 6% extra for biodegradable packaging, 5.9% for planting a tree for every product sold, 5.6% to reduce food waste, 4.8% for eco-friendly delivery, and 4.7% for vegan products. As seen in figure 6, the mode for locally sourced ingredients was between 5-10%, which was selected 60 times.

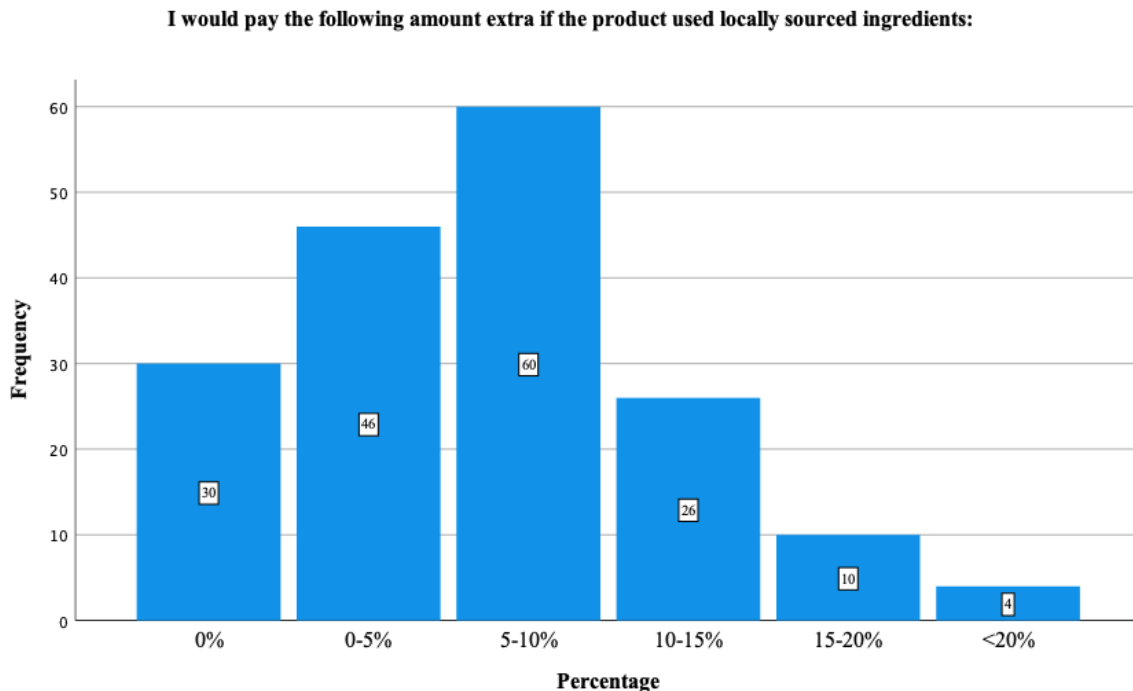


Figure 6: Mode of % extra willing to be paid for product with locally sourced ingredients.

Secondly, figure 7 shows the mode for biodegradable packaging, which was in-between 0-5%, and selected 70 times.

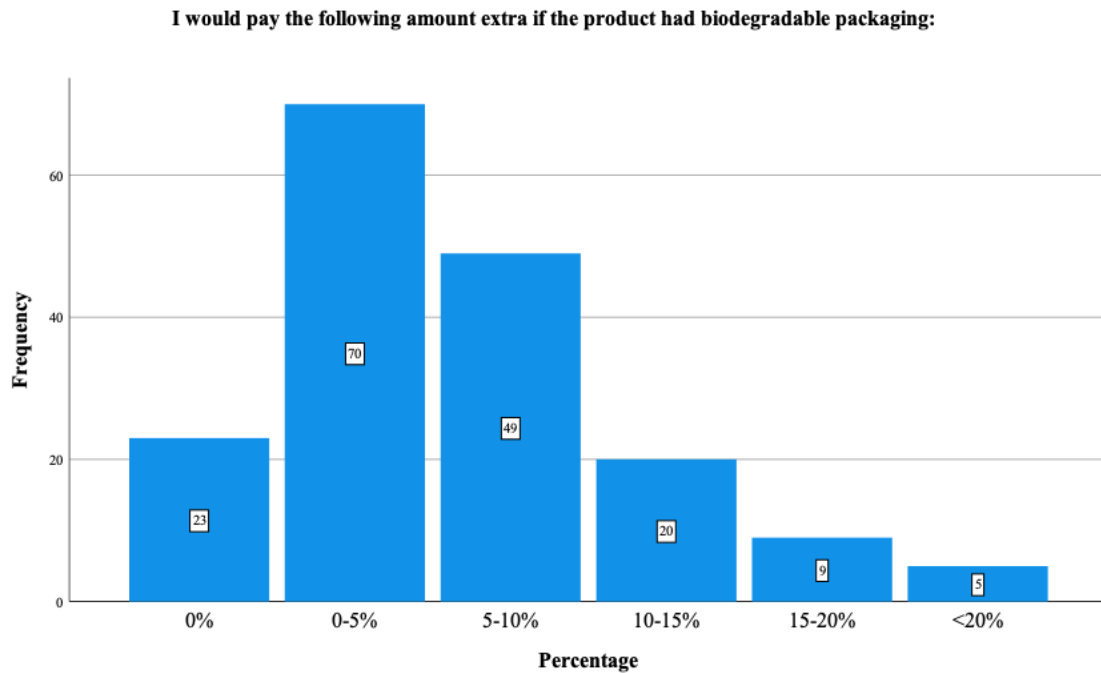


Figure 7: Mode of % extra willing to be paid for product with biodegradable packaging.

Finally, the mode for one tree planted for every product was also 0-5%, and was selected 65 times, as shown in figure 8.

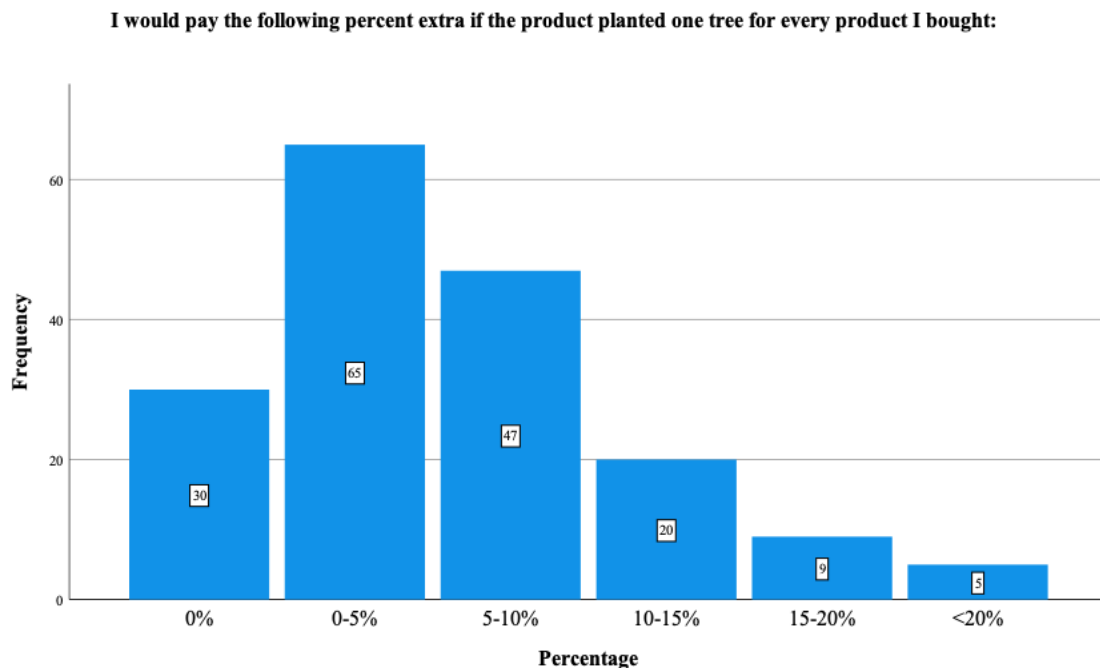


Figure 8: Mode of extra willing to be paid for one tree planted alongside every product sold purchased.

3.3.1. Age

Table 6 provides an overview of the average percentage respondents are willing to pay per age group. It can be seen that the counts per age group remain the same as indicated in the previous tables in relation to sub-question 1. The 50-59 range had the highest averages for vegan at 6.5%, biodegradable at 6.8%, food waste at 7% and one tree at 8.3%, while 18-29 had the highest average for eco delivery at 5.4%, and 40-49 the highest for local ingredients at 8.2%. The highest average willing to be paid is 8.3% for one tree for every product sold in the 50-59 age group, and the lowest is 1.9% for vegan products in the 60+ group. With that being said, it can be recognized that the P-value was higher than the alpha for every dependent variable, suggesting no statistical significance. Therefore, there is no relationship between age and the percentage willing to be paid per sustainability effort.

Table 6: Age vs. % extra willing to be paid per sustainability effort, showing the average percentage per effort, Kruskal-Wallis test value and level of significance expressed as p value.

Count		Vegan %	Biodegradable %	Food waste %	One tree %	Eco delivery %	Local ingredients %
73	18-29	5	6.3	5.8	5.9	5.4	6.4
60	30-39	4.7	5.6	5	5	4.4	5.8
20	40-49	4.5	6	5.6	7.6	4.9	8.2
10	50-59	6.5	6.8	7	8.3	4.3	7.8
13	60+	1.9	6.2	5.6	5.4	4.2	7.3
	Test value	6.877	1.685	2.761	5.829	4.447	5.503
	P-value	.143	.793	.599	.212	.349	.239

Mean=**bold**

3.3.2. Education

When looking at the averages for education in relation to the independent variables, table 7 shows that those who have solely graduated from secondary school had the highest averages for the most variables. They averaged the highest in food waste with 6.8%, one tree for every product at 6.6%, and 7.9% for local ingredients. Those in the secondary school group indicated the lowest average in general with 3.8% in relation to eco delivery. The highest average was 7.9% for local ingredients, also indicated by the secondary school group. Master's or PHD graduates averaged the highest for vegan products at 5.1%, and bachelor's the highest for biodegradable packaging at 6.4% and eco delivery at 5.3%. As indicated by the P-values in table 7, there is no statistical significance between education and the independent variables, and

therefore there is no relationship between education level and the amount extra consumers are willing to pay for a given sustainability effort.

Table 7: Education vs. % extra willing to be paid per sustainability effort, showing the average percentage per effort, Kruskal-Wallis test value and level of significance expressed as p value.

Count		Vegan %	Biodegradable %	Food waste %	One tree %	Eco delivery %	Local ingredients %
14	Secondary school	5	5.9	6.8	6.6	3.8	7.9
40	A-levels	4.4	5.8	5.2	5.6	4.8	5.3
87	Bachelor's	4.6	6.4	5.6	6.1	5.3	6.9
35	Master's and/or PHD	5.1	5.6	5.4	5.4	4.2	6.6
	Test value	.235	.458	2.362	.262	.713	3.532
	P-value	.972	.928	.501	.967	.870	.317

Mean=**bold**

3.3.3. Gender

Finally, table 8 compares men and women, and displays that men had higher averages for vegan products with 5.5%, biodegradable packaging with 6.3% and reducing food waste at 5.7%, while women had higher averages for one tree for every product at 6.2% and eco-friendly delivery at 4.9%. Much like age and education, the P-value was found to be higher than the alpha for every dependent variable, and there is no relationship found between gender and the amount extra consumers will pay for a given environmental sustainability effort.

Table 8: Gender vs. % extra willing to be paid per sustainability effort, showing the average percentage per effort, Mann-Whitney U test value and level of significance expressed as p value.

Count		Vegan %	Biodegradable %	Food waste %	One tree %	Eco delivery %	Local ingredients %
57	Male	5.5	6.3	5.7	5.1	4.8	6.6
118	Female	4.3	5.9	5.5	6.2	4.9	6.6
	Test value	3247.500	3317.000	3345.000	2948.500	3355.000	3264.000
	P-value	.702	.878	.952	.170	.979	.744

Mean=**bold**

3.4. Top marketing channels

As a final part of the survey, respondents were asked if they would want to be informed if their favorite brand were making environmental sustainability efforts. 83.5% of respondents answered “agree” or “totally agree” to this question, with 57.4% indicating “agree”. Furthermore, the mean was found to be 3.99, indicating that the average respondent wants to be informed of their favorite brands sustainability efforts. As seen in figure 9, of the 176 respondents, 101 stated “agree”, while 46 chose “totally agree”.

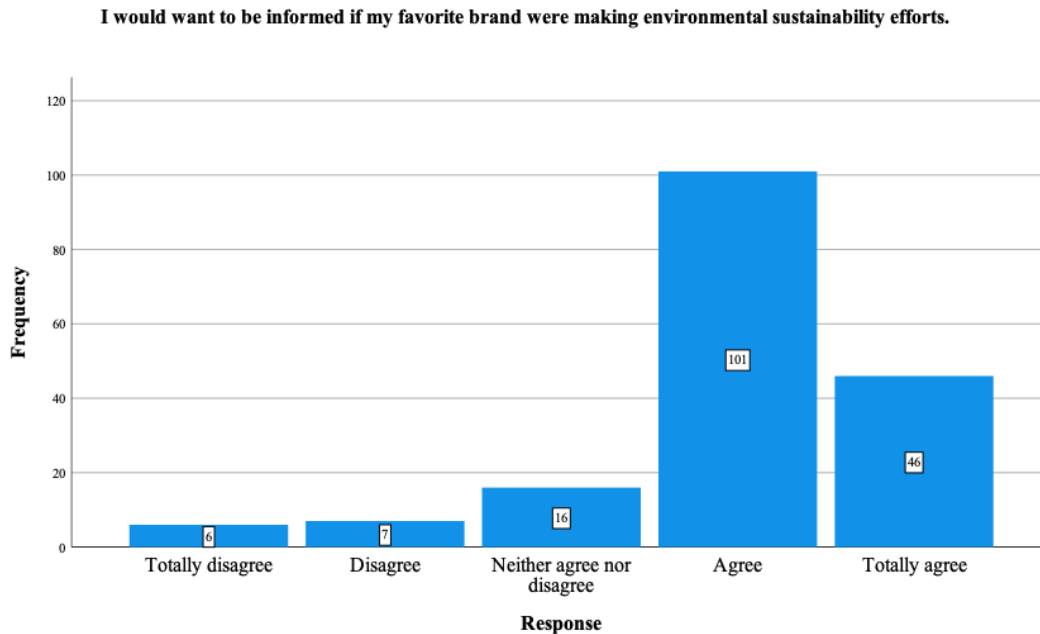


Figure 9: Indication of respondents wanting to be informed of environmental sustainability efforts by count.

Respondents were then asked to indicate where they **currently** hear or learn about how food companies are being more environmentally friendly and were allowed to select a maximum of three choices. The three most selected options were:

1. The product packaging with 28.1% of total selections.
2. Social media with 26.9% of total selections.
3. TV, radio, podcasts, newspapers, magazines and news websites with 13.8% of total selections.

Moreover, the product packaging was found to be selected 126 times, social media 121 times, and TV, radio, podcasts, newspapers, magazines and news websites 61 times. As opposed to where respondents **currently** hear about environmental sustainability efforts, they were also asked where they would **like** to hear or learn about how food companies are being more environmentally friendly. The top three responses are as follows:

1. The product packaging with 26.5%.
2. Social media with 24.9%.
3. TV, radio, podcasts, newspapers, magazines and news websites with 15.7%.

Regarding the number of times each option was selected, product packaging was chosen 115 times, social media 107 times, and TV, radio, podcasts, newspapers, magazines and news websites 68 times. A comparison of the two groups can be seen in figure 10. As can be seen, word of mouth decreased from 47 to 33, and product review sites increased from 25 to 41. This indicates that respondents would like to hear about sustainability efforts less via word of mouth, and more from product review sites. TV, radio, podcast, etc., also increased from 61 to 68, indicating a small increase in demand.

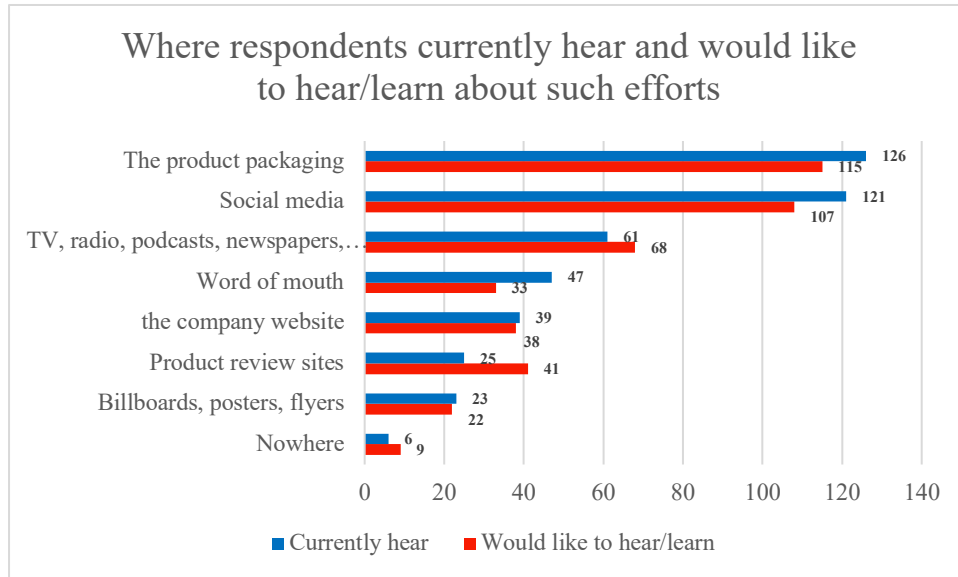


Figure 10: Marketing channels respondents currently hear and would like to hear about environmental sustainability efforts from.

3.4.1. Age vs. currently learn/hear

The independent and dependent variables were then compared to find if there was any statistical significance between the dependent and independent variables. In this analysis, the Chi-Squared test was used, as the dependent variables were nominal, and only had 2 subpopulations (yes or no for the given marketing preference). The analysis began with comparing the various demographics to where consumers **currently** learn or hear about environmental sustainability efforts. Firstly, age was compared to the dependent variables, in which it was found that social media is the only variable with statistical significance. As the P-value was .011, it can be recognized that age does have an impact on whether or not an individual currently hears about environmental sustainability efforts via social media. Table 9 shows that 18-29-year-olds gave the most responses with 49%, then followed by 30-39 at 29%, 8% from 40-49, 5% from 50-59 and 9% from 60+. When looking at the expected and realized counts for selecting “yes” on social media, it can be seen that those in the 18-29 and 60+ age

groups had lower percentages for expected count than realized count. This is shown by the expected count being 41% compared to 49% for 18-29, and 7% compared to 9% for 60+. 30-39, 40-49 and 50-59 then had higher percentages for expected count than realized count. The expected count indicates what the data would assume if there were no statistical significance between variables. Therefore, as there is a statistical significance found and the expected count is lower than the realized count, this indicates that social media has a positive impact on respondents currently hearing about environmental sustainability efforts in that given age group, and that those aged 18-29 and 60+ currently hear about such efforts via social media.

Table 9: Age vs. respondents **currently** hearing about environmental sustainability efforts from social media, showing the realized count and expected counts as a percentage of total social media selections, Chi-Squared test value and level of significance expressed as p value.

Age	Realized count % of social media total	Expected count % of social media total	Test value	P-value
18-29	49%	41%		
30-39	29%	34%		
40-49	8%	11%		
50-59	5%	7%		
60+	9%	7%		
Total:	100% (121 responses)	100% (121 responses)	13.134	.011

Highlight = expected count percentage lower than realized count

3.4.2. Education vs. currently learn/hear

As stated previously, the marketing platform with the most selected answers for **currently** learn or hear about environmental sustainability efforts was product packaging with 126 selections. Table 10 indicates that product packaging received 8% of responses from those who solely graduated from secondary school, 20% from those who completed their A-levels, 53% from those with a bachelor's degree, and 19% from those with a master's or PHD. There was no statistical significance found for product packaging, as indicated by the P-value of .386. There was also no statistical significance found for any of the other variables, indicating that there is no relationship between education and where respondents currently hear about environmental sustainability efforts. As there is no statistical significance found, drawing comparisons between expected and realized count is not necessary.

Table 10: Education vs. respondents **currently** hearing about environmental sustainability efforts from product packaging, showing the realized count and expected counts as a percentage of total product packaging selections, Chi-Squared test value and level of significance expressed as p value.

Education	Realized count %	Expected count %	Test value	P-value
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	of product packaging total	of product packaging total		
Secondary school	8%	8%		
A-levels	20%	23%		
Bachelor's	53%	49%		
Master's and/or PHD	19%	20%		
Total:	100% (126 responses)	100% (126 responses)	3.039	.386

3.4.3. Gender vs. currently learn/hear

When comparing gender and where respondents **currently** learn or hear about environmental sustainability efforts, there was statistical significance found between gender and TV, radio, podcasts, newspapers, magazines and news websites. As indicated in table 11, the P-value of .016 indicates a significant correlation between gender and such marketing channels. While men provided 44% of the responses for this category, women provided 56%. Moreover, the expected count for men was lower than realized (33% compared to 44%), indicating that men are more likely to currently hear about environmental sustainability efforts from TV, radio, podcasts etc.

Table 11: Gender vs. respondents **currently** hearing about environmental sustainability efforts from TV, radio, podcasts, etc., showing the realized count and expected counts as a percentage of total TV, radio, podcasts, etc. selections, Chi-Squared test value and level of significance expressed as p value.

Gender	TV, radio, podcast etc. count	TV, radio, podcast etc. expected count as a %	Test value	P-value
Male	44%	33%		
Female	56%	67%		
Total:	100% (61 responses)	100% (61 responses)	5.827	.016

Highlight = expected count percentage lower than realized count

3.4.4. Age vs. like to hear/learn

Next, the data in regard to where respondents would **like** to learn or hear about environmental sustainability efforts was compared to the independent variables. Beginning once again with age, the only statistical significance that was found was between age and TV, radio,

podcasts, newspapers, magazines and news websites, with a P-value of .062. This then indicates a relationship between age and respondents wanting to hear about sustainability efforts via TV, radio, podcasts, etc. Table 12 shows that 40% of responses were given from 18-29-year-olds, 29% from 30-39, 10% from 40-49, 6% from 50-59 and 15% from 60+. The largest contrast in count and expected count for “yes” answers was found in the 60+ range, as the expected count was 8%, while realized count was 15%. This shows that those who are 60 and older would like to hear about environmental sustainability efforts via TV, radio, podcast, etc., while the 50-59, 40-49 and 18-29 were very neutral, and those aged 30-39 would prefer to hear about such efforts elsewhere.

Table 12: Age vs. respondents **wanting to hear/learn** about environmental sustainability efforts from TV, radio, podcasts, etc., showing the realized count and expected counts as a percentage of total TV, radio, podcast, etc. selections, Kruskal-Wallis test value and level of significance expressed as p value.

Age	TV, radio, podcast etc. count	TV, radio, podcast etc. expected count as a %	Test value	P-value
18-29	40%	41%		
30-39	29%	34%		
40-49	10%	11%		
50-59	6%	6%		
60+	15%	8%		
Total:	100% (68 responses)	100% (68 responses)	8.953	.062

Highlight = expected count percentage lower than realized count

3.4.5. Education vs. like to hear/learn

When comparing education and the dependent variables, statistical significance was found between education and the product packaging, with a high statistical significance of .006. This indicates a strong relationship between education and whether or not respondents want to hear about environmental sustainability efforts via product packaging. 10% of responses were provided from secondary school, 22% from A-levels, 55% from bachelor's and 13% from master's and/or PHD. When looking at expected count, the largest contrasts can be seen in master's and/or PHD (expected count is 20% compared to 13%), and bachelor's (expected count 49% compared to 55%). This indicates that those with a bachelor's education would like to hear/learn about environmental sustainability efforts via product packaging, while those with a master's or PHD would not. Those with a secondary school and A-levels education were found to be rather neutral.

Table 13: Education vs. respondents **wanting to hear/learn** about environmental sustainability efforts from product packaging, showing the realized count and expected counts as a percentage of total product packaging selections, Kruskal-Wallis test value and level of significance expressed as p value.

Education	Product packaging count	Product packaging expected count as a %	Test value	P-value
Secondary school	10%	8%		
A-levels	22%	23%		
Bachelor's	55%	49%		
Master's and/or PHD	13%	20%		
Total:	100% (115 responses)	100% (115 responses)	12.443	.006

Highlight = expected count percentage lower than realized count

3.4.6. Gender vs. like to hear/learn

Social media had the second most selections for where respondents would like to hear/learn about environmental sustainability efforts. As indicated in table 14, there were 107 total responses, of which 36% were men and 64% were women. While men indicated a slightly lower expected count than realized count (33% compared to 36%), there was no statistical significance found between gender and respondents wanting to hear/learn about environmental sustainability efforts via social media. There was also no statistical significance found between gender and any of the other dependent variables, therefore indicating that there is no relationship between gender and respondents wanting to hear/learn about a given environmental sustainability effort.

*Table 14: Gender vs. respondents **wanting to hear/learn** about environmental sustainability efforts from social media, showing the realized count and expected counts as a percentage of total social media selections, Kruskal-Wallis test value and level of significance expressed as p value.*

Gender	Social media count	Social media expected count as a %	Test value	P-value
Male	36%	33%		
Female	64%	67%		
Total:	100% (107 responses)	100% (107 responses)	1.885	.170

4. Discussion of results

4.1. General overview

While the research methodology provided ample data in order to sufficiently answer the established questions, the survey was not as efficient or fruitful as previously hoped. While it was the only feasible methodology for gathering consumer data in a foreign country during a pandemic, the survey was open for longer than originally planned, and fell short of the target responses by 20 answers. This 20-respondent difference did not make a large impact and resulted in a .4% change to the margin of error, and no change to the confidence level. Due to the ongoing pandemic and the increased usage of all things virtual, it was hoped that simply sharing the survey on social media platforms would be enough to gather 196 responses in two to three weeks. This assumption was incorrect, and further efforts were needed, such as incentivizing respondents with two €25 Amazon gift cards and tapping into as many personal networks within the UK as possible. Furthermore, the survey was shared on various Facebook groups in the UK, LinkedIn, as well as numerous survey sharing platforms. In this process, attempts to maintain diversity amongst the various demographics were upheld, as well as efforts to ensure that there were no biases involved between respondents and the research topic. In the end, the survey was open for half a week longer than previously planned and closed without reaching the target 196 responses due to time constraints.

All 176 valid respondents completed the survey in its entirety, and there was no indication towards a lack of quality. When reflecting on the quality of the survey, it is likely that only two of 178 responses were invalid due to the simplicity, ease and convenience of the survey. The survey only took two to three minutes to fill in, and the questions were easy to understand. Furthermore, the survey was convenient to fill in, as a link was shared which took respondents directly to the Google Forms page. Although the survey was easy to answer, it gathered all necessary information required to answer the research questions and was therefore a good balance between simplicity and effectivity.

It is also quite possible that using a survey that was primarily distributed on social media platforms is responsible for the high percentage of 18-39-year-old respondents. It has been found that in the UK, 97% of those aged 16-24 use social media, as well as 93% of those aged 25-34 (Tankovska, 2021). As age increases, this percentage seems to decrease, with 90% in relation to 35-44, 85% with 45-54, and 59% with 55+ (Tankovska, 2021). It should also be pointed out that 90.34% of respondents live in England, while 3.98% live in Wales, 3.41% live in Scotland, and 2.27% are from Northern Ireland. These results are fairly reflective of the population distribution in the UK by country, as England makes up 84% of the UK population (Clark, 2021). When looking at education, it was previously indicated that 94% of UK residents have graduated from secondary school, which is closely in line with the data, as approximately 92% of respondents had further education after secondary school (Bada, 2020). Finally, as 76.31% selected agree or totally agree when asked to indicate if they were more likely to purchase a product having known it is good for the environment, it can be recognized that approximately $\frac{3}{4}$ of respondents have some form of desire to be more environmentally friendly in their purchasing decisions. This information is useful as it gives a understanding of what percent of respondents are willing to make environmentally friendly purchases in general.

4.2. Most attractive environmental sustainability efforts

The research found that the sustainability efforts with the highest means were biodegradable packaging at 4.44, food waste at 4.44 and one tree for every product at 4.24. Biodegradable packaging then had the highest percentage of “totally agree” responses at 56.82%, making it the most attractive sustainability effort. The results indicate that consumers are quite enthusiastic about biodegradable packaging and reducing food waste, as they fall nearly in the middle between “agree” and “totally agree” when asked if they would be happy if their favorite food product made such an effort. Furthermore, one tree for every product is slightly less attractive, but still averages higher than agree. This information is useful to SME manufacturers as it is now known that these three are found to be the most attractive on a consistent basis. If a manufacturer then decides to incorporate one or more of said sustainability efforts into their business model, the average UK consumer will then find their product to be more attractive by default. As it has been found that 86% of UK consumers are concerned with plastic packaging (Randall, 2019), and just under 80% of consumers are concerned with deforestation (Jaganmohan, 2020), it is self-explanatory that these sustainability efforts are so attractive to consumers. Furthermore, it was found that 87% of UK consumers stated “strongly agree” or “agree” in regard to food waste being an important national issue (Finn, 2020).

As it was found that vegan products are the only variable with statistical significance in relation to age, SME manufacturers of vegan products should be considerate of specific age groups when marketing and selling their products. 18-29 had the highest mean of 3.85, 40-49 and 50-59 had means of 3.80, and 30-39 had a mean of 3.57. This indicates that those aged 18-60 fell somewhere in-between being neutral and agreeing when asked if they would be happier if their favorite packaged food products were vegan, the majority being closer to agreeing. These findings are in line with current data in relation to veganism by age group in the UK, as 41% of UK vegans are aged 15-34, while just 14% are aged 65 or older (The Vegan Society, 2016). While manufacturers of vegan products should therefore focus on younger generations as their target group, it is important to understand that the average respondent indicated an answer less than “agree”, and that other efforts are more attractive to consumers. Therefore, it is worth investing one’s efforts elsewhere if the goal is to implement sustainability efforts that are the most attractive to consumers in general. As there was no statistical significance found between education and the variables, manufacturers do not have to consider level of education when evaluating the attractiveness of various sustainability efforts. Finally, when comparing gender and the various efforts, the only variable with statistical significance was eco-friendly delivery. It was found that women averaged 4.06 in this area, while men averaged 3.63. Furthermore, the P-value was .006, indicating not only a strong relationship between gender and eco-friendly delivery, but that women find this effort to be more attractive than men. This information is useful to SME manufacturers who already offer an eco-friendly delivery option, as they can make sure to market and sell these delivery options in a way that is specifically attractive to women. This is also useful for manufacturers who have products that are specifically made for women but are not yet offering eco-friendly delivery options, as they now know such an addition would make their product more attractive to this demographic.

4.3. Percent extra willing to be paid

After analyzing the percent extra willing to be paid for each individual sustainability effort, it was found that consumers will pay the most for locally sourced ingredients, biodegradable packaging and one tree for every product. When taking the average percentage of the six efforts, the outcome is 5.6% extra for sustainability efforts in general. While 5.6% may not seem like a huge number, any extra percentage can be beneficial towards a manufacturer, by allowing investment into environmental sustainability or increasing a products margin. Furthermore, as indicated in the previously referenced study by E.ON, UK consumers were found to be willing to pay 3.39% extra for an environmentally friendly product or service (E.ON, 2020). This study was not specifically relating to food products and makes the newly found percentages appear as an upgrade. Moreover, in a previously cited study by the Boston Consulting Group, it was mentioned that nearly $\frac{1}{4}$ of respondents would pay 10% or more for biodegradable packaging alternatives. This research found somewhat similar findings, as approximately 19% of respondents indicated that they would pay 10% or more (Holbrook, 2020).

As locally sourced ingredients had the highest average at 6.6%, it was also the only variable to have a mode higher than 0-5%, at 5-10%. In using a candy bar sold for £1.99 as an example, this 6.6% would increase the price to £2.12, and allow 13 pence extra per bar to be reinvested into sourcing locally. While each supply chain is unique in its own, the practical application of this percentage is quite subjective, and it would be difficult to provide a scenario which is widely applicable, as all companies use different ingredients and have varying suppliers. With that being said, any amount of these 13 pence could be invested in sourcing as many local ingredients as possible, whether that results in one ingredient being sourced locally, or all of them. It is also interesting to point out that sourcing local ingredients fell closely behind one tree for every product with the 3rd highest average for environmental sustainability attractiveness, but consumers are willing to pay the most for it. When UK shoppers were asked why they do not buy local products, 1/3rd of respondents indicated it was because local products are more expensive than larger brand products (IRI, 2018). This indicates that a fair percentage of UK consumers already perceive local products as more expensive, which could explain why consumers are willing to pay more for such an effort, but do not find it the most attractive.

Since consumers are willing to pay the second most for biodegradable packaging, the feasibility of doing so should be closely examined. While each scenario and cost of switching to biodegradable packaging is also subjective per manufacturer, it is theoretically achievable given the 6% extra willing to be paid. The £1.99 candy bar will once again be used as an example in this case. On average, product packaging costs are said to be 9% (Spitz, 2013), and bioplastics are around 20-50% more expensive than comparable traditional plastic materials (Tappwater, 2019). This would mean that biodegradable packaging would increase the cost of the packaging by £0.06 pence per bar ($1.99 \times .09 = .18 \times .35 = .06$). By increasing the overall price by 6%, the bar would cost approximately £0.12 pence more than previously (£2.11 instead of £1.99), thus covering the cost of the new packaging alternative with money to spare. Once again, while this is achievable in theory, each scenario is different and the feasibility of using biodegradable packaging is also largely dependent on the availability and reliability of suppliers.

Finally, planting a tree for every product sold was ranked 3rd in this category, in which consumers will pay 5.9% extra for. The achievability of this effort is quite realistic and could allow for a partnership with an NPO/NGO. If a manufacturer sells a product for £1.99, the 5.9% increase will result in an increase of approximately £0.12 per product. This £0.12 is enough to cover the cost of partnering with an organization such as Eden Reforestation Projects, who charge around £0.11 pence per tree (Eden Reforestation Projects, 2021). While this is an achievable and worthwhile effort, biodegradable packaging is better from an economic standpoint (in theory), as close to the entire 5.9% price increase would be invested into tree planting, while only half could be invested into such a packaging alternative. It is possible sourcing locally could be more economical as well, which is entirely dependent on what ingredients are being used, and what suppliers are charging.

As it was mentioned that vegan products are most attractive to those in the 18-29, 40-49 and 50-59 age ranges, this is also reflected in the age groups of 18-29 and 50-59 for payment percentages, as these groups will pay the most for vegan products. 18-29-year-olds indicated 5%, while 50-59-year-olds averaged 6.5%, which is 2% higher than the overall average for vegan products. It is therefore useful for vegan manufacturers to know that the age groups who found vegan products to be more attractive will also pay the most for such products. With that being said, there was no statistical significance found for any of the variables, so manufacturers do not have to consider a certain age group when increasing the price, as long as it does not exceed previously indicated percentages. There was also no statistical significance in relation to education or gender, so once again, manufacturers should be more concerned about the average percentages willing to be paid for each effort. In many cases for both education and gender, the P-value was very high and extremely close to “1”, for example the score of .979 with eco-friendly delivery in relation to gender. This indicates nearly the lowest correlation possible between gender and the percent extra willing to be paid for environmental sustainability efforts. This can also be seen when comparing education and vegan products, in which the P-value was .972. Manufacturers therefore do not have to consider education or gender when making price adjustments based on sustainability efforts. While it was previously found that women find eco-friendly delivery options to be more attractive than men, this is not reflected in the extra percentage willing to be paid, as women averaged 4.9%, and men averaged 4.8%.

4.4. Top marketing channels

The top three places where respondents currently hear about sustainability efforts were the product packaging, social media, and TV, radio, podcasts, newspapers, magazines and news websites. Furthermore, the ranking did not change with where respondents would **like** to hear about sustainability efforts, clearly indicating that product packaging, social media and TV, radio, podcasts, newspapers, magazines and news websites are the best places for SME manufacturers to market their sustainability efforts. While it is not groundbreaking information that consumers want to hear about sustainability efforts via these common marketing channels, it is useful to SME manufacturers to have a concrete understanding of how these marketing channels are ranked, and that the product packaging is the top choice, as opposed to other common marketing channels like social media, TV advertisements, billboards or the company's website.

In marketing sustainability efforts via these top three channels, SME manufacturers will likely reach a larger audience, which could lead to higher brand awareness, sales and overall appreciation. It is also interesting to note that product review sites increased from 5.6% to 9.4%. This is represented in a number increase from 25 to 41. As this is the largest change in percentage for any of the variables, manufacturers should also consider product review sites as a feasible marketing channel. While product review sites can be seen as more of a niche channel, it would be foolish to ignore a lesser utilized form of marketing with the largest increase in demand. While the total number of selections decreased from 449 to 434, the selections of hearing about such efforts from “nowhere” only increased by three responses. This indicates that some respondents would rather hear about such efforts from less places than they currently do and would preferably focus on one or two platforms as opposed to two or three. Another interesting piece of data is the low score for company website (39 for currently hear and 38 for would like to hear). As it was previously mentioned that the company website is often a great place to tell the company’s story and share an organizations sustainability efforts, it is interesting to see that consumers would rather hear about such efforts via TV, podcasts, radio, etc., or product review sites (Chris, n.d.). This is useful information for SME manufacturers as organizations can spend a lot of time on their website, which could instead be invested into making their packaging or social media more competitive, attractive and informative.

When comparing age to where respondents currently hear about environmental sustainability efforts, the only variable with statistical significance was social media. As a statistical significance was detected and the expected count was lower than the realized count for 18-29 and 60+ year-olds, the data states that a consumer is more likely to currently hear about environmental sustainability efforts via social media if they are in those age groups. However, these results do not match the previously cited information that UK residents use social media decreasingly as they get older (Tankovska, 2021). With that being said, the difference in expected and realized count for 60+ group was minor, and the more notable relationship is in regard to those aged 18-29. Manufacturers should therefore target those aged 18-29 via social media. Age was then compared to where respondents would like to hear/learn about such efforts, in which a statistical significance was only found in relation to TV, radio, podcasts, newspapers, magazines and news websites. As the expected count was only half of the realized count for the 60+ range, it is indicated that this age group is more likely to want to learn about such efforts via these channels. As it was found that those in the 30-39 range do not want to hear about effort from these places, manufacturers should try to target older generations through said platforms. These findings are in line with current data, as 93% of UK TV viewers aged 56 years or older watch TV on a weekly basis, compared to 65% with those aged 15 to 25 (Stoll, 2021).

After comparing education to where respondents currently hear about environmental sustainability efforts, no statistical significance was found. When looking at where respondents would like to hear about such efforts, a strong correlation was found between education and product packaging, with a P-value of .006. As those with a bachelors were found to want to hear about such efforts via product packaging, those with a master’s or PHD do not. Furthermore, those with a secondary school education or A-levels degree were quite neutral. This shows that there is not a pattern in relation to level of education and the product packaging. Although a statistical significance was detected, the results seem to be quite random, as the most educated group was uninterested, while the second most educated group was, and the least educated

groups were neutral. With that being said, those with a bachelor's degree accounted for 55% of responses, while those with a master's only accounted for 13%. Manufacturers can therefore target those with a college education when marketing via their product packaging, but keep in mind that those with a master's or PHD could be less interested.

Finally, in comparing gender to where respondents **currently** hear about environmental sustainability efforts, the only statistical significance that was found is in relation to TV, radio, podcasts, newspapers, magazines and news websites. When looking at gender and where respondents would **like** to hear/learn about such efforts, there was no statistical significance found. Although men were found to currently learn about such efforts from these channels as opposed to women, an 11% increase was seen in the total count from currently hear to like to hear, regardless of gender. Manufacturers should therefore be cautious of specific channels based on gender, as recent UK studies discovered women watch 26 more minutes of TV per day than men (Stoll, 2021). Furthermore, 52% of UK podcast consumers were found to be men, as opposed to 48% women (Backtracks, 2018), and when asked about newspaper consumption, 51% of women said they had not read the newspaper in the last week, as opposed to 39% of men (Sherwin, 2018). SME food manufacturers who have women specifically in their target group should then cater their TV advertisements to be more attractive to women, while the same is done for men with podcasts and newspapers.

4.5. Benefits to SME manufacturers

In answering the three sub-questions, it is now clear how consumers attitudes towards SME environmental sustainability efforts can benefit food manufacturers selling packaged goods in the UK. As consumers found biodegradable packaging to be the most attractive sustainability effort and are willing to pay the 2nd most for it, it would be highly beneficial for SME manufacturers to implement into their business model. As the extra cost willing to be paid has the potential to not only cover the price of biodegradable packaging, but also leave extra money to be reinvested into further sustainability efforts or kept as a margin, it is even clearer how beneficial switching to biodegradable packaging could be. In a recent study regarding UK food and drink packaging, 63% of consumers stated that manufacturers were the most responsible for ensuring that packaging does not damage the environment, when compared to numerous other players along the supply chain (Tiseo, 2021). This not only suggests that there is a demand for biodegradable packaging alternatives, but that consumers are already looking to manufacturers to make a change. It is therefore crucial that SME manufacturers see this as an opportunity to not only improve their business from an economic standpoint, but a social one as well, and become leaders in the food industry and community as a whole.

As locally sourcing ingredients had the 3rd highest mean regarding sustainability attractiveness and the highest percentage willing to be paid, this is the second sustainability effort which SME manufacturers should strongly consider. As stated previously, each supply chain and product is different, so it is difficult to pinpoint if the 6.6% willing to be paid will cover the cost of sourcing specific ingredients, or if it is even possible for a manufacturer to source a given ingredient locally. For example, UK chocolate manufacturers will never be able to source their cacao locally, no matter how much extra consumers are willing to pay for it. In light of such subjectivity, the research did not specify on sourcing **entirely** local ingredients, but

rather sourcing locally in general. Moreover, a SME manufacturer does not necessarily need to use this 6.6% to reshape their entire supply chain but use it to make a conscious effort towards a more centralized supply chain and properly communicating these efforts. As it was recently found that 75% of UK consumers want to see more retailers sourcing food from British farmers, there is a clear demand for local products in stores (Specialty Food, 2020). Therefore, by sourcing local ingredients, SME manufacturers are able to earn a small price premium, make their products more attractive the consumers, and meet current consumer demands.

Finally, as planting one tree for every product had the second highest attractiveness mean and third highest payment percentage, this is the third sustainability effort which needs to be considered by SME manufacturers. While it was previously indicated that this effort is feasible with the extra percent willing to be paid, it is not the ideal choice, as the entirety of the percentage will be contributed to the partnership (in the case of working with an organization similar to Eden Reforestation Projects), and was only slightly more attractive than sourcing local ingredients (a mean of 4.24 opposed to 4.20) (Eden Reforestation Projects, 2021). Once again, each reforestation group is different, and the cost of partnership will likely vary amongst organizations. Deforestation is also a large concern amongst UK consumers, as just under 80% have indicated concern about deforestation, while just 2% claimed no concern whatsoever (Jaganmohan, 2020).

While consumers attitudes towards biodegradable packaging, locally sourced ingredients and planting a tree for every product sold have made clear to be the most beneficial for SME food manufacturers, manufacturers can most benefit from these efforts by marketing them via the products packaging, social media and TV, radio, podcasts, newspapers, magazines and news websites. In relation to product packaging, a recent study found that 42% of British consumers look for specific trustworthy claims, indicating the importance of clearly displaying environmental sustainability efforts with credible labels and certifications (Marsh, 2020). Furthermore, 78% of consumers buy from brands they know, indicating the relevance and importance of clearly communicating a brands efforts and values (Marsh, 2020). While the colossal presence that social media holds in the modern world needs no introduction, it is worth noting that the UK is home to 53 million active social media users as of January 2021 (Tankovska, 2021). This translates to a penetration rate of 77.9%, ranks the UK 22nd in the world, and justifies the legitimacy of social media as a primary marketing channel (Tankovska, 2021). As figure 11 displays that TV, radio, podcasts, newspapers, magazines and news websites amounted to approximately £6.7 billion in revenue in 2019 (£4.7 billion of which coming from TV), this number is trumped by that of online marketing, which totaled to nearly £15.7 billion (Media Nations, 2020). Even though these channels are still relevant and useful, TV and newspapers in particular have each seen a sharp £1 billion decline since 2015, so product packaging and social media should therefore be the top priorities of SME manufacturers.

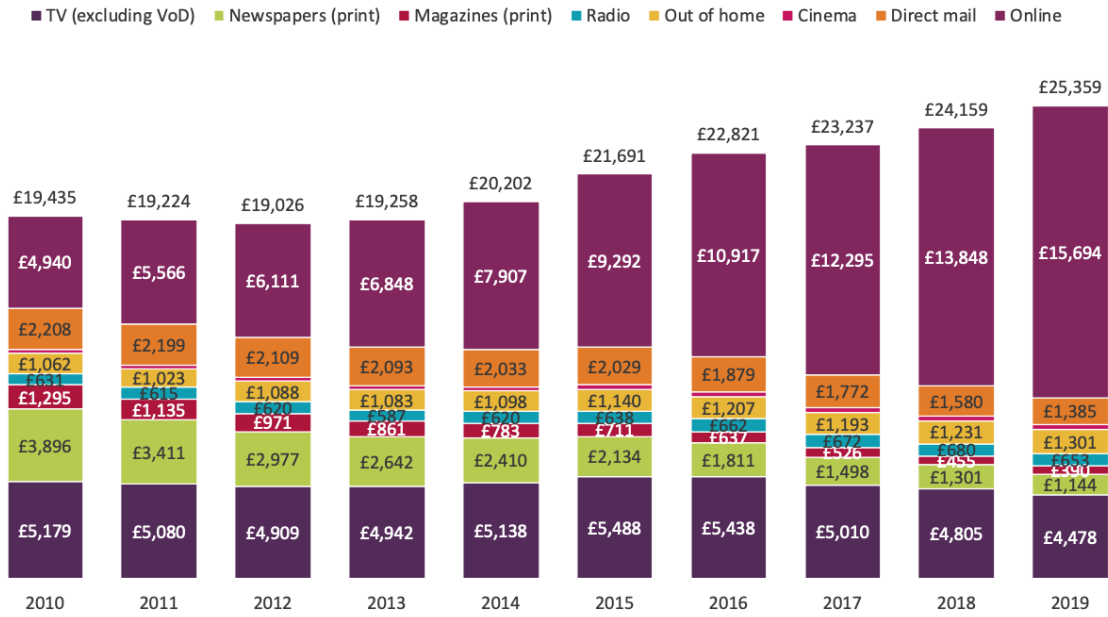


Figure 11: Year-to-year UK advertising revenue distribution by respective marketing channel (Media Nations, 2020).

5. Conclusion and recommendations

5.1. Conclusion

As issues such as climate change and overpopulation become ever more pressing in the modern world, the word “sustainability” is often used when discussing the future. The importance of SMEs, manufacturers, consumers and the UK have been previously highlighted, which lead to the objective of the research, which was to determine how consumers attitudes towards environmental sustainability efforts can benefit SME food manufacturers selling packaged goods in the UK. In answering this question, the most attractive sustainability efforts were determined, which were biodegradable packaging, reducing food waste, and planting one tree for every product sold, as they had the highest means. While vegan products were found to be the least attractive sustainability effort, such products were found to be most attractive to those aged 18-29, 40-49 and 50-59. Furthermore, women found eco-friendly delivery options more attractive than men. These were the only demographic factors with any statistical significance in relation to sub-question 1, as the other variables had no statistical significance when compared to age, education or gender.

To further understand how environmental sustainability efforts can be beneficial to SME manufacturers, the extra amount willing to be paid for such efforts were determined, in which locally sourcing ingredients, biodegradable packaging and one tree for every product sold had the highest percentages. Moreover, 5.6% was found to be the average percentage of all the sustainability efforts combined, which was a considerable increase from previously cited research (E.ON, 2020). Furthermore, the most frequently selected percentages for every variable was 0-5%, except for locally sourced ingredients which had the highest mode at 5-10%. When comparing percent extra willing to be paid and the various demographic factors, no statistical significance was found between any of the independent and dependent variables.

Finally, in order to help determine how such sustainability efforts can benefit SME manufacturers, it was also crucial to understand where these efforts can be best marketed. It was found that the top marketing channels are the products packaging, social media, and TV, radio, podcasts, newspapers, magazines and news websites. It was also found that there is an increase in demand for such efforts to be communicated via product review sites, and TV, radio etc. Furthermore, a significance was found between those that currently learn about environmental sustainability via social media and age, particularly those in the age group of 18-29. This data is in line with external literature, as 97% of those aged 16-24 use social media, as well as 93% of those aged 25-34 (Tankovska, 2021). A statistical significance was also found for those who currently and would like to hear from TV, radio, etc., and those who are 60+, as well as men. Finally, a large statistical significance was found between education and wanting to learn/hear about efforts from product packaging. As those with a secondary and A-levels education were neutral, those with a bachelors wanted to hear about such efforts from product packaging, and those with a master's/PHD did not, there were no clear patterns, the results were not intuitive, and therefore not as useful.

After considering both attractiveness and amount extra willing to be paid, it can be concluded that consumers attitudes are most positive towards biodegradable packaging, locally

sourcing ingredients, and planting one tree for every product sold, and that these sustainability efforts can benefit SME manufacturers selling packaged goods in the UK the most. By incorporating one or more of said efforts, the company's brand will automatically be seen as more attractive, can justify an increase in price, meet clear consumer demands, and gain more recognition for having a sense of corporate social responsibility. Furthermore, such efforts will be most beneficial if marketed via product packaging, social media and TV, radio, podcasts, newspapers, magazines and news websites, as expressed by the respondents. This information is useful not only to manufacturers who are looking for ways to make their business more sustainable, but organizations who invest in environmental sustainability already. As an example, if an organization is already using biodegradable packaging, the information is useful as they now know that consumers attitudes towards biodegradable packaging are overall more positive compared to other efforts, and that they are on the right path. Moreover, SME manufacturers will then be able to assess if they are marketing their efforts via the right channels, and if any adjustments need to be made.

5.2. Recommendations

5.2.1. Short-term recommendations

As a short-term recommendation, manufacturers should first conduct a brief assessment of whether switching to biodegradable packaging is feasible for their organization (assuming that they do not already use biodegradable packaging). This should begin with searching if a supplier is available in the first place, and if there is, discussing the price of the packaging. As long as the packaging does not increase the price of the product by more than 6%, then it is recommended to begin discussing a business relationship with said supplier. In the case that an organization is already using biodegradable packaging, such alternatives are too expensive, or other issues arise, manufacturers are recommended to repeat a similar process with re-evaluating their supply chain and looking to source as many local ingredients as possible with the 6.6% price increase at their disposal. Finally, in the case that neither biodegradable packaging nor sourcing local ingredients is feasible, manufacturers are recommended to contact Eden Reforestation Projects, or a comparable organization, and discuss whether a partnership is possible.

5.2.2. Long-term recommendations

As a long-term recommendation, it is therefore suggested that SME food manufacturers commit to whichever of the three sustainability efforts is most feasible, ideally selecting biodegradable packaging. Once the given sustainability effort is implemented, a second long-term recommendation is to invest in properly communicating such effort via the products packaging. Regardless of which sustainability effort is chosen, time and money will need to be invested into redesigning the products packaging to properly inform the end consumer of said effort. Furthermore, it is recommended to attain the applicable label for whichever sustainability effort is being made, so that the legitimacy of one's sustainability effort is upheld for the end consumer. Using biodegradable packaging as an example, manufacturers are recommended to achieve the "plastic-free" certification (A Plastic Planet, 2021). It is also recommended that SME manufacturers invest time into making sure that their social media profiles properly inform

consumers of their sustainability effort, and bear in mind that those aged 18-29 are more likely to currently hear about such efforts via social media. If the organization has a budget leftover for social media marketing after the packaging modifications, it is recommended to invest into social media advertisements and influencer marketing, in order to increase the awareness of their efforts. If more money is available for further marketing investments, SME manufacturers are then recommended to develop marketing material for TV, radio, podcasts, etc., and focus primarily on TV and newspapers, as these are the most profitable (Media Nations, 2021). Manufacturers are also recommended to target older generations via these platforms, and focus on women in regard to TV advertisements, and men when dealing with newspapers and podcasts. Furthermore, when marketing eco-friendly delivery options, manufacturers should cater the material specifically to females, as they were found to appreciate eco-friendly delivery alternatives more so than men. Moreover, it is recommended that SME manufacturers invest time into gaining a presence on product review sites, as more consumers would like to learn about sustainability efforts via these platforms. Finally, manufacturers of vegan products are then recommended to focus marketing campaigns on those aged 18-29, 40-49 and 50-59, as these age groups found vegan products to be more attractive than the other age groups.

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Appendices

Appendix #1: Survey

This survey takes roughly 2-3 minutes to complete, and can result in winning 1/2 €25 Amazon gift cards. PLEASE DO NOT ANSWER IF YOU HAVE NOT GRADUATED FROM SECONDARY SCHOOL AND DO NOT CURRENTLY LIVE IN THE UK. Sustainability in the food industry is a very relevant topic, and the United Kingdom can be seen as a key global market for all industries, including the food industry. With this, we see many food companies (especially manufacturers) operating in the UK making environmental sustainability efforts. As a consumer, your attitudes towards such efforts are very valuable, and can be used to further improve an organizations sustainability efforts. Thank you very much for your time and effort in filling out this survey, it's for a good cause:)

General information:

1. How old are you?
 - 1) 18-29
 - 2) 30-39
 - 3) 40-49
 - 4) 50-59
 - 5) 60+
2. What is your sex?
 - 1) Male
 - 2) Female
 - 3) Other
3. In what part of the UK are you living?
 - 1) England
 - 2) Scotland
 - 3) Wales
 - 4) Northern Ireland
4. What level of education have you completed?
 - 1) Secondary school
 - 2) A-Levels
 - 3) Bachelor's degree
 - 4) Master's and/or PHD

Food choices and the environment:

5. I am more likely to purchase a food product if I know it is good for the environment.
- 1) Totally disagree
 - 2) Disagree
 - 3) Neither agree nor disagree
 - 4) Agree
 - 5) Totally agree

Attractiveness of different environmental sustainability efforts:

For the following questions, please answer them while thinking of your favorite packaged food product as an example.

6. I would be even more happy with my favorite product if it were **100% plant-based** (it tastes just as good).
- 1) Totally disagree
 - 2) Disagree
 - 3) Neither agree nor disagree
 - 4) Agree
 - 5) Totally agree
7. I would be even more happy with my favorite product if it had **biodegradable packaging**.
- 1) Totally disagree
 - 2) Disagree
 - 3) Neither agree nor disagree
 - 4) Agree
 - 5) Totally agree
8. I would be even more happy with my favorite product if it **helped reduce food waste**.
- 1) Totally disagree
 - 2) Disagree
 - 3) Neither agree nor disagree
 - 4) Agree
 - 5) Totally agree

9. I would be even more happy with my favorite product if **one tree was planted every time I purchased it.**

- 1) Totally disagree
- 2) Disagree
- 3) Neither agree nor disagree
- 4) Agree
- 5) Totally agree

10. I would be even more happy with my favorite product if **I could get it delivered to my house in an eco-friendly way.**

- 1) Totally disagree
- 2) Disagree
- 3) Neither agree nor disagree
- 4) Agree
- 5) Totally agree

11. I would be even more happy with my favorite product if **it were using locally sourced ingredients.**

- 1) Totally disagree
- 2) Disagree
- 3) Neither agree nor disagree
- 4) Agree
- 5) Totally agree

Willingness to pay extra:

Please indicate how much extra you would pay for each of the previous environmental characteristics in the form of a percentage.

12. I would pay the following amount extra if the product were **vegan**:

- 1) +20%
- 2) 20-15%
- 3) 15-10%
- 4) 10-5%
- 5) 5-0%
- 6) 0%

13. I would pay the following amount extra if the product had **biodegradable packaging**:

- 1) +20%
- 2) 20-15%
- 3) 15-10%
- 4) 10-5%
- 5) 5-0%
- 6) 0%

14. I would pay the following amount extra if the product **helped reduce food waste**:

- 1) +20%
- 2) 20-15%
- 3) 15-10%
- 4) 10-5%
- 5) 5-0%
- 6) 0%

15. I would pay the following amount extra if the product **planted one tree for every product I bought**:

- 1) +20%
- 2) 20-15%
- 3) 15-10%
- 4) 10-5%
- 5) 5-0%
- 6) 0%

16. I would pay the following amount extra if **I could order the product to my house with eco-friendly delivery**:

- 1) +20%
- 2) 20-15%
- 3) 15-10%
- 4) 10-5%
- 5) 5-0%
- 6) 0%

17. I would pay the following amount extra if the product **used locally sourced ingredients**:

- 1) +20%
- 2) 20-15%
- 3) 15-10%
- 4) 10-5%
- 5) 5-0%
- 6) 0%

Marketing preferences:

18. I would want to be informed if my favorite brand were making environmental sustainability efforts.

- 1) Totally disagree
- 2) Disagree
- 3) Neither agree nor disagree
- 4) Agree
- 5) Totally agree

19. Where do you **currently** hear or learn about how food companies are being more environmentally friendly? (select a maximum of 3)

- 1) The product packaging
- 2) The company website
- 3) Social media
- 4) Product review sites
- 5) Billboards, posters, flyers
- 6) TV, radio, podcasts, newspapers, magazines, news websites
- 7) Word of mouth
- 8) Nowhere

20. Where would you **prefer** to hear or learn about food companies being more environmentally friendly? (select a maximum of 3)

- 1) The product packaging
- 2) The company website
- 3) Social media
- 4) Product review sites
- 5) Billboards, posters, flyers
- 6) TV, radio, podcasts, newspapers, magazines, news websites
- 7) Word of mouth

8) Nowhere

Appendix #2: SPSS Outputs

Sub-question 1:

Test Statistics ^{a,b}						
	Vegan	Plastic free	Food waste	One tree	Eco delivery	Local ingredients
Kruskal-Wallis H	9.873	8.478	3.875	7.376	7.473	5.623
df	4	4	4	4	4	4
Asymp. Sig.	.043	.076	.423	.117	.113	.229

a. Kruskal Wallis Test
b. Grouping Variable: Age

Figure 1: Age vs. sub-question 1 dependent variables SPSS output

Test Statistics ^{a,b}						
	Vegan	Plastic free	Food waste	One tree	Eco delivery	Local ingredients
Kruskal-Wallis H	3.325	1.330	1.947	.334	6.793	6.228
df	3	3	3	3	3	3
Asymp. Sig.	.344	.722	.583	.954	.079	.101

a. Kruskal Wallis Test
b. Grouping Variable: Education

Figure 2: Education vs. sub-question 1 dependent variables SPSS output

Test Statistics ^{a,b}						
	Vegan	Plastic free	Food waste	One tree	Eco delivery	Local ingredients
Kruskal-Wallis H	.018	2.300	1.480	2.740	7.632	3.009
df	1	1	1	1	1	1
Asymp. Sig.	.894	.129	.224	.098	.006	.083

a. Kruskal Wallis Test
b. Grouping Variable: Gender

Figure 3: Gender vs. sub-question 1 dependent variables SPSS output

Sub-question 2:

Test Statistics ^{a,b}						
	Vegan %	Plastic free %	Food waste %	One tree %	Eco friendly %	Locally sourced %
Kruskal-Wallis H	6.877	1.685	2.761	5.829	4.447	5.503
df	4	4	4	4	4	4
Asymp. Sig.	.143	.793	.599	.212	.349	.239

a. Kruskal Wallis Test
b. Grouping Variable: Age

Figure 4: Age vs. sub-question 2 dependent variables SPSS output

Test Statistics ^{a,b}						
	Vegan %	Plastic free %	Food waste %	One tree %	Eco friendly %	Locally sourced %
Kruskal-Wallis H	.235	.458	2.362	.262	.713	3.532
df	3	3	3	3	3	3
Asymp. Sig.	.972	.928	.501	.967	.870	.317

a. Kruskal Wallis Test
b. Grouping Variable: Education

Figure 5: Education vs. sub-question 2 dependent variables SPSS output

Test Statistics ^a						
	Vegan %	Plastic free %	Food waste %	One tree %	Eco friendly %	Locally sourced %
Mann-Whitney U	3247.500	3317.000	3345.000	2948.500	3355.000	3264.000
Wilcoxon W	10268.500	4970.000	4998.000	4601.500	10376.000	4917.000
Z	-.383	-.153	-.060	-1.374	-.027	-.326
Asymp. Sig. (2-tailed)	.702	.878	.952	.170	.979	.744

a. Grouping Variable: Gender

Figure 6: Gender vs. sub-question 2 dependent variables SPSS output

Sub-question 3:

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.134 ^a	4	.011
Likelihood Ratio	13.407	4	.009
Linear-by-Linear Association	1.223	1	.269
N of Valid Cases	176		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 3.13.

Figure 7: Age vs. social media currently hear SPSS output

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.039 ^a	3	.386
Likelihood Ratio	3.004	3	.391
Linear-by-Linear Association	.270	1	.603
N of Valid Cases	176		

a. 1 cells (12.5%) have expected count less than 5. The minimum expected count is 3.98.

Figure 8: Education vs. product packaging currently hear SPSS output

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.827 ^a	1	.016		
Continuity Correction ^b	5.039	1	.025		
Likelihood Ratio	5.723	1	.017		
Fisher's Exact Test				.018	.013
Linear-by-Linear Association	5.794	1	.016		
N of Valid Cases	175				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 19.87.

b. Computed only for a 2x2 table

Figure 9: Gender vs. TV, radio, podcasts, etc., currently hear SPSS output

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.953 ^a	4	.062
Likelihood Ratio	8.835	4	.065
Linear-by-Linear Association	4.129	1	.042
N of Valid Cases	176		

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 3.86.

Figure 10: Age vs. TV, radio, podcast, etc., would like to hear/learn SPSS output

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	12.443 ^a	3	.006
Likelihood Ratio	12.451	3	.006
Linear-by-Linear Association	5.442	1	.020
N of Valid Cases	176		

a. 1 cells (12.5%) have expected count less than 5. The minimum expected count is 4.85.

Figure 11: Education vs. product packaging would like to hear/learn SPSS output

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.885 ^a	1	.170		
Continuity Correction ^b	1.458	1	.227		
Likelihood Ratio	1.914	1	.167		
Fisher's Exact Test				.189	.113
Linear-by-Linear Association	1.874	1	.171		
N of Valid Cases	175				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 22.15.

b. Computed only for a 2x2 table

Figure 12: Gender vs. social media would like to hear/learn SPSS output