Finding the sweet spot

a sustainability strategy and holistically sustainable packaging designs for Bertolli

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Integrated Product Design

Master Thesis

Cover image: Photograph of Bertolli products (from Bertolli Instagram post on 18 October, 2022)

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Preface and Acknowledgements

This was my first big individual design project and it was a very humbling experience, to say the least. It helped me discover my strengths and weaknesses as a designer and helped me grow into a more versatile designer. Coming from an engineering background, my main expertise was in physical product design, but this project pushed me to learn about less familiar areas like consumer behaviour, branding, and sustainability strategy.

I found it challenging to keep to a specific project scope since I wanted to do it all. So you will see that my project spans a broad range of topics and types of design activities. In the end, I hope that, while the project may not have been the most focused or innovative, the work I did brings value to Bertolli, consumers, and the field of packaging design. I am proud of myself for learning and accomplishing so much in such a short span of time. One of my primary intentions for this masters experience was to form an expertise in the area of sustainable product design and I'm proud to say that with this project I was able to do just that.

This project would not have been possible without the support of many people. I would like to thank:

My supervisors, Ir. Sijia Baker-Wu and Dr. Lise Magnier, for their guidance throughout the project. Your feedback was always very valuable and helped me look at the project from a different perspective.

Danique and Aleks from Enrico, as well as, other Enrico team members for being supportive and so willing to share your knoweldge and expertise. Your perspectives helped ground my work in reality and your expert feedback pushed me to develop my ideas with a more critical lens.

My fellow IDE classmates, who were an awesome support team throughout this process.

My housemates and dear friends who were always there for me and offered words and acts of kindness when I needed them.

My family for always believing in me and supporting me throughout my Masters experience.

Finally, the participants and experts who were willing to lend me their time and expertise.

Executive summary

Food packaging serves many functions, from product protection to extending product shelf life to enabling convenient or effective usage (i.e., portability, resealability) to communicating relevant information or brand image to consumers. However, packaging has various negative impacts on the environment throughout its life cycle. While consumers are aware of the detrimental environmental impact of packaging, there is a mismatch between consumers' perception of packaging sustainability and the scientifically-measured impact (Otto et al., 2021). This thesis explored the intersection of the consumer, governmental, and scientific perspectives on packaging sustainability, while also balancing other important aspects (i.e., quality perception, feasibility, etc.) to realise a holistically sustainable packaging strategy.

The client company for this project was Enrico Food, the brand owner of Bertolli. Bertolli is a key player in the Mediterranean foods category in the Netherlands, Belgium, and Germany. This project aimed to contribute to two of Enrico's business objectives: a successful launch of the Bertolli pasta sauce product line in the UK and improving the environmental sustainability of the pasta sauce packaging. This thesis resulted in a suitable sustainability strategy and holistically sustainable packaging concepts for the UK launch and beyond.

First, background research into the system surrounding (Bertolli's) food packaging was conducted via stakeholder interviews and desk research. Literature research into sustainable packaging design strategies, consumer behaviour, and brand sustainability strategy was carried out. A framework integrating various stakeholders' perspectives was developed to aid in the creation of a suitable and meaningful sustainability strategy for Bertolli. Various tools and methods identified in the literature review were employed to evaluate the current packaging formats and develop new packaging concepts. The strategy and concepts were refined based on internal and external stakeholder feedback, expert feedback, and consumer studies.

This process resulted in the proposal of a comprehensive sustainability strategy that addresses relevant material issues in an authentic way. Concerning packaging design, a revamped design of Bertolli's pouch pack format was proposed. The pouch was identified as the most suitable pack format for Bertolli to focus its efforts on in the short-term and medium-term due to its current and forecasted environmental performance, ease of implementation, and high consumer acceptance. Various sustainability cues (i.e., naturalistic graphic design style, claims, and sustainability information) were embedded to improve consumer sustainability perception. For the long-term time horizon, two main strategies were proposed: direct-to-consumer models and reusable packaging models. Roadmaps were developed to guide Bertolli in implementing the proposed sustainability strategy and packaging sustainability improvements.

This thesis provides insights into sustainability strategy development, UK consumers' packaging preferences, and techniques to design and evaluate sustainable packaging concepts.

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1 Introduction

This chapter introduces the project and the design process followed. Section 1.1 discusses the context and motivation behind the project. In Section 1.2, Bertolli and Enrico are introduced. Finally, Section 1.3 covers the research questions and design process.

1.1 Context

Food packaging serves many functions, from product protection to extending product shelf life to enabling convenient or effective usage (i.e., portability, resealability) to communicating relevant information or brand image to consumers. However, packaging has various negative impacts on the environment starting with its manufacture until its disposal.

First off, raw materials and resources are consumed to manufacture the packaging materials. And in the production process, gases (GHG, sulfur oxides and nitrogen oxides), fine particulate, PAH, volatile organic compounds and heavy metals such as arsenic and lead are released into the air and wastewater and/or sludge that can contain polluting substances are generated (De Pilli et al., 2021). Much of this packaging is used only once and then enters the waste stream thus contributing to society's waste and pollution problem. In 2021, 12.6 million tonnes of packaging waste was generated in the UK alone (UK Statistics on Waste, 2023). With only 30% of this packaging being recycled (Thomson et al., 2018), much of this waste ends up in landfills or in nature, leading to grave environmental consequences. Even if discarded properly, the waste releases ammonia and hydrogen sulphide in landfills and causes the emission of heavy metal, hydrogen chloride, sulphur dioxides, nitrous oxides and particulates during incineration (De Pilli et al., 2021).

One of the drivers behind these environmental issues is the ubiquity of single-use packaging. Single-use packaging is convenient for both suppliers and consumers since it does not require reverse logistics or conscious efforts from the consumer to return or refill the packaging.

Figure 1.1.1 - Packaging pollution

Image source: https://unsplash.com/photos/FMrZLPdDyx4

Another large issue related to packaging is food waste. Otto et al. (2021) found that along the European food value chain, households are the main source of food waste and half is avoidable. Food waste problems can be traced back to packaging characteristics, such as insufficient barrier properties, lack of information on food storage and cooking advice (Santi et al., 2022). Therefore, when not designed properly, packaging can lead to food waste that could have been avoided.

Given all of these issues, sustainable packaging design has become an increasingly important area of interest for consumers, governing bodies, retailers, and producers/brands alike. According to Nordin & Selke (2010), there is a growing percentage of green-motivated consumers, many of which are actively trying to reduce their plastic consumption and packaging waste (KANTAR, 2022). To add, there have been stricter regulations being passed in the EU and the UK to reduce packaging waste and improve recyclability and reusability of packaging systems (Trubetskaya et al., 2022). Given the limited supply of raw materials for plastic, metals, and glass, and higher energy costs (Nordin & Selke, 2010), innovating on packaging for better environmental performance would also mean more economic competitiveness (Grönman et al., 2013).

On top of the environmental improvements, it is important to consider the economical and social aspects. Simply changing the design for better on-paper environmental performance is not enough as consumers are the "final arbiter" of success (Nordin & Selke, 2010). In the past few decades, there has been a focus on material reduction and recyclability for marginal improvements, but experts and various institutions call for a shift toward more circular systems like refillable and reusable packaging solutions (Coelho et al., 2020).

There are many challenges to realising more sustainable packaging systems. In general, it is a difficult optimisation problem as there are many stakeholders (i.e., raw material producers, product manufacturers, distributors, retailers, brand owners, consumers, regulators, waste management actors) who may have conflicting interests and incentives.

In the category of pasta sauce, consumers are used to buying products in glass jars. Switching to a different material may lead to a lower rate of recognition or correct categorization and even negative perceptions of the product quality. In general, consumers tend to believe that sustainable packaging comes at the cost of other product attributes (i.e., cost, quality) (Magnier & Crié, 2015). The relative homogeneity in packaging (appearance, material, and environmental performance) in the pasta sauce aisle offers the opportunity for Bertolli to differentiate itself by

breaking the current norms or making distinct claims related to their packaging.

Another issue is the mismatch between perception and reality of the environmental-friendliness of different packaging designs. Consumers often do not consider the resource intensity of producing certain materials or the packaging design's impact on transportation and food waste when evaluating sustainability (Otto et al., 2021). The aspects that are more salient to consumers are biodegradability, recyclability, and the use of renewable materials, leading to an inaccurate appraisal of packaging options (Norton et al., 2022). Therefore, one must find either a solution that achieves a good match between perception and reality or strategy that compensates for or debunks consumer misconceptions.

Enrico Food wants to do their part in this area of packaging sustainability. This project focuses on improving the sustainability of the pasta sauce packaging for their brand Bertolli. Bertolli is a key player in the Mediterranean foods category in the Netherlands, Belgium, and Germany. Enrico wants to not only reduce the environmental impact of Bertolli product packaging, but also start exporting to the UK. This is a new market for Enrico and thus it is important to thoroughly research the UK market and consumers' preferences and perception of sustainable packaging. This thesis describes the packaging redesign process for Bertolli's pasta sauce with a focus on sustainability and UK consumer acceptance.

While analysing the competitors it was found that Bertolli is lagging behind in establishing and communicating a sustainability strategy. Therefore, while this was not part of the initial project scope, a sustainability mission and roadmap were developed to help Bertolli establish a coherent sustainability image.

Figure 1.1.2 - Photograph of Bertolli products (from Bertolli Instagram post on 7 April, 2023)

1.2 Meet Bertolli and Enrico

Figure 1.2.1 - Bertolli storefront (from Bertolli)

Bertolli's Roots

The story of Bertolli goes all the way back to 1865 in Lucca (Tuscany), when Francesco Bertolli founded a small emporium selling typical local food: olive oil, wine, cheese, olives. Later on, he founded "Banco e Cambio Bertolli", which provided loans to emigrants without requiring any collateral. As a result, he was able to establish a network in America and started exporting olive oil to the US. By the 1890's, Bertolli was even expanding into other international markets. Bertolli has a history of being an innovative brand. It was the first olive oil brand to use clear glass bottles, to include product information and health benefits of olive oil on its labels, and develop a range of different variants of oil. Nowadays, the brand is well known globally and its portfolio spans many categories, including spreads, sauces, and pasta. In 1994, Bertolli was bought by Unilever and since then, parts of Bertolli have been sold to different companies. This graduation project was conducted with Enrico Food, which handles Bertolli's sauce, toast, pizza, and vegetable products in Europe.

Bertolli's Vision and Mission

Bertolli's vision is a quote from Francesco Bertolli himself:

"Pure & natural ingredients prepared in all their simplicity is the essence of great tasting Italian food."

And their mission is to

"Make all the goodness from Italian cuisine accessible."

Bertolli is all about curating and sharing authentic, quality Italian food products. They offer the whole Italian kitchen (from sauces to toasts) at a premium mass price.

Brand

Bertolli brands itself as a progressively authentic Italian brand that wants to share the simplicity of Italian cuisine. The brand personality is based on Francesco Bertolli's (the founder's) identity as an explorer, expert, and pioneer.

The unique aspects of their pasta sauces are: soffritto as a basis, extra virgin olive oil, authentic italian recipes, and 100% sun ripened italian tomatoes.

Target consumers

Bertolli has a large consumer base of shoppers between 25-60. Their target consumer group is striving inspiration seekers. These consumers seek authentic Italian flavours and enjoy exploring new recipes without spending too much money or time. For them, quality and certainty for a little extra cost is okay.

Figure 1.2.2 - Bertolli's product portfolio (from Bertolli)

The pasta sauce product line (the focus of this project)

- Volume: 400 g (2-3 servings)
- USPs: Authentic recipe, Soffritto base, pronounced taste

- Volume: 460 g (3-4 servings)
- USPs: Good value, convenient packaging

- Volume: 300 g (1-2 servings)
- USPs: Vegetable chunks, convenient packaging

- Volume: 690 g (6 servings)
- USPs: Basic pasta sauce, good value, large volume

(Pack shots from Bertolli)

Image from Bertolli

About Enrico Food

Enrico Food is the company behind the Bertolli pasta sauces, pestos, toasts, jarred vegetables, and pizza products in the Netherlands, Belgium, and Germany. They also own the Mayonaise brand Jean Baton, work with partner brands on product development, and provide private label solutions to various clients. The company is based in Weesp and has its own production location, Glasbest in Udenhout.

Figure 1.2.3 - Enrico food products (from Enrico)

Takeaways

Bertolli's mission is about making authentic and high-quality Italian food accessible. Based on this, it was important to ensure the authenticity and quality perception of the product is not negatively impacted by the packaging redesign. It was also essential to verify that the packaging format is acceptable to a broad range of consumers and that the product would still be profitable at an accessible price after the packaging redesign.

Bertolli's main brand message is "authentic Italian." It is important to support this branding through the packaging. The packaging should be consistent with the look and feel of the rest of the product portfolio.

Their main target consumer is someone who wants good value products (good quality to price ratio). They are fairly knowledgeable about Italian cuisine, but are not traditionalist (e.g., they are open to trying new things). This means it is okay to push the envelope a bit when it comes to packaging conventionality and authenticity if the product-package combination still fulfils the basic price, quality, and functionality needs. A novel packaging format might even be an attractor for them.

Concept drivers: quality perception, cost, authenticity perception, brand-fit, novelty-familiarity balance

Image from Bertolli

1.3 Assignment and Approach

Problem definition

Enrico Food wants to develop more sustainable packaging solutions to address consumer, customer, and regulatory demands. Specifically, the goal is to develop a more sustainable pasta sauce packaging concept for a launch in the UK. However, there are many considerations and constraints to designing sustainable food packaging including food safety/shelf-life, manufacturability, logistics, and consumer perception and behaviour. As a new player in the UK market, Bertolli needs to find a balance between differentiation and familiarity to ensure customer and consumer buy-in. It is also important for Bertolli to establish a sustainability strategy that goes hand-in-hand with the packaging design they pursue.

Key tension areas

- balancing sustainability, desirability, feasibility, and viability
- balancing scientific, regulatory, and consumers' definitions of sustainability
- balancing familiarity and uniqueness
- informing consumers about the nuances of sustainability without confusing them or generating scepticism
- communicating a sustainability strategy without distracting from or departing from the brand core

Photograph from Bertolli Instagram post on 17 November, 2022

Research questions

The following are themes and research questions that defined the project scope:

Theme 1: Sustainable food packaging

RQ1.1: What does the system surrounding food packaging look like (i.e., historical and future trends, stakeholders and their relationships, regulations, processes, life cycle, etc.)?

RQ1.2: What frameworks for defining and evaluating the sustainability of packaging design exist and what is a suitable framework for Bertolli's pasta sauce packaging?

Theme 2: Consumer perception

RQ2.1: What factors, relevant to packaging design, are considered when consumers make a purchase decision?

RQ2.2: How do consumers define sustainable food packaging and what are the perceived costs and benefits?

Theme 3: Packaging design

RQ3: How can pasta sauce packaging be designed for improved sustainability and high consumer acceptance in the UK market?

If there is a conflict between ideals or a gap between actual sustainability and perception, how can that gap be bridged in the long-term?

Theme 4: Sustainability strategy

RQ4: What sustainability mission and goals are fitting and meaningful for internal and external stakeholders?

Scope

The result of this thesis is a sustainability strategy encompassing Bertolli's overall sustainability mission, pasta sauce packaging designs, and a roadmap. More specifically, the scope is as follows:

- The packaging design should be catered to the UK market. The overall sustainability strategy should be aligned with the current markets (thinking primarily about the Netherlands), as well as, the UK market.
- Target group for packaging designs and sustainability strategy: Striving inspiration seekers
- Constraints
  - Product: ambient pasta sauce, no flavour changes, there can be tweaks made to the recipe to accommodate new packaging format, but that is not preferred
  - Supplier chain changes are not feasible for the short-term.
- Time horizons: short-term (1-3 years ahead), medium-term (4-6 years), long-term (7-10 years)

Approach and Process

The design process for this project can be split into four main phases: Discover, Define, Develop, and Deliver. In each phase, various design methods were applied, as seen in the Figure 1.3.1. The process was based on the double-diamond model.

In the Discover phase, I conducted desk research as well as interviews with internal stakeholders to understand the context surrounding the project. The key activities in this phase were: trend analysis (Section 2.1), stakeholder analysis (Section 2.2), and literature studies of sustainable packaging design (Section 2.3), consumer behaviour (Section 2.4), and sustainability strategy (Section 2.5).

The Define phase involved benchmarking the current packaging performance (using the Whole System Mapping method and EcoAudits (Sections 3.1 and 3.2)), consumer research to understand consumers' preferences when it comes to sustainable packaging (Section 3.3), and defining the vision (using a GIGA map and ViP method), requirements, and evaluation criteria (Section 3.4).

The Develop phase consisted of ideation and iteration on the strategy (Section 4.1) and packaging designs (Section 4.2). The packaging concept development process was conducted in three parallel tracks (short-term, medium-term, and long-term). Two consumer studies and discussions with stakeholders and experts were carried out to inform the design decisions.

The Deliver phase was focused on polishing the strategy and packaging designs and developing the roadmaps and future recommendations.

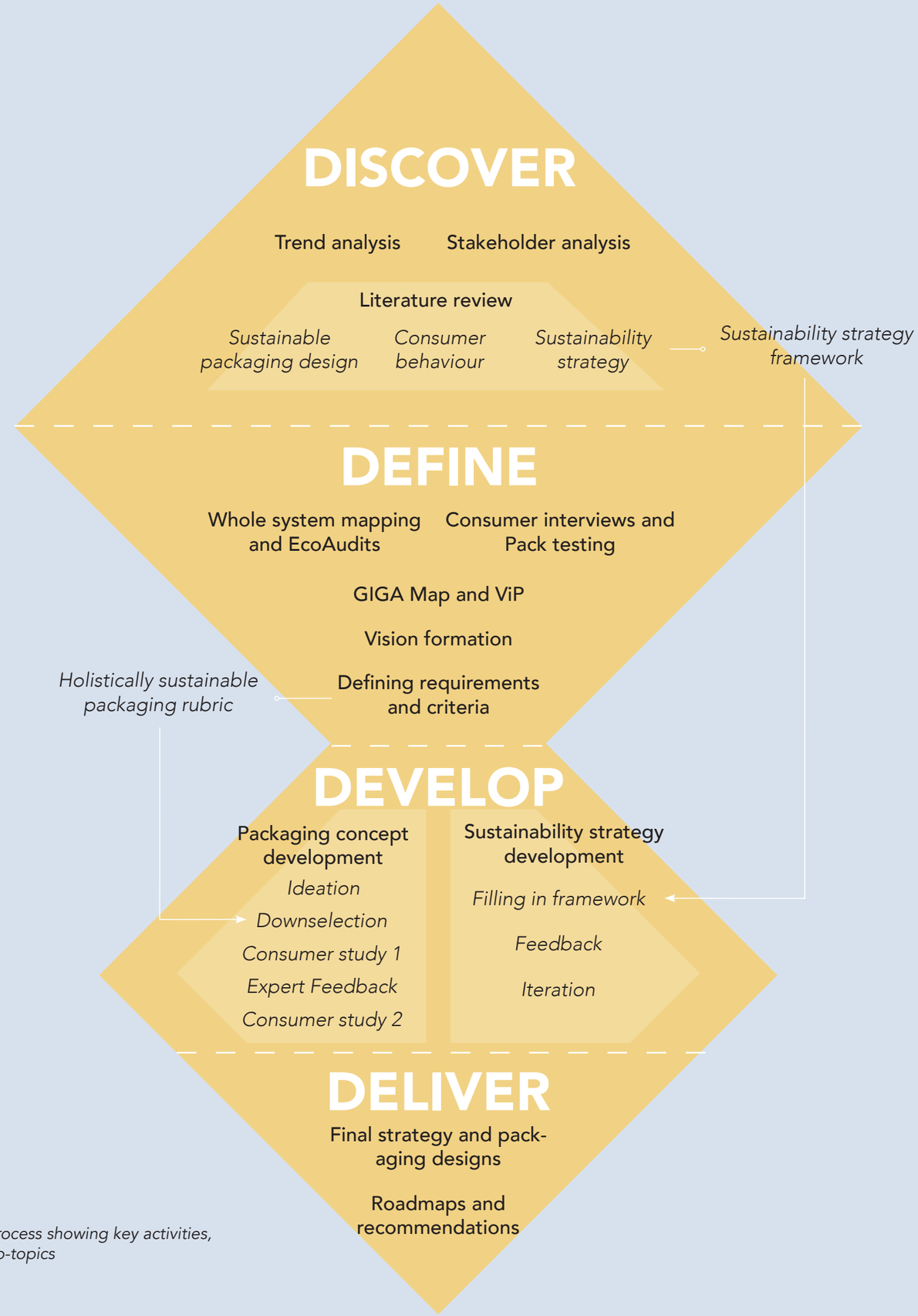


Figure 1.3.1 - Design process showing key activities, and sub-activities or sub-topics

Image source: https://unsplash.com/photos/a4Vow2p6AXE

2 Discover

This chapter presents the desk research conducted to answer the research questions from a theoretical point of view. Section 2.1 provides an overview of the history of packaging, current trends, and possible future scenarios. I conducted this analysis to understand how the packaging industry has developed up until now, familiarise myself with new trends and innovations, and forecast how the industry might develop in the future. The next section details the stakeholder analysis, which encompasses a competitor analysis. These activities contributed to my understanding of the system behind Bertolli's packaging and uncovered packaging-related issues, requirements, and opportunities. Section 2.3 details various approaches toward sustainable packaging design. In Section 2.4, insights from literature about consumer behaviour (notably, decision-making and sustainability perception) are summarised. Finally, Section 2.5 presents the background research conducted in company/brand-level sustainability strategy-building and the framework used to construct Bertolli's sustainability strategy.

2.1 Past, Present, and Future

Introduction

To bring about real sustainable change, it is important to have a well-informed forecast for what the future could look like. However, before looking forward, one must look backward at the historical context and at the current situation. Thus forth, this section is split into three sections:

Past: How did packaging come to be how it is today?

Present: What are the current functions, constraints, and trends?

Future: What are the future scenarios and what role can Enrico/Bertolli play?

Past

Packaging has been around since the early days of man. Initially, crude materials like leaves, gourds, animal skin, and wood were used by hunters and gatherers (The History of Packaging, n.d.). The developers and users of the package were the same people and the main function of packaging was to contain relatively small volumes of goods.

Once villages began to develop, there was an increased need for better packaging solutions to meet the needs of larger groups of people. It was at this time that woven sacks and baskets, wooden crates, clay vessels, and animal skin containers were developed.

The establishment of cities brought about more advancements in packaging. Trade led to greater availability of new materials and products. Craftsmen learned how to blow glass and make barrels. These were durable ways for transporting liquids and dry goods in even larger quantities and over longer distances.

During the industrial revolution it became possible to manufacture packaging using machines. These technological advancements paired with the rise in demand for products due to increased disposable income, led to the development of mass-manufacturable packaging solutions using glass, metal, and cardboard. In this era, the main goal of packaging was to provide efficient containment solutions to meet the demands of growing markets and packaging development and production methods became specialised knowledge.

In regard to food packaging, companies and governments were focused on increasing shelf life of the food product. This was especially of interest for militaries who needed methods to preserve food for troops. It was General Napoleon Bonaparte's call for a food preservation solution that was the impetus for the development of sterilised tinplate packaging in 1810 (Hook & Heimlich, 2017). In 1825, aluminium was first extracted from bauxite ore. But it took time for aluminium to be used in packaging with the first aluminium cans developed in 1959.

In the 1900s the way goods were sold was revolutionised by the invention of the self-service grocery store, which is what we know now as the supermarket (T, 2013). Before this, a grocer was a dealer of dry goods and other foodstuffs and these establishments were operated "over the counter." With the shift toward the supermarket, the function of packaging changed. Packaging replaced the grocer and became "the silent salesman" for products (Bruijnes et al., 2020). Goods now needed to be sold in individual and smaller packages. To fulfil this need for primary packaging, a variety of papermaking methods were implemented. Glass jars were also used for individual packaging. Companies developed printing methods so they can place their branding on the packaging. As more brands entered the market, packaging needed to become more vibrant and appealing to attract consumers' eyes in the store.

Plastics were introduced to the packaging industry in the early 1900s starting with cellulose plastic and later Polyethylene. Now, there are many types of plastics that can be used, which has given companies a lot of design flexibility, but increases the complexity of waste sorting and separation. In the 1960s, techniques were developed to combine different materials through lamination, which has led to many new packaging material possibilities with specific barrier and mechanical properties.

Takeaways

The function of packaging has become more and more multifaceted over time due to changes to supply chains and consumption patterns. When considering the future of packaging, trends in consumption should be analysed to predict packaging functions.

At the beginning, the producers and consumers of packaging were one in the same. Over time, packaging design has become specialised knowledge, which suggests that consumers have less knowledge and concern about packaging production. Bridging the gap between producers and consumers could be an interesting way to increase consumer knowledge and spur innovation.

Technology is becoming more embedded in packaging. In the past, technological innovations in packaging were focused on increasing efficiency (downgauging, multilayer materials, etc.). When designing Bertolli's packaging, it is important to determine and evaluate opportunities for new technology integration.

	hunters and gatherers	villages	cities	industrialization	1900s	present
materials	animal skin, leaves, gourds, wood 	baskets, woven sacks, crates, earthenware 	paper, glass, barrels 	glass, metal, cardboard 	plastics, aluminium cans 	mutlilayer flexible plastic reuse models 
inventions			more efficient material processes	sterilised tinplate packaging (1810)	self-service grocery store (1916) plastics (mid-1900s)	active & intelligent packaging multi-material laminations & coatings
functions	contain small volumes of goods	contain larger volumes to meet needs of larger groups	durable way to transport goods over long distances	cost and time efficient containment to meet rising demand; food preservation	silent salesman; high functionality	aesthetics; convenience (on-demand, portioned)

Image sources: gourd, woven basket: https://uspackagingandwrapping.com/blog/the-history-of-packaging.htmlglass pack, tin pack: https://ambalaj.org.tr/en/environment-history-of-packaging.html | 1900s packaging: https://www.nhb.gov.sg/nationalmuseum/our-exhibitions/exhibition-list/packaging-matters | piggly wiggly: https://en.wikipedia.org/wiki/Piggly_Wiggly# | plastic shower: https://thedieline.com/blog/2020/3/10/the-history-of-plastic-the-invention-of-throwaway-living | flex pack: https://www.industrialpackaging.com/blog/flexible-vs-rigid-packaging

Present

A trend analysis was conducted to understand the drivers behind current and future trends (see Figure 2.1.2). This was done by following the sensing, scanning, and sense-making workflow laid out in Smith & Ashby's (2020) book on Futuring. Around 80 "signals" were collected leading to the development of 32 trends and 16 drivers.

The current situation (past decade) can be summarised in a few main points:

Technology

- Active and intelligent packaging technology is becoming more popular.
- Packaging is becoming more digitalised (i.e., QR codes, RFID, etc.).
- Plastic is ubiquitous since it is a cost- and resource-efficient material.
- There are more and more bio-based, renewable, recycled content, and compostable packaging options becoming available and viable.
- Recycling technology is becoming more advanced (i.e., chemical recycling or multi material packaging) and collection systems are improving (i.e., curbside pick-up of flexible packaging).

Social norms

- Shoppers are prioritising cost, convenience, and health. (There is a growing popularity in grocery delivery.)
- Shoppers are trying to consume more sustainably (i.e., shop locally, shift to vegetarianism, avoid plastic, recycling).

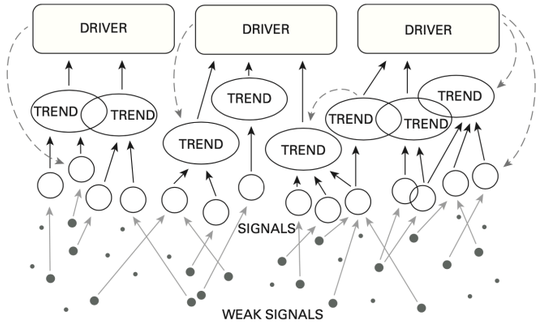


Figure 2.1.1 - Futuring process. Extracted from Smith & Ashby (2020).

- Shoppers care about if packaging *looks* sustainable.
- Since food is such a commodity, food waste is not taken as a serious problem.
- There is a shift to more portion-packing due to smaller household sizes

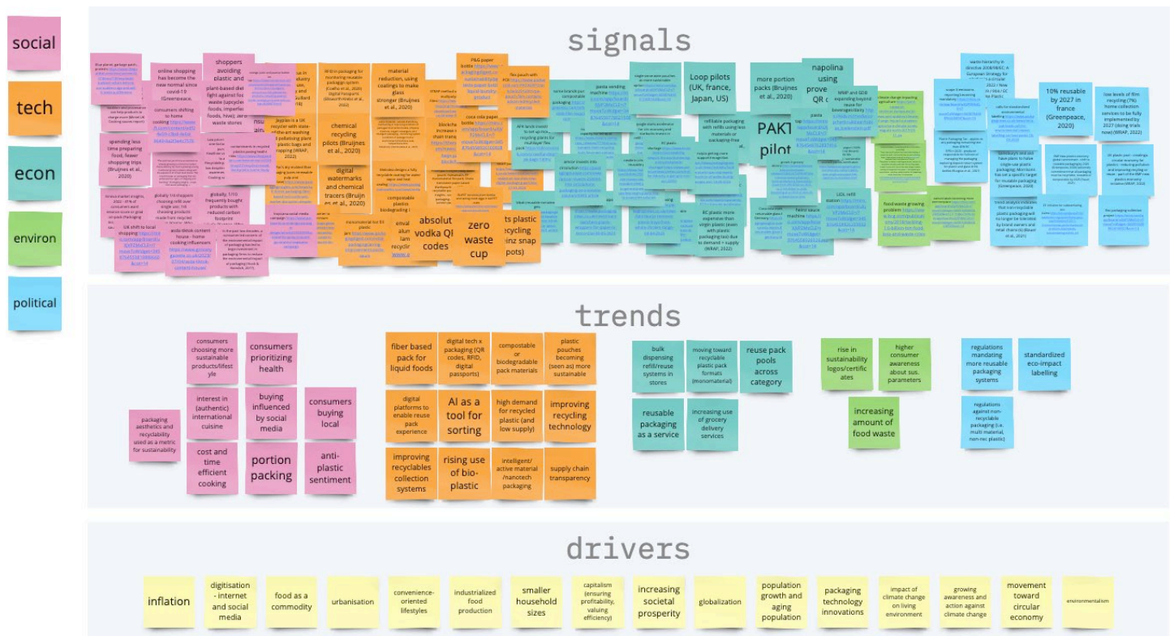
Value Chain and Business models

- Supply chains are becoming more complex, but also more transparent.
- The reusable packaging industry is experiencing a renaissance with many reuse models cropping up with the help of digital platforms.

Regulation

- Regulations and retailer demands are pushing brands and producers toward recyclable packaging.
- There is a rise in sustainability logos and certificates.

Figure 2.1.2 - Trend analysis



Regulations

A review of the current regulations in the EU and the UK was done to better understand what types of packaging Bertolli should or should not pursue (according to regulations).

The first legislation concerning the field of packaging and packaging waste was the European Packaging and Packaging Waste Directive (94/62/EC), which has been revised several times since it was first published in 1994 (OJEU, 2004). This directive calls upon the member states to establish EPR (Extended Producer Responsibility) schemes for all packaging. This means that producers are to take financial and organisational responsibility for the prevention, collection, and reuse of packaging materials. The directive also sets a recycling target of 65% by 2025 and 70% by 2030 with a rate of 55% for plastic and 75% for glass. It calls for a packaging waste reduction of 15% per capita per member state by the end of 2024, as compared to 2018. Some other topics covered are reuse and refill targets, requirements for recycled content materials, the standardisation of recycling icons and charging for single-use plastic. In 2022, the European Commission published the Packaging Packaging Waste Regulation (PPWR), which is the successor of the European Packaging Waste Directive, and if passed, it would become European law for all Member States (KIDV, 2022).

In UK law, the European Packaging and Packaging Waste Directive is implemented in the Producer Responsibility Obligations (Packaging Waste) 2016 (B P Collins LLP, n.d.). This law requires that companies meet a set of recycling targets determined by the government and establishes PRNs (Packaging Recovery Notes). With this system, accredited reprocessors can sell PRNs to companies or Compliance Schemes to prove that packaging material has been properly recycled. There is also a Plastic Packaging Tax, which applies to any packaging containing less than 30% recycled content (Plastic Packaging Tax: Steps to Take, 2023). Companies that have imported or manufactured 10 tonnes or more of finished plastic packaging components are obligated to pay this tax. The tax is £210.82 per tonne (as of 1 April 2023). However, this system is set to change soon as the UK is in the process of implementing an EPR scheme where producers will be responsible for full cost of managing the packaging (Burgess et al., 2021). Under this scheme, there are different fees depending on material and recyclability (Valpak, 2023).

Besides general packaging taxes and fees, there are also regulations on single-use plastic (SUP) packaging, in specific. As a part of the European Strategy for plastics in a circular economy, the European Commission published the Single Use Plastic Directive, which encourages producers to find more sustainable alternatives to single-use plastic packaging by setting reporting requirements, bans, and levies (EU, 2018). The scope of this directive is limited to single-use food and beverage containers, cutlery, and hygiene products and packaging. Therefore, it currently does not concern Bertolli's products. However, it could be expanded in the future to encompass single-use food packaging. The European Strategy for plastics in a circular economy calls for all plastics packaging to be reusable or recyclable by 2030 and proposes strategies for national and regional authorities and industry (EU, 2018).

Finally, there is Directive 2019/904/EC 2022/1616/EC, which pertains to recycled materials for food contact. It calls for controlled waste collection and decontamination requirements for recycling food contact plastic (OJEU, 2019).

An influential regulation in the area of sustainability that impacts Enrico on a higher-level and informs Bertolli's sustainability strategy is the European Green Deal, which proposes a strategy for the European Union to achieve zero net emissions of greenhouse gases in 2050 (OJEU, 2020). This directive mandates companies to measure and report their Scope 1 and 2 emissions to authorities. These emissions include onsite energy consumption, company-owned vehicle emissions, and emissions from bought electricity. Recently, the ISSB (International Sustainability Standards Board) has unanimously decided that it should be mandatory for companies to also report Scope 3 emissions (OBeirne, 2022). This means that it is only a matter of time until Enrico (Bertolli) will need to also measure and report on their Scope 3 emissions.

Takeaways

The trend analysis and regulations review revealed the following tension areas and opportunities:

- The use of plastic is contentious: From producers' perspective, plastic packaging formats are cost efficient, and from an scientific point of view, they have a relatively low impact. However, plastic packaging has a negative consumer perception due to the influence of the media. Retailers are reducing their plastic packaging in order to meet consumer demands. To add, regulations pay more attention to plastic packaging than other forms of packaging that may have a technically larger impact from an emissions perspective. How could this misalignment be bridged?
- Consumers are convenience-oriented: More and more consumers are using e-commerce or delivery services. Bertolli should consider what role they can play in this trend. On a different note, convenience factors are a barrier to the widespread adoption of some reuse systems. Thus forth, Bertolli should carefully consider which reuse models might be the best fit for Bertolli's products and target consumers.
- Increasing popularity of refill/reuse systems: As refill and reuse become more commonplace, Bertolli can be a first mover in the pasta sauce category to pursue reuse by participating in pilots.
- Technological advances in packaging materials and recyclability: There are many technological packaging innovations in the R&D pipeline that Bertolli should monitor and experiment with.
- Rise of sustainability labels: Sustainability labels are becoming more popular, but are still not pervasive giving Bertolli the opportunity to differentiate itself by pursuing and communicating packaging sustainability.

Future

To paint a picture of the future, it is important to analyse the drivers underpinning the current trends as they catalyse and shape future trends.

The main drivers that surfaced during the trend analysis are:

- Demographic changes
  - The average household size is decreasing. The global population is growing. There is a larger ageing population.
- Globalisation
  - Food is a commodity. Fresh produce is now available all year round. There is less awareness about the origin of products. Supply chains are highly complex leading to various packaging requirements.
- Material science innovation
  - Packaging materials are becoming more efficient in providing the necessary barrier properties (i.e., same protection or shelf life using less material or less resource-intensive materials). Biomaterials are becoming a viable alternative to traditional packaging materials. New recycling technologies are enabling more circular material cycles.
- Shift to service economy
  - Businesses are switching to service models. Some reuse models for packaging involve "packaging as a service."
- Increasing prosperity
  - People are living more convenience-oriented lifestyles leading to the rise of e-commerce and grocery delivery services. With basic needs being met, there is more capacity to care about environmental sustainability.
- Environmentalism
  - There is a rising interest and movement toward a circular economy. There are more extensive regulations governing pollution and resource and waste management. There is a growing awareness about sustainability and sustainable consumption.
- The internet and social media
  - Digital technologies are being integrated into packaging. Most business is now being conducted and marketed via the internet. Consumers are more conscious of sustainability via the media.

Based on relevant trends and drivers, I formulated two possible alternative futures (10 years ahead) to inspire the long-term packaging concepts. The trends mapping and scenarios were presented to a WRAP expert and iterated upon based on their feedback.

Scenario 1

In this scenario, single use packaging is still very much the norm. Delivery services have become even more popular. Consumers value having personalised food products (i.e., curated flavours, just-enough portion packs). At this point, regulations and an improved recycling system have made recycled plastic a more economical option over virgin plastic. Plus, there are now viable renewable and bio-based material options. There is higher consumer awareness about food product and packaging sustainability due to various public awareness efforts and the recent launch of an obligatory standardised eco-labelling system.

Scenario 2

Due to pressure from consumer groups and NGOs, plastic has become effectively boycotted. This has led to the rise of reuse models: delivery services use reusable packaging and refill and reuse stations are commonplace in grocery stores. Consumers are now used to using reuse systems; returning or refilling packaging is just part of their routine now. There are category-wide efforts to standardise packaging and implement digital passports to keep track of packaging condition.

Takeaways

Based on the key drivers, the following points summarise my position on how things could progress and my recommendations to Bertolli.

- Recyclability is a stop-gap solution supported by innovations in packaging and recycling technology. There will also need to be a shift to more reuse/refill systems in order to support a more circular economy (as supported by regulations, growing consumer awareness, shift to more services, and new distribution channels via grocery delivery). Bertolli should invest in recyclable and recycled material packaging for the short and medium term, and invest in long-term reuse solutions.
- Biomaterials may become more relevant further in the future once infrastructure catches up to material innovations. Bertolli should investigate these possibilities in the medium term (and critically assess their environmental impact).
- Sustainability needs to be incorporated into Bertolli's branding and strategy as Corporate Social Responsibility will be expected by consumers and impact reductions or movement toward more circular packaging will be demanded by retailers and mandated by regulations.

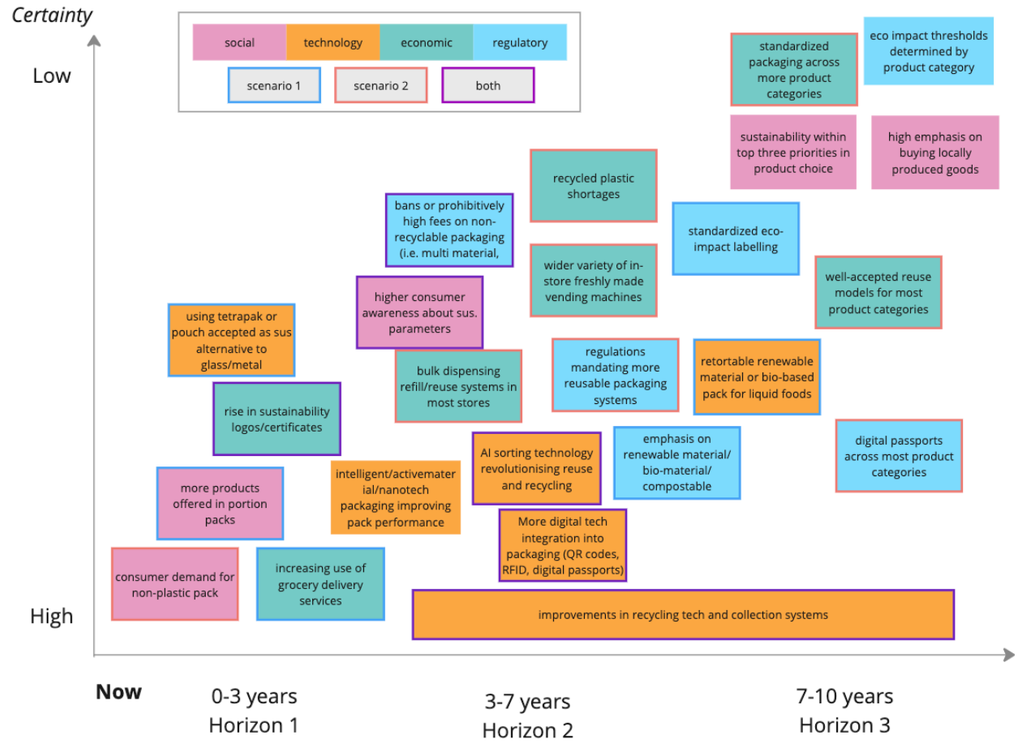


Figure 2.1.3 - Trends and Drivers relevant to Imagined Future Scenarios (Blue outline - Scenario 1, Pink outline - Scenario 2, Purple outline - both)

Figure 2.1.4 - Future scenario collages (Scenario 1 - right, Scenario 2 - left)

Image sources: https://fortune.com/2022/08/07/demand-for-grocery-delivery-cools-with-consumers-wary-of-cost-quality/ | https://www.miwa.eu/blog/rfid | https://www.renewablematter.eu/articles/article/reusable-packaging-the-loop-system-conquers-supermarkets-all-over-the-world | https://www.duurzaam-ondernemen.nl/lidl-van-start-met-pilot-eco-score/ | https://www.letsrecycle.com/news/cost-of-living-crisis-could-hit-reusable-packaging-tesco-warns/ | https://picclick.co.uk/Popular/plastic-beer-crates-500ml | https://kezzler.com/blog/the-digital-product-passport-is-coming/ | https://www.abelandcole.co.uk/pantry/club-zero | https://www.hellofresh.com | https://www.bioplasticsmagazine.com/en/news/meldungen/20210209-deSter-Pulpac-enter-strategic-partnership-to-produce-fiber-based-single-use-food-packaging-products.php | https://www.papier-mettler.com/en_about-us_plastic-packaging-manufacture.htm

2.2 Stakeholder Analysis

Introduction

After studying the general landscape behind the packaging industry, the more immediate system surrounding Bertolli's products and packaging was analysed via a stakeholder analysis.

The following activities are reported on in this section:

- Stakeholder and value chain mapping - this was done to identify sustainability issues and opportunities
- Competitor analysis - this was done to identify category norms and opportunities for differentiation

Stakeholder mapping

In order to understand the system better, a stakeholder mapping was conducted (Figure 2.2.1). First, I brainstormed all possible stakeholders (primary, secondary, and tertiary) and then mapped them on an influence vs. interest graph. In order to verify that I had identified the correct stakeholders, I discussed the graphs with my company mentors.

I then had some meetings with relevant stakeholder contacts to learn more about their interests and influence on packaging development. After the interviews, I was able to compile the information I learned into Stakeholder cards (which can be found in Appendix A). This activity helped with identifying the wants/needs and influence of the stakeholders (in the context of sustainable packaging).

I also mapped the value chain (Figure 2.2.2) to identify the issues and opportunities. For the sustainability issues, a tag system (CC for Climate Change, RD for Resource Depletion, P for aire, water, or soil Pollution, E for freshwater, marine, or terrestrial Ecotoxicity, and LU for Land Use) was used to identify key impact areas. The key impact areas are Climate Change, Resource Depletion, and Pollution. These issues were used to help stimulate ideation during my personal ideation process.

Figure 2.2.1 - Stakeholder map

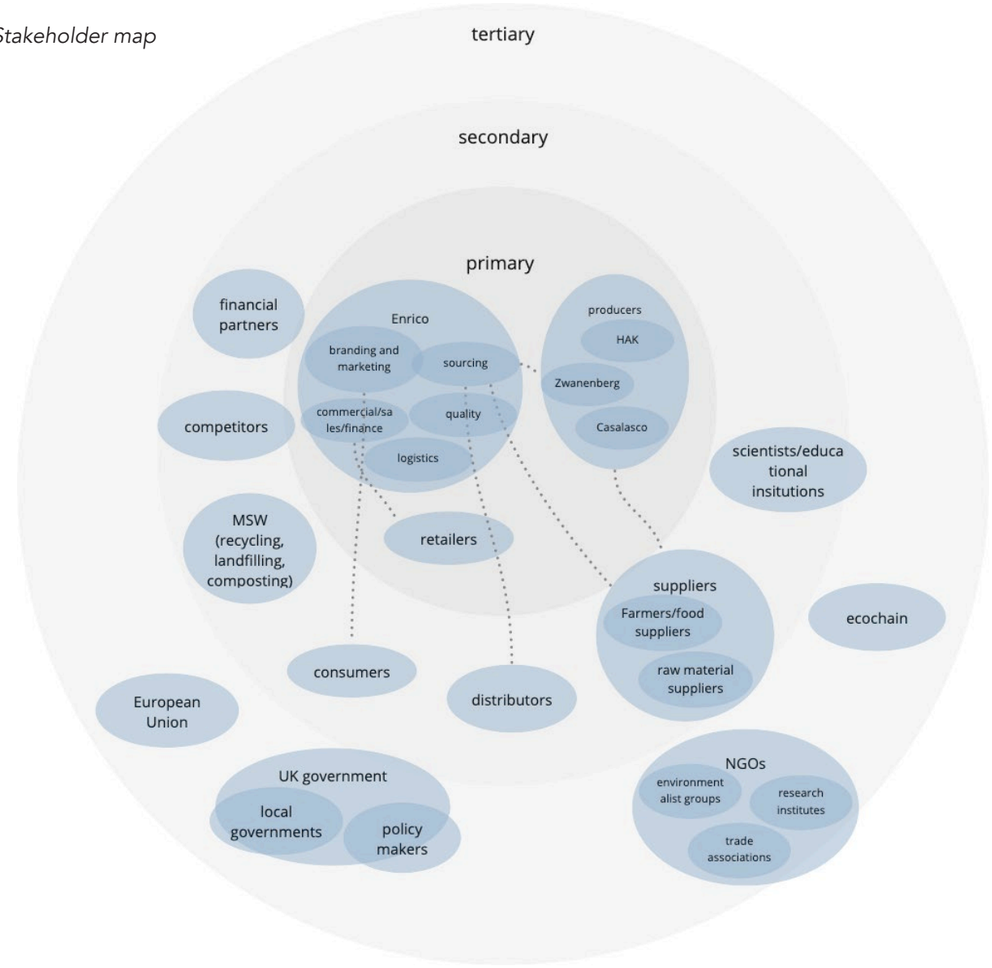


Figure 2.2.2 - Value chain with sustainability issues and opportunities

	raw material acquisition and packaging production	production & packing	distribution	retail	consumer	end of life
activities	Packaging materials are extracted and manufactured into packaging components. Raw ingredients are grown, harvested, and processed. These materials (from all around the world) are shipped to the producers.	The sauce is produced in large batches and pumped to the filling line The packaging is loaded into the production line, filled with the sauce, pasteurized, labeled, and packed onto pallets.	Logistics partner takes pallets to their warehouse and then distributes to various retail warehouses and locations. Pallets are reused as a part of a pool or trading system.	Retailers stock their shelves with the product with or without the secondary packaging. Secondary packaging is collected for recycling.	Consumers purchase the pasta sauce, consume (and store) it, and Depending on how much they use in one cooking session, they might need to store the product in the fridge. And it might go bad before it's finished.	After use, the consumer disposes of the packaging (recycling for glass or trash for plastic pouch). The trash service of the area collects and recycles or incinerates the packaging.
product and pack sustainability issues	Energy use; Resource depletion (water, minerals); Land use; Waste and pollution; Transport emissions ***CC, RD, P, E, LU***	Energy use; water depletion; Transport emissions ***CC, RD, P***	Transport emissions Product damage/loss due to collapses on pallets or transport conditions ***CC, P***	Food waste (past shelf-life) ***CC, P***	Energy use (storage) Food waste (spoilage, unable to empty packaging) ***CC, RD, P***	Saved energy and resources due to recycling Energy recovered from incineration Toxic pollutants from incineration ***+CC, +RD, P, E***
other issues	availability issues transport costs	Processing costs Specific machine capabilities High investment cost for changing packaging production process	Product loss/damage risks Space utilization on pallet	Use of space Shelf life Standing out	Food preservation/protection Informativeness Ease of use	Ease of emptying and sorting Waste costs Local variations in waste management
opportunities	choosing less resource-intensive materials shortening transport distances	optimizing production process (i.e., reducing cycle time, eliminating steps)	reducing packaging/product loss improving protection shortening transport distances	preventing food waste	preventing food waste (ensuring consumption in one go or preventing spoilage)	improving recyclability (or reusability) clear instructions for disposal

Figure 2.2.3 - UK Grocery store shelves

Figure 2.2.4 - Close-ups of competitor packs and claims

Competitor analysis

A competitor analysis was also conducted to understand what the category norms and differentiation opportunities are.

Category norms

Common claims: 1 of your 5 a day; vegetarian/vegan; serves X; no artificial colours, flavours, or preservatives; no added sugars; italian tomatoes & basil; convenience claims ("Ready in 50 seconds")

Offering: Packaging size - single-serve, serves 2-3, and serves 6 (family size); Product portfolio - pasta bake, pizza sauce, lasagna sauce

Packaging formats: jars and some pouches and single serving pots; Pouches are mainly for single servings and advertised for their convenience (microwave-ability) and most have a see through window

Sustainability/philanthropy: Goal of 100% recyclable, reusable, or compostable packaging by 2025; advice on repurposing leftovers and packaging on websites; sustainable farming initiatives (i.e., Mutti x WWF); partnerships with charities (i.e. Magic Breakfast x Heinz, Natasha Allergy Research Foundation x Sacla)

Opportunities for differentiation

- Product portfolio - "The whole Italian kitchen"
- Different packaging format or volume offering
- Using sustainability claims or labels

Takeaways

Overall, these are my key takeaways from the stakeholder analysis activities:

The producers have a large influence on the packaging process and determine what improvements can be made from a sustainability standpoint. However, one could say that the suppliers are even more critical as they determine what materials we can use and they often set minimum order quantities and lead times. However, there is no direct communication between Bertolli and the suppliers. Bertolli could start to form a relationship with suppliers and support sustainability efforts.

KIDV and WRAP can be valuable partners in knowledge sharing. Thus forth, they are included in the sustainability roadmap, which is detailed later in Section 5.1.

Waste management actors should be consulted to learn more about what is truly recyclable in various areas as that is not consistent across different countries and regions. This was done during the concept development phase.

The applicable regulations depend on what packaging materials are used. A lot of regulation is fixated on plastic packaging waste so if different materials are used, there are less regulations to be concerned about.

Retailers are influential in setting the standards for sustainable packaging or products for brands and suppliers. To ensure that the packaging fits their criteria, the final design was evaluated against their sustainability requirements/goals. To generate buy-in for Bertolli pasta sauce products, pack testing was conducted with a reputable agency.

A sustainability strategy can be a differentiator for Bertolli in the UK market where very few brands are not embedding sustainability cues into their packaging.

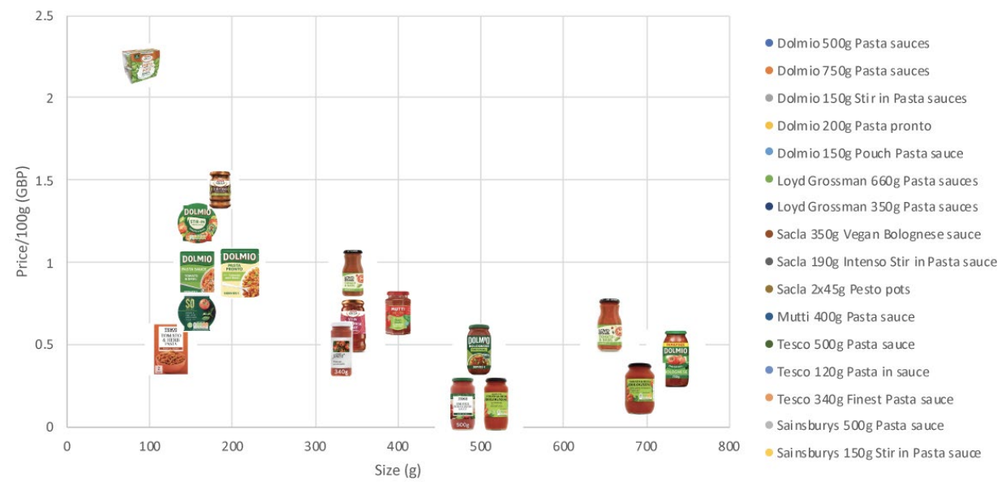


Figure 2.2.5 - Price vs. size mapping

	history/owner	proposition and claims	portfolio/offering	brand/pack look and feel	sustainability
Dolmio	mars	convenience; good value	low fat offering	bold, punchy	mars: 100% recyclable, reusable, or compostable; reduce virgin plastic use by 25%; incoprorate 30% RC
Loyd Grossman	premier foods Loyd grossman celebrity chef	freshness; flavourful; indulgence and exclusivity	italian, indian, and thai sauces no added sugar	simple, fresh, ingredients imagery	100% recyclable, reusable, or compostable by 2025 https://www.premierfoods.co.uk/Sustaina
Sacla	authentic italian roots	authentic italian	no added sugar; organic and plant-based	indulgent, intense, eye-catching metallic details	jars and metal caps - 15% RC, cardboard trays - 40%; pesto in pots means less food waste and pots are recycable; ideas
Homepride	premier foods	for families; convenience; good value	slow cooker concentrated sauce; cooking sauces and pasta bake; no added sugar or reduced fat	childish, nostalgic	100% recyclable, reusable, or compostable by 2025 https://www.premierfoods.co.uk/Sustaina
Heinz	150 years of history (US)	"grown not made" - from seed to bottle	pasta sauce, sauces, beanz, soups, pasta, dessings, meat-free	simple, timeless look	sustainability - "a better planet starts with the soil"; health and wellness; sustainable sourcing and growing;
Mutti	120 years of history (IT)	the best, most authentic italian tomato	tomato products (polpa, pelati, passata, etc.)	regal, classic italian look	cooperation with WWF italy - sustainable farming; field to table webpage https://mutti-
Napolina	Naples roots	bringing our passion for italian style food to life on your table	tomato products, beans, pasta, sauces, olive oil, pizza	Premium, minimalist	partnered with Provenance and Coldiretti Farmer's union explanation on packaging

Figure 2.2.6 - Competitor analysis

2.3 Sustainable Packaging

Introduction

This section summarises the most relevant sustainable packaging frameworks and methods that informed the concept development process, starting with some general knowledge about sustainable development and product design, then the notable philosophies toward sustainable packaging design, and finally specific frameworks, guidelines, and methods that can be applied to this project.

Background

Background information about sustainable development and different approaches to sustainable product design were studied and summarised in Appendix B.

The main takeaways from this research are:

Sustainable development

Strong sustainability and the UN Sustainability Development Goals (SDGs) set some priorities for the project.

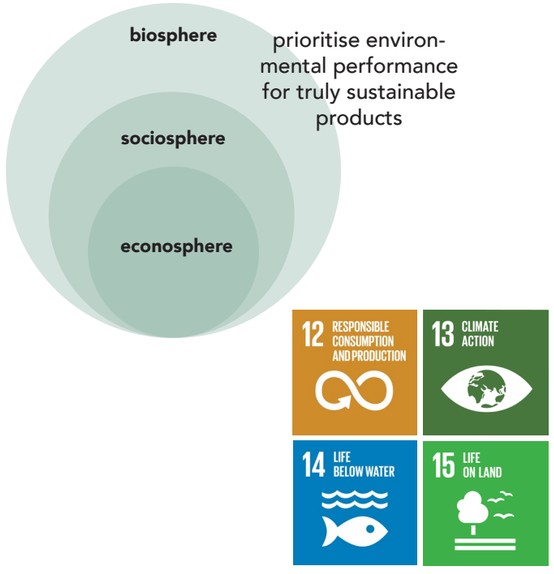


Figure 2.3.1 - Strong sustainability and relevant SDGs. SDG icons from https://www.kit.nl/.

Sustainable product design

In the area of product design there are several different approaches toward sustainability. For instance, there is the field of eco-design, which encompasses various strategies to reduce the environmental impacts of products and services. Another approach which is interrelated with eco-design is cradle to cradle or circular design. The governing principle of this approach is that waste equals food: materials at a product's end of life shall feed biological or technological cycles so that products can be regenerated endlessly. This means that in the area of packaging, recovery of materials is more important than minimising packaging from the start (Wever, 2014). Research into these approaches garnered the following insights:

- Ensuring that the final product and packaging combination fulfils functional, social/positional, and inspirational/spiritual needs is crucial to develop a truly sustainable solution.
- Consumer behaviour is something to keep in mind when it comes to eco-design to avoid any adoption issues or the rebound effect.

Sustainable Packaging Approaches

In the area of packaging there is no one definition for sustainable packaging. Organisations like the Sustainable Packaging Coalition (SPC) define sustainable packaging in a technical and objective way.

According to the Sustainable Packaging Coalition (SPC), sustainable packaging:

- Is beneficial, safe and healthy for individuals and communities throughout its life cycle; 2. Must meet market criteria for performance and cost;
- Is sourced, manufactured, transported and recycled using renewable energy;
- Maximises the use of renewable or recycled source materials;
- is manufactured using clean production technologies and best practices;
- Is made from materials healthy in all probable end-of-life scenarios;
- Is physically designed to optimise materials and energy; and
- Is effectively recovered and utilised in biological and/or industrial cradle to cradle cycles

(Fitzpatrick et al., 2012)

However, this definition does not necessarily align with how the various system stakeholders define sustainable packaging. Literature suggests that eco-friendliness can be understood from three different perspectives: governmental, scientific and consumer (Boks and Stevels, 2007, as cited in Magnier & Crié, 2015). Governmental eco-friendliness is related to carbon emission goals and waste management regulations. From the scientific perspective, eco-friendliness is defined by the analysis of scientific measures across the whole product life cycle through the use of life cycle assessments (LCAs). Finally, the consumer perspective is concerned about eco-friendliness perception. In this project it is important to take into account all of these perspectives to deliver a holistically sustainable concept (Figure 2.3.2).

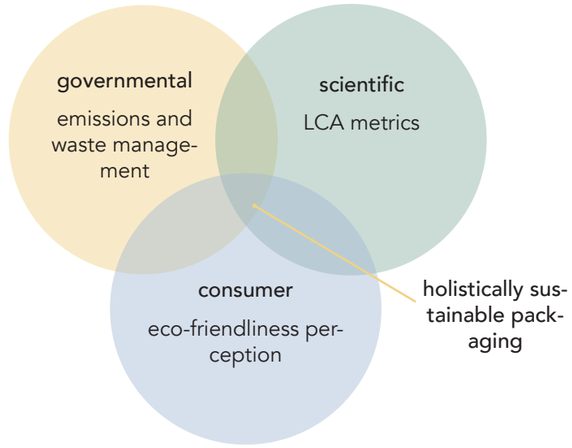


Figure 2.3.2 - Venn diagram of different views on sustainability

In the packaging industry there is an ongoing discourse about sustainability strategies. A priority order of waste management strategies was formally established by the European Waste Framework Directive. One can see this hierarchy in Figure 2.3.3.

According to Bruijnes et al. (2020) these strategies can be grouped into three main types of sustainability strategies for the packaging problem: Laissez faire (business-as-usual), Problem-limiting sustainable development, and Intrinsically sustainable development.

In the past, generally companies only focused on reducing material as there is also an economical benefit for doing so. There was no regard for what happens after packaging use. That was the Laissez faire, passive approach. The consensus among experts and regulatory bodies is that circular approaches are better than the linear approaches used up until now. According to Nordin & Selke (2010), this circular design mentality is summarised in the following cradle to cradle vision: "a vision for sustainable packaging is that a package is sourced responsibly, designed to be effective and safe to human health or ecosystems, made efficiently with renewable energy and meets market criteria for cost and performance, and once used, is recycled or reused efficiently to provide valuable resources for subsequent generations." This is very much inline with SPC's definition of sustainable packaging and proposes clear criteria for developing packaging based on ecodesign and circularity principles. However, even if we apply cyclical principles, completely closing the loop is not possible (Bruijnes et al., 2020). There will always be a need to extract more resources for the growing population and emerging economies. Plus, product/material loops are complex given the unpredictability of consumer behaviour and inevitable existence of impurities. Therefore, we can only hope to make the most of what we extract and ensure the waste does not contaminate the biosphere (Bruijnes et al., 2020). This is why the ultimate future-minded strategy is the Intrinsically sustainable development strategy: ensure that material flows passing through are biosphere-compatible to allow for better social welfare and well-being (Bruijnes et al., 2020).

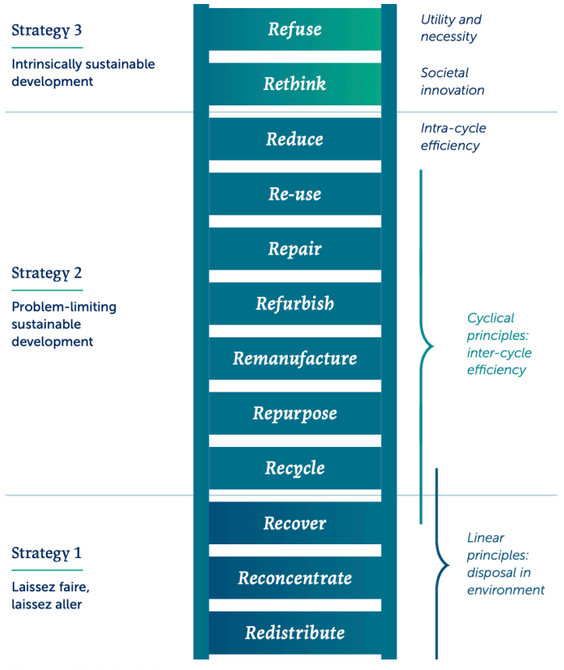


Figure 2.3.3 - Waste management hierarchy with categories. Extracted from Bruijnes et al. (2020).

While a dominant narrative for the past few decades was that packaging should be reduced as much as possible, that approach can actually do more harm than help due to the potential increase in food waste. Instead of viewing packaging as an additional economic or environmental cost, one can view it as added value for waste reduction (Guillard et al., 2018; Lindh et al., 2016). The primary function of packaging is to protect the food so it is important to not lose sight of that as a sustainability driver in itself. However, there should be a balance between protection and limiting the impact of the packaging materials. Licciardello (2017) proposes that packaging developers should use the "Packaging relative environmental impact" (PREI) to determine a suitable sustainability improvement strategy. The PREI is the ratio of the packaging's environmental impact to the overall environmental impact. By knowing the PREI, one can determine if the focus should be on reducing packaging impact or on developing effective

Product	Package material	PREI (GWP%)
Tomato puree	carton-based	9.7-12.1
	glass bottle	36.3-46.8
Tomato, chopped	glass bottle	46.5
	tinplate steel can	55
Tomato, peeled	tinplate steel can	46.1-51.5

Figure 2.3.4 - PREI values of tomato products. Adapted from Del Borghi et al. (2014).

packaging to protect the food from being wasted. Figure 2.3.4 is a table of PREI values for products similar to pasta sauce.

We can assume for pasta sauce the PREI would be around 40% for glass jars and cans, which compared to dairy and meat products is relatively high, but not as high as beer and wine. The proposed strategies for this PREI value is to reduce packaging or choose alternative packaging materials (Licciardello, 2017).

Another dimension of packaging sustainability to consider is the social dimension. For one, as the interface between consumers and food supply chain, packaging could be used to spur consumers to consume more responsibly and sustainably (Santi et al., 2022; Nordin & Selke, 2010). This could be done through building awareness about the whole life cycle impact of the packaging or empowering consumers with the ability to make more informed decisions by providing metrics to evaluate packaging sustainability. More sustainable behaviour change could also be prompted in the use phase by designing the packaging so that it is intuitive to empty, wash, or reseal so that the consumer can successfully do their part in preventing food waste and ensuring proper disposal/recycling.

Sustainable Packaging Frameworks and Methods

Figure 2.3.5 depicts various guidelines and frameworks that can be considered to develop sustainable packaging.

Aside from frameworks and guidelines, there are also some specific methods that can be employed to help with ideation and concept refinement. These include:

Whole system mapping: Consists of four steps - 1. Create a whole system map of the product; 2. set priorities based on a life cycle assessment and business strategy; 3. brainstorm solutions on the system map; 4. choose winning ideas based on priorities set in step 2 (VentureWell, n.d.)

Ecodesign strategy wheel or Lunar design field guide (Yumpu.com, n.d.): ideation tool for ecodesign and can be used to assess the design before and after improvements

Rethink activity: ideation tool that uses motivation laddering to uncover new product-packaging combinations

Life cycle assessment (LCA): a common method for measuring the environmental impact of products; will be expanded upon in the next section

Functionality and usability testing: tests for validating functionality and usability aspects (Grönman et al., 2013)

Title	Source	Description
Packaging for sustainability framework	Sustainable Packaging alliance (SPA)	Uses SPA definition as a framework for evaluating packaging sustainability
Sustainable Packaging Guidelines	Australian Packaging Covenant Organization	Sustainable packaging principles and considerations
Framework for sustainable food packaging design	(Grönman et al., 2013)	Packaging design process incorporating various design methods
Food Packaging Sustainability Framework	(Santi et al., 2022)	Evaluates the presence of "levers" and thus the sustainability potential of packaging

Figure 2.3.5 - Relevant guidelines and frameworks

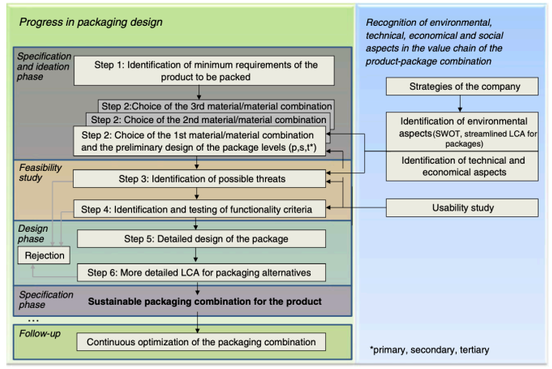


Figure 2.3.6 - Framework for sustainable food packaging design. Extracted from Grönman et al. (2013).

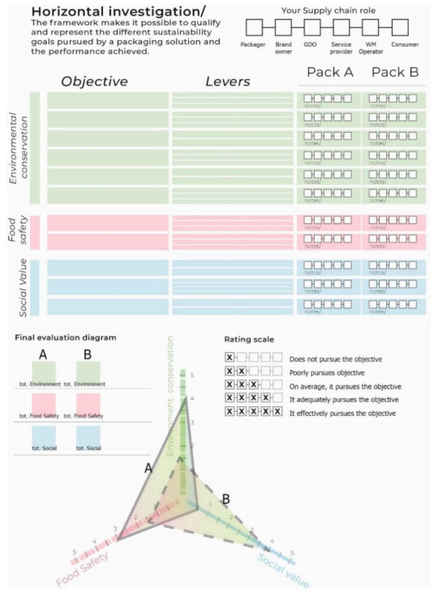


Figure 2.3.7 - Food Packaging Sustainability Framework. Extracted from Santi et al. (2022).

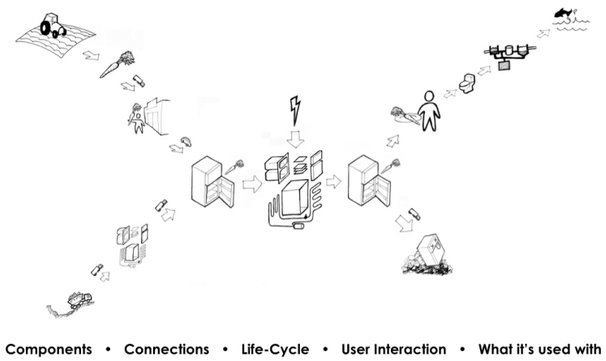


Figure 2.3.8 - Whole system mapping. Extracted from VentureWell (n.d.).

Figure 2.3.9 - Lunar design field guide. Extracted from Yumpu.com (n.d.)

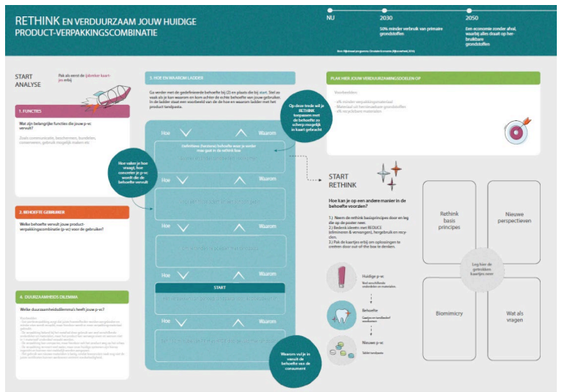


Figure 2.3.10 - Rethink tool. Extracted from Groote Schaarsberg & Oskam (2021).

There are several tool for decision-making:

Simplified environmental evaluation tool: tool with four assessment areas - 1. Packaging material; 2. Transport efficiency; 3. Influence on household food waste; 4. Packaging end-of-life (Molina-Besch & Pålsson, 2020).

Impact matrix: matrix between environmental indicators and phases in the life cycle

A mix of these methods were used in this project. The impact matrix was the inspiration behind the value chain activity in Section 2.2. The Whole system mapping activity was conducted to benchmark and ideate (Section 3.1). The Rethink tool and Lunar design field guide were used during ideation (Section 4.2). Simplified LCAs were conducted for all of the considered pack formats (Section 3.2 and Chapter 4). The SPA Packaging for sustainability framework, the Framework for sustainable food packaging design, the Food Packaging Sustainability Framework, and the Simplified environmental evaluation tool were used in the development of the Holistically sustainable packaging rubric, which is discussed in Section 3.4.

Figure 2.3.11 - Environmental Evaluation tool. Extracted from Molina-Besch & Pålsson (2020)

Table 3.10 Sustainability impact matrix for roasted coffee

	Cultivation/ primary processing	Roasting, packaging	Distribution	Consumption	Disposal
Energy	High	Medium	Low	High	Low
Air	Medium	Medium	Low	Medium	Low
Water	High	Medium	Low	High	Low
Soil	High	Low	Low	Low	Low
Waste	Low	Medium	Low	Low	High
Ecosystems	High	Low	Low	Low	Low
Health	Medium	Low	Low	Low	Low
Equity	High	Low	Low	Low	Low
Opportunities for improvement and innovation	Organic growing Minimum prices paid to growers	Energy efficiency Cleaner production		Work with machine manufacturers to improve efficiency	Recyclable packaging Encourage composting of coffee grounds
Environmental claims or labels	Certified organic Fair trade				Recyclable packaging Mobius loop recycling symbol

Source: Builds on Belz and Peattie [2, p. 60]

Figure 2.3.12 - Impact matrix. Extracted from Fitzpatrick et al. (2012).

Considering the approaches, guidelines, and methods presented above, we can consolidate sustainable packaging design strategies into the following categories:

- refuse and rethink - about interrogating why packaging is needed in the first place and potentially eliminating it or innovating the product and packaging combination to serve the core needs in a more efficient way
- reduce - optimise for material reduction; reduce the number of materials used optimise or eliminate secondary packaging; reduce manufacturing complexity
- reuse - packaging is reused over multiple product use cycles either by the consumer refilling the packaging or returning the packaging
- repurpose - packaging fulfills a new function and thus more utility is gained before its disposal
- recycle - design for recycling or increase recycled content
- food waste prevention - preservation, resealability, encourage using leftovers
- go renewable or bio-based - bio polymers, non-plastic bio-materials
- eliminate steps or processes - sourcing from same supplier, reduce manufacturing complexity, reduce stops in distribution
- offset/compensate - support projects that reduce or remove greenhouse gas emissions to offset the firm's emissions
- certified sustainable sourcing - source materials from suppliers with sustainability certifications

However, there are various barriers to achieving some of these strategies as summarised in Figure 2.3.13. These obstacles were considered when evaluating concepts.

Figure 2.3.13 - Hurdles to circularity diagram. Extracted from Bauer et al. (2021).

Life Cycle Analysis

An important method that was employed throughout my design process is the life cycle analysis (LCA). LCA is widely used for assessing the environmental impact of products and processes along the whole life cycle. The general framework for conducting an LCA is laid out in ISO standards 14040 and 14044. Figure 2.3.14 describes the LCA process.

There are many different tools that can be used for LCAs. For this project fast track LCAs (EcoAudits) were conducted using Granta Edupack.

Usually, LCAs measure the global warming potential of a product in the unit "kg Co2 eq." However, there are many other metrics or indicators that can be measured. Some common metrics are:

- Climate change
- water extraction
- mineral resource extraction
- stratospheric ozone depletion
- human toxicity
- freshwater, marine, and terrestrial ecotoxicity
- fossil fuel depletion
- eutrophication (freshwater)
- photochemical ozone creation
- acidification (terrestrial)
- land occupation
- natural land transformation

Since it is difficult to make trade-offs with so many impact categories to consider, LCA metrics that combine individual impact categories and convert them into more tangible units of damage (i.e., disability-adjusted life years, percentage of species likely to go extinct every year, cost increase in commodity prices) have been developed over the years. (See the Figure 2.3.15 for the ReCiPe method.)

There are various limitations to LCAs when it comes to assessing packaging sustainability. First off, there is quite a bit of methodological diversity in how LCAs are conducted, which makes comparing studies difficult. To add, manufacturers can bias the results by selecting more favourable methods and secondary data. In fact, Pauer et al. (2020) found that there are non-negligible discrepancies between databases. For instance, Ecoinvent contains more background processes than GaBi and the different databases use different allocation methods. Another issue is presenting just one indicator. Some manufacturers conduct LCAs focusing on one indicator like CO2 emissions, which does not give us the whole picture and can even be misleading if they claim to be environmentally-friendly based on just that one factor when the product might have harmful effects in other areas. There is also the risk of using too many indicators when some of which might be irrelevant or redundant (Pauer, 2021).

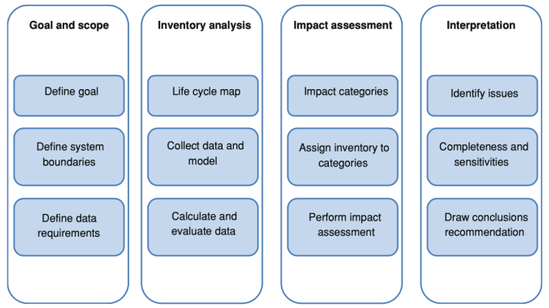


Figure 2.3.14 - LCA Process. Extracted from Fitzpatrick et al. (2012).

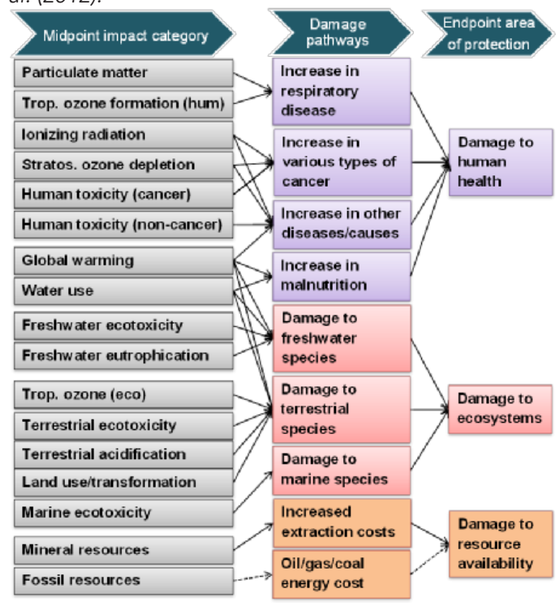


Figure 2.3.15 - ReCiPe Overview. Extracted from Huijbregts et al. (2016).

While there are plenty of metrics that LCAs can cover, there are also plenty of things that they do not measure like the social aspect of sustainability (i.e., added convenience, behaviour change, etc.) (Wever, 2014; Boz et al., 2020).

In order to address these limitations, it is good practice to conduct sensitivity analysis and peer review (Wood & Sturges, 2010). Another strategy is to couple the LCA with other approaches to understand the benefits and drawbacks on a more holistic level (Leggett, 2022). For instance, Bertoluci et al. (2014) conducted a functional analysis and questionnaire with potential users to judge the concept's performance on more key functionality-related metrics. Another approach is to combine the LCA with a Life Cycle Costing (LCC) and Willingness to Pay (WTP) measurement to evalutate the viability of the product (Dobon et al., 2011). Wever (2014) proposed a metric called Eco-cost Value Ratio (EVR), which measures the functionality per unit of environmental impact. This metric accounts for the fact there can be concepts with a higher absolute carbon footprint value, but are more efficient at fulfilling certain functions.

There are some considerations that should be taken into account to ensure that the LCA is a realistic representation of the true scenarios. For example, the likelihood of proper disposal, and amount of food waste should be factored into the assessment (Boz et al., 2020; Pauer, 2021). Also, it is important to make a proper recyclability assessment by considering waste management capabilities of the market where the product is sold (Schweitzer et al., 2018; Pauer, 2021).

Review of relevant LCAs

A review of LCAs for similar products to pasta sauce was conducted to get a general idea of the environmental performance of applicable packaging options. Figure 2.3.16 shows the performance of each format relative to the highest impact format. The following insights were extracted from the papers:

The impact is dependent on the country (Humbert et al., 2009; Bertoluci et al., 2014). This is due to the variations in transport distances and recycling rates. Given this finding, the transport distances for distribution in the UK and UK recycling rates were used in the EcoAudits for this project.

Aside from the raw material production, the secondary manufacturing and production processes can have a large influence on the overall impact. Poovarodom et al. (2012) found that the printing and lamination steps of pouch were the most energy intensive (1/2 of emissions in manufacturing process). This study also found the retort pouch had the largest impact and this result can be largely attributed to the fact the pouch is less efficient to sterilise. In Humbert et al. (2009)'s study, 23-34% of the total benefit of the plastic pot could be attributed to using the ultra-high temperature process instead of retort sterilisation. Thus forth, it is important to consider these specific processes when comparing the impact of different pack formats. It was not possible to include the manufacturing and production processes in the EcoAudits conducted in this project due to a lack of information and limited software functionality, but it is a future recommendation to conduct more thorough LCAs.

Generally, in the studies that assessed glass packaging (single-use), the glass packaging had the highest impact. This was not the case for Poovarodom et al. (2012) due to the sterilisation inefficiencies as mentioned in the previous paragraph. In the case of Cappiello et al. (2022), the glass bottle actually had a lower impact than the alternatives in the impact categories climate change, acidification, freshwater eutrophication, water resources depletion, and particulate matter, but had the highest impact in the categories ozone depletion human toxicity, photochemical ozone formation, and land use. This highlights the importance to consider several metrics to prevent blindspots.

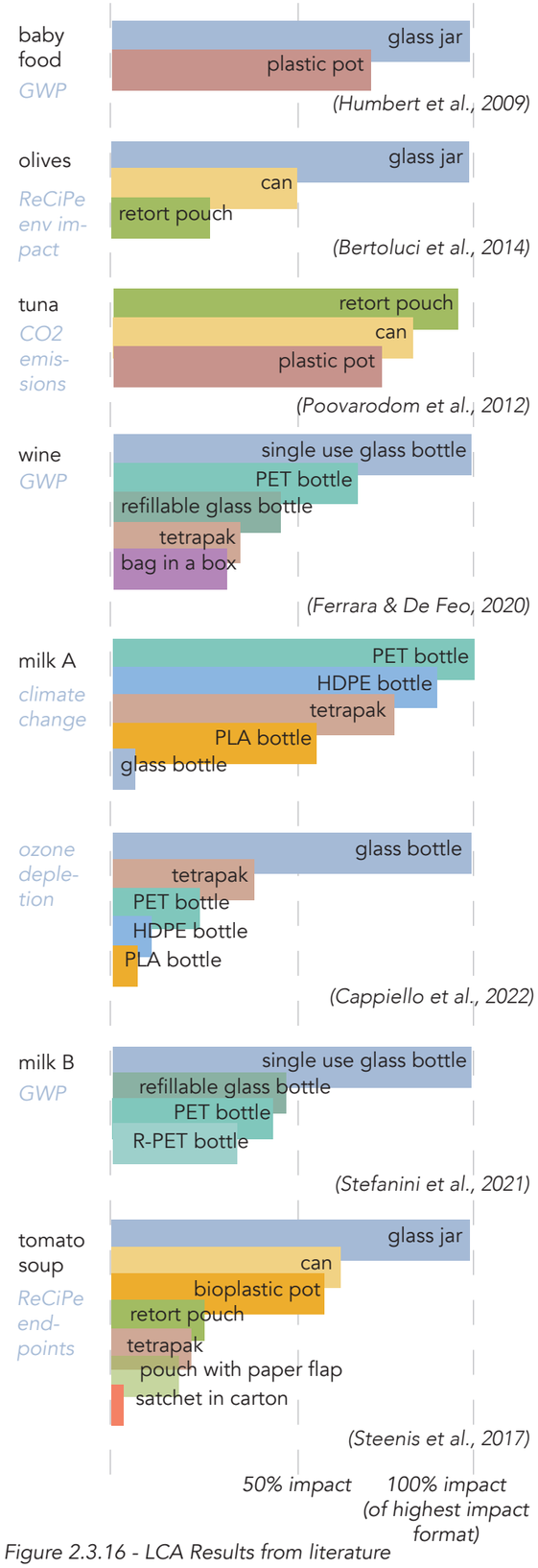


Figure 2.3.16 - LCA Results from literature

Takeaways

Sustainable packaging approaches

There are varied definitions of sustainable packaging and in this project I focus on the intersection of the definitions to achieve a holistically "sustainable" design

It is important to consider the waste hierarchy and aim for higher up the ladder to find more future-proof and intrinsically sustainable ideas.

Sustainability can also be maximised by considering the food waste and social element of packaging. By calculating the PREI-value, one can determine the focus of the packaging redesign. In this case, preventing food waste can be less of a priority since the PREI value is relatively high. Also, there is potential for the packaging to be an interface for building greater consumer awareness and nudging the consumer to adopt more sustainable practices.

Sustainable packaging frameworks and methods

Several relevant frameworks and methods were identified. These tools were used in this project and can be used in Bertolli's future projects, as well.

There are various strategies for sustainable packaging design, as outlined on page 32. These strategies were considered during the concept development phase and some were incorporated into the roadmap as future recommendations for packaging redesigns.

LCA

When conducting LCAs it is important to consider what metrics are being measured and which are not (i.e., functionality changes, WTP, etc.), and to account for those as much as possible (when relevant).

The review of relevant LCAs revealed some important influencing factors, such as country and secondary manufacturing and production processes.

2.4 Consumer Behaviour

Introduction

Improving the sustainability of packaging is not only about reducing the carbon footprint or energy consumption during the production and transport phases, but also about supporting sustainable consumer behaviour. Sustainable packaging solutions can only be successful if consumers are likely to purchase and willing to pay for the eco-alternatives (Steenis et al., 2018). The packaging should support sustainable purchase behaviour, reduce the likelihood of food waste, and ensure proper disposal or reuse practices. Therefore, it is essential to understand consumer behaviour theories regarding the topics of appearance, emotion, attitude formation, decision-making, behaviour change, and categorization.

Luckily, there has been an increasing share of consumers who are interested in sustainable products and packaging. In fact, according to Kantar's Worldpanel study about Eco consumer segmentation, in 2022, around 18% of households worldwide are considered "Eco Actives," meaning that they are highly concerned about the environment and are actively pursuing ways to reduce their plastic waste (KANTAR, 2022). They project that this figure could grow to 38% by 2027. Eco Actives look for locally produced products, products with natural ingredients, refillable over single use products, recycled plastic products, reduced carbon footprint labels, and generally avoid plastic packaging (KANTAR, 2022). And the pursuit for more sustainable packaging is not only on the minds of Eco Actives, but also on the minds of a majority of consumers worldwide as 62% of people try to buy environmentally friendly packaging.

However, this intention does not reliably lead to action. For instance, only 24% of people actually avoid plastic packaging. 30% of UK consumers are interested in the environment, but this intention does not translate to green purchase behaviour (Defra, 2006 as cited by Orzan et al., 2018). In the US, nearly 2/3s of consumers look for environmentally friendly products, but 22% consumers actually buy green products; (GMA & Deloitte, 2009, as cited in Grönman et al., 2013). A survey of Portuguese consumers found that 31% of consumers think about the negative impact of plastic packaging, but buy the product anyway,

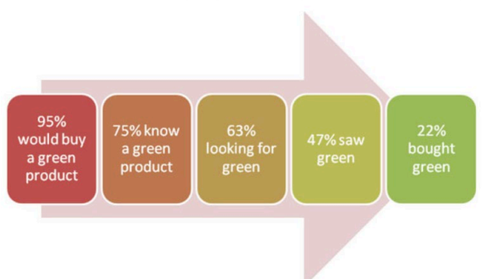


Figure 2.4.1 - Results from Deloitte consumer study showing lost opportunity on the path to purchase. Extracted from Fitzpatrick et al. (2012).

39% sometimes choose to not buy the product, and 30% look for alternatives (Macena et al., 2021).

The following sections summarise the insights gathered from consumer behaviour theory and studies to unpack what consumers care about when it comes to packaging, the intention-behaviour gap, consumer perception of sustainable packaging, and packaging cues.

Decision-making

Process

According to consumer behaviour literature, there are two main categories of decision-making processes that consumers may adopt when making a purchase decision: compensatory and non-compensatory. In compensatory decision-making, each option is evaluated against multiple criteria and the one with the highest overall score "wins." In non-compensatory decision-making, positive evaluations do not compensate for negative evaluations. For REPLIN (REpeat Purchase Low-INvolvement) products it is posited that consumers use non-compensatory techniques, like "satisficing," that are based more on intuition than on a deliberate weighing of different factors (Kunamaneni et al., 2019).

Several studies have found that sustainability is an issue of general interest to consumers, but not of high priority in the context of food choice (Fitzpatrick et al., 2012; Grunert et al., 2014; Pires et al., 2015; Janßen & Langen, 2017). Therefore, while it is reported that consumers are buying more environmentally friendly packaging in general, that may not be the case for the pasta sauce product category where factors other than environmental impact are paramount. However, many of these literature findings are fairly outdated. One can assume that environmental concern has only increased since then as the effects of climate change have become more palpable. Therefore, environmental friendliness might be a higher priority nowadays.

Yet, it is still difficult to see the connection between a purchase and the environmental consequences (Thogersen, 2000), making it also difficult to distinguish between more or less sustainable alternatives (Bech-Larsen, 1996). This difficulty leads to consumers leaning on heuristics and habits to make decisions (Koenig-Lewis et al., 2014).

Decision-making factors

There have been various studies on the factors that consumers consider when choosing food products. One study conducted with German consumers in 2009 found that taste and price were primary determining factors of purchasing beverage products and would not be sacrificed for more environmentally-friendly packaging (Van Birgelen et al., 2009). According to Fitzpatrick et al. (2012), price, taste, convenience, and habits are the reasons for purchase in Australia with only 4% mentioned packaging (Fitzpatrick et al., 2012). In the UK, low price is the number one factor influencing purchasing (Mintel, 2020). And healthy options (i.e., less sugar, less fat, etc.) appeal to a third of UK consumers, which suggests healthiness is an important decision-making factor. Another driving factor is habit, which means that Bertolli, as a new player, needs to find a way to break consumers' purchasing routines to ensure a successful launch in the UK (Mintel, 2020).

Decision-making factors related to packaging

While consumers may not reference packaging as a decision-making factor, it undoubtedly plays a role in their evaluation of options especially in the pasta sauce product category where differentiation is low (Magnier et al., 2016). When it comes to the packaging design, some important factors are price, quality, safety, material, size, shape, convenience, functionality, protection, shelf life, environmental sustainability, biodegradability, reusability, and recyclability (Norton et al., 2022). Some drivers of purchase related to packaging for UK consumers are ease of transport, disposal, and storage in the home (Young, 2008, as cited in Lindh, Olsson, et al., 2016). A cross cultural study conducted in 2008 found that across the US, the UK, Germany, and China, packaging preferences are mainly driven by functionality and protection (Young, 2008, as cited in Nordin & Selke, 2010). In fact, less than 10% of participants spontaneously mentioned environmental aspects when explaining their packaging design preferences. However, the study also reported that sustainability features could drive a purchasing decision if quality, appearance, and functional needs are met.

According to Otto et al. (2021) some important sustainability factors related to packaging are material, size, ease of opening and resealing, and (perceived) recyclability. End of life attributes stand out to consumers across multiple cultures (Liem et al., 2022; Borden et al., 2018; Van Dam, 1996). For UK consumers, fundamental attributes for sustainable packaging are biodegradability, disposal methods, renewable sources (Norton et al., 2022). 10% of UK consumers look for information on the label about recycling and 9% avoid over packaged products (Fitzpatrick et al., 2012; Schweitzer et al., 2018). A clear majority of UK consumers used "made from recyclable materials" to judge if a package is environmentally-friendly (Young, 2008, as cited in Lindh, Olsson, et al., 2016). According to Innova market insights, gobally, 41% of consumers want an environmental score or grade on the packaging (Gore-Langton, 2022).

An Innova Market Insights study found that in 2022, 1 in 5 consumers, globally, believe that reusable packaging is the most sustainable (Gore-Langton, 2022). Reusable packaging was followed by recyclable packaging, biodegradable packaging, compostable packaging, packaging made from recycled materials, and refillable packaging as the most sustainable packaging type (Poole, 2023).

Intention-behaviour gap

As mentioned earlier, there is a gap between what consumers intend and how they behave. As depicted by the matrix in Figure 2.4.2, the factors impacting the intention-behaviour gap are the degree of compromise and degree of confidence (Fitzpatrick et al., 2012).

In terms of degree of compromise

- There are perceived risks associated with and distrust toward sustainable products which is elaborated on later in this section.
- There are not enough convenient means of being more environmentally-friendly (KANTAR, 2022).
- Strategies to reduce degree of compromise: Assure that quality, shelf-life, and price are not different (if that is the case); create awareness about the benefits of the pack type (Sharma, 2021); make the sustainable packaging format the norm by pushing for a category-wide shift

degree of confidence

- In a study examining Swedish consumers' perceptions and knowledge of environmental aspects of food packaging, it was found that around half of the respondents did not know the environmental impact of packaging (Lindh, Olsson, et al., 2016). Even if consumers want to buy more sustainably-packaged products, it is difficult for them to make informed decisions based on environmental impact.
- Strategies to increase degree of confidence: Combat lack of knowledge and distrust by using third party certifications or claims that are clear and understandable

The intention-behaviour gap can also be understood through behavioural models like the Theory of Planned Behaviour (TPB). The TPB posits that attitudes, the sub-

Degree of confidence \ Degree of compromise	Low	High
High	Win-win purchases	Feel-good purchases
Low	Why not? Purchases	Why bother? purchases

Figure 2.4.2 - Sustainability purchase matrix. Extracted from Fitzpatrick et al. (2012)

jective norm together with perceived behavioural control are factors of human behaviour (Ajzen, 1991).

The beliefs that set the desired behavioural intention (i.e., purchasing the product) are:

- attitude: "using sustainably packaged pasta sauce is more sustainable than conventionally packaged pasta sauce"
- subjective norm: "people around me think that I should use sustainably packaged pasta sauce"
- perceived control: "it takes little effort to use sustainably packaged pasta sauce"

Attitude formation can be influenced by Bertolli through information campaigns (i.e., stressing the environmental and ethical impacts of their product). It is important to consider how the information is conveyed as some consumers may interpret sustainability messages or cues as greenwashing (Dörnyei et al., 2022). Another consideration is consumers' sceptism regarding the impact they believe they can make as an individual and in changing their pasta sauce packaging choice (O'Rourke & Ringer, 2016).

Given that pasta sauce packaging is not closley linked to one's external identity, the subjective norm belief is likely very weak. One study that measured the effect of adding social norm information on seafood labels found that this information actually demotivated shoppers (Richter et al., 2018). The paper suggests that consumers might have seen the labels as manipulative leading to psychological reactance.

The perceived control beliefs can be strengthened by improving product accessibility and design (i.e., price, good usability, improved functionality).

According to TPB model, the intention-behaviour gap is brought about by "influencing factors." Some potential influencing factors are habitual buying and brand loyalty.

Willingness to pay

While consumers state that food packaging plays an important role for their choice, 77% are not willing to pay more for environmentally-friendly packaging in Germany. On the other hand, 86% of consumers in Sweden, Finland and France are willing to pay more. These findings convey the importance of considering demographic differences when evaluating WTP (Willingness To Pay). Given that an international study showed that 73% of consumers from 11 countries are willing to pay more, one can infer that, generally, consumers are willing to pay a green premium (Otto et al., 2021).

In terms of how much consumers are willing to pay differs from country to country and depends on the product category. According to literature, an acceptable premium can vary between 1% to 15% (Pires et al., 2015; Young, 2008; Miremadi et al., 2012; Van Birgelen et al., 2009, as cited in Lindh, Olsson, et al., 2016; Grunert et al., 2014). In the UK, some consumers are okay with paying more and consumers are willing to compromise on shelf-life, but would not compromise on quality (Norton et al., 2022).

Image source: https://unsplash.com/photos/tWXH_zGJrPo

Sustainability perception

Perception vs. reality

To consumers, sustainable packaging is "packaging design that evokes explicitly or implicitly the eco-friendliness of the packaging" (Magnier & Crié, 2015). Since the consumer definition is based on a subjective evaluation of packaging cues, there is often a mismatch between what consumers believe to be more sustainable and what is scientifically more sustainable. For example, one review found that paper and metal were rated in line with scientific measure by consumers, but plastic was underestimated and glass and biodegradable plastics were highly overestimated in their sustainability (Otto et al., 2021). This mismatch (as depicted in Figure 2.4.3) was observed in a study with Dutch students evaluating different tomato soup packaging formats (Steenis et al., 2017). This misalignment may be related to the fact that consumers have an incomplete understanding of sustainable packaging due to insufficient communication about the role of packaging in the food value chain (Boz et al., 2020; Otto et al., 2021; Norton et al., 2022). Consumers often place high importance on material and convenience factors (i.e., open-ability, resealability, ease of transport, disposal, storage) and do not consider a packaging system's influence on aspects like food waste or efficient transportation when evaluating packaging sustainability (Lindh, Olsson, et al., 2016).

There is also a terminology gap. For example, some consumers may interpret "sustainable packaging" as "recyclable packaging" (Nordin & Selke, 2010), or assume that "made out of bio-materials" means it is "fit for home composting" (Guillard et al., 2018). Among Danish consumers, "bio-based" is misconstrued as "biodegradable" and the difference between compostable and biodegradable is unclear. And complex terms like post-consumer material, recycled content, biodegradable, may only confuse consumers or make them sceptical (Nordin & Selke, 2010).

On top of the misconceptions regarding sustainable packaging, there are some perceived costs associated with choosing sustainable alternatives. The perceived risks associated with sustainable packaging are an increase in price, decline in quality, hygiene or protection (Magnier & Crié, 2015; Orzan et al., 2018; Steenis et al., 2018). Regarding the quality aspect, Magnier et al. (2016) suggests that when a package is noticeably more sustainable, the product is perceived to be of better quality. This was the case for raisins and chocolate bars with French consumers, but a similar "halo effect" was not observed for milk with Dutch consumers where higher taste and health benefit expectations were not observed for milk products in packaging with explicit sustainability cues (Liem et al., 2022). In one of the studies conducted for this thesis, this halo effect is tested for the pasta sauce product category to understand whether sustainable packaging enhances or worsens quality perception (and thus the viability of the concepts).

According to Magnier et al. (2016), quality perception is mediated by perceived naturalness and in the domain of food products, there is a strong relationship between concepts of sustainability and naturalness. Therefore, higher packaging sustainability perception can also lead to a higher naturalness perception, which might be desirable for certain brands (Steenis et al., 2018). Moreover, sustainable packaging positively influences the perceived ethicality of the brand and purchase intentions (Magnier & Schoormans, 2015).

Sustainable packaging cues

According to cue utilisation theory, cues are used to

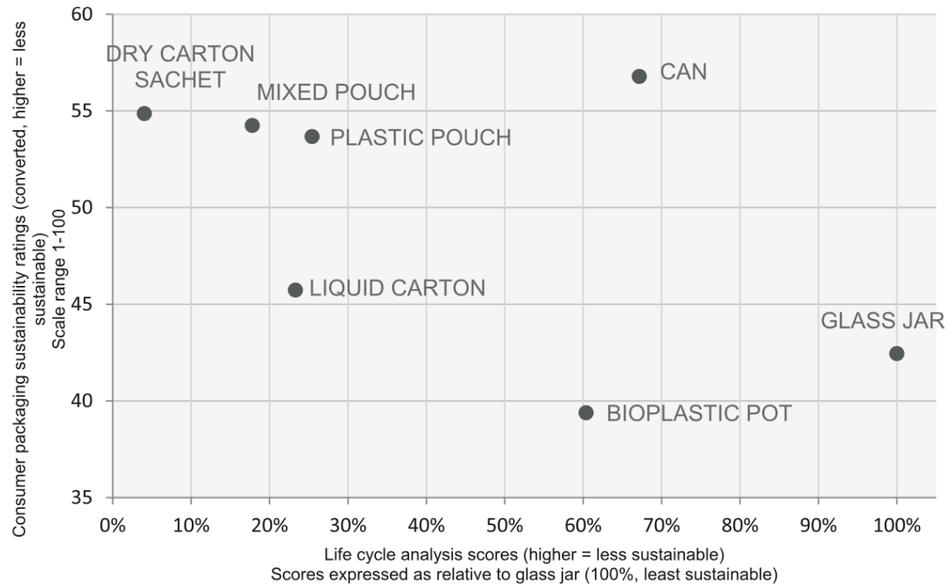


Figure 2.4.3 - Consumer sustainability ratings vs. LCA results. Extracted from Steenis et al. (2017).

evaluate products (Steenis et al., 2017). Figure 2.4.4 depicts the theoretical model for cue utilisation. Cues have predictive values (degree to which cues are associated with specific benefits) and confidence values (degree to which consumers are confident about making an accurate judgement based on the cues). There are intrinsic cues, which are qualities of the product itself, and extrinsic cues, which are related to characteristics like brand, packaging, and price. Extrinsic cues have lower confidence values, but are important in the purchase environment where intrinsic cues cannot be assessed. This might explain why consumers value having clear packaging. They are then able to see the product and thus sense intrinsic cues.

Depending on the design, person, and context, not all cues may be perceived and even if perceived, they might have different salience (i.e., different people have different reads on the same design). Steenis et al. (2017) found that cue utilisation is inconsistent for sustainability since different people use different criteria to determine packaging sustainability. They found that material choice has a strong effect, but consumers can also be influenced by graphics. Moreover, when intrinsic attributes are sustainable, the packaging sustainability does not increase the sustainability perception (Magnier et al., 2016). Given all of the inconsistencies in cue utilisation for food packaging, it was important that studies with the target users about the target product category be conducted in this project.

According to Magnier & Crié (2015), cues can be split into three categories: structural, graphical, and informational. Here is an overview of examples of cues and what the literature concludes in terms of consumer perception of those cues:

Structural cues

Examples of cues: over-packaging reduction, size, shape, container enlargement, concentrated, unpackaged, eco-refills, recyclable/RC materials, biodegradable materials, renewable materials, material weight, reusable/repurposable packaging

Note: Consumers do not always understand these elements as more environmentally-friendly. For instance, plant-based or recycled plastic needs to be visibly recognizable to be perceived as being more environmentally-friendly

- Paper, cardboard, and glass are seen as very environmentally-friendly (Magnier & Schoormans, 2017; Orzan et al., 2018; Lindh, Olsson, et al., 2016).
- Bioplastic packaging and Tetra pack are seen as an environmentally-friendly (Steenis et al., 2017; Lal et al., 2015).
- Stand up pouches, cartons and rectangularly-shaped packaging have a lower environmentally-friendliness perception (Steenis et al., 2017).
- Across various studies it was found that paper and metal are rated in line with scientific measure, but plastic is underestimated and glass and biodegradable plastics are highly overestimated (Otto et al., 2021; Steenis et al., 2017).

Findings unrelated to sustainability:

- Flexible material has a low quality, protectiveness perception (Steenis et al., 2017).
- Carton and rectangular shapes are associated with convenience (Steenis et al., 2017).
- Participants reported to like the products they believed to come from glass packages more than products contained in plastic packages (Balzarotti et al., 2015).

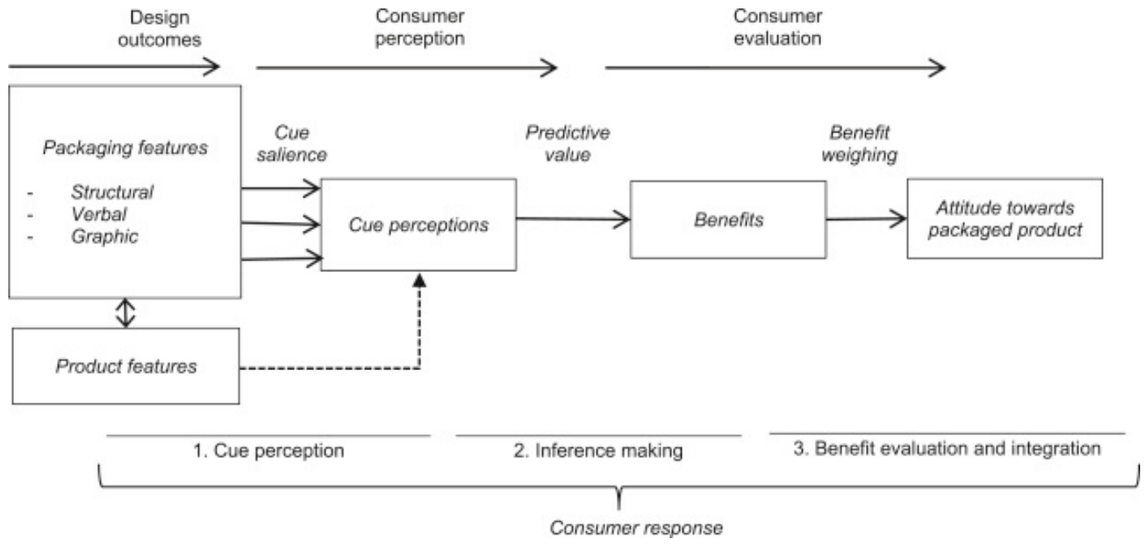


Figure 2.4.4 - Cue utilisation theory. Extracted from Steenis et al. (2017).

- Unusual shapes required longer visual and haptic exploration, and were rated as less pleasant and containing lower quality products (Balzarotti et al., 2015).
- Paper elicits positive emotions and feeling of healthiness (Otto et al., 2021).

Graphical cues

Examples of cues: colours, photos, images, logos

- Natural colour scheme, organic typography, and images of nature lead to higher environmental-friendliness (Magnier & Schoormans, 2017)
- Recycled/kraft look and green colour increase environmental-friendliness perception (Granato et al., 2022).
- Visible cardboard texture in combination with a cardboard look increases consumers' perception of sustainability (Liem et al., 2022).

Informational cues

Examples of cues: environmental labelling, licensing agreements, pedagogical attributes, environmental claim, scientific/environmental attributes

Note: Claims need to be understandable, meaningful, and credible to influence attitudes (Magnier & Schoormans, 2017; Smith & Brower, 2012). Otherwise, they may be misconstrued as greenwashing. They can be made more credible through expert endorsement (Smith & Brower, 2012).

- Verbal elements are usually subject to more intentional cognitive processing than graphic elements, but can also be subject to scepticism or confuse the consumer (Magnier & Schoormans, 2015; Richter et al., 2018; Boz et al., 2020; Grunert et al., 2014).
- Consumers tend to use labels to help arrive at quick decisions when purchasing low involvement products like food items or when it is difficult to evaluate product qualities (Chen & Chain, 1999 as cited by Janßen & Langen, 2017).
- German and UK consumers have a high concern, understanding, and use of labels compared to the other countries (Grunert et al., 2014).
- Labels can be used as a nudge. For instance, one study found that adding recycling info resulted from no preference to selecting more sustainable choice (Norton et al., 2022).

Note about combining cues

Combining visual and verbal claims can increase persuasive impact (Magnier & Schoormans, 2015). If there is an incongruence between the look and verbal claims, consumers may become suspicious.

Dörnyei et al. (2022) developed a matrix for evaluating how different sustainable packaging attributes are communicated through cues. This matrix (Figure 2.4.5) was used in the short-term/med-term concept development phase to come up with ideas for communicating the attributes of Bertolli's current packaging formats.

Figure 2.4.5 - Attribute cue matrix. Extracted from Dörnyei et al. (2022).

ATTRIBUTES			CUES										
			CONSUMER JOURNEY										
			View Visual Cues			Touch Sensory Cues		Read Information Cues	Consume Structural Cues				
LIFE CYCLE STAGES PACKAGING			Color	Label	Image / picture	Haptics / texture	Tightly packed	Text	P2P ratio	Packaging levels	Waste pieces		
No stage	-						▨		▨	▨	▨		
Material production	Reused		▨				▨		▨	▨	▨		
	Recycled						▨		▨	▨	▨		
	Renewable						▨		▨	▨	▨		
Packaging production	Less packaging		▨			▨							
	Local production		▨			▨	▨		▨	▨	▨		
	Environmentally friendly production		▨			▨	▨		▨	▨	▨		
Transport and use	Light-weight		▨			▨	▨			▨	▨		
	Space-saving		▨			▨			▨	▨	▨		
Post-use	Recyclable		▨			▨	▨		▨	▨	▨		
	Reuseable		▨			▨	▨		▨	▨	▨		
	Bio-degradeable		▨			▨	▨		▨	▨	▨		

Categorisation

We categorise the products around us to form judgements about their functions, quality, and other relevant attributes. Categorisation is especially important for repetitive, low-involvement purchases. Packaging plays a large role in categorisation since it is the main "face" of a product in the store. In general, categories are groups of products with similar physical attributes, type of usage or product goals.

Generally, consumers prefer more typical products especially when they are insufficiently motivated to compare brands (Schoormans & Robben, 1997). However, some consumers seek variety, or prestige. There is an upside down U relationship between time spent searching stimulus info and incongruity and between degree of arousal and incongruity. This means that medium incongruence has higher levels of uncertainty and time taken to categorise, yet leads to positive responses because it is more interesting. If the product is too incongruent, it can lead to frustration.

Another interesting category theory to discuss is alignability of attributes. This is a type of similarity-based comparison, where products are compared based on their attributes (Gentner, 1997). We talk of alignability between products when the attributes are similar. The pasta sauce product category in the UK market consists mainly of glass jars. Therefore, if a different packaging format is used, there will be less alignability between Bertolli pasta sauce and the pasta sauce category.

When a new product is aligned with its fellow category members, information about those products (positive or negative associations) transfer to the new product. This is called the assimilation effect (Schwarz, 1992). The opposite of this effect is the accommodation effect, where the product is designed to be distinct from the others, thus highlighting the innovative aspects of the product and creating a new product category. This could be an interesting opportunity for Bertolli to bring some freshness to the category and stand out as an innovative brand. However, if the pasta sauce packaging is too unique, consumers might not even consider it as an option as they are making split-second decisions on what pasta sauce to buy.

In the Consumer research section, I analyse the different packaging formats in terms of these categorization theories to draw conclusions about which formats are more acceptable.

Takeaways

Consumers usually use the satisficing decision-making strategy or go by habit when it comes to pasta sauce. For a successful launch, Bertolli needs to make a splash that gets consumers out of their habitual buying routine.

The main drivers of pasta sauce purchasing decisions are price and taste. For a more sustainable option to be considered, it needs to be within their WTP range and fulfil consumers' taste/quality, appearance, and functional needs.

Recyclability, biodegradability, renewable sources or recycled content are important sustainable packaging aspects for consumers

To better motivate sustainability packaging purchasing, the degree of compromise and increase degree of confidence should be reduced. Ways to influence consumers' attitude, subjective norm, and perceived control beliefs should also be considered. These aspects were contemplated in the concept development phase of this project.

There is a gap between perception of reality due to consumers not having a clear understanding of the whole system. Plus, there is a terminology gap. Therefore, it is important to educate the consumer in an approachable way (i.e., avoid jargon).

Increasing the naturalness perception could be a good way to improve quality and sustainability perception.

Paper or fibre-based material or look, natural graphical elements, environmental labels are all cues that can increase sustainability perception. The look and verbal claims need to be in alignment to have a more favourable perception.

Bertolli should find a sweet spot between assimilation and accommodation (in terms of categorisation).

2.5 Sustainability Strategy

Introduction

While the main focus of this thesis was packaging design, it was identified halfway through the project that Bertolli was lacking an overarching sustainability strategy to motivate and shape packaging innovation. Therefore, literature on brand sustainability strategy and communication was briefly studied. The findings were integrated to form a framework (Figure 2.5.1). This framework was used to create the sustainability strategy proposed to Bertolli.

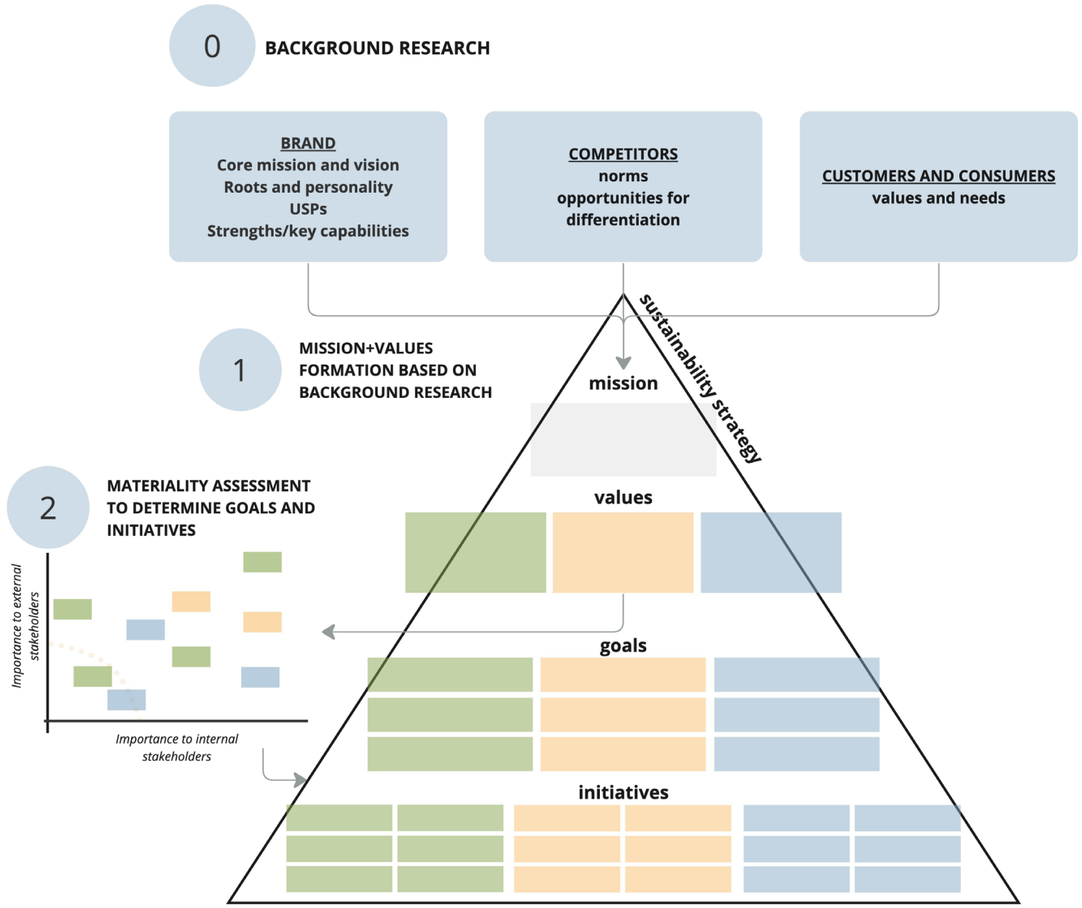
Functional Integration of Sustainability

In order to successfully integrate sustainability into an organisation, The UN Global Compact suggests applying three lenses: Strategic, Operational, and Cultural integration (Roadmap for Integrated Sustainability, n.d.).

- Strategic is about the priorities and goals
- Operational is about processes and practices
- Cultural is about the often unchallenged beliefs or behavioural patterns ("how things get done around here")

For this project the first two lenses are considered via developing and following a framework for building a suitable sustainability strategy (strategic lens) and developing

Figure 2.5.1 - Framework for sustainability strategy development



a roadmap that suggests the implementation of specific initiatives and processes (operational).

Framework development

When developing the sustainability strategy, it is important to find the "sweet spot" between the core brand DNA and sustainability. Langguth & Schnee (n.d.) identified that sustainable fashion brands have value propositions that do not clearly state sustainability, but rather imply sustainability-related values (i.e., "natural timeless fashion" (armedangels), 'long-lasting simplicity' (Filippa K), 'functional clothing and gear produced the best way possible' (Patagonia)). And their sustainability impact areas are rooted in the brand's value proposition: i.e., patagonia: outdoors, Filippa K: minimalism, Reformation: self-worth. The brands also have unique personalities based on their mission:

- Patagonia is "the activist company"
- Filippa K can be described as 'the minimalist', keeping clothing lines simple, communicating in a reserved Swedish way
- armedangels acts as a 'change agent', wanting to make a difference in the industry
- the feminist millennial', Reformation, combines fashion with trends, targeting primarily millennials (Reformation)

This analysis of the fashion brands implies the importance of considering the current value proposition and brand personality when developing a sustainability strategy. This also makes sense from the standpoint of value creation. According to the UN Global Compact, value is created at the intersection of unmet human needs, societal challenges, and core company competencies (Roadmap for Integrated Sustainability, n.d.). Therefore, the current brand's strongpoints and capabilities, which are usually also built into its value proposition, must be considered.

The fact that all of the brands adopted unique personalities suggests that it is best practice to (a) consider the target consumer group and cater the mission, values, and personality to their preferences and (b) analyse other brands' personalities so that a unique positioning can be found. For the brand to be meaningful, there should be clear functional, personal well-being, and collective well-being benefits (Roadmap for Integrated Sustainability, n.d.).

Given these findings, the three main blocks of the framework were developed: brand, consumers, and competitors.

Communication

According to Pujol (2022), to build legitimacy in a sustainability strategy, 3 connections need to be considered:

- Brand and Environmental sustainability: This connection is fostered via explicit, detailed, and visible messages showing that the brand is actually concerned and acting.

Figure 2.5.2 - Fashion brand sustainability personalities (from top to bottom: Patagonia, Filippa K, Armedangels, Reformation

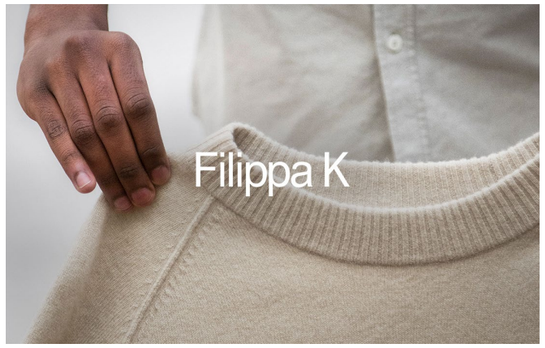


Image sources: Patagonia: https://besthiking.net/sustainable-brands/ | Filippa k: https://trustrace.com/case-studies/filippa-k-quest-full-transparency | Armedangels: https://www.mynewsdesk.com/armedangels/pressreleases/fashion-is-trash-armedangels-turns-trash-into-fashion-and-transforms-the-fashion-industry-3096249 | Reformation: https://edited.com/blog/reformation-brand-analysis/

- Consumers and Environmental sustainability: The-brand should inform consumers about authentic sustainability measures and what consumers should, can, and must do. In other words, shared responsibility and expectations should be established.
- Consumers and Brand: To boost this connection, the brand needs to know what matters to consumers. Therefore, ther should be two-way communication and consumers should be involved as much as possible.

What to say and how to say it

What to say

- The brand needs to find a balance of how much information to communicate so that it is not overwhelming, but also not so little that people become sceptical (Brydges et al., 2022).
- Interactive materials like videos that are actionable and customer-oriented should be developed to increase consumer engagement (Brydges et al., 2022).
- Social media can be used to engage with consumers in short, yet frequent doses and show behind-the-scenes footage (Brydges et al., 2022). A risk with this is that sustainability information on social media could be perceived as "heavy" or as greenwashing. Plus, there is the risk of campaigns being derailed by disgruntled users.
- The brand should use the rhetorical triangle (i.e., logos, pathos, and ethos) to communicate functional value, emotional value, and social value (Huang et al., 2022; Langguth & Schnee, n.d.):
  - logos - logical proof to increase quality of information and provide functional value (e.g., include a concise story style and concrete numbers)
  - pathos - pathetic proof to entertain and provide emotional value (e.g., humor, metaphor, and storytelling)
  - ethos - ethical proof to build credibility and provide social value (e.g., certifications and referencing expert advice)

Delivery

- The information should be explicit and clear: Go in depth, provide exemplifications, andshow weak spots. It should be recognised that sustainability is a philosophy of continuous improvement and not an achievable state (Langguth & Schnee, n.d.).
- Simple language and an education tone of voice should be used (Langguth & Schnee, n.d.).
- Storytelling techniques should be leveraged (e.g., accompanying sustainability manager, visiting suppliers, profiles of employees) (Langguth & Schnee, n.d.).
- The website should be organise into sections that follow life cycle to make it more reader-friendly.

Takeaways

The sweet spot of sustainability strategy can be found by analysing the brand's value proposition. A unique personality should be crafted to resonate with the target consumers and differentiate the brand.

The connections among the brand, environmental sustainabiltiy and consumers should be considered to build legitimacy in the strategy.

The communications should be concise, yet informative (logos), engaging and relatable (pathos), and well-substantiated (ethos).

3 Define

47

This chapter discusses the activities conducted to benchmark the current packaging systems from an environmental perspective (Whole system mapping, EcoAudits) and to understand UK consumers' decision-making factors and perception of different packaging formats (Consumer interviews and pack testing). Finally, based on the gathered knowledge, the vision, requirements, and evaluation criteria are defined.

3.1 Whole System Mapping

Process

In order to understand and benchmark the performance of the current packaging formats, a whole system mapping study was conducted with two Enrico employees. This activity typically involves: 1) drawing out a system map including the product's main components, the life cycle, and user interactions, 2) assessing the impacts and prioritising objectives, and 3) brainstorming ideas on the system map (VentureWell, n.d.).

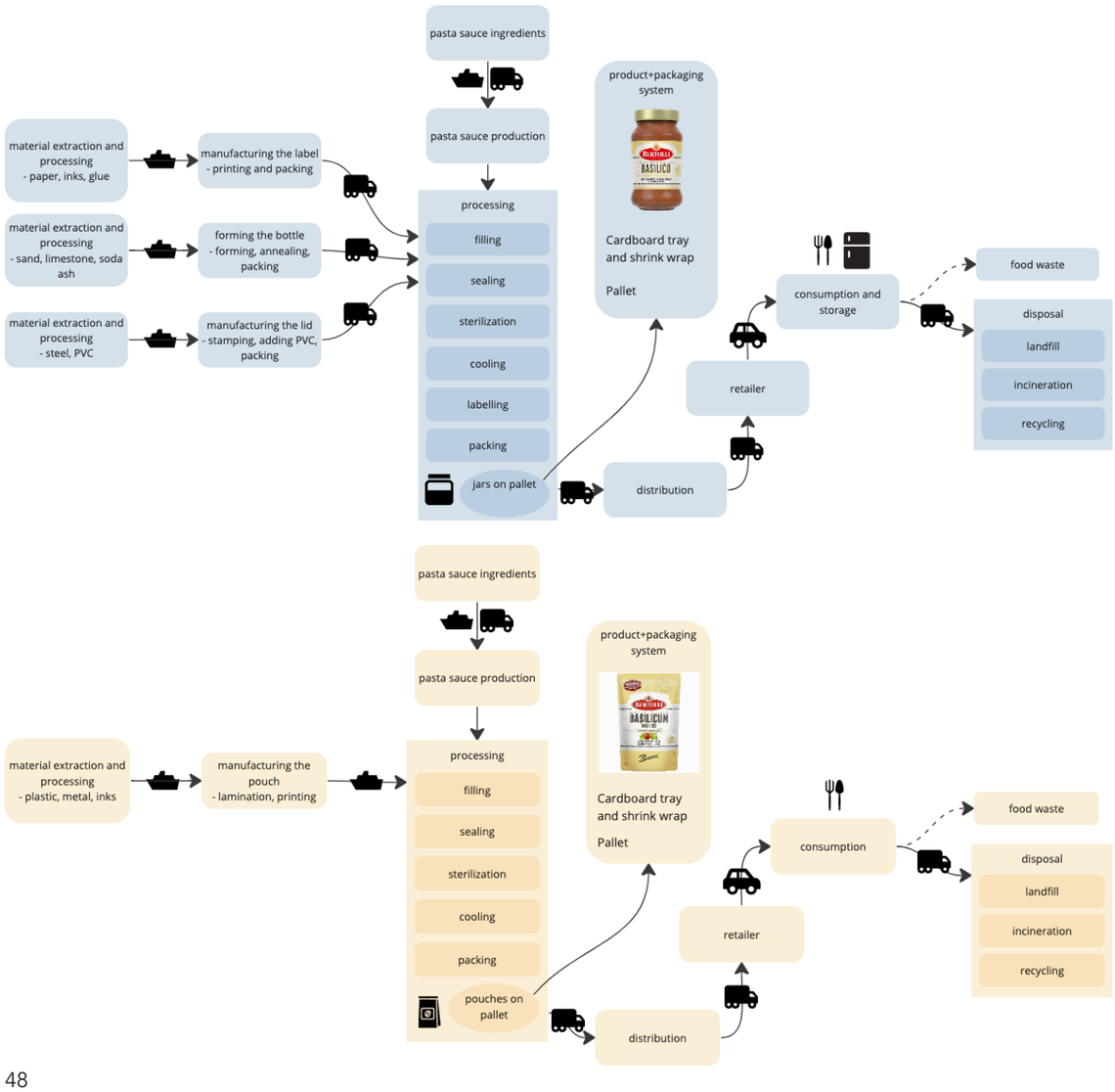
This study also helped illuminate what sustainability aspects are top-of-mind for Bertolli and what types of solutions or strategies are acceptable or feasible for this project based on the participants' input.

Since the session could only be an hour long, the activity was streamlined. I created preliminary whole system maps and conducted Eco Audits beforehand.

Step 1:

During the session, I asked the participants to review the maps and point out any incorrect or missing aspects. See the edited maps below.

Figure 3.1.1 - Whole system maps for jar and pouch pack formats



Step 2:

The priorities that we landed on (in order of importance) were:

- retailer acceptance (may be related to sustainability improvements)
- differentiation
- consumer acceptance
- lower CO2 footprint in material and manufacturing phases
- improve recyclability (EoL potential)
- reduce logistics environmental impact

Step 3:

And the ideas that were generated were added to my idea bank to be reviewed later on in the process as is discussed in Section 4.2.

Takeaways

Some opportunities to improve the environmental impact of the current packaging systems are:

- Eliminate links in the supply chain:
  - For the glass jar: sourcing all packaging materials from one supplier
  - Sell directly to the consumer instead of selling through retailers
- Reduce distribution transport distances by finding UK supplier options or a more local pouch supplier
- Optimise the secondary packaging - for glass jars: replace shrink wrap with plastic straps or lower the wall height of the tray; for pouches: make the box smaller or change the geometry so there is less empty space
- Increase circularity
  - Collect the packaging from consumers for reuse or proper recycling. Have consumers refill the pack at the store or at home.
- During the session it was evident that consumer/customer acceptance takes precedence over environmental impact reductions from the company's perspective.

3.2 EcoAudits

Method

Instead of full LCAs, Eco Audits in the software Granta Edupack were conducted. This was done because this thesis project's scope neither necessitated nor allowed for high accuracy impact assessments. The assessments were conducted (a) to understand which phases of the life cycle have the most significant contributions for the whole system mapping activity and (b) to compare different pack format options. For (a), a high uncertainty is acceptable since it is the proportions between phases that is important. For (b), since little data is available on the exact specifications of the pack formats that are not currently being supplied to Enrico food, it would be misleading to conduct a more full-fledged LCA with data that is not necessarily realistic. Moreover, ideally primary data would be used to assess the current pack formats. However, the producers are still in the process of measuring the impact of the current production process. Therefore, it was only possible to conduct EcoAudits with secondary data.

For the Whole System Mapping activity, I conducted Eco Audits on the current pack formats using a cradle to grave approach and the system boundaries depicted in Figure 3.2.1. Given the limited capabilities of the EcoAudit tool, it was not possible to include the packaging filling and pasteurisation processes. It was also not possible to differentiate between the transport of components before production and transport of the final product. The material compositions were based on spec sheets provided by the producers and scaled to the functional unit of "delivering 100g of pasta sauce." In the Pouch EcoAudit, I included the lamination process and calculated the area as 100g/460g x pouch area. However, it is unclear whether the impact calculated by Granta for this process is representative since I do not know the actual process that is used by the manufacturers. The transportation distances were based on the locations of the current suppliers, producers, and distribution hubs. The EoL scenarios are based on UK recycling data.

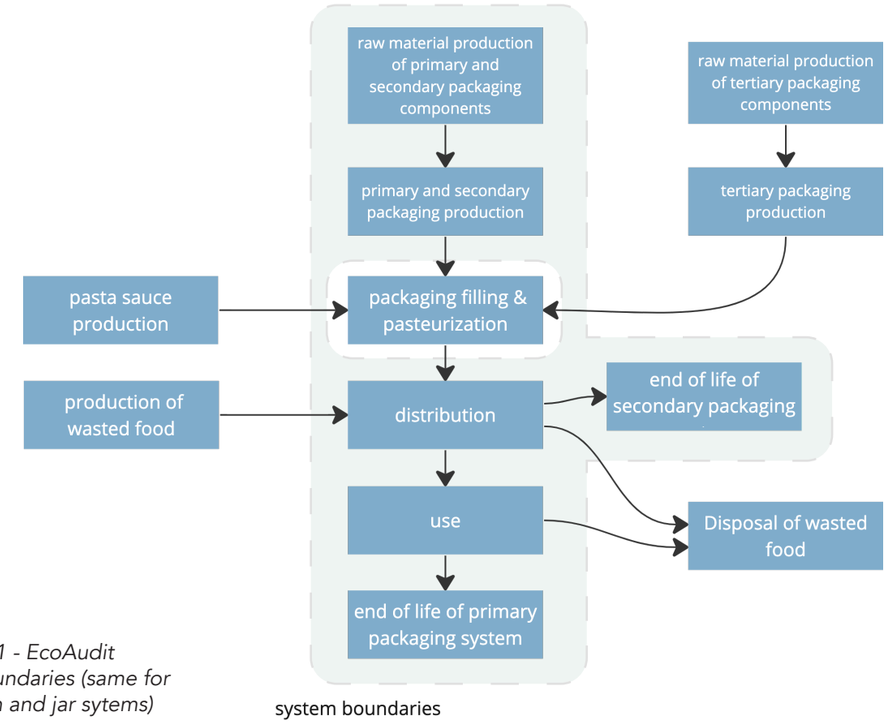


Figure 3.2.1 - EcoAudit System boundaries (same for both pouch and jar sytems)

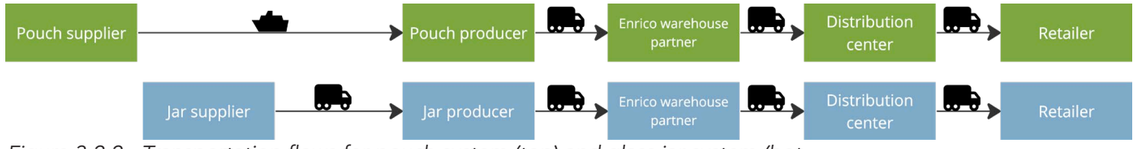


Figure 3.2.2 - Transportation flows for pouch system (top) and glass jar system (bottom)

Results

The EcoAudits show that the pouch packaging has a lower impact compared to the glass packaging despite not being recyclable. This result is due to the pouch requiring less material and less intensive manufacturing processes. The transport phase has an almost negligible impact compared to the other phases.

Given the uncertainties and limited output metrics, it is difficult to draw a definitive conclusion that the pouch has a lower impact. However, given the large gap between the impact numbers, it can be said with a fairly high confidence that the pouch has a lower impact.

Takeaways

Between the jar and the pouch, the pouch is more environmentally-friendly according to the metrics of carbon footprint and energy. In the short-term where only minor improvements can be made, the pouch should be pushed as the most sustainable option (from a scientific perspective).

Given that the material and manufacture phases have the highest contributions to the overall impact, those phases should be targeted when making improvements (e.g., material reduction, manufacturing process optimisations).

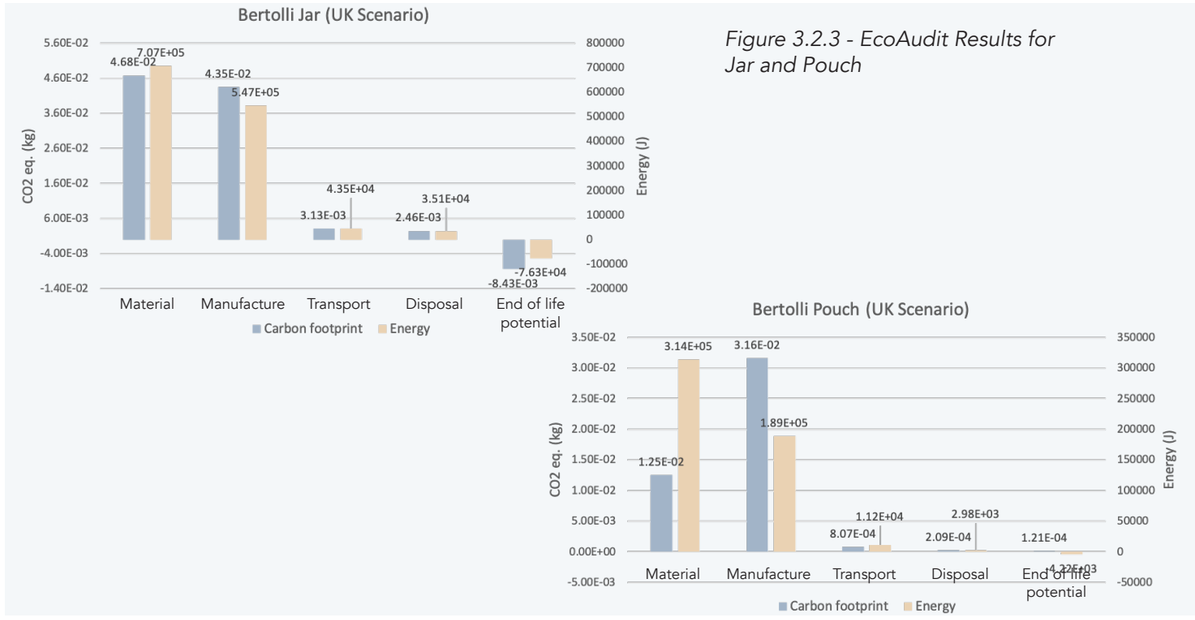


Figure 3.2.3 - EcoAudit Results for Jar and Pouch

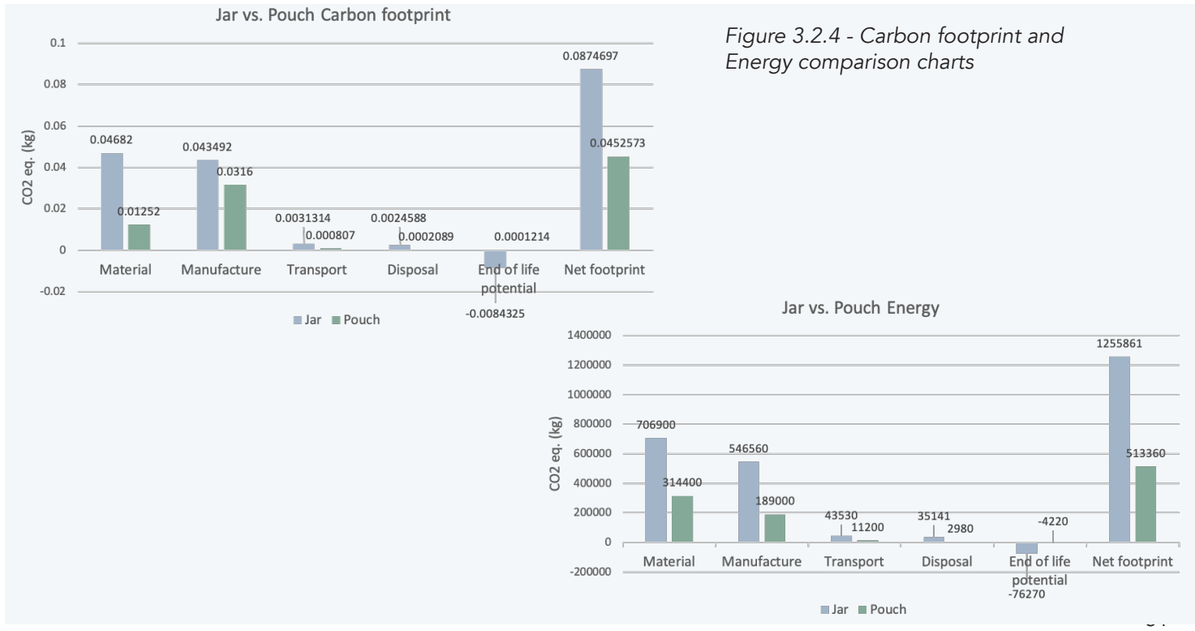


Figure 3.2.4 - Carbon footprint and Energy comparison charts

3.3 Consumer Research

Introduction

This section discusses the exploratory consumer research (interviews and pack testing) that was conducted to understand UK consumers' packaging preferences.

Consumer Interviews

Pasta Sauce Products and Packaging: UK Consumer Needs, Wants, and Perceptions

Introduction

As mentioned earlier, when it comes to food products, sustainable features can drive preferences if quality, appearance, and functional needs are met (Young, 2008, as cited in Nordin & Selke, 2010). But what are those needs? And what packaging attributes or cues do UK consumers use to evaluate pasta sauce products and how are they used?

Limited research exists on UK consumers' preferences when it comes to pasta sauce products and packaging. Understanding how UK consumers perceive different pasta sauce packaging formats and features is crucial to designing a desirable pack. It is also important in determining whether sustainability should be communicated by the packaging or not, and if so, how. Therefore, a primary research study was conducted with UK consumers to dig deeper into these topics.

Research Questions

The research questions were as follows:

- What are UK consumers' needs/wants when it comes to pasta sauce and pasta sauce packaging?
- What sustainability attributes/cues are appealing when it comes to pasta sauce packaging?

Method

The research method of interviews was used because it allows for the collection of rich data that gets to the "why" behind consumers' preferences. The interviews were conducted online since it was not within the project scope to go to the UK to meet face to face with interviewees and it lowers the barrier for participation. Eleven participants were recruited via convenience sampling and screened using a survey. The screening criteria were: use pasta sauce at least once every six months and lived in the UK for more than one year.

For the interview structure, the ZMET method was loosely followed. The ZMET method involves the participants bringing in some photos to stimulate a grounded reflection on real experiences (Khoo-Lattimore & Prideaux, 2013). The participants were instructed to send in one image of a pasta sauce product that they like buying (could be your favourite sauce, could be just a sauce that you get regularly) and four images of sauce/liquid-food/beverage package(s) that represent sustainable packaging to them. Some hypothetical pasta sauce packaging mockups were prepared to study participants' responses to different packaging formats and sustainability labels. The Interview guide can be found in Appendix C.

Interview structure

The main sections of the interview were:

- introduction and gathering background info
- questions about pasta sauce experience (e.g., what factors they consider when purchasing, what they like about their go-to pasta sauce, how they use it)
- questions about pasta sauce packaging (e.g., what are the pros and cons of different formats)
- questions about sustainability (e.g., their definition of sustainability, ranking pasta sauce packaging options, thoughts on sustainability labels, what represents sustainable packaging in their eyes)

Pilot test

The interview guide was iterated on, based on feedback from the academic mentors and company mentors. Then, a pilot interview was conducted with a fellow TU Delft student to check that the interview structure and questions were satisfactory.

Participant demographics

Figure 3.3.1 depict the participant demographics for this study. Note that due to convenience sampling, a wider age range was not achieved.

Informed consent

Before the interview, participants were asked to sign an Informed consent form. The Informed consent form can be found in Appendix C.

Data Analysis

The interviews were recorded, transcribed and then analysed via line-by-line coding. The coding led to a code structure, which is presented in the results section. During the interviews, the participants were asked to choose two packs they would buy and rank the packs in terms of sustainability. These data are presented quantitatively in the next section.

Results

The next pages present the key results. (The size and opacity of the circles and the opacity of the boxes indicates prevalence of the code. The colours of the boxes in the pack format section represent the polarity of the association or perception (green for positive, yellow for neutral, and pink for negative).)

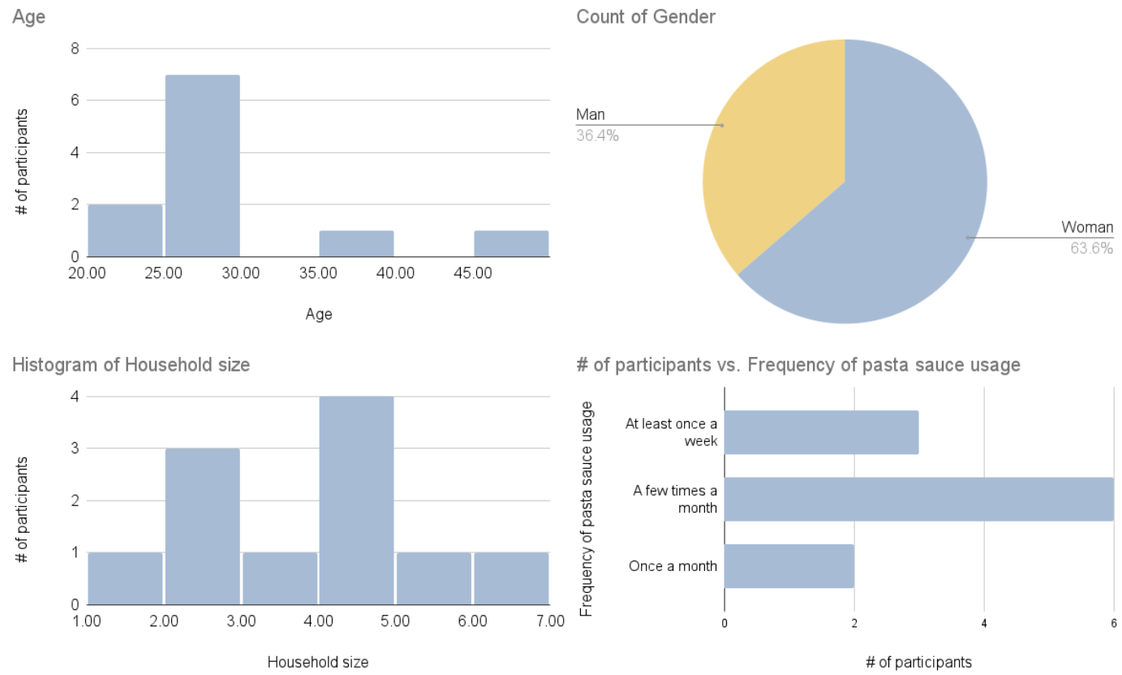
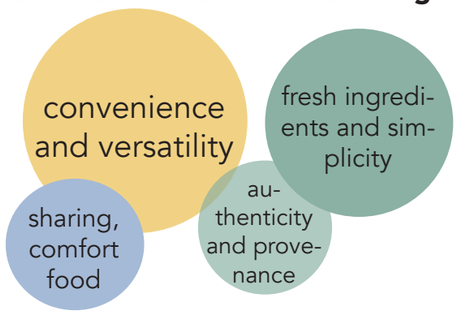


Figure 3.3.1 - Participant demographics

Results regarding Italian cooking and Pasta sauce products

Associations with Italian Cooking



Premade sauce vs. From scratch

convenient
cheap
reliable

VS

more control over flavour, ingredients, and texture
cooking experience
cheaper
not that much more difficult than premade

Considered factors

primary	price	brand	flavour/taste
secondary	authenticity	quality	quantity	reliability
tertiary	novelty	packaging	accessibility

Is sustainability considered?

- Don't think about it much (5)
- In my top 5 (2)
- Is it different between options? (2)
- I would consider if I knew more (2)
- The options are already sustainable (1)

Current pasta sauce routine

9 out of 11 use all the sauce at once

pesto users who do not use all of it at once and sometimes experience spoilage

Most participants add extra ingredients

All participants rinse and recycle

Some repurpose the jar, but only sometimes

Participants cited only a few frustrations (difficult to empty, open; heavy; want more sauce in one jar)

Participants' reactions to the hypothetical packaging concepts

Glass jar

associations: pasta sauce | vegetables

perception: premium | high-quality | reliable

purchase intent: "I would pay more money to get sauce in jar over a can" (1)

Pros and Cons

easy to store	difficult to get everything out (smaller opening or weird geometry)
resealable	can break
repurpose-able	hard to open
don't have to worry about getting crushed in grocery bag	
can see contents	

Tetrapak

associations: tomatoes | soup

perception: different taste | cheap | good protection | more sustainable

purchase intent: "I would buy if there's nothing else, it's on sale, or a good brand" (4)

Pros and Cons

lightweight	not resealable (some don't see that as a problem since it's stable)
easy to store	difficult to empty out/ clean
better for efficient transport (stacking)	need to use scissors
doesn't take up much space in recycling bin	can't see inside

Plastic pot

associations: soups | fresh sauces | takeaway food

perception: premium | fresh | not fresh

purchase intent: "I would avoid this packaging" (2)

Pros and Cons

resealability (some don't think it's a good seal -compared to jar)	can burst
large opening	made out of plastic
repurpose-able (not all do this)	usually shorter shelf life
can see contents	
microwaveable (connotation that it's for takeaway and lower quality)	
lightweight	

Metal can

associations: vegetables | soup | tomatoes | baked beans

perception: cheap | longer shelf-life | low quality | trust- vs. un-trustworthy

purchase intent: "I've never had canned sauce and I'm not attracted to the idea" (2)

Pros and Cons

easy to pour	not resealable
durable	hard to get all content out
long shelf life	can't see inside
easy to rinse out	can be difficult to open

Pouch

associations: rice | gravies | freeze-dried | camping food | smoothies | coffee grounds | nuts | cat food

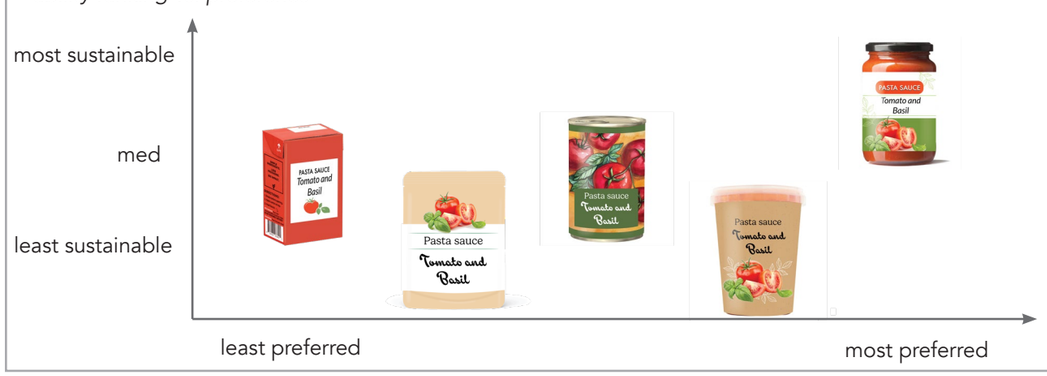
perception: unfamiliar | less authentic | innovative

purchase intent:
"I would avoid it. It seems weird that a sauce is in it" (1)
"I would be open to it if it looked attractive or was made by a good brand" (2)
"I would like to try it" (2)

Pros and Cons

lightweight	not resealable - some assume that it is resealable (zipper)
good for single-person	less sturdy (could leak)
doesn't take up much space in recycling bin	less stable (could tip over)
don't need opener or spoon to scoop out sauce	difficult to pour
can squeeze out extra air and reseal	hard to tell how much was used

Figure 3.3.2 - Mapping of sustainability ranking vs. preference



Participants' reactions to the alternative packaging concepts

Dry sachets

associations: cup a soup | stock cubes | custard | american box products

perception: not fresh | not tasty | environmentally friendly

purchase intent: "I would try it if made by a good brand" (2)

Pros and Cons

more healthy (nutritionally fortified) vs. less healthy (preservatives and chemicals)	less fresh
convenient	unfamiliar
longer lasting	wary of bad taste/consistency
more sustainable	

Reusable glass jar

associations: zero waste shop | collection system for brita | haeckels cosmetics

perception: environmentally friendly | cheaper

purchase intent: A majority of the participants (10/11) mentioned they would be willing to try as long as not too high a premium and trustworthy brand.

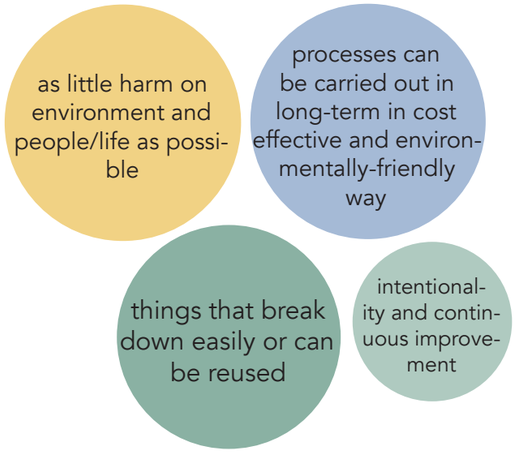
"I'm willing to go the extra mile to make sure it's recycled and sustainable and stuff. So I like that idea a lot." (P3)

"I would definitely use that. I think that's an amazing idea. I think sometimes with recycling, sometimes it's, you know, I think sometimes we're not doing enough." (P6)

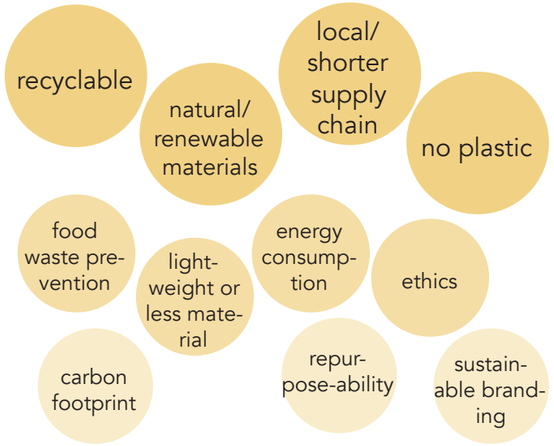
Pros and Cons

nice to have jar be put to use again; step up from recycling; not going to go to landfill	need a guarantee that it's properly cleaned (3); inconvenient if return point is not at supermarket/not super accessible

Consumers' definition of sustainability



Their definition of sustainable food packaging



Consumer quotes regarding plastic packaging

"I'm not sure. It's just, it's just you hear that plastic is so bad for the environment, isn't it?" (P4)

"I'm a bit wary of having plastic in your life in general, like if I had to make one product and put it onto the world, it wouldn't be plastic. I think we have enough of that." (P8)

Labels

Only a few of the participants reporting looking for labels. Two participants mentioned fairtrade, one organic, one FSC, one recycling labels, and one marine stewardship council. A majority of the participants do not look for labels.

Participants liked to see recyclability labels because they can be acted upon. Some participants were were skeptical of the BCorp, Carbon Neutral, and Eco impact score labels. Some were also unsure about what some of the labels stood for (i.e., organic logo, bio-based).

Consumer quotes regarding labels:

"With all these things..with the exception of the recycling, because that's more of a civic…people are kind of paying for the privilege of displaying these logos" (P9)

"It's so easy to get a label... it doesn't mean much, I think" (P2)

Figure 3.3.3 - Pictures of the labels presented to the consumers with reaction tags (Ggeen circle: positive reaction, yellow diamond,: familiar; red rectangle: negative reaction of don't understand the label)

Show and tell

Figure 3.3.4 - Collage of sustainable packaging images submitted by participants

Sustainability attributes elicited during show and tell:

- refillable/repurpose-able/ reusable
- less parts
- geometry
- quality ingredients
- recyclable
- material
- weight
- bulk pack
- labels
- material texture/colour
- graphic design
- philanthropy
- novel/innovative
- resealability
- no packaging
- healthy
- bio-based
- portioning
- good company/brand

Summary

What are UK consumers' needs/wants when it comes to pasta sauce and pasta sauce packaging?

Mentioned when talking about pasta sauce generally

good flavour, consistency
convenience
cheap
reliable
simple, fresh ingredients
provenance/authenticity
healthy, no added sugar
large volume
eye-catching
see-through
versatility
lightweight
easy to open
trustworthy brand

Mentioned when discussing the 5 formats

easy to store
resealable
repurpose-able
sturdiness
easy to empty
recylability
volume efficient (can compress)
long shelf life
easy to pour
easy to rinse out
stability
telling how much is left
simple graphic design

Mentioned when discussing unconventional products

familiarity
sustainability (doing more than just recycling)

What sustainability attributes/cues are appealing when it comes to pasta sauce packaging?

recyclable and recyclabililty label
natural/renewable materials
local/shorter supply chain
no plastic
food waste prevention
light weight
less material/parts
repurpose-ability (unique geometry)
branding and graphics design

Discussion

Italian cooking is valued for its convenience and versatility. Plus, many of the participants choose premade sauce due to convenience factors. Bertolli could accentuate convenience factors of their products or shed light on the benefits of authentic flavours to generate more consumer buy-in for the authentic-Italianness of the brand.

The most considered factors are price, brand, and flavour. Sustainability factors are not considered spontaneously. However, the participants would like to act more sustainably. They do not identify pasta sauce as a category where sustainability could play a role because they consider glass as sustainable and the sustainability of the pasta sauce itself does not seem to differ between brands that much. Highlighting the sustainable aspects of the brand or products could convert sustainability from a latent consideration to a discriminating factor.

Regarding their current pasta sauce experience, most participants reported that they use all of the pasta sauce at once and do not experience problems with spoilage. Therefore, while resealability was often mentioned as a pro or con of the various formats, it is really not consequential when it comes to environmental impact. For non-resealable pack formats, this finding could be alluded to in the packaging graphics. On a different note, Bertolli's Rustico pasta sauce line could be a good fit for UK consumers since most participants mentioned that they usually add extra ingredients to their pasta sauce. All participants rinse and recycle pasta sauce packaging (which is a jar in all cases). This implies that recycling is a well-practised behaviour in the UK. This may differ per pack format. Some participants repurpose the jar, but do so only some of the time. Repurposing behaviour should be encouraged to elongate the use phase of the packaging.

The glass jar format (single use and reusable) had the most positive associations while the tetra pak, can, and dry sachets had the most negative perception. The pouch and plastic pot had mixed reviews. These findings are aligned with the findings in Balzarotti et al. (2015) and Steenis et al (2017).

The pouch did not have any strong associations and was perceived as less familiar. Therefore, unlike the other formats where there are durable associations that would be difficult to displace (i.e., tetra pak and tomato ingredients), there is potential to make a positive (first) impression with the pouch via the accomodation effect (according to categorisation consumer behaviour theories).

When it comes to sustainability ranking, the plastic formats were seen as the least sustainable. The tetra pak is perceived as more sustainable due to it being lightweight and being made out of carton, but many participants were uncertain about recyclability. The can was also ranked around the middle of the pack and this was mostly due to its recyclability. The glass jar was perceived as the most sustainable for many of the participants and this can be attributed mainly to its recyclability and repurpose-ability. Most participants expressed some uncertainty about ranking packages. There was even one participant who did not rank the pouch at all because they did not feel informed enough. These findings are well-aligned with what was found in literature (Steenis et al., 2017; Magnier & Schoormans, 2017; Orzan et al., 2018; Lindh, Olsson, et al., 2016). There is an opportunity for Bertolli to play a role in informing consumers about packaging sustainability.

The dry sachet concept was not well-received. Some participants would be willing to try it, and many pointed out the benefits of it, but in the end, it seemed too divergent from what they are used to when it comes to pasta sauce to be a success.

The reusable glass jar was extremely well-received. Some consumers shared reservations about the inconvenience of returning the packaging and the potential for food safety issues.

Concerning sustainability labels, most of the participants said they did not check for labels. However, there were a few logos that they were familiar with. Participants value labels that are clear (i.e., no jargon), actionable (i.e., end of life related), and reputable (i.e., labels that they know are well-earned). To get a better understanding of which sustainability labels and claims are meaningful to UK consumers, some labels were tested in the follow-up pack testing.

The show and tell portion of the interview revealed that recyclability, renewable materials, lightweight materials, repurpose-ability, and sustainable claims/labels or graphic design are the key sustainability cues that consumers use to identify sustainable packaging. Most of these aspects were reported to also increase their buying intention.

Looking at the summary of consumer wants and needs, one can see that there are some desires that only surfaced when discussing pasta sauce (packaging) in depth. Packaging attributes were rarely spontaneously mentioned when discussing what they look for in pasta sauce. Using certain cues to remind consumers of their more latent desires could be an interesting way forward for Bertolli. This direction was explored in the concept development phase.

Limitations

The participant demographics were not representative of the UK general populace making it difficult to make any generalisations about consumer perception of the different packaging formats and sustainable packaging. Moreover, one of the participants could have been biassed because they are an acquaintance to the interviewer.

Some aspects that could have biassed the consumers' responses are:

- The lack of standardisation in graphic design - The graphic design could have subliminally affected their overall or sustainability perception of certain concepts and this could not be controlled for because it was not explicitly asked about in the interview.
- Ordering effects - The same order was used for unconventional products across all of the participants and that could have affected their reactions.
- The "homework" (collecting images of sustainable packaging) - It could have primed the participants to look at the pack formats through the lens of sustainability in earlier parts of the interview (before asking for the sustainability ranking).
- The suggestion of taking pictures of packaging on their next grocery shopping trip - This could have led participants to bring in pictures that may not be fully representative of what they think of as sustainable packaging since they were limited by what is accessible.

This study could have been improved by using different recruitment methods, redesigning the stimuli to control for confounding variables, tweaking the interview protocol to mitigate ordering effects, and changing the "homework" for less priming and biassing effects.

Takeaways

Based on these findings, quality, taste, authenticity, and usability were flagged as important evaluation criteria when developing packaging concepts.

Sustainability is not considered in consumer's decision-making process, but could become a discriminating factor if they are reminded. This could be done through sustainability labels.

For the less familiar packaging formats, good aesthetics, brand, or price could motivate consumers to try the format. The reuse concept was very well-received, and could be a good long-term solution for Bertolli.

There is some scepticism toward sustainability labels, but if clear, actionable, and reputable, labels can improve perception of the product or brand.

The study confirms what was found in literature regarding the gap between sustainability perception and reality.

The most interesting formats to investigate further based on the study are the jar (i.e., how to improve the actual environmental impact), the tetrapak (i.e., how to override pre-existing negative associations), and the pouch (i.e., how to improve the sustainability perception).

Pack testing

Image source: https://unsplash.com/photos/SpVHcbuKi6E

Pack testing was done with a market research agency to understand which of Bertolli's current formats (including a new potential format, the can) are more popular among UK consumers and to see what claims or labels resonate with them.

Research Questions

Format - How do the more scientifically sustainable pack formats (can, pouches) perform compared to the traditional formats (jar and bottle) (See stimuli in Figure 3.3.5.)

The qualitative research implied that the pouch is not very appealing. Is this actually the case when consumers are exposed to the brand, real artwork, claims, and the price?

Claims and Labels - What sustainability claims and labels resonate with consumers? Would knowing that the packaging is more sustainable make it more appealing to consumers? Figure 3.3.6 shows the tested labels.

Method

Since the goal is to clearly quantify attitudes toward different pack formats in a way that is generalisable across the UK population, a questionnaire was chosen as the research tool. This research required a large sample so a research agency was hired to help design, distribute, and analyse the results from the questionnaire. Monadic sampling was conducted to prevent ordering bias and 100 respondents were recruited per concept as that sample size was recommended by the agency as being large enough to draw meaningful conclusions. The structure of the questionnaire was based on the agency's pre-established questionnaire format. (A few custom questions were added to help answer the claims and labels research question and gather some background information about the respondents.) First, some screening questions are asked. Then, the respondent was shown the pack stimuli (just the front of the pack) and asked to rate the packaging on a few metrics. They were then asked to rate the claims and labels. Finally, they were asked for some demographic information.

Figure 3.3.5 - Pack shots used in the survey

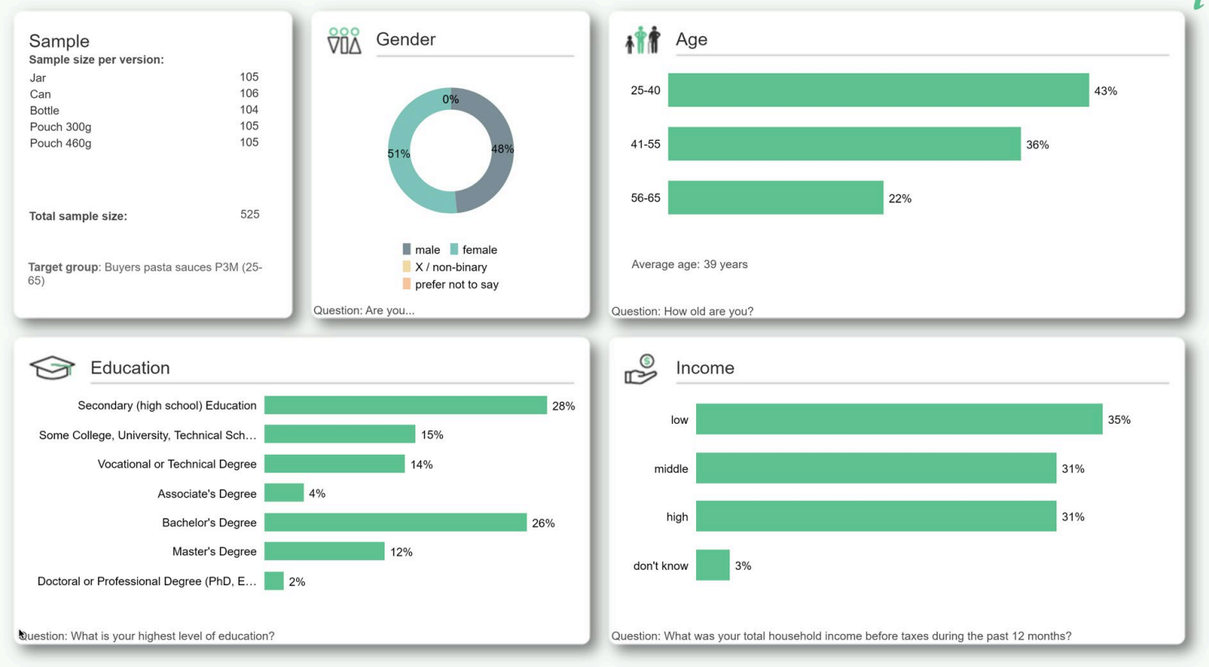


Figure 3.3.7 - Participant demographics

Participant demographics

Figure 3.3.7 depicts the participant demographics for this study.

Data Analysis

The averages for each metric (and statistical significance using the z-test) were calculated by the agency. For the open-ended questions, clustering was used to categorise and quantify the trends in comments. For each claim and label, a composite score (average of all three metrics) was calculated for easier comparison.

Results

As seen in Figure 3.3.8, the 460g pouch performed well relative to the bottle and very similar to the jar. The 300g pouch and the can scored pretty similarly to the bottle and jar. The can was worse than the jar when it came to overall score and appeal. Considering the main metrics of interest, strikingness, buying intention, brand fit, and info clarity, the Pouch 460g is the best performer.

Participants were asked to give their rationale for their answer to the question about how likely they are to buy the product. It was found that the main rationale against the pouch options and the can were that the packaging looked too dull, boring, or old-fashioned.

Regarding the claims, the composite scores, shown in Figure 3.3.9, suggest that the claims of primary interest are "1 of your 5 a day," "100% natural ingredients." The claims "No added sugar," "250 g vegetables" are moderately meaningful and the claims "50% lower carbon footprint," "carbon neutral certified" were the least meaningful. These results imply that UK consumers find health-related claims more appealing and relevant than sustainability-related claims. As for the labels, the Eaternity label had the highest composite score as can be seen in Figure 3.3.10.

	Brand fit	Striking-ness	Buying intention	Infor-mation clarity	Overall score	Appeal	Easy to find	Unique-ness	Believ-ability
Bottle	P460	P460; P300	P460	P460		P460	P460	P460; P300; Can	P460
Jar		P460; P300			Can	Can	P460	P460; P300	

Figure 3.3.8 - Comparison table depicting the areas in which the 460g pouch ("P460"), 300g pouch ("P300", and can scored statistically significantly higher or lower than the bottle or jar. The green cells indicate a higher score and the red cells are for lower scores. If the format is not listed, it has a similar score to the corresponding glass format.

Claim	appeal	relevance	brand fit	purchase intent	compos-ite score
1 of your 5 a day	90	92	92	86	90
100% natural ingredients	94	91	93	86	91
No added sugar	89	85	86	82	86
250 g of vegetables	84	82	84	76	82
50% lower carbon footprint	76	72	78	68	74
Carbon neutral certified product	74	68	76	65	71

Figure 3.3.9 - Claims scores. The score is the sum of the percentage of participants who selected "agree" and "strongly agree." The composite score is the average of the four scores per claim.

Label	familiarity	under-standing	meaningful	average
Eaternity	59	78	72	70
EcoImpact	64	64	65	64
Carbon Cloud	65	60	72	66

Figure 3.3.10 - Sustainability labels scores. The score is the weighted average of all of the responses. The composite score is the average of the three scores per label.

A full report of the results can be found in Appendix J.

Discussion

This study suggests that among UK consumers, the pouch formats would be well-received as the 460g and 300g pouches scored statistically higher than the glass bottle and jar in several metrics. More specifically, the pouches were more striking and unique than the glass formats. These results were expected as the pouch is a less common pasta sauce format. The can's low scores support the finding from the interviews that the can format is relatively less appealing than the other formats.

It was expected that the health-related claims would rank higher than the sustainability claims as healthiness is an influential decision-making factor for many consumers, as discussed in Section 2.4. In fact, these results are in alignment with O'Rourke & Ringer (2016)'s finding that health ratings on food products are more influential than environmental ratings. While the environmental claims were rated lower than the other claims, it does not mean that they are not meaningful at all. In fact, a large majority of the participants scored them positively. This implies that it is still worthwhile to explore environmental claim options.

Regarding the labels, while the Eaternity label was less familiar, it was more understandable and meaningful than the other labels. It might be more understandable than the EcoImpact score because it clearly states the considered metrics and the scores. The EcoImpact score is one grade without any description of what the considered metrics are. Compared to the Carbon cloud label, it might be more understandable because it has a star rating system to contextualise how well the product is performing relative to a certain benchmark, and icons that convey what each category means. While it is not very familiar, the high understanding and meaningfulness ratings make the Eaternity label a promising label to move forward with.

Limitations

A limitation of the study is that it is not super representative of the actual buying scenario as the selling price was not shown and the packages were shown in isolation. Moreover, only the front of the pack was shown. The results could have differed if the participants were able to see the back of the pack as there is quite a bit more information (e.g., brand history, recipes) on the pouch than on the jar or bottle. Another limitation is the fact that participants were not able to feel or hold the packaging. This could have negatively impacted the ratings on the pouches as some consumers might find the flimsiness of the pouches unappealing. In the rationales, there were some references to the flavour as being a deterring or appealing factor. Therefore, while the questions asked about packaging, evidently, some respondents considered the overall product in answering the questions. In a way, this makes the ratings more realistic as it implies that the consumers appraised the concepts in a similar way they would in the store. However, it makes it difficult to tell what factors played an important role in their rating process. Moreover, some key metrics were not included in this study, such as quality perception, authenticity, naturalness, and sustainability perception. The studies performed later, during the concept development phase, included these metrics.

For the claims and labels, it should be noted that the statistical significance was not calculated. Therefore, it is possible that the health claims are not actually statistically significantly more meaningful than the sustainability claims and the same goes for the Eaternity label as compared to the EcoImpact and Carbon cloud labels.

Takeaways

The 460g pouch format is a promising format for the UK market.

Health claims resonate more with consumers, but this does not mean that environmental claims should not be explored further.

The Eaternity label is the most promising label to move forward with out of the three that were tested in this study.

3.4 Vision

Introduction

This section summarises the process it took to develop the vision statement and list of requirements. The vision and requirements helped guide the rest of the design process by providing inspiration for ideation and guiding the concept evaluation process.

GIGA Map

Before arriving at a vision and the project requirements, I first created a GIGA Map to map out the entire system surrounding Bertolli's pasta sauce products and packaging in the UK context. This helped me synthesise all of the information I had gathered and identify positives, problems, and opportunities.

Takeaways from GIGA Map

The GIGA Map revealed several opportunities for improving sustainability along the whole value chain. These opportunities were embedded in the sustainability strategy and packaging concepts and roadmap.

The most notable potential areas of improvement based on the GIGA Map are:

- Developing a closer relationship with suppliers or producers to spur more sustainability innovations
- Sourcing for a lower material/component transportation impact, improving production and logistics processes, optimising the end of life scenario (recyclability and collection)
- Communicating sustainability initiatives and playing a role in fostering more sustainable consumer behaviour

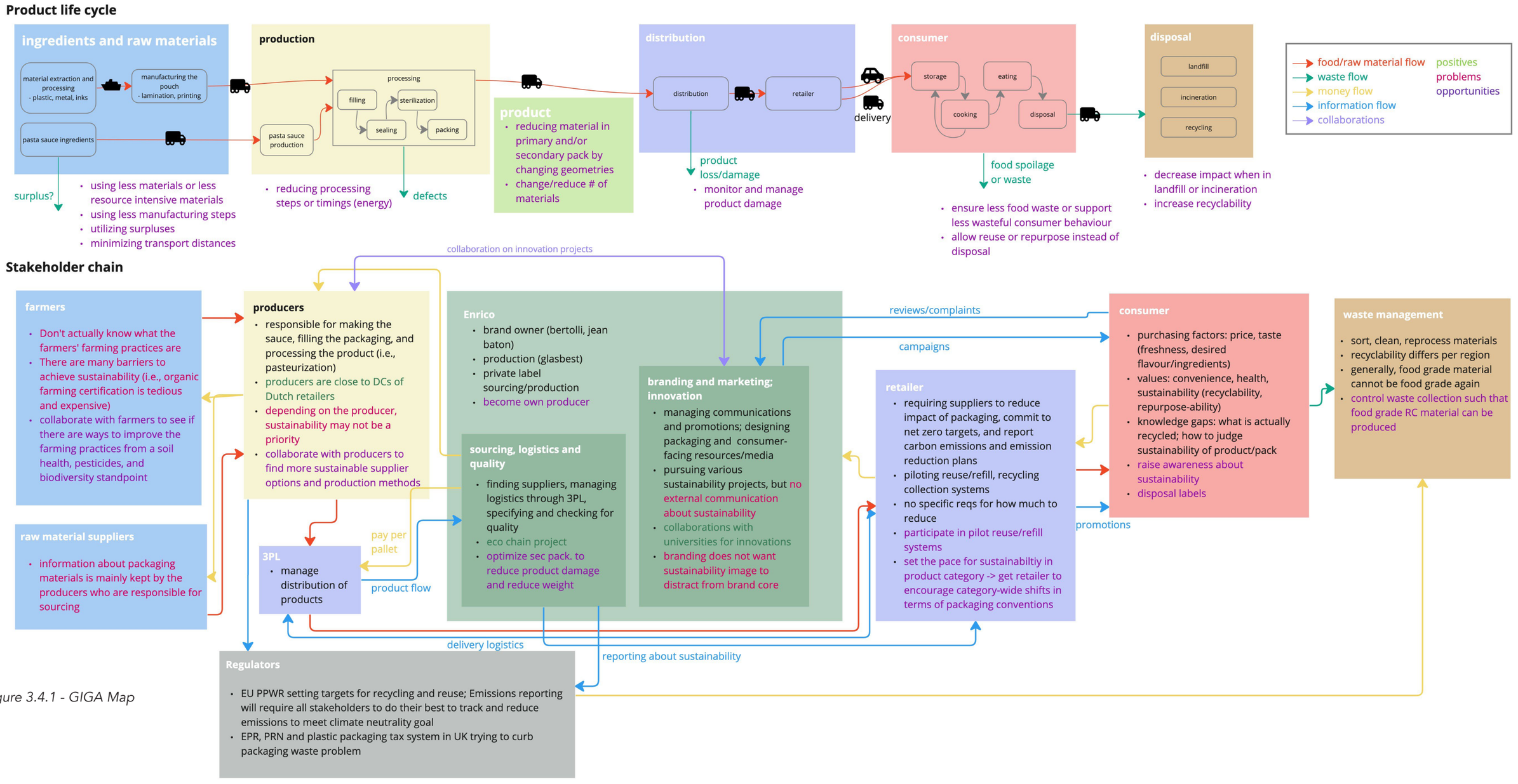


Figure 3.4.1 - GIGA Map

ViP Method

To develop a vision statement, the ViP method was loosely followed. ViP is a method for designing "meaningful" products that are based on achieving a desired interaction motivated by a clear "raison d'être." The first step is to deconstruct the current product, interaction, and context of usage. See Figure 3.4.3 for the deconstruction of the current packaging systems. Then, one constructs a possible future within which the new product would be used. This was done by defining the design domain, identifying relevant context factors, and making sense of the context factors by clustering and finding relationships between them. Then, a vision statement was formed based on the future context (as described by the context factors). After that, interaction qualities and product qualities were defined, which fed into the ideation and concept development phase.

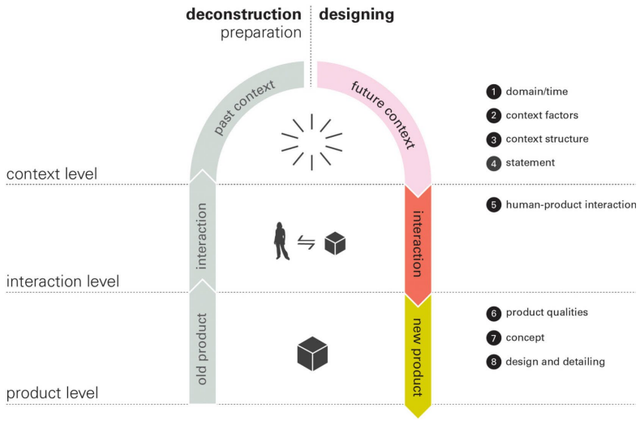


Figure 3.4.2 - VIP Method. *Image source: https://www.fabrique.nl/blog/2022/4/hoe-voorspel-ik-de-toekomst/*

Figure 3.4.3 - Deconstructing current options

what is it?	glass jar with metal cap; paper label with graphics printed on it; bumps out at bottom	reliable; honest; cute; stable; fragile; down-to-earth; familiar	stand-up pouch made out of plastic and metal layers; graphics with bertolli branding; glossy, flexible material	flimsy; all-in-one-go; for on-the-go; dynamic/light; ambiguous; mass-produced; modern
interaction	with care while in store and transport; in-control in kitchen	BOTH: unquestioning; clockwork; means to an end	rough while in store and transport; careful and controlled in kitchen	
considerations	people like familiarity; people want something that feels high quality; people want to see the product	the lighter and cheaper the better; branding real estate is important	people value convenience and ease of use; people care about the product more than the package	

The Domain

The consumption of pasta sauce products in the UK in 2 years time, 5 years time, and 10 years time

The Future Context

A wide variety of context factors were collected from different disciplines (environmental science, material science, consumer behaviour, public policy) and sources (news articles, scientific papers, videos/movies, personal observations).

Figure 3.4.4 depicts the clusters.

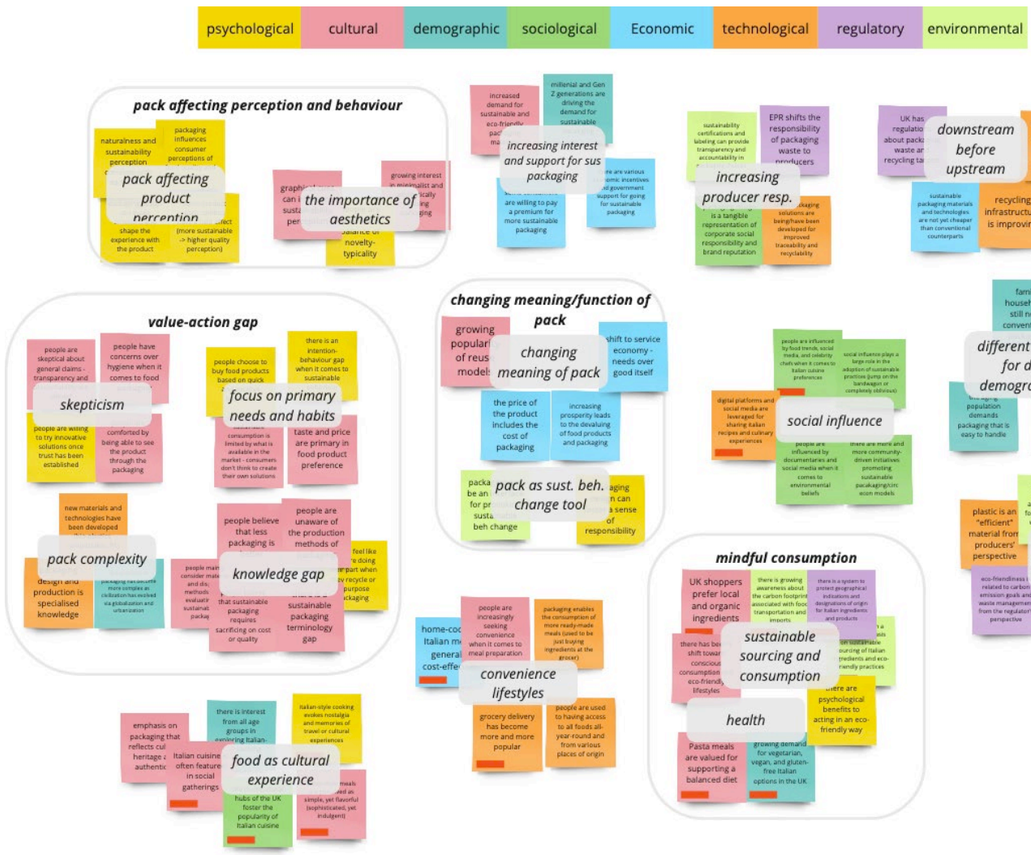


Figure 3.4.4 - Context factor clusters

Clusters of factors and their relationships were mapped to distil the future context into its higher-level drivers.

By plotting the clusters, I was able to identify four main types of consumers when it comes to the topic of packaging sustainability, as can be seen in Figure 3.4.5.

There are different ways to approach this situation from a designer's perspective:

- Move individuals from one quadrant to another
- Design for the individuals without changing their mindset

The first option requires more effort since it requires educating consumers. However, it can lead to a ripple effect where by informing consumers about some sustainability concepts in the realm of food packaging, they could apply the learnings to other areas of their life. Moreover, rather than taking a discrete approach, I personally believe that businesses have a responsibility to increase consumers' consciousness of (un)sustainable consumption behaviour. It is important to design the product-packaging combination so that it works for people on the left side, but generally moves individuals upwards in the matrix (increasing their knowledge/ability to act more sustainably).

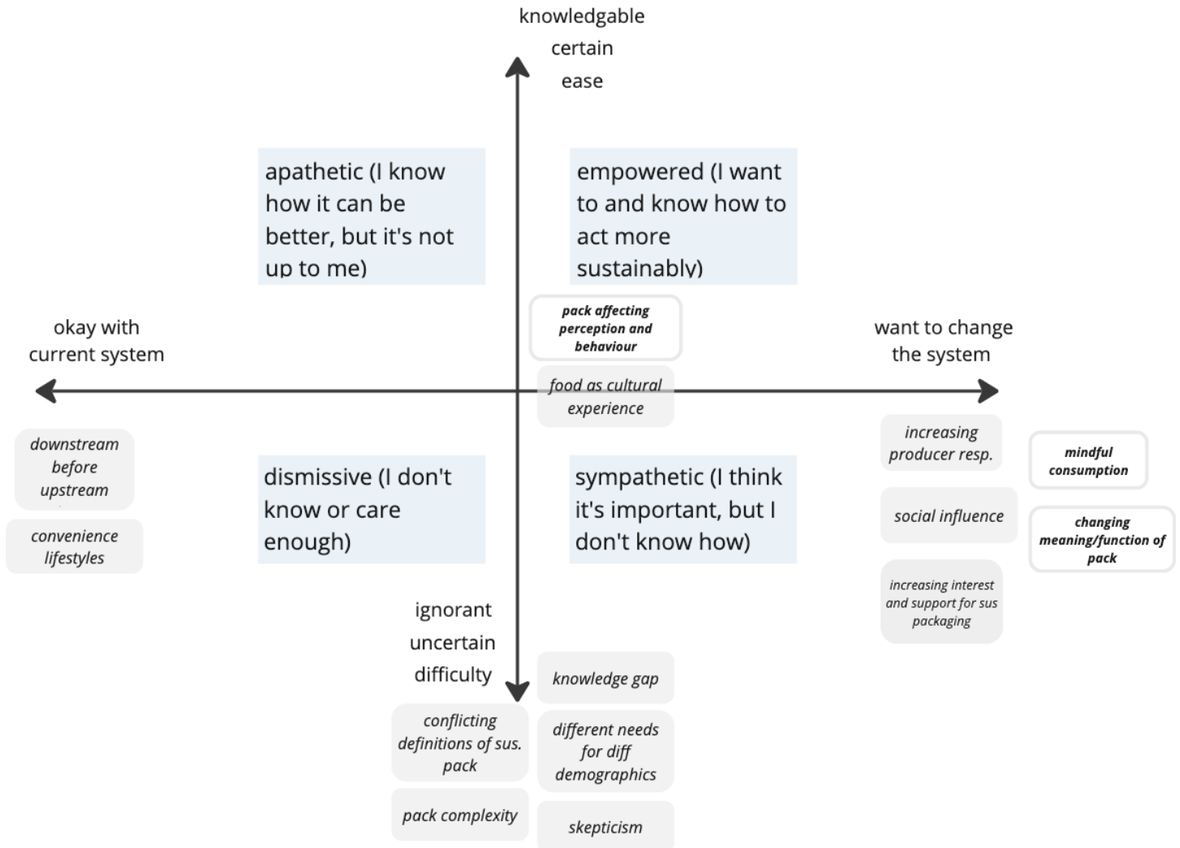


Figure 3.4.5 - Context factor matrix

Vision Statement

All things considered, the following vision statement was created:

I want to help consumers feel empowered to make informed decisions when it comes to packaging sustainability by encouraging routine reflection and system-level thinking.

With this vision, the goal is to move individuals from the sympathetic quadrant to the empowered quadrant. This vision cannot be achieved with just slapping a label on the packaging because consumers do not even look for that currently. It requires finding interesting ways to get people to reflect and change their behaviour.

The envisioned interaction with the packaging is like solving a puzzle: you carefully examine each piece of information, reflecting on its significance. Sometimes puzzle pieces might not fit together challenging your preconceived notions and prompting you to reevaluate your perspective. When the puzzle is solved, a coherent and complete picture, which may be surprising, is revealed. With time, you build intuition and develop problem solving skills that can be applied to other puzzles. The desired qualities are: surprising, revealing, stimulating, supportive.

This interaction metaphor and the desired qualities were used to inspire ideas during the ideation phase and evaluate concepts during the concept development phase.

Image source: https://unsplash.com/photos/sWlDOWk0Jp8

3.5 Requirements and Criteria

Requirements

Shown below are the requirements for the packaging concepts. The requirements were formulated based on insights from stakeholder interviews and literature.

- *Whole packaging system is manufacturable within time scope of interest.*
- *Primary packaging system fits with current brand image.*
- *Primary packaging system communicates claims and USPs.*
- *Primary packaging system provides all necessary information about ingredients, storage, preparation, and product identification.*
- *Whole packaging system has a reduction in carbon footprint of packaging compared to current system (in the materials/manufacturing phase and transport phase).*
- *Primary packaging system shows evidence of closure (tamperproof)*
- *Primary packaging system en.sures a shelf-life of at least a year.*
- *Primary packaging system is easy to use for the consumer (easy to open, pour, empty, store, handle and transport, reseal, dispose of properly).*
- *Primary packaging system is attractive in appearance*
- *Product-packaging combination has high quality, taste, naturalness, and authenticity perceptions.*
- *Product-packaging combination have a similar or higher sustainability perception compared to the current formats.*
- *Product-packaging combination have a high likelihood of purchase score.*

Evaluation criteria

Based on the previous research phases, a list of concept selection criteria was developed. These criteria were discussed with the company mentors and used in the initial down-selection processes for the packaging concepts. This list was developed further into a rubric (the Holistically sustainable packaging rubric) to allow for a more comprehensive comparison of some packaging concepts. This rubric combines various frameworks and tools mentioned in Section 2.3 with desirability, viability, and feasibility criteria, which were identified during stakeholder interviews and consumer research activities. The table below shows the criteria included in the rubric. The full rubric can be found in Appendix D.

Category	Criteria
effective	influence on food waste behaviour
	influence on disposal behaviour
	shelf life
	supporting more responsible or sustainable consumption
	alignment with labelling/ marketing codes
efficient	Material carbon footprint
	inbound transport load efficiency
	outbound transport weight efficiency
	outbound vol efficiency

Category	Criteria
cyclic	renewable content
	rec content
	separation and sorting
	circular economy value
	amount of non-recycled waste
	waste incineration impact
	littering risk
	littering impact
safe	non-hazardous materials
desirability	consumer quality perception
	consumer taste perception
	consumer authenticity perception

Category	Criteria
	ease of handling and opening
	ease of understanding claims, instructions, and ingredients
viability	likelihood of purchase (LOP)
	cost
	alignment with regulations
	alignment with retailer demands
	brand fit
	differentness
feasibility	manufacturability
	robustness (product wastage)

4 Develop

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In this chapter, the process for developing the sustainability strategy and the packaging concepts is presented. More specifically, Section 4.1 presents the competitor analysis and materiality assessment that informed the creation of the strategy. Section 4.2 shows the process taken to develop the short-term, medium-term, and long-term packaging designs. Two consumer studies and expert interviews were conducted to develop the concepts further.

4.1 Sustainability Strategy

Introduction

In order to develop a sustainability strategy for Bertolli, the framework detailedin Section 2.5 was used. The filled out framework is depicted in Figure 4.1.1. The brand and consumer blocks are based on the research delineated in earlier sections (1.2, 2.4 & 3.3). The following sections detail the background research, competitor analysis, and materiality assessment I conducted to complete the rest of the framework. The competitor analysis helped inform what the category sustainability norms are and how Bertolli can differentiate themselves. The materiality assessment helped me develop the targets and specific initiatives that Bertolli should pursue.

Background Research

Before getting started with the strategy development, I discussed Enrico/Bertolli's sustainability strategy with three Enrico employees to understand what is already being done. I learned the following:

- Current strategy - They have a few targets, but the scope of the strategy is fairly limited.
- GHG emissions - They have already measured their Scope 1 and 2 emissions and are working with an impact measurement service to measure their Scope 3 emissions.
- Packaging - They already work with their producers on packaging innovation projects.
- Supply chain - They have a code of conduct and a supplier questionnaire to collect data on supplier environmental performance. They are also in the process of getting all of their suppliers to register for a third party ESG supply chain assessment platform.
- Food quality and safety - They have supplier screening criteria to ensure that the suppliers meet quality and safety standards.

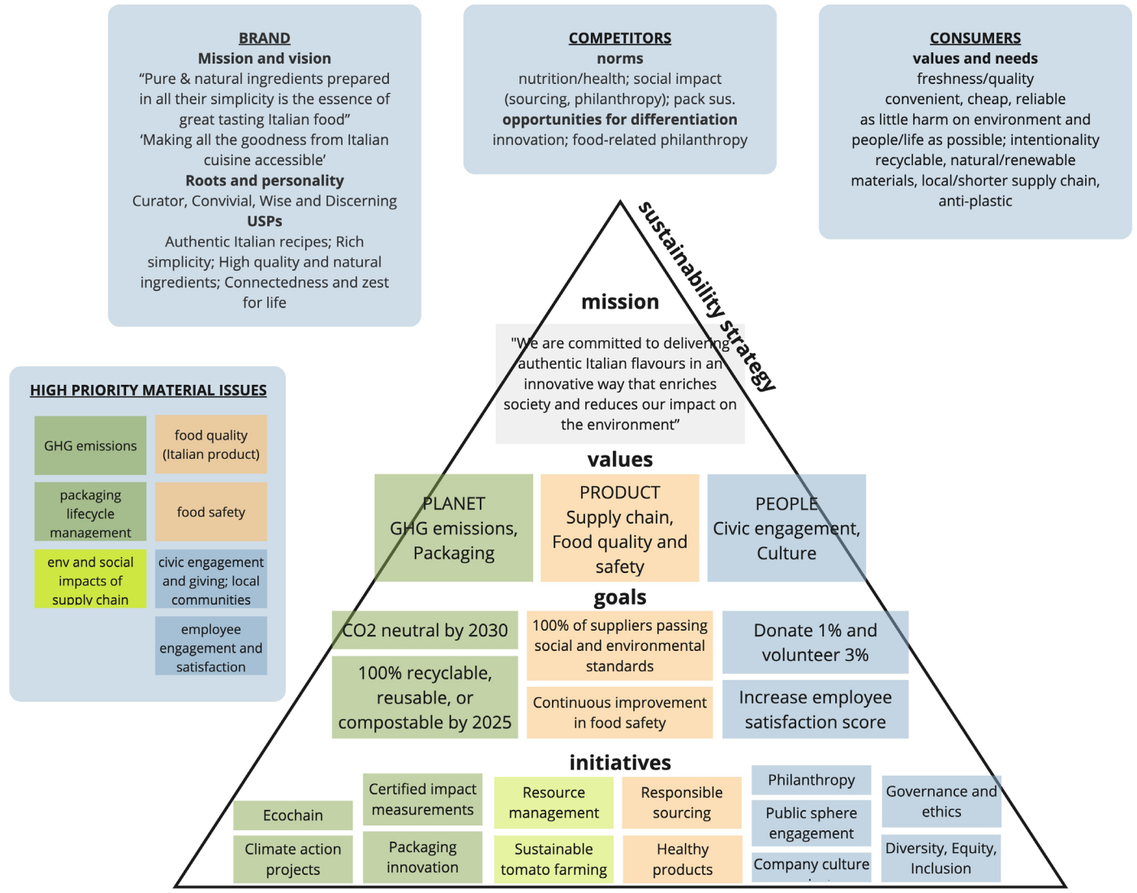


Figure 4.1.1 - Filled out framework

Competitor analysis

To get a better understanding of what the category norms and opportunities for differentiation are, the main competitors (that are not owned by a larger entity i.e., Dolmio, Loyd Grossman) were analysed.

Moreover, to get an idea of good practices and what possible values/goals could be pursued, the sustainability strategy of a few BCorps of around 50 employees were analysed. BCorps were chosen because they can be seen as the leaders in sustainability integration as they have already gone through the process of implementing the current best sustainable business practices (as outlined by BCorp).

Finally, just to have an awareness of where Bertolli might stand with consumers on the sustainability front already, the other brand owners' sustainability strategies were studied.

Competitors

The brands' sustainability missions, projects, and brand personalities were studied.

Napolina - "Our overriding commitment to the quality of ingredients means that we will never cut corners or compromise in any way. From planting to harvesting and processing we are proud of the ethical and transparent ways of working with all partners in our supply chain."

Personality: Responsible, serious; The Steward of Quality

Sacla - "We promise to transform the food lives of future generations" "Of course, we treasure our past, but our focus is firmly on the future. It has to be. Because we are determined to leave the world in better shape than we found it. And positively transform the food lives of future generations"

Personality: Friendly, family-oriented; The Caring Everyman

Mutti - " We, as a business, have a responsibility towards: Consumers and customers; Employees and partners; Farmers and business partners; Community and region; The industry and markets"

Personality: Responsible, orderly; The Tomato Executive (similar to Heinz)

Napolina

Sacla

Mutti

Figure 4.1.2 - Competitor sustainability webpages highlighting values and personality

Takeaways

Norms

- Health and well-being (Sacla)
- Responsible sourcing (Napolina, Mutti)
- Sustainable farming (Mutti, Heinz, Napolina)
- Sustainable packaging (Napolina, Heinz, Sacla)
- Philanthropy (Sacla)

Opportunities

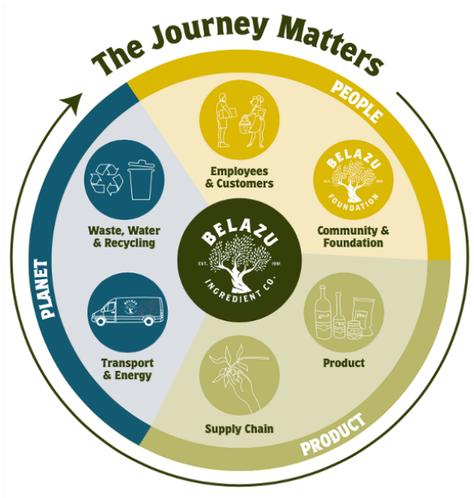
- Sustainable packaging innovation
- Philanthropy in the food space
- Supply chain management
- Projects with Italian suppliers and farmers
- Personality: Genuine, progressive; The Innovator

Small Food BCorps

The brands that were reviewed are Belazu, Jude's Ice Cream, Beco, and Little Freddie.

Observations

- All of the brands have a part of their website dedicated to sustainability.
- Most brands had a catchy initiative name and three or four memorable pillars grounded in SDGs.
- Their reports detail clear objectives and document their progress. Most brands use official reporting methods (e.g., CSR - ISO26000, GRI, or SASB)



Belazu CSR campaign

Beco sustainability strategy

Little Freddie's "Big Green Plan"

AREA	OBJECTIVES
1. EMISSIONS	• Validate emissions data by end of 2021 • Reduce carbon intensity by 3% by April 2022
2. PLASTICS	• Complete a plastic audit by April 2022 • Reduce non-recyclable plastic by 50% by 2025 • Communicate clear recycling message on pack
3. TRACEABILITY	• Have 100% ingredient traceability • Conduct 12 traceability audits throughout the year • Register all suppliers with Sedex by the end of 2022
4. FOOD WASTE	• Reduce food waste by 50% by 2030
5. LABELLING	• Communicate sustainability on our socials throughout the year with an average of 4 posts per month • Three on pack sustainability messages
6. COMMUNITY SUPPORT	• Achieve 250 volunteering days by April 2022 • Support our community through £90,000 worth of financial donations and product donations by April 2022
7. FAIR NUMERATION	• Maintain our status as a London Living Wager employer
8. WATER	• Map products and suppliers based on high-risk areas and water intensive crops by the end 2021 • Reduce water usage by 5% by April 2022
9. COMPANY CULTURE	• Achieve an overall increase on the staff survey to have an average of 85%

Belazu's sustainability objectives

Figure 4.1.3 - Exemplary screenshots from BCorp sustainability reports

Other Bertolli brand owners

Deoleo (Canada, Asia, and Europe Olive Oil)

- The Canada/Australia/Asia Bertolli website has sustainability undertones without making mention of sustainability explicitly.
- The NL Olive oil website has a brief sustainability page (sustainable agriculture and social responsibility promises).
- Deoleo's website has a sustainability page with an ESG report.

Mizkan (US)

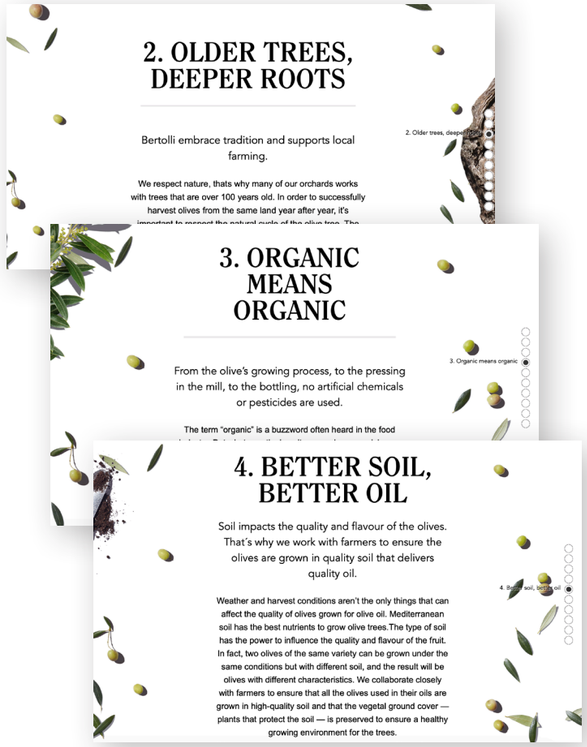
- Mizkan's website has a page for California transparency in supply chain act and the Human Trafficking Statute.

Upfield (UK Margarine)

- The UK Bertolli website has nothing about sustainability
- Upfield's website has information about their sustainability strategy and an ESG report.

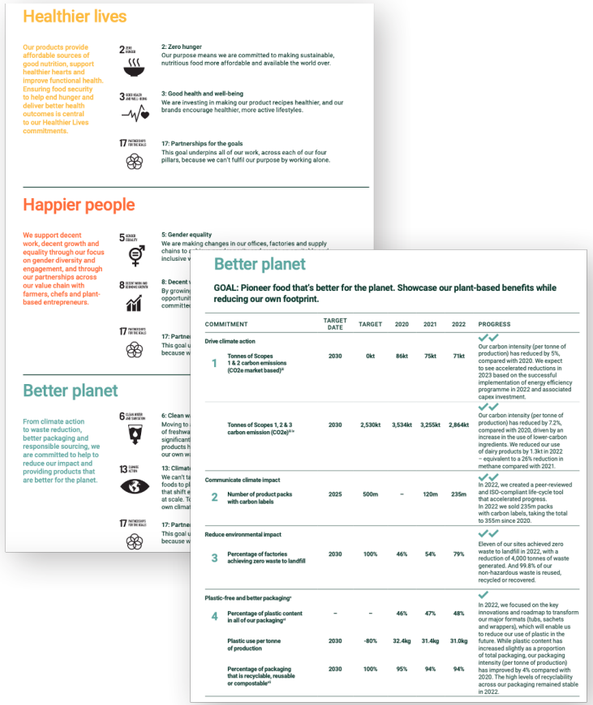
Summary

The other Bertolli brand owners have not made any substantial efforts to communicate brand sustainability. Bertolli olive oil websites (Deoleo) do make mention of sustainable farming.



Deoleo's Canada/Australia/Asia Bertolli website

Deoleo Sustainability report



Upfield sustainability report

Figure 4.1.4 - screenshots from websites and sustainability reports of other Bertolli brand owners

Materiality Matrix

Process

A materiality assessment is a method used by companies to guide their sustainability strategy and planning. According to NYU Stern (2019), the process of conducting a materiality assessment involves identifying relevant material sustainability issues, prioritising the issues using a materiality matrix, and moulding the strategy accordingly.

A material sustainability issue is an economic, social, or environmental issue that could impact the company or on which the company has an impact. A list of issues was collected from various sources, such as the UN SDGs, GRI standards, SASB standards, the BCorp assessment, and company sustainability reports.

For the materiality matrix, the following stakeholders were considered:

- Internal stakeholders - marketing and branding, product development, sourcing and quality
- External stakeholders - UK and NL customers, consumers, regulatory bodies, consumer groups, producers

I first mapped the topics based on my best guess of how the various stakeholders would prioritise the issue as informed by my preliminary research in the Discover phase of the project. Then, I amended the matrix based on feedback from three internal stakeholders, one of whom also spoke to the interests of external stakeholders. Only one external stakeholder was directly interviewed.

See the resulting materiality matrix in Figure 4.1.5.

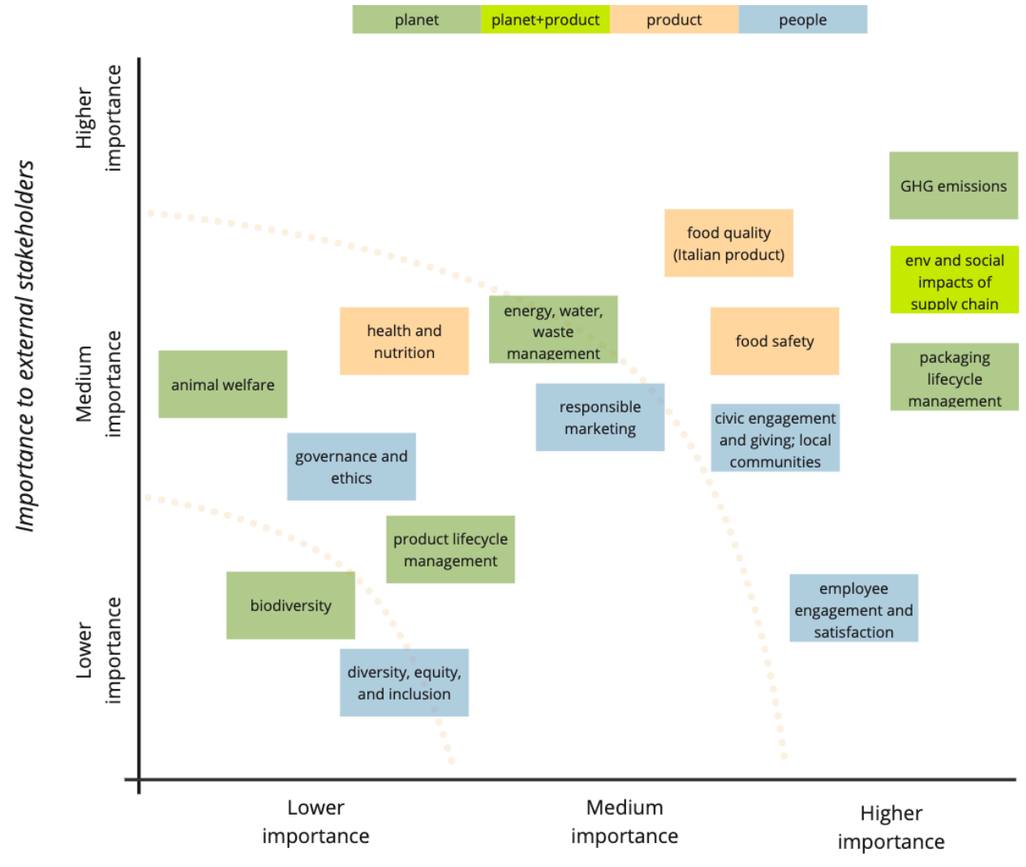


Figure 4.1.5 - Materiality Matrix

Iteration

Once I had gone through the framework, I developed the key strategy assets (i.e., the mission statement, key pillars and values, and a roadmap and an accompanying spreadsheet detailing the specifics of each activity). To get feedback on the strategy, I sent a proposal to company mentors for feedback.

The main points of feedback I received were:

- Incorporate "Italy" into the mission as that is the key message they want to convey in everything that will be communicated externally. Moreover, make sure each pillar is imbued with "Italian" values. For instance, the People pillar can be about gathering people around the table literally and metaphorically, which can be tied to the Italian value for connectedness. This aspect is imbued in my final strategy (which is detailed in Section 5.1).

- Consider proposing projects that are more top-of-mind for consumers and would contribute to the quality perception of the brand and products. For example, think about projects dealing with tomatoes or aspects of packaging sustainability that consumers care about. Based on this feedback, I detailed a project about regenerative tomato farming and studied its relevance and effect on likelihood of purchase (LOP) in the final consumer study detailed in Section 4.2.

Image source: https://unsplash.com/photos/r9RW20TrQ0Y

4.2 Packaging Concept Development

Process

Concept development was conducted in three parallel sub-areas: short-term, medium-term, and long-term.

For the short-term, tweaks on the current formats were explored to see if there were any easy ways to improve the environmental performance or enhance desirability (to contribute to a successful UK launch).

In the medium-term it is feasible to implement a new packaging format so I evaluated various alternative packaging formats.

Since the pouch format came out as the most promising for both the short-term and medium-term, the tracks were merged and different pouch variants were developed and then tested with consumers. The most promising ideas were iterated on resulting in the final design for the UK launch and the medium-term.

The long-term ideas were based on the future scenarios developed in Section 2.1. The pros and cons of the ideas were considered to narrow down and refine them into concepts.

During this phase of the project, Consumer empowerment concepts, not necessarily related to packaging design, were developed. However, due to the various limitations of the concepts, this idea direction was abandoned. Some of the ideas were incorporated into the sustainability strategy as potential campaigns that Bertolli could pursue. See Appendix H for details on the consumer empowerment concept development phase.

Short-term - small structural changes and graphic design changes

Pugh chart

Criteria:

- Consumer perception
- Environmental impact
- Protectiveness
- Alignment with regulations
- Ease of implementation
- Diferentness
- Usability
- Cost

Medium-term - new packaging format or more drastic structural changes

Pugh chart

Criteria:

- Consumer perception
- Environmental impact
- Usability
- Alignment with regulations

Long-term - new packaging models or new materials

packaging concepts based on D2C (top) and reuse (bottom) models

Qualitative pros and cons evaluation of following areas:

- Desirability
- Feasibility/Viability
- Environmental impact

Figure 4.2.1 - Concept development process

Packaging Ideation

Ideation was conducted in several phases to achieve creative and realistic ideas.

I conducted two group ideation sessions using the RETHINK tool developed by Hogeschool van Amsterdam. I was introduced to the tool through the KIDV's Packalicious Live event in March. The first session was conducted with three IDE students and the second session involved an IDE masters student, an IDE PhD researcher, a material science masters student, and science communications masters student. Then solo ideation and clustering was conducted. The ideas were clustered nto different format types (pouch-related, jar-related, other formats) and scopes (secondary packaging, system-level change, business model changes, long-term changes). (Appendix E contains more pictures of the ideation process.)

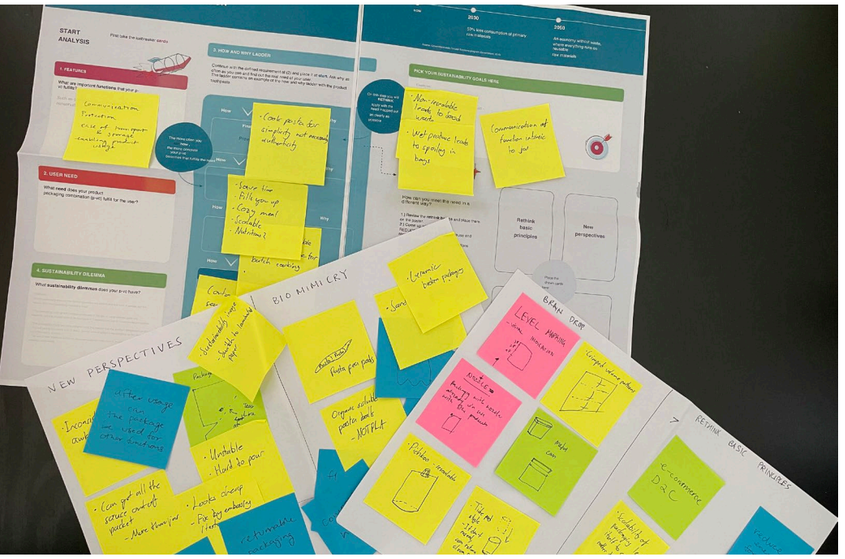


Figure 4.2.2 - RETHINK canvases

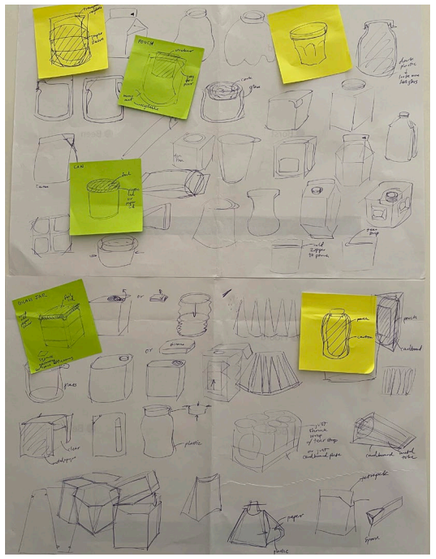


Figure 4.2.3 - Solo ideation sketches

Figure 4.2.4 - RETHINK ideation session

Short-term Concept Development

The short-term ideas involved making slight changes to the existing pack formats. The ideas were discussed with the current producers and suppliers to understand what would be feasible.

For the glass jar format, Bertolli could change the geometry or recycled content. However, as can be seen in the Pugh chart, the ideas would result in almost negligible gains. Thus forth, they were not developed any further.

For the plastic pouch, the only feasible structural change is to switch to a transparent or partly transparent pouch with or without a paper label or sleeve. This change would not lead to sustainability gains, but could be more appealing to consumers.

	Current jar	Square jar w foil	Brown jar w skinnier lid	Straight jar
Consumer perception (quality, taste, naturalness, authenticity)	0	-1	-1	0
Environmental performance	0	1*	1	1 *
Consumer sustainability perception	0	1	1	0
Protectiveness	0	-1 **	0	0
Cost	0	1	0	0
Ease of implementation	0	-1	0	0
Differentness	0	1	0	0
Usability	0	-1	0	0
Totals	**0**	**0**	**1**	**1**

*Figure 4.2.5 - Jar variation pugh chart; * - only the tranport phase is improved therefore there is only a negligible improvement in impact when considering whole life cycle; ** - the foil might have a lower protectiveness*

	Current pouch	Pouch with sleeve/ paper component	Metal pouch
Consumer perception (quality, taste, naturalness, authenticity)	0	1	0
Environmental performance	0	0	0
Consumer sustainability perception	0	1	1
Protectiveness	0	-1 *	0
Cost	0	-1	-1
Ease of implementation	0	-1	-1
Differentness	0	1	0
Usability	0	0	0
Alignment with regulations	0	0	1 **
Totals	**0**	**0**	**0**

*Figure 4.2.6 - Pouch variation pugh chart; * - clear might have a lower shelf-life; ** - if recyclable, then it is more aligned with regulations (will not be fined for low recyclability)*

Medium-term Concept Development

The main concepts and their pugh chart scores can be seen in Figure 4.2.7.

The environmental impact of the formats were calculated via the EcoAudit tool in GrantaEdupack. The input parameters can be found in Appendix J. A cradle to grave approach was used, except the transport and sauce production stages were taken out. The transport phase was left out because it is out-of-scope to identify suppliers and thus transport distances could not be determined. Moreover, it has been observed in other EcoAudits that the transport phase has an almost negligible impact relative to other phases. The production stage was omitted due to limited data availability. Material composition was based on spec sheets from current packaging options and desk research. Secondary and tertiary packaging were not considered. The results can be seen in Figure 4.2.8.

Note that it was assumed that the recyclable pouches would be implementable with the current supplier in the medium-term time horizon. (This is based on an estimate from the current pouch supplier that recyclable pouches would be available sometime in the next 2 years.) Costs were estimated using Granta Edupack's cost analysis feature, which calculates the material and manufacturing costs. Note that protectiveness was not considered due to a lack of data and usability was not included due to the complexity of evaluating that metric for such a diverse array of pack formats.

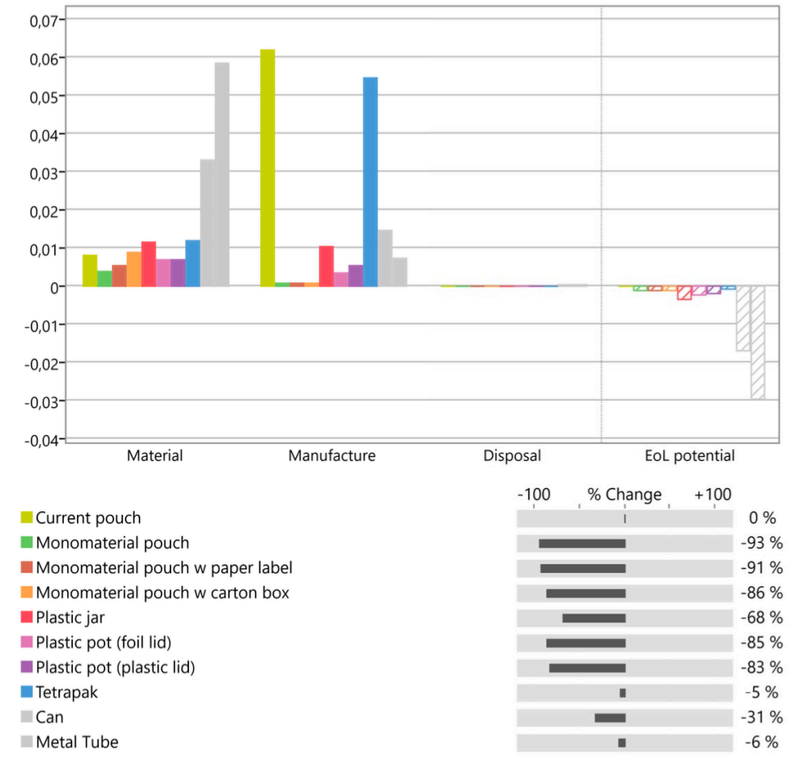
As can be seen in the pugh chart, the most appealing options here are the recyclable pouch formats and the Tetrapak.

The holistically sustainable packaging rubric was used to further evaluate these two options. The scores for the desirability and viability criteria were based on previous consumer research. The pouch scored higher than the tetrapak so the pouch design was identified as the most promising pack format to move forward with.

At this point, the short-term and medium-term concept development processes were merged. Given the gap between sustainability perception and reality for the pouch format, the main objective at this point of the project was to explore ways to close that gap. At the same time, ways to improve the quality perception were also considered. Figure 4.2.9 depicts the various designs that were developed. To assess some concepts, a questionnaire was conducted with UK consumers, as is elaborated on in the next section.

	Current pouch	Mono, Recyclable pouch	Pouch with paper label	Metal tube	Can	Tetrapak with spout	Plastic jar	Plastic pot with foil top	Plastic pot plastic top
Consumer perception (quality, taste, naturalness, authenticity)	0	0	1	-1	-1	1	0	-1	-1
Environmental performance	0	2	2	0	1	0	1	2	2
Consumer sustainability perception	0	1	0	1	1	1	0	0	0
Cost	0	1	1	-1	-1	0	1	0	1
Ease of Implementation	0	1	0	-1	0	0	-1	-1	-1
Usability	0	0	-1	1	0	1	1	0	1
Alignment with regulations	0	0.5	0.5	1	1	1	0.5	0.5	0.5
Totals	**0**	**5.5**	**4.5**	**0**	**1**	**4**	**2.5**	**0.5**	**2.5**

Figure 4.2.7 - Medium-term pack concepts pugh chart



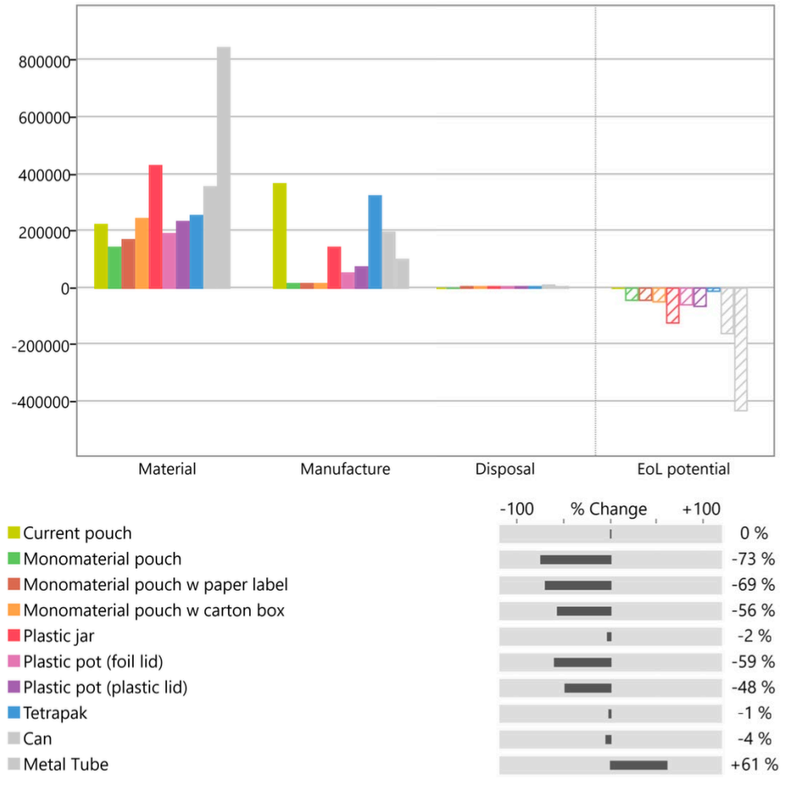
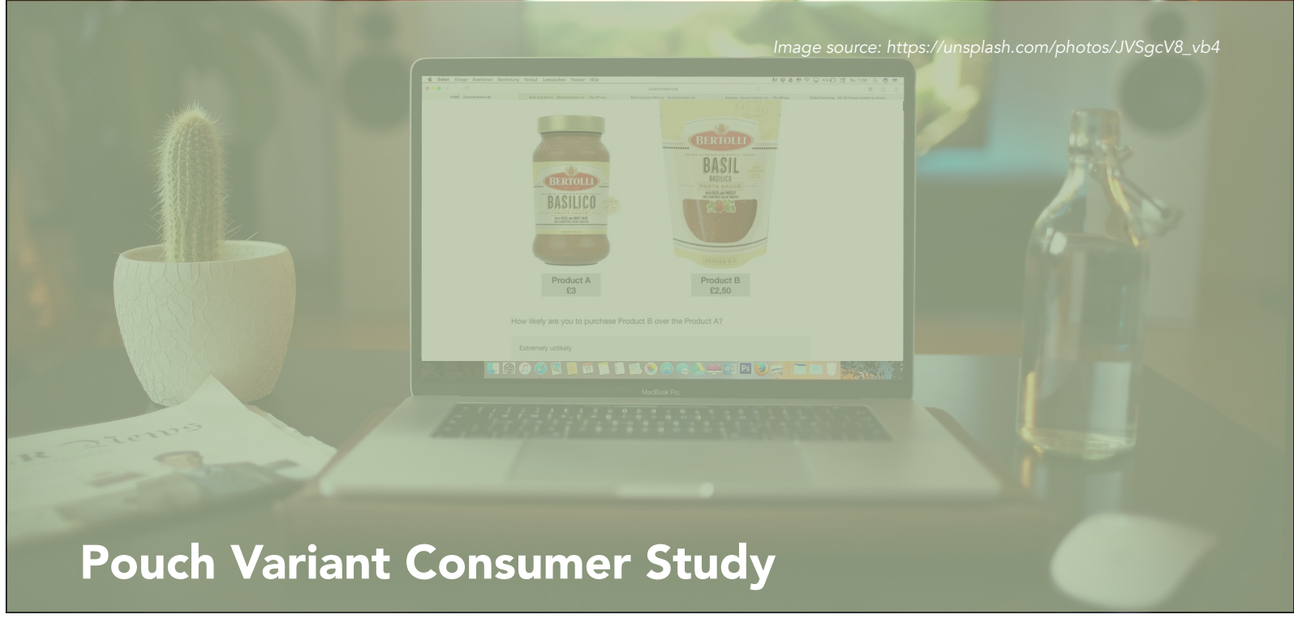


Figure 4.2.8 - Medium-term pack concepts EcoAudit comparisons (CO2 footprint - Top, Energy - Bottom)

Figure 4.2.9 - Pouch variants



Introduction

While the pouch format is the most promising format for the short-term and medium-term from a holistic standpoint, there is the issue of consumer perception. It was found during the consumer interviews that the pouch is relatively unfamiliar to consumers and has a lower quality perception for some consumers due to the thin-plastic look and feel. Moreover, many of the participants ranked the pouch as being the least sustainable. This result is corroborated by Steenis et al. (2017)'s findings as discussed in Section 2.4.

To improve the perception of the pouch, various quality and sustainability cues (Section 2.4) were explored. The six most promising pouch variants (Figure 4.2.10) were tested in this study to learn which cues or designs are the most successful. (Note that the Ecoscore label was used rather than the Eaternity label (which was the recommended label in Section 3.3) because this study was conducted before the pack testing results were analysed completely.)

Research Questions

Does adding a window make the pouch more appealing to consumers?

Hypothesis: Yes because then you can see inside and consumers will feel more confident about the quality of the sauce.

Does changing the background of the pouch make it more appealing to consumers?

Hypothesis: Yes because there is a nostalgic and homemade element to the background and it is more appetising than a solid colour.

Does adding a paperboard component make the pouch seem more sustainable to consumers? (And which option is most appealing?)

Hypothesis: Yes because paper is perceived as more natural and environmentally-friendly and will make the pouch seem more sturdy.

Figure 4.2.10 - Tested variants

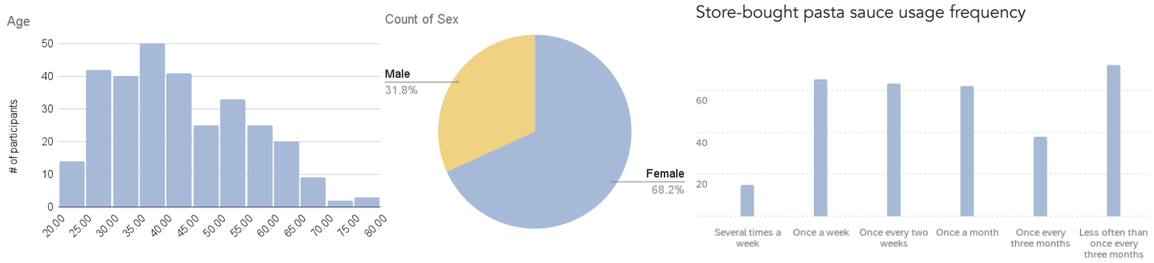


Figure 4.2.11 - Participant demographics

Rationales for the pouch	#
cheaper	164
more eco-friendly	40
more attractive, premium, or fresh	15
more functional	15

Rationales against the pouch	#
less functional	28
less eco-friendly	26
less attractive, premium	12
less familiar/trustworthy	10
not transparent	6

Figure 4.2.13 - Most common rationales for or against the pouch variant

Variant	LOP	Attractive-ness	Carbon Footprint	Environmen-tal burden	Functional-ity	Taste	Quality	Naturalness	Authenticity	Care for en-vironment	Innovative-ness	average	weighted average
Weight	3	2	0.5	0.5	2	3	3	2	3	1	2		
Control	3.57	3.19	2.89	2.60	2.79	2.98	2.94	2.98	3.96	3.34	3.49	3.16	3.24
Window	3.12	3.00	3.15	2.52	2.62	2.94	2.94	2.88	3.72	2.94	3.28	3.01	3.07
Eco score	3.54	2.98	3.22	2.91	2.92	3.04	3.00	2.98	3.77	3.42	3.60	3.22	3.25
Jar window	3.83	2.72	3.00	2.96	2.83	2.91	3.02	2.89	3.74	3.31	3.46	3.15	3.21
Watercolour	3.51	3.06	2.98	2.14	2.82	3.00	2.98	3.04	3.59	3.10	3.27	3.04	3.15
Paper flap	3.53	2.69	3.08	2.56	2.71	3.18	3.04	3.02	3.78	3.06	3.37	3.09	3.18

Figure 4.2.12 - Score table. Green indicates scores that are statistically significantly higher than 3, which means better performance than the glass jar. Red indicates scores that are statistically significantly lower than 3. Yellow means there was no statistically significant difference.

Does adding explicit sustainability graphic cues make the pouch seem more sustainable to consumers? (And which option is most appealing?)

Hypothesis: Yes but it may depend on the type of cue (i.e., certification vs. brand's own claim).

Method

For this study, an online questionnaire was used. This was done because collecting quantitative data makes it easier to compare the variants. To add, a large sample size could be more easily achieved making the results more representative.

The questionnaire had the following sequence:

- Stimuli presentation (Glass jar and Pouch variant side-by-side with prices)
- Likelihood of purchase (Likert scale rating and rationale)
- Packaging-related attributes comparison (attractiveness, carbon footprint, environmental burden after use, functionality)
- Pasta sauce-related attributes comparison (taste, quality, naturalness)
- Brand-related attributes comparison (authenticity, caring for environment, innovative)
- Pasta sauce consumption habits

The stimuli presentation was randomised such that each participant would only see one variant. The rating questions were worded so that the participant was always comparing the pouch variant to the glass jar. The glass jar was used as a benchmark for comparison because it is the status quo pack format and the goal of this study is to understand which designs have the potential to outperform the glass jar. The whole questionnaire can be found in Appendix F.

Structuring the survey as a conjoint analysis study was considered. However, a conjoint analysis provides data on the importance of discrete, independent attributes and the aim for this study was to assess the variants more holistically. Further down the line, it might be more suitable for Bertolli to conduct a conjoint analysis study.

Prolific, an online study recruitment service, was used to distribute the questionnaire. 50 participants were recruited per concept. This was done as it is a general rule of thumb that at least 30 responses should be collected to achieve acceptable reliability in results. The screening criteria that were applied were the participant should be from the UK and be the primary grocery shopper in their household.

Participant demographics

The participant demographics are summarised in Figure 4.2.11.

Pilot test

A pilot test of the questionnaires was conducted with a fellow TU Delft student to check for typos or usability issues, and to estimate the length of the questionnaire.

Data analysis

The average scores for each variant were calculated and compared using a one-way analysis of variance (ANOVA) and Matlab's Multiple comparison test. Weighted averages were calculated for each concept to get an idea of which concepts performed the best, in general. Coding was done for the LOP rationales. More figures can be found in Appendix F.

Results

Appeal (LOP, attractiveness, functionality,, taste, quality, naturalness)

- Most of the pouch variants had a higher LOP than the glass jar (except the window variant).
- With the exception of the Paper flap variant, all of the pouch designs were rated as having a similar attractiveness to the jar.
- The window and paper flap variants were rated as less functional than the jar.
- The paper flap variant was perceived as tastier than the jar (and the jar window pouch variant).
- All of the variants were rated as similar quality and naturalness to the jar.

Rationales for LOP

- Across all pouch variants, the main reason was because the pouch is cheaper.
- There was a higher prevalence of sustainability-related rationales for the ecoscore and jar window variants.
- In the rationales, there was quite a bit of uncertainty about recyclability and some people said they would only purchase if recyclable or assuming recyclable.

Sustainability perception (Carbon footprint, environmental burden)

- The carbon footprint was rated as similar to that of the jar across all variants. However, the environmental burden was rated as worse for all of the pouch variants except the eco score and jar window variants. (The watercolour variant had a higher burden rating than the eco score and jar window variants.)

Brand perception (Authenticity, Cares for environment, innovativeness)

- All of the pouch variants led to higher brand authenticity and innovativeness ratings. For the "cares for the environment" metric, the control, eco score, and jar window scored better than jar. The window variant had a statistically significantly lower score than the eco score variant in this metric.

The variants with the highest overall scores were the eco-score, the control, and the jar window concepts.

Discussion

The pouch variants generally had a higher LOP than the jar. However, this is likely due to the lower price point of the pouch, as suggested by the rationales.

The window variant's relatively lackluster performance was surprising as it was expected that consumers would find the product more appealing if they could see the contents. It is possible that it was perceived as less appealing because it is more "plasticky" and less premium than the other variants.

The watercolour variant did not have a better LOP or quality perception than the control variant, which means the background change did not have an effect on consumer perception.

The data suggests that adding a paper flap is not effective in improving the perception of the pouch as the paper flap variant was deemed less attractive and less functional.

All of the pouches were evaluated as having a similar carbon footprint as the jar, even for the jar window variant which had an explicit sustainability cue saying that it has a lower carbon footprint than the jar. This might be because consumers are not very familiar with the carbon footprint of different materials and pack formats. It is promising to see that at least the pouches were not perceived as having a higher footprint than the jar. The environmental burden results were expected since the pouch is made out of plastic and that is perceived as (and is) in certain aspects more harmful for the environment than glass. The sustainability cues did lead to improved environmental burden and brand sustainability perception. The lower environmental burden ratings suggest that consumers relate the eco score and the carbon footprint to the environmental burden. Further research into consumers' definitions of these metrics should be conducted to understand the nuances of consumer sustainability perception and to determine which metric is more meaningful.

The pouch variants were shown to improve the overall brand image. The high brand innovativeness scores build upon the findings from the consumer interviews where the pouch was described as innovative by several participants and the pack testing where the pouch formats were rated as more striking and unique than the jar. It was unexpected that the pouches would improve authenticity perception. This could be related to the fact that the pouches have more graphic elements that could be seen as authentic (i.e., the "Dal 1865" stamp and the visual of the ingredients).

The variants with relatively higher sustainability metric ratings did not attain higher quality or taste scores. This suggests that the halo effect might not be present in this product category. However, it is possible that the halo effect cannot be seen because the variants are not seen as more environmentally-friendly than the status quo format.

Limitations

There were several limitations to this study. For one, the demographics are not representative of the UK general populace. Specifically, there were a lot more women who answered the questionnaire than men, which could have biassed the results. Moreover, the question about store-bought pasta sauce usage did not have an option for "Never." This means that of the respondents who answered "Less often than once every three months" many could be non-users of store-bought pasta sauce, which could have biassed the results due to respondents' lack of experience or interest. This issue is mitigated slightly by the fact that the questions are all comparison-based and not absolute ratings based on the respondents' previous experiences. Another limitation is the lack of data on respondents' familiarity with Bertolli. The respondents' perception of Bertolli could have biassed their responses (e.g., they give a high taste or quality rating because they have had good experiences with Bertolli). Moreover, the way the respondents were exposed to the stimuli is not very representative of the environment in which they would likely encounter these products. For one, if these products were launched in the UK, it is likely that the respondents would have some exposure to the overall brand story via marketing campaigns. Therefore, the brand story should have been presented in some way to the respondents. Moreover, the stimuli show the pack shots in isolation. Embedding the packshots into a picture of store shelves would have been more realistic. Another limitation of the questionnaire was that respondents could only see the images of the packaging. If given prototypes to physically interact with, perhaps the results would have differed, as touch is an important sensory input in consumer buying behaviour. The number of times "cheaper" came up as a rationale implies that the high LOP scores were mainly due to price, but it is hard to know how other factors contributed to the scores. Finally, it is possible that some respondents could not see/read all of the claims if the picture was not big enough on their screen. This could have led to a lower cue perception for the Ecoscore and jar window variants.

Takeaways

The pouch format led to a better LOP and brand perception, in general, but none of the added features made the pouch more appealing.

The sustainability cues were relatively successful in improving the sustainability perception of the pouch. However, further research needs to be done to identify the most effective cues or wording of claims and ways to bring the sustainability perception of the pouch above the glass jar.

Based on the rationales, the following improvements were made to the pouch designs: mention functionality benefits (on back-of-pack), incorporate cues that could make the pouch seem more premium (this led to the development of the naturalistic concept).

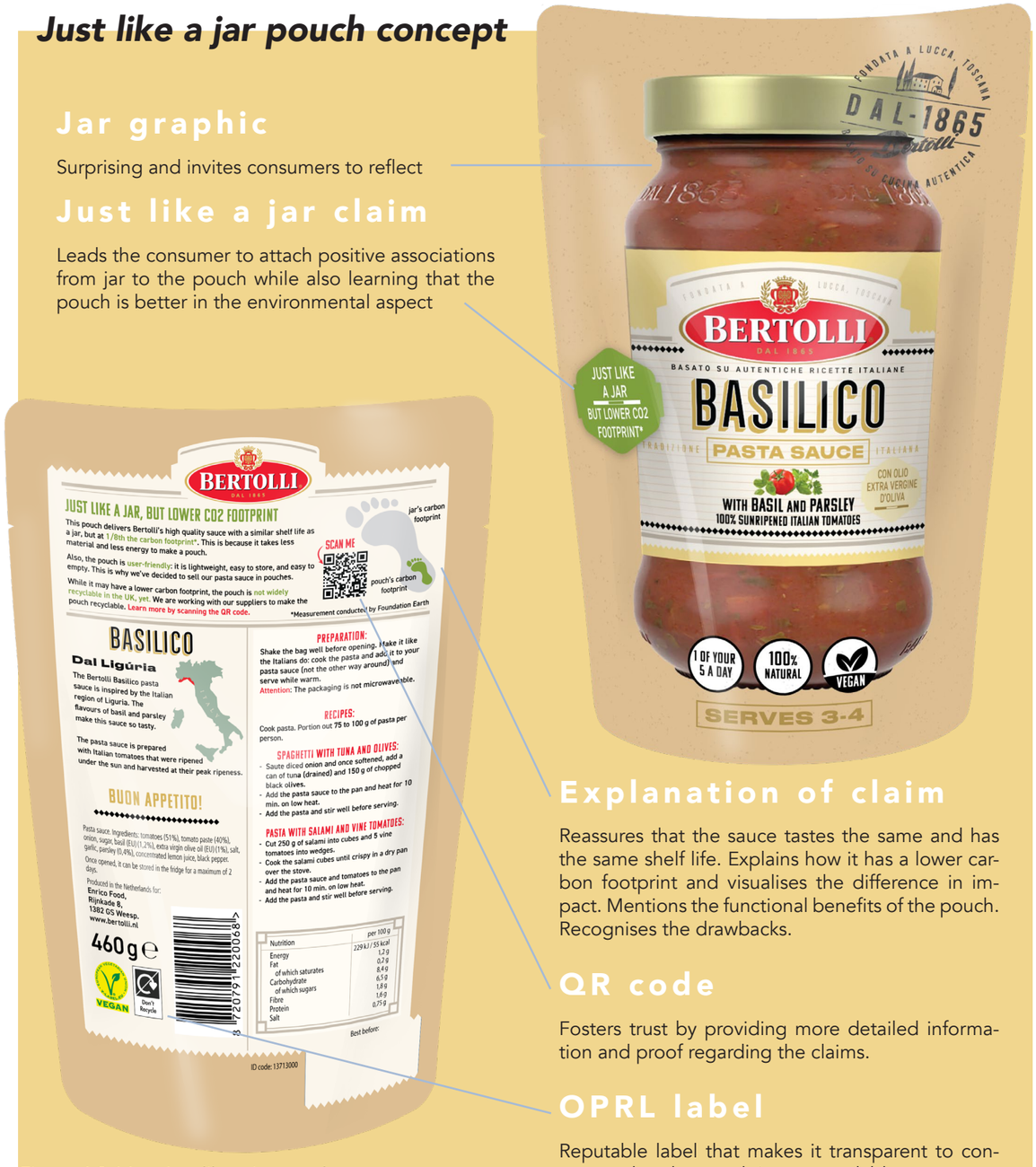
The ecoscore and jar window concepts had the highest average scores. Thus forth, elements of these designs were incorporated into the proposed pack design detailed in the next section.

Initial Short-term and Medium-term Proposals

It was proposed that Bertolli launch in the UK with only the pouch format with the following "Just like a jar" design. This will make a splash in the market since it is different and establishes Bertolli's position as a sustainable brand.

For the Jar graphic to be effective, Bertolli needs to commit to offering only the pouch. The idea is that Bertolli is on a mission to replace the jar with the pouch because of its various benefits. Launching with both formats might lead to scepticism as it could give consumers the impression that Bertolli is not actually devoted to the sustainability cause. Launching with the jar is not necessary because consumers already have a good impression of the brand according to the brand tracker. Plus, the pouch format has performed well in the pack testing and pouch variant study.

Just like a jar pouch concept



Jar graphic

Surprising and invites consumers to reflect

Just like a jar claim

Leads the consumer to attach positive associations from jar to the pouch while also learning that the pouch is better in the environmental aspect

Explanation of claim

Reassures that the sauce tastes the same and has the same shelf life. Explains how it has a lower carbon footprint and visualises the difference in impact. Mentions the functional benefits of the pouch. Recognises the drawbacks.

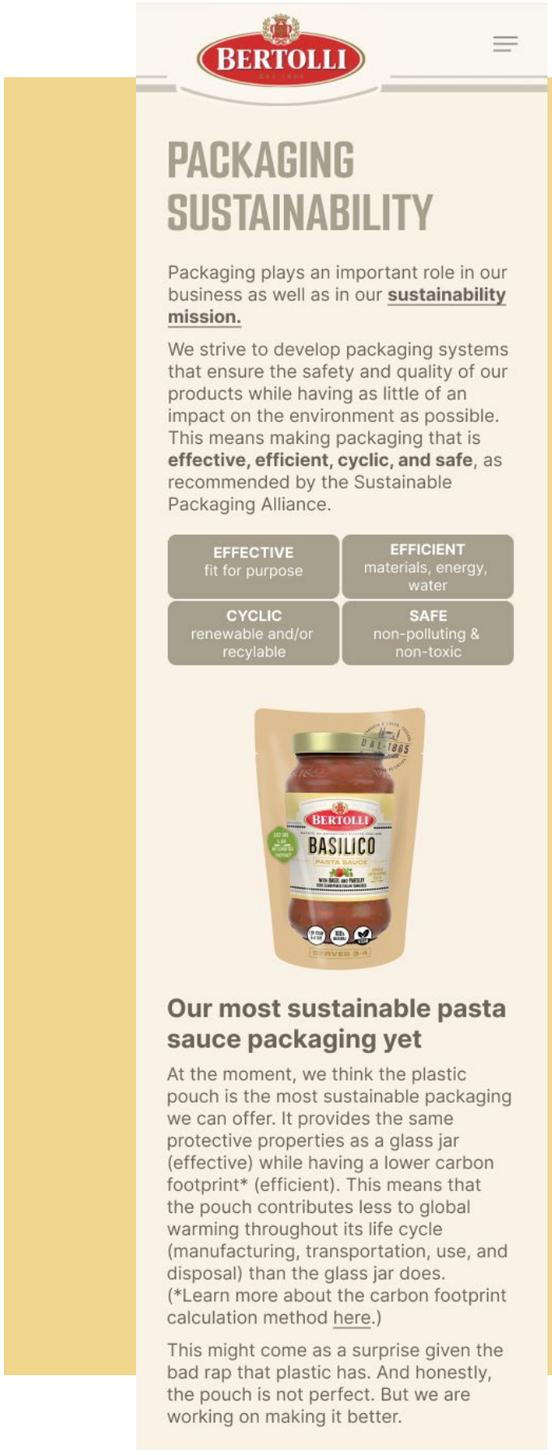
QR code

Fosters trust by providing more detailed information and proof regarding the claims.

OPRL label

Reputable label that makes it transparent to consumers that the pouch is not recyclable.

Figure 4.2.14a - Just like a jar pouch concept



Follows the communication guidelines described in Section 2.5.

Figure 4.2.14b - Just like a jar pouch concept's accompanying webpage about packaging sustainability

For the medium-term, a Naturalistic-looking recycable pouch design was proposed. The naturalistic graphics could improve environmental friendliness and recyclability consumer perception as suggested in Section 2.4.

Naturalistic pouch concept

Natural look

Encourages an association with carton and the environment, improving sustainabiltiy perception.

Sustainability claims

Establishes that the pouch is now recyclable and has a low carbon footprint for unaware consumers.

Easy pour

Tear notches at the corner facilitate easier pouring.

Sustainability Initiative Blurb

An area reserved for sharing information about Bertolli's sustainability initiatives.

OPRL & Eaternity label

Establishes trust through transparency and helps consumers act more sustainably.

Figure 4.2.15a - Naturalistic pouch concept

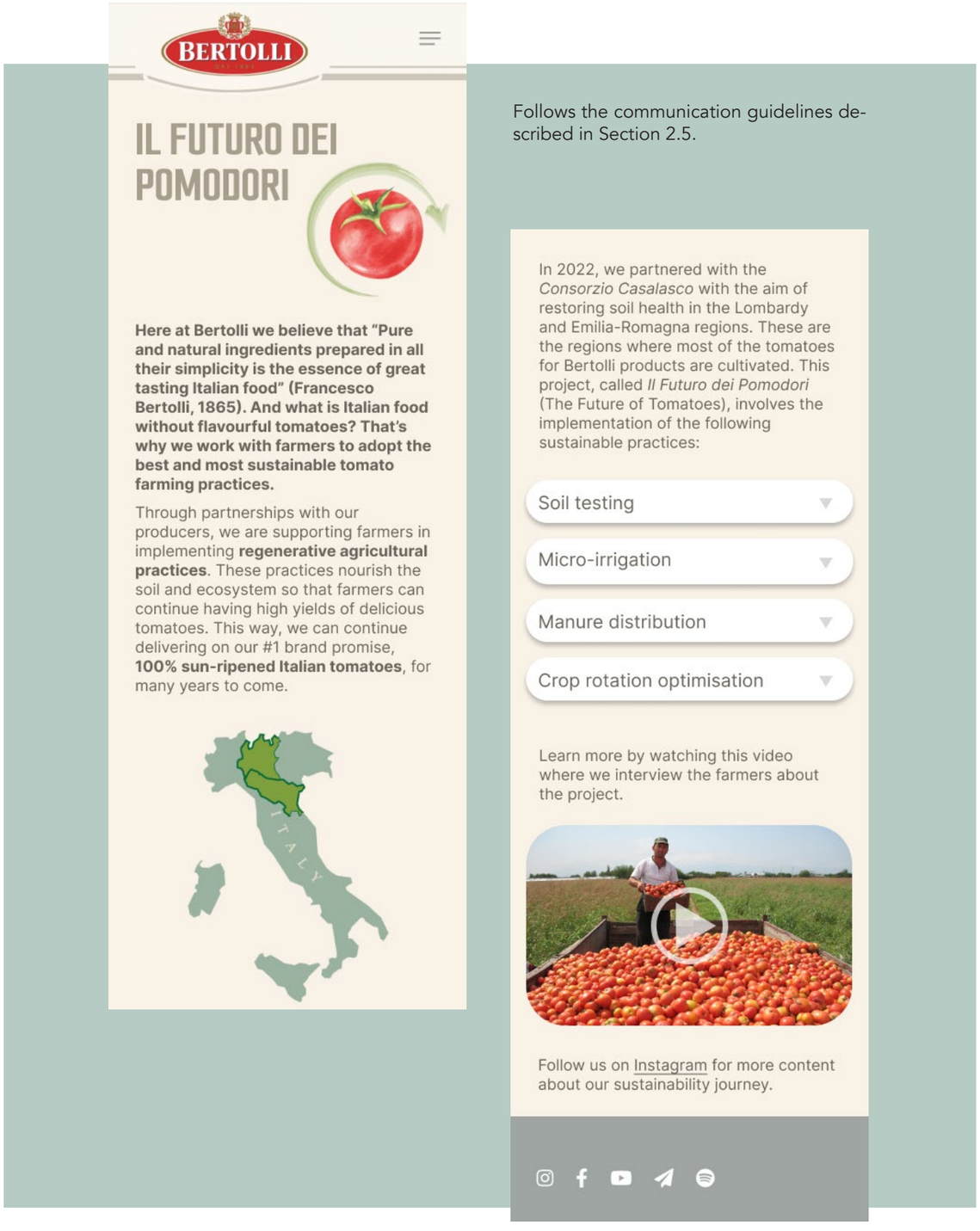


Figure 4.2.15b - Naturalistic pouch concept's accompanying webpage about sustainable farming

Tomato farmer image source: https://commons.wikimedia.org/wiki/File:Tomato_Harvesting_in_Armenia.JPG

Long-term Concept Development

Using the scenarios detailed in Section 2.1 as inspiration, the following long-term ideas were developed.

Scenario 1

On-demand custom size and flavour pasta sauce

Let the consumer design their own pasta sauce experience. They can choose the size and flavours and it will be delivered to them directly or to a nearby pick-up point.

Grocery delivery service partnership

Partner with a grocery delivery service. This means the packaging could be pared down in terms of protectiveness and labelling. It could also result in emissions savings due to more streamlined logistics.

Direct to consumer Italian meal boxes

Expand the product portfolio to include pasta and/or rice and offer a meal box service. The environmental benefits are similar to that of the grocery delivery service partnership.

Figure 4.2.16 - Scenario 1 ideas

Figure 4.2.17 - Scenario 2 ideas

Scenario 2

Consumer-refilled reusable packaging model

At-store - pasta vending machine (like the orange juicers at grocery stores), sauce bulk dispensers

At-home - frozen portion packs or "boxed" sauce (like boxed wine)

Producer-refilled reusable packaging model

At-store - Consumers shop like normal, but pay a deposit fee on the reusable packaging. They get refunded the fee if they return the packaging, which can be returned to any participating retail store.

At-home - Consumers either buy the product on the retailer's website or through a different delivery service. After use, they can return the packaging either through parcel delivery or by leaving them on the doorstep for pick-up when the next delivery comes.

Narrowing down on Long-term concepts

In order to narrow down to 1-2 concept(s) for each scenario the following aspects were considered:

- Desirability - How aligned is the concept with trends in consumer preferences? What are some potential barriers to adoption?
- Feasibility/Viability - How many resources would be needed and what is the cost of implementation?
- Sustainability - How likely is it that this model would actually have a lower environmental impact?

Scenario 1

The on-demand, custom pasta sauce idea may be desirable, but it would be a pretty big deviation from the brand's image and current production process. One of the core values of the brand is simplicity and Bertolli is also supposed to be a discerning authentic brand. Flavour exploration and making everything customisable goes against this image. Moreover, food waste was not observed as a big problem for pasta sauce. So portion packing may not actually be more sustainable. In fact, it could lead to the use of more packaging per portion of sauce than necessary. While it is possible to implement the production changes, given the misalignment with the brand image and the low likelihood of a reduced environmental impact, I believe all of the changes needed would not be justified.

Regarding partnering with a meal kit or grocery delivery service, there is potential for mutual benefit. The partner could benefit from the Authentic Italian credentials of Bertolli and Bertolli could expand their consumer base to include meal kit or grocery delivery consumers. In this scenario, Bertolli would not need to change much about their operations. It is the same as the current situation, except the retailer is replaced with the partner service. This partnership would enable new opportunities for reducing the impact of their products and packaging. For one, the packaging could be thinner or less robust since protection and shelf life are of less concern. Plus, the labels can be pared down since the packaging would not need to fulfil the "salesman" function anymore. Moreover, this model might reduce the carbon footprint of the logistics processes, depending on the partner's distribution process (i.e., do they use electrical vehicles, how spread apart are the delivery points). In summary, the grocery delivery partnership idea is promising. However, Bertolli needs to first determine whether there is interest from the potential partner services.

The D2C Italian meal boxes idea is a more ambitious version of the grocery delivery idea with the potential for a higher reward. It aligns well with consumer trends toward personalised delivery subscriptions and could lead to high brand loyalty and greater profits compared to the partnership idea. However, Bertolli will first need to expand the product line such that Bertolli could be consumers' one-stop-shop for Italian cuisine. Moreover, they will need to develop new business capabilities.

Scenario 2

The value of the consumer-refilled reuse model ideas is in the way it allows consumers to control how much pasta sauce they are able to buy, which is something some consumers might find desirable based on my interview findings and would help reduce food waste. However, the refill-at-store ideas were eliminated because the pasta sauce's shelf life and food safety would likely be compromised by it being in bulk containers that are being frequently opened and closed. To add, maintenance and cleaning might be troublesome. Moreover, the sauce cooking machine would be expensive to develop. From an environmental perspective, it might actually lead to more energy consumption compared to the current production process because the sauce is made in small batches.

The refill-at-home idea might be more feasible and sustainable, but would not have a desirable impact on brand perception. A large box of pasta sauce that sits in consumers' fridges for a month does not give the impression that the sauce is fresh or high quality even though it would be highly convenient.

Overall, the consumer-refilled reuse model ideas are not suitable for pasta sauce. However, this does not mean that this model would not work well for other Bertolli products. For instance, the pasta and toast products could be sold in refill bulk containers since selling dry goods in this way is already familiar to retailers and consumers.

The producer-refilled reuse model is more suitable for pasta sauce products because it is more controlled from a food safety perspective and is convenient for the consumer. They do not need to clean their container, remember to bring it back, and go through the refill and weighing process. In order to implement the producer-refilled reuse model, Bertolli should partner with a reuse platform service. Partnering with a company specialised in reuse logistics is advisable because implementing this reuse model as an individual brand would require the development of many new capabilities (sorting, cleaning, reverse logistics), which would be costly. Moreover, through a partnership, it is more likely that greater sustainability gains could be achieved through logistics- and resource-sharing with the other participating brands. Loop is the most promising partner as it is the biggest player in this space and has a presence in the UK and France already.

For this model there are two main options: home delivery or at-store. Assuming that Bertolli partners with a reuse platform, the model might be pre-determined by the partner's strategy. However, if there is flexibility, the following pros and cons should be considered. From an environmental perspective, the at-store option might save on transport emissions. However, the home delivery model is more convenient for consumers since they would not need to bring the empty containers to the store.

In summary, for Scenario 1, the most promising ideas are the grocery delivery partnership and D2C meal boxes. For Scenario 2, the producer-refilled reuse model is the most favourable. A high-level roadmap for implementing these models along with accompanying packaging concepts were developed (as presented in Section 5.2).

Concept Evaluation

Introduction

To evaluate the packaging designs, I conducted tailored interviews with internal stakeholders and packaging experts and a questionnaire with consumers

The interviews allowed me to collect rich data in a short timespan. In total, I consulted six individuals: three Enrico employees and three packaging experts. For all of the interviews, I used a slide deck to present the solution and then asked probing questions to get their thoughts on the concepts. These interviews validated that I was on the right path, informed improvements to the designs, and gave me some ideas for future considerations and recommendations.

Then, to get a read on how the short and medium term ideas would be received by consumers and how they could be improved, I developed and distributed a questionnaire via Prolific.

The following sections describe the process and takeaways in detail.

Feedback from internal stakeholders

I presented the initial designs to my company mentors, as well as, another Enrico employee who works on product development. Their feedback helped inform the questions posed in the consumer study and design improvements. The questions and improvements are *italicised*.

- Regarding the Naturalistic design, they were concerned about the connotations surrounding this sort of graphic style. *So the question is, would the organic style of the pouch turn the traditional consumer off from Bertolli or this product? This was a topic of the consumer study.*
- While not relevant to the UK launch, they also mentioned that, if they were to launch the Naturalistic design in the Netherlands, the change in colour could affect current consumers' buying behaviour. Perhaps, they would not recognise the flavours anymore (since they are currently clearly colour-coded) and thus be confused by the change. *This informed the final design, which uses an altered version of the original colours. This way, it is easier to tell the difference between the flavours and the design could be considered for existing markets, as well.*
- They suggested emphasising Italian provenance with the sustainability projects. *This led me to visually highlight the areas of Italy where the projects would be carried out.*

Feedback from experts

A packaging expert from WRAP (Expert A) and two researchers in sustainable packaging at the Hogeschool van Amsterdam (Expert B and C) were interviewed. The main takeaways, resulting changes to the designs, and recommendations are detailed below.

Holistic sustainability of packaging concepts

The pouch is indeed what they believe could be a more environmentally-friendly packaging format for pasta sauce. And in the UK, the pouch is technically recyclable, though it cannot be put in household recycling (needs to be brought to retailer collection point) (Expert A). Kerbside pickup will become available in the coming years and thus would make the pouch an even more appealing alternative to glass.

Regarding the regulatory side of things, although the current pouch would be penalised (Plastics packaging tax and EPR "difficult to recycle" penalty once EPR is introduced), once Bertolli switches to monomaterial pouches and once it becomes viable to incorporate recycled content (at TRL 4 or 5 now according to Expert A) the pouch would be in alignment with all of the regulations. Even with the penalties, it was calculated that the pouches would be cheaper than the glass jars. Therefore, going for the pouch now as the main packaging format for pasta sauce is worthwhile as a way to start establishing the pouch as a sustainable alternative.

Regarding consumer perception, Expert A predicted that paper-type finish would be well-received by consumers and would not be considered as greenwashing.

Experts B and C made a few comments about the content of the back of pack message and webpage:

- Make sure to substantiate claims properly. For instance, what parts of the life cycle were included? What assumptions were made? What are the recycling rates and are the materials down-cycled?
- Share information about how the pouch compares to the jar in functionality aspects like shelf-life. (This might be more important for the customers than consumers.)

These suggestions are included in Section 5.4 as future recommendations.

Desirability of pouch format

In terms of desirability, something to consider is Expert A's observation that retailers are moving out of plastic due to consumer pressure. For instance, some retailers are switching from HDPE jugs to Tetrapaks for milk, even though HDPE is 100% recyclable and has 40% RC. (Tetrapak has a 60% collection rate and there is only one recycling plant in the UK.) Therefore, it is important for Bertolli to collect data that suggests high consumer acceptance of the plastic pouch and present a strong argument to the retailers.

Long-term ideas

Expert B mentioned that the D2C could be considered in the near-term and encompass the reuse model.

The reuse model has already proven to be fairly desirable, but is currently limited to a narrow range of products (Expert A). According to Experts B and C, legislation will likely require more and more reusable packaging in the long-term making the reuse model more futureproof. Some considerations they mentioned were the overall costs and impacts of logistics behind reuse, and the impact of standardisation on the brand.

Takeaways

Changes based on feedback

Added more information about how the pouch compares to the jar in terms of functionality on the back of pack message and on the webpage.

Changed the long-term proposal such that the D2C is not presented as a separate concept, but rather a supplementary medium-term opportunity, a potential route for Bertolli to expand their reach and a way to implement reusable packaging in the long-term.

Recommendations

Ensure that the impact measurement is well-documented and that all possible questions that consumers might think of are answered somewhere on the website.

Bertolli should collect evidence that the pouch is seen as sufficiently sustainable by consumers to sell the pouch to retailers.

Final Consumer Study

Research Questions

In order to understand the consumer perception of the concepts, a consumer study was conducted. The main research goals behind this study were to evaluate how appealing the front of pack designs are and to assess how informative and meaningful the back of pack and webpages are.

More specifically, the research questions were as follows,

Front of pack design

- How appealing is the product based on the front of pack design (graphics and claims)?
  - For the jar design, questions about eye-catchingness and confusion were also added to understand how much the packaging would stand out and to check that the jar graphic is not off-putting.
- What is the sustainability perception of the concepts (i.e., how do consumers rate the sustainability of the concepts and why)?
  - For the jar design, is it enough for the pouch to be lower CO_2 footprint and not recyclable to be recognised as a sustainable alternative to a jar?

Back of pack message

- How informative (understandable and believable) and meaningful (relevant and appealing) is the back of pack message about packaging sustainability?

Webpage

- Is the webpage successful in informing consumers? How can it be improved?
- How does having a substantiating webpage affect LOP?
- How meaningful (relevant and appealing) is a non-packaging related sustainability initiative like Il Futuro Dei Pomodoro?

Method

A questionnaire was used as the research tool for this study. This was done because the main goal of the study was to validate the concepts. The quantitative nature of the questionnaire made it easy to analyse and draw conclusions about the concepts. Moreover, this tool was used because a larger sample size could be achieved in a short period of time compared to an interview or observation.

Two versions of the questionnaire were made, one for the Just like a jar concept (referred to as the "Jar graphic design/concept" from now on) and another for the natural colour scheme and graphic design concept (referred to as the "Naturalistic design/concept: from now on). The questionnaires can be found in Appendix G.

The questionnaire had three main sections:

- Front of pack: The participant is shown an image of the front of pack mock-up and asked to record the first three words that come to mind. Then, they are asked to rate the packaging's appeal and sustainability. After rating the sustainability, they are asked for their rationale.
- Back of pack: Next, the participant is shown the back of pack with a zoomed in shot of the sustainability-related message. They are asked to rate the informativeness and meaningfulness of the message.
- Webpage: Finally, they are shown the packaging's accompanying webpage and asked about the informativeness and meaningfulness. With an opportunity to state their rationale.

The questionnaire was distributed via the recruitment service Prolific. A sample size of 30 participants per concept was chosen as it is a general rule of thumb that at least 30 responses should be collected to achieve acceptable reliability in results. Given cost limitations, more participants were not recruited. The screening criteria that were applied were the participant should be from the UK and

be the primary grocery shopper in their household.

Participant demographics

Figure 4.2.18 shows the participant demographics for this study.

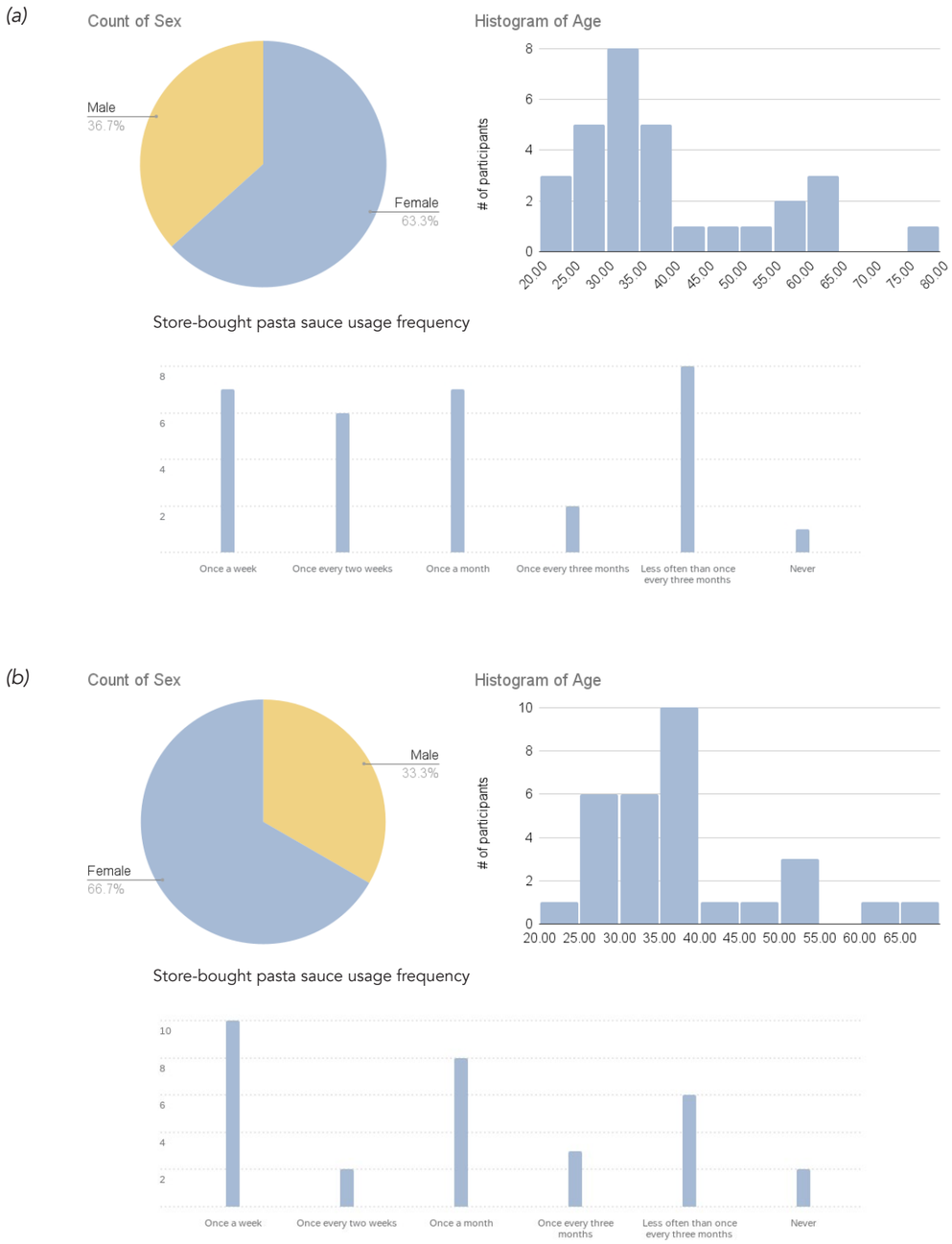
Pilot test

A pilot test of the questionnaires was conducted with a fellow TU Delft student to check for typos or usability issues, and to estimate the length of the questionnaires.

Data analysis

A word cloud was generated using the text data for the word association task to get an overview of the perception of the pack designs. The built-in data analysis functions of Qualtrics were used to produce bar graphs for the rating questions. Descriptive statistics were used to draw conclusions about each research question.

Figure 4.2.18 - Demographics for (a) Jar Graphic design and (b) Naturalistic design



Results

Word association

Figure 4.2.19 - Word clouds based on questionnaire results

The positive words associated with the Jar pack design (3 or more responses) are interesting, attractive, smart, eco-friendly, inventive, and tasty. The negative words with 2 or more responses are dull, unnecessary/wasteful, and cheap.

The Naturalistic pack design was associated with the following positive words (3 or more responses): simple, tasty, attractive, clean, and easy. No negative words were recorded.

How appealing is the product based on the front of pack design?

Q2: To what extent do you agree with the following statement: The packaging design makes me want to try the product.

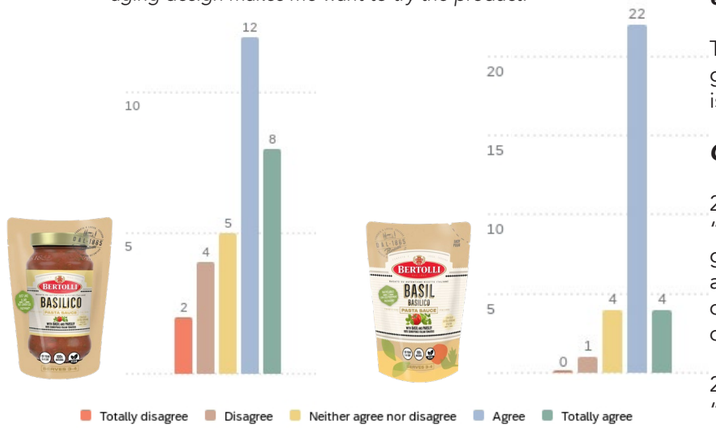


Figure 4.2.20 - Trying intention question results

Both designs have a moderate effect on trying intention.

The average score was 3.6 for the Jar graphic design and 3.9 for the Naturalistic design.

Other metrics

2/3 of the participants (22 out of 31) "agree" or "totally agree" that the Jar graphic design would catch their eye and 5/6 of the participants (25 out of 31) did not feel confused by the packaging design.

29 out of 31 participants "agree" or "totally agree" that the Naturalistic design is visually attractive.

Sustainability perception

For the Jar graphic design, 12 participants "disagreed" or "totally disagreed" and 16 "agreed" or "totally agreed" with the statement "The pouch is a sustainable alternative to glass jar packaging." This means that there is not a clear consensus about the pouch being a sustainable alternative to the glass jar when participants are confronted with the Jar graphic design. On the other hand, for the Naturalistic design, there is a larger consensus that the pouch is a sustainable alternative as only 8 participants "disagreed" or "totally disagreed" and 19 "agreed" or "totally agreed."

Q3: To what extent do you agree with the following statement: The pouch is a sustainable alternative to glass jar packaging.

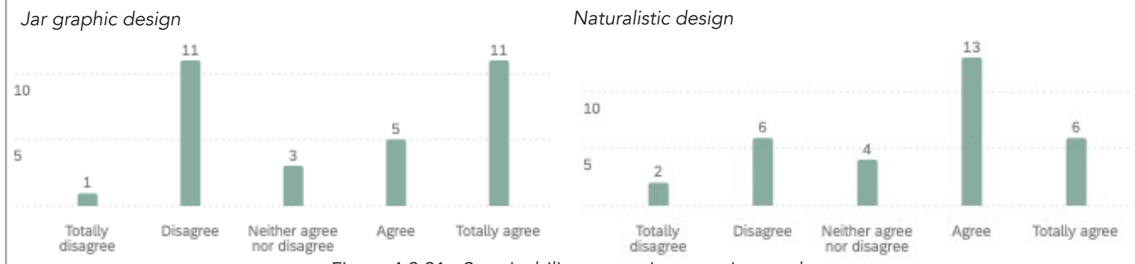


Figure 4.2.21 - Sustainability perception question results

Rationales

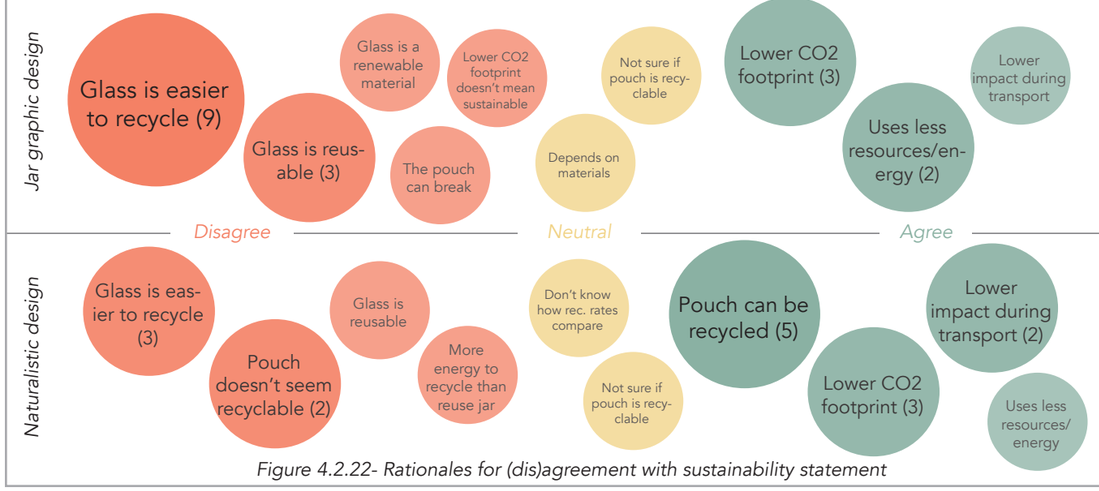


Figure 4.2.22- Rationales for (dis)agreement with sustainability statement

Just like a Jar Back of Pack Message

The Jar graphic back of pack message is informative.

26 out of 31

participants agreed that the message is **understandable**.

26 out of 31

participants agreed that the message is **believable**.

The Jar graphic back of pack message is moderately meaningful.

19 out of 31

participants agreed that the message is **relevant**.

16 out of 31

participants agreed that the message would make them **more likely to buy the product or from the brand.**

Figure 4.2.23 - Jar graphic concept back of pack

Packaging Sustainability Webpage

The webpage is informative.

26 out of 31
participants agreed that the webpage made them feel **well-informed** about packaging sustainability.

The webpage makes some consumers more interested in trying the product or the brand.

15 out of 31
participants agreed that the webpage would make them **more likely to buy the product or from the brand.**

Consumers want:

- more proof and numbers
- information about reuse and reduce (from the 3 Rs
- to know what steps are being taken to improve the packaging with time frames
- to know time until pouch would biodegrade
- less information

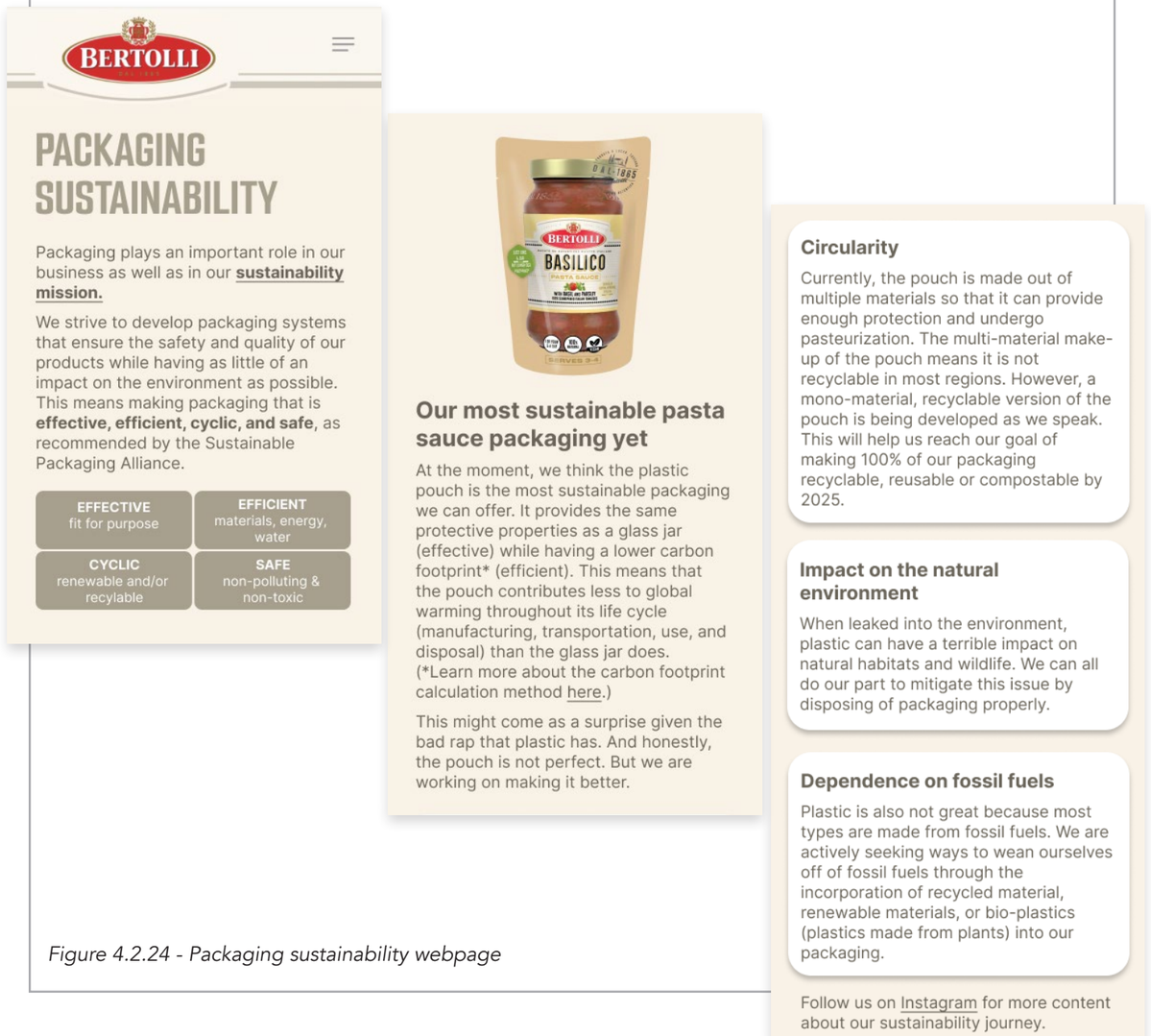


Figure 4.2.24 - Packaging sustainability webpage

Il Futuro Dei Pomodoro - Back of pack message and webpage

The back of pack message is moderately meaningful.

19 out of 31
participants agreed that the message is relevant.

20 out of 31
participants agreed that the message would make them more likely to buy the product or from the brand.

The webpage is less relevant, but does contribute to a positive perception of brand.

14 out of 31
participants agreed that the webpage is relevant.

21 out of 31
participants agreed that the webpage would make them more likely to buy the product or from the brand.

Figure 4.2.25 - Naturalistic concept back of pack

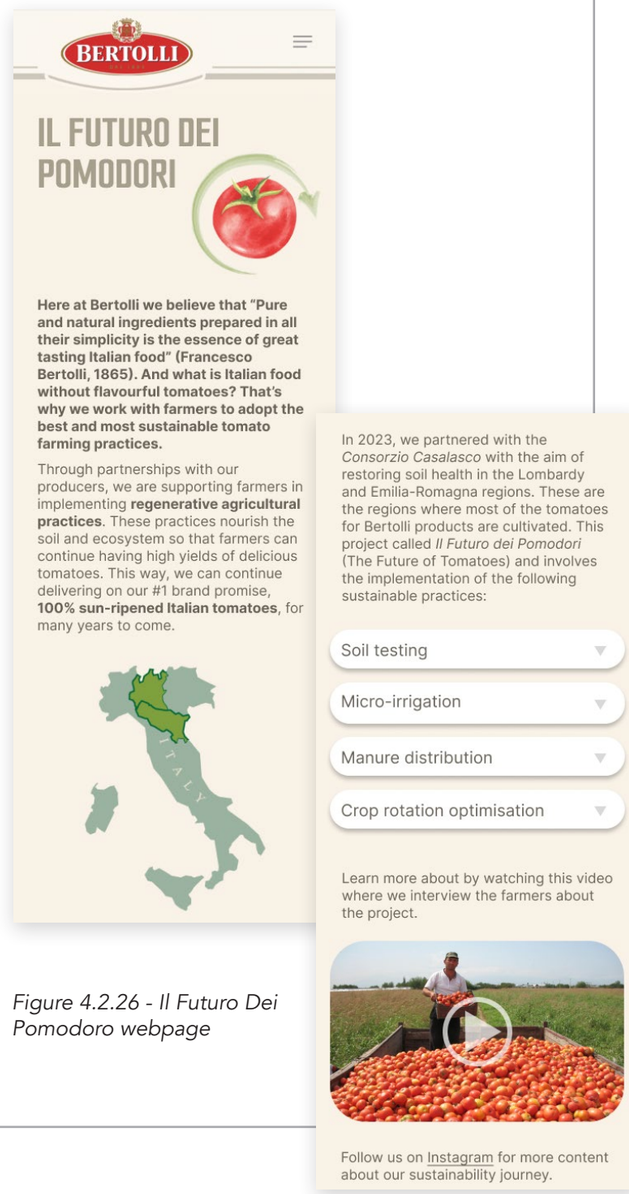


Figure 4.2.26 - Il Futuro Dei Pomodoro webpage

Discussion

Front of pack design

Both designs are both sufficiently appealing. The Naturalistic design is more appealing than the Jar graphic design.

According to the word cloud, the Jar graphic pack is seen as more novel while the Naturalistic pack is perceived as simple and minimalistic. Therefore, the two designs appeal in different ways to the consumer.

The survey results confirm that the jar design is eye-catching, yet not confusing. For a launch scenario, it is advisable to choose the Jar graphic design since it would grab the consumer's attention.

The sustainability perception of the pouch with the Jar graphic design is split between a third of participants disagreeing and half agreeing. On the contrary, the pouch with Naturalistic design is seen as more sustainable by the participants. According to the rationales this difference could be attributed to the recyclability. These results imply that it is not enough for the packaging to have a lower carbon footprint for it to be considered as more sustainable than the jar. With all of the caveats that need to be explained for the non-recyclable pouch, it is hard to convince the consumer that it is a more sustainable alternative than a jar. Even when there is the claim that the pouch is recyclable, there is still some scepticism and glass jars are seen as "easier to recycle." This implies that beyond the recyclability, consumers would like to know the actual recycling rate for the material to make a more informed decision.

Back of pack message and webpage

The "Just like a jar" back of pack message and webpage are seen as quite informative and fairly relevant. The fact that around half of the participants answered that the webpage would make them more likely to buy the product or from the brand implies that the webpage has a positive influence on LOP.

The message and webpage could be improved by adding some quantitative data and more information about improvement measures. One respondent mentioned that there is too much information and thus it might be more effective to streamline the information. Moreover, it is important to note that some participants alluded to the fact that they would not look at the back of the pack or scan the QR code. Therefore, it is important to consider what exact message is the most meaningful to put on the front of the pack.

Consumers do not seem to find information about the sustainable farming initiative that relevant, but it does contribute positively to their perception of the product and brand. We can assume that consumers find initiatives like this as a plus, but do not need to know the specifics. Unlike the packaging sustainability claims, these projects are not susceptible to the same scepticism.

Limitations

There are various limitations of this study. First off, the sample size was limited and the demographics are not representative of the UK general populace. To add, depth was sacrificed for breadth in this questionnaire making it difficult to decipher why the respondents answered the way they did. For instance, it is not possible to determine whether it was the jar graphic or the colour or the structure of the pouch that affected the taste ratings. Moreover, it is difficult to draw conclusions about the efficacy of the specific sustainability cues embedded in the front of pack design because there were no questions about these specific elements or a control case to compare it against. (The same goes for the efficacy of the back of pack message and webpage in improving sustainability perception.)

Takeaways

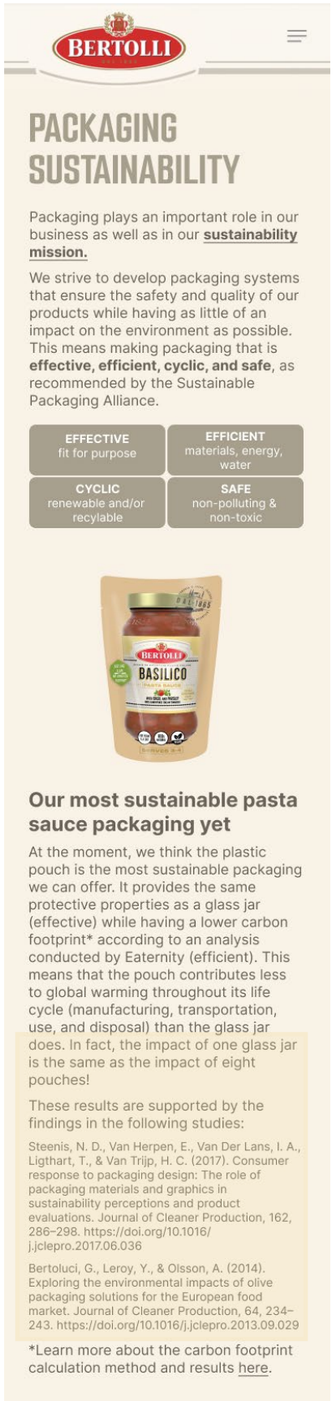
Overall, both designs performed well. For the Jar graphic design, there were mixed results regarding the sustainability perception of the pouch. The results suggest that a lower carbon footprint is not enough of an argument for one to consider the pouch as more sustainable than the glass jar. This finding informed the final proposal.

The back of pack messages and webpages were validated as informative. Both back of pack messages and the packaging sustainability webpage were considered relevant and had a slight influence on LOP. The sustainable farming webpage was not considered as relevant as the other assets, but had a higher LOP rating. This implies that consumers would not actively seek this information, but find it appealing. Making it important to raise awareness about non-packaging-related initiatives in a highly accessible way.

The following improvements were made:

- Changed colour of Jar graphic design so it pops out more
- Replaced beige to more natural-looking key colours in the Naturalistic design
- Added phrase "certified by Eaternity" in claim on the Jar graphic design to inspire more trust
- Specified that it has been "certified as recyclable" to inspire more confidence that it will actually be recycled (Naturalistic design)
- Added more information about the packaging on the webpage according to the comments from the survey

Figure 4.2.27 - Improved designs



5 Deliver

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This chapter presents the final strategy and packaging design proposals.

5.1 Final Strategy

5.2 Final Packaging Designs

5.1 Final Sustainability Strategy

I propose a comprehensive and action-oriented sustainability strategy for Bertolli to pursue sustainability across three key dimensions: Planet, Product, and People. The graphic below is the cornerstone of the strategy. It depicts the sustainability mission statement and the main pillars and material topics of the strategy. The next page expands upon all of the material topics and what targets and initiatives should be pursued.

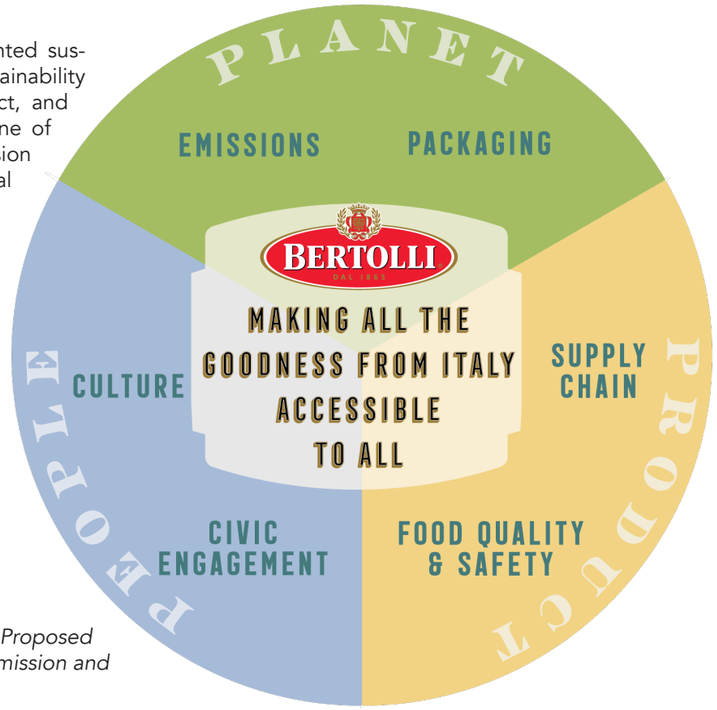


Figure 5.1.1 - Proposed sustainability mission and pillars

PLANET

"To all" includes future generations - It's our responsibility to reduce and compensate for our impact on the environment

GHG Emissions - reducing and offset emissions (Scope 1, 2, and 3)

Target: CO2 Neutral by 2030

Key action: Working with a climate action partner to reduce and offset emissions

Packaging - reducing packaging carbon footprint and working towards circularity

Targets: By 2025 - 100% of products and packaging have impact measurements and reduction plans; 100% recyclable, reusable, and/or compostable; 100% FSC carton

By 2030 - 100% of packaging made from recycled or renewable materials

Key action: Packaging innovation projects

Resource Management - reducing water and energy usage and reducing waste across the supply chain

Targets: Marked reduction in resource usage and waste by 2030; 100% Renewable energy across supply chain by 2050

Key actions: Internal resource management initiatives; Supplier and Producer resource management initiatives

Animal welfare and Biodiversity - improving farming practices

Targets: TBD

Key action: Sustainable farming initiatives in partnership with producers

PRODUCT

"All the goodness" is about healthy ingredients and good practices - Authenticated authentic ingredients; Simple and natural ingredients for a healthy Mediterranean diet

Supply Chain - improving the environmental and social impacts of supply chain

Target: 100% of suppliers conformant with ESG assessment by 2030

Key action: Supporting suppliers and producers in achieving ESG goals (through resource management and sustainable farming initiatives and beyond)

Food Quality and Safety - ensuring high quality and safe foods

Target: 2030 - Improved safety and quality conformance

Key action: Check-ins with suppliers and supporting their efforts to improve quality (i.e., obtaining certifications)

Health and Nutrition - empowering consumers to eat more healthily

Target: Increase in healthy products in portfolio by 2030

Key action: Product innovation projects

PEOPLE

"Accessibility" means equity - Fulfilling and equitable workplace; Increasing food access through donations

Civic Engagement - giving back to communities in need through donations and volunteering

Target: Donation and Volunteering program in place by 2025

Key actions: Collectively select fitting causes/activities; 1% of revenue donated to charitable causes and 3% of employee time devoted to volunteering

Culture - improving employee satisfaction

Target: Improvement in satisfaction scores by 2030

Key action: Culture and workplace improvement projects

Responsible Marketing - communicating sustainability achievements and claims in a informative and transparent way

Key actions: Developing marketing guidelines; Sustainability reporting

Governance and Ethics - integrating sustainability into decision-making

Key action: Sustainability integration project

Diversity, Equity and Inclusion - increasing representation of minority groups and ensuring equitable and inclusive practices

Targets: By 2030 - 50% of employees are women; 15% of employees identify as an underrepresented social group (excluding gender identity)

By 2050 - 50% of management are women

Key actions: New hiring practices; DEI training and events program

Figure 5.1.2 - Proposed sustainability mission statement

Mission Statement Rationale

To Bertolli, sustainability is about ensuring that they fulfil their core mission, 'Making all the goodness from Italian cuisine accessible,' for many more years to come by doing their best to mitigate climate change and protect Italian land and resources. The mission also challenges Bertolli to think more broadly. It is not just about delivering good food, but also about making a positive social impact (e.g., giving back to those in need, improving work culture and conditions, raising awareness about sustainable consumption, etc.), hence "making ***all the goodness*** from Italy ***accessible to all***."

Position

The sustainability mission statement is an extension of Bertolli's overarching mission and aligns well with Enrico's tagline ("Roots in good food").

Bertolli should approach the mission through the lens of innovation. This fits well with Bertolli's progressively authentic take on Italian cuisine. Rather than sticking to traditional ways of business or agriculture, Bertolli can reimagine their way of working that is still aligned with their values and mission. This could mean pushing the envelope when it comes to things like packaging, which has not changed much for this product category in a long time (while maintaining the same quality and traditional recipes). In this way, Bertolli can be seen judiciously discerning what needs to be changed and what needs to be kept the same. Bertolli is not copy-and-pasting Italian stereotypes or throwing traditions out the window in the pursuit of environmental-friendliness. In this way, Bertolli is more likely to come across as a sage and truly authentic brand.

Going pillar by pillar, here are the links to the current branding:

Planet	Product	People
Wise, discerning	Curator	Convivial, connectedness
Progressively authentic	High quality, natural	Accessible

"We are committed to delivering authentic Italian flavours in an innovative way that enriches society and reduces our impact on the environment"

"Authenticity isn't about sticking to old traditions, it's about staying true to our roots and values and that requires adapting to the new realities of climate change"

"Curating the best of Italian cuisine – this work doesn't stop at the flavours and recipes - we strive for the best sustainability practices to ensure future generations can also enjoy all the goodness from Italian cuisine"

Example statements about the sustainability mission

Communication

Stakeholder awareness

Before the launch of the strategy (and after it has been iterated upon with the input of more internal stakeholders), all relevant stakeholders (internal and external) should be made aware about the strategy and its programs. I suggest that the strategy be announced with a letter from Bertolli/Enrico's leadership team so that it feels personable and genuine, but also serious.

External communication

There are three main communication channels that were identified as the most important for communicating the sustainability strategy and initiatives: packaging, the website, and social media. It can be expected that the packaging would be the consumer's first and most frequent exposure to the sustainability strategy.

Packaging

As proposed in the final packaging designs, there could be a regularly updated sustainability blurb on the back of the packaging. Next to the blurb, there can be a QR code for the curious or sceptical consumer to learn more.

To engage further with consumers, the packaging could be made more interactive. For instance, there could be cutouts with fun facts about sustainability, or a social media campaign encouraging repurposing the packaging (#repurposewithBertolli). See Appendix H for more details on these ideas.

Website

The website should have all relevant information about the strategy and initiatives and house relevant documents. The website should have a page about the overarching sustainability strategy and sub-pages about each pillar, plus a page with certifications and the reports.

For each page, start with the big picture (goals and how pursuing those goals benefits the environment, society, and consumers). Then, share the progress in a concrete way (showing numbers or certifications). Finally, tell the stories behind the progress (via videos or images) and what comes next with clear timeframes.

Based on the findings from my primary and secondary research, the packaging sustainability page should be easy-to-digest (i.e., no jargon) at first glance, but have drop-downs or links to other pages with more details (i.e., the life cycle assessment comparison between packaging formats, recyclability certifications and recycling rates, etc.). Aside from being informative, the page should empower the consumers by communicating what consumers should, can, and must do. It might also be nice to give consumers a way to provide input or contribute to Bertolli's initiatives (e.g., a public packaging innovation competition).

The other pages do not need to be as detailed and can simply showcase the content from social media. This will make it easy to keep these pages up-to-date.

Social Media Content

Assuming that not many people will actively go to the website, it is important to post promotional content about the initiatives and about achievements on social media. This way, consumers can routinely stumble upon sustainability project content, which can make a good impression and increase brand loyalty. Some examples of potential social media content to create are: sustainable ingredient spotlights, farmer profiles and interviews, a behind-the-scenes look at the production process, volunteering videos. Bertolli can also incorporate sustainability information into their recipes. This can be done by reporting the carbon footprint of the recipe, mentioning tips to prevent food waste, or incorporating little tidbits of information about Bertolli's sustainability initiatives (e.g. "Did you know that the tomatoes used in this pasta sauce were grown using sustainable farming methods?").

Benefits

Establishes a structured way to approach sustainability - Builds upon Enrico's existing sustainability strategy to create a more far-reaching and ambitious strategy with specific targets and actions.

Makes Bertolli more competitive - Most other competitors have an externally-communicated sustainability strategy. This strategy brings Bertolli in line with and, in some ways, ahead of their competitors.

Encourages more collaboration between Bertolli and suppliers - As identified in the GIGA map, there is a disconnect between Bertolli and its suppliers. This is a missed opportunity to develop a more sustainable supply chain. By actively setting goals to improve the environmental and social impacts of the supply chain, it spurs Bertolli to engage with suppliers and establish that missing connection.

Consumer engagement - This strategy could attract new consumers and increase loyalty if marketed in a way that helps consumers recognise Bertolli as a more sustainable brand than its competitors. The information about the sustainability efforts would help raise awareness about the issues and could empower consumers to act more sustainably.

Employee engagement - Having this purpose-led strategy feeding into Bertolli's project portfolio, processes, and culture can give employees a greater sense of purpose in their work and attract new talent.

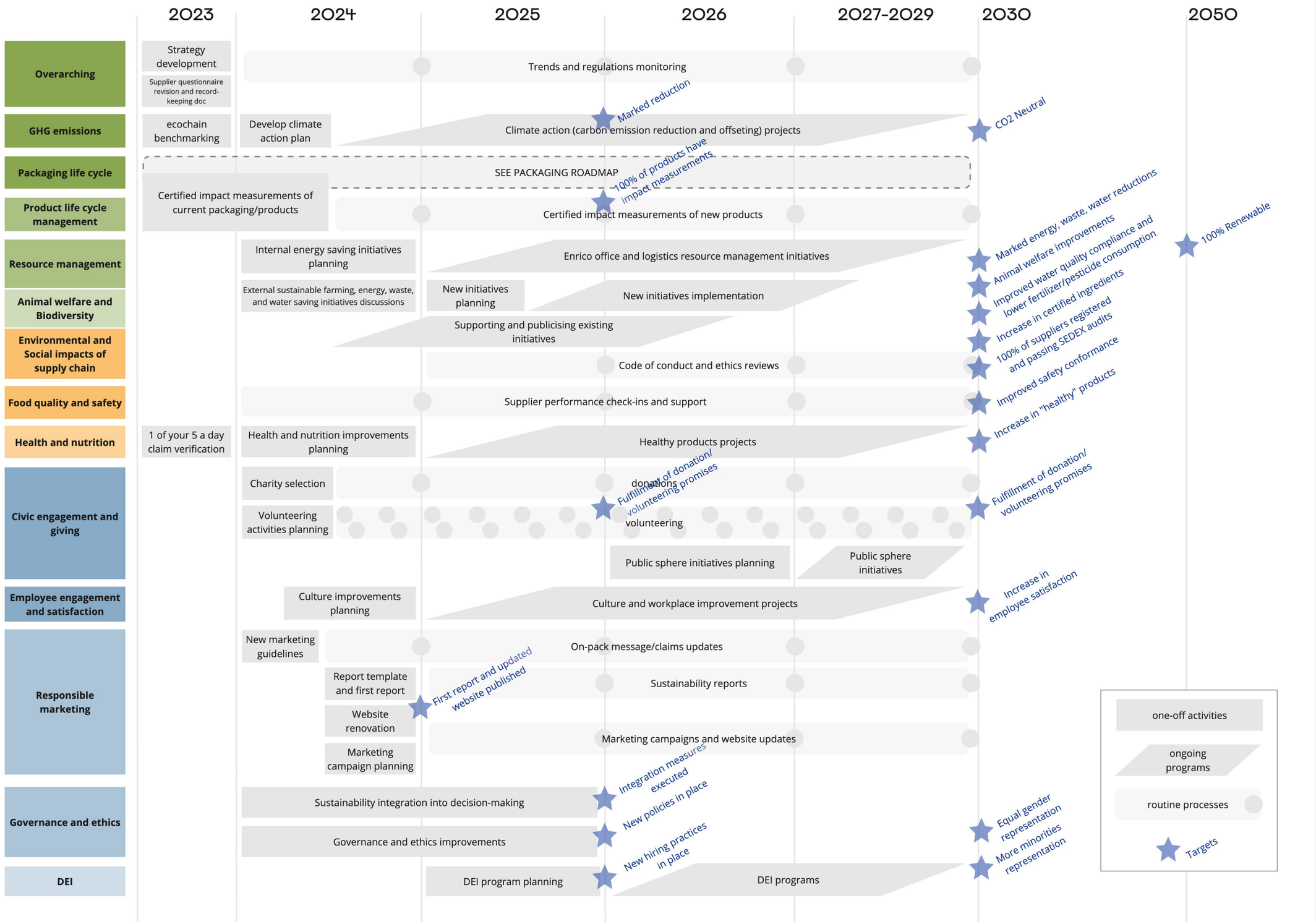
Roadmap

Figure 5.1.3 depicts the sustainability strategy roadmap. (An accompanying spreadsheet with the specific sustainability targets and more details on each roadmap activity was developed. It can be found in Appendix J) The implementation of the sustainability strategy can be summarised into two horizons:

Horizon 1 (now until 2025) - Benchmarking, planning the initiatives, and developing guidelines and templates

Horizon 2 (onwards from 2025) - Executing the initiatives and routine tasks

Figure 5.1.3 - Proposed sustainability roadmap



5.2 Final Packaging Designs

Short and Medium term

Based on all of the previous research, the most holistically sustainable packaging format for the short and medium-terms is the pouch. I propose the following designs to improve the perception of the pouch and tie it into Bertolli's overarching sustainability strategy.

While the Jar graphic concept is surprising, it would not work if the company wants to sell both the jar and the pouch. Plus, selling the current non-recyclable pouch purely based on lower carbon footprint is not strong enough for a launch with just the pouch. Therefore, I propose launching with the Naturalistic design with some tweaks and the "Just like a jar" back of pack message.

Graphic design

This naturalistic graphic design style was chosen because it was rated as highly attractive in the final consumer study and could improve the environmental friendliness perception of the pouch based on literature findings (Magnier & Schoormans, 2017; Granato et al., 2022; Liem et al., 2022). This increased sustainability perception could improve disposal behaviour as suggested by (Geiger, 2020). The abstract shapes were added to make the pouch look modern, yet natural, and to catch the consumer's eye. A risk with this graphic feature is that the pack might be considered busy. Further pack testing should be conducted to evaluate this aspect.

Claims

The claim that was landed on is "Lower CO2 footprint than jar, certified by Eaternity." In previous concepts, the claim said "Just like a jar, but lower CO2 footprint," suggesting that the pouch should replace the jar. By simply saying it has a lower CO2 footprint than the jar, this claim sends a more neutral message. The certifying organisation is mentioned, as per the suggestions from the final consumer study, to foster more trust and avoid a greenwashing perception.

The green stamp can be added to other products with information about recyclability, recycled material, improvements, or comparisons to other formats. This would help Bertolli products stand out as more sustainable and inform consumers about food product and packaging sustainability.

The claims at the bottom were added according to category norms.

The combination of sustainable visual and verbal cues makes the whole design cohesive and less susceptible to consumer scepticism (Magnier & Schoormans, 2015).

Current designs

Figure 5.2.1- Final proposed packaging designs

Easy pour

During interviews, consumers expressed difficulty with opening and pouring the product out of pouch packaging. Changing the seal geometry for easy pouring did not have a significant effect and would lead to more material usage. Therefore, it was decided that changing the location of the tear notches and the graphics would be a simpler way to improve ease of opening and ease of pouring.

Volume

The volume of the pouch was not changed because, based on interviews, food waste is not an issue with the sizes consumers purchase currently (which ranged between 350g and 500g).

Back of pack

The Just like a jar message describes the benefits and drawbacks of the pouch establishing Bertolli as a brand that is genuinely working on sustainability. The current pouch can be brought to supermarket recycling points so there should be a label indicating that on the back of the pouch. Bertolli should work with OPRL to develop an effective label. Note that the "1/8th the carbon footprint" has not been validated. For the monomaterial pouch, the value is 1/8, but for the current multi-layer pouch it is closer to 1/2.

Figure 5.2.2 - Back of pack message and its features

Pouch relaunch

Once a recyclable pouch becomes possible, Bertolli could relaunch the pouch with a simple, yet eye-catching banner at the top of the pouch (Figure 5.2.3). Another proposal is to use the Jar graphic and phase out the jars since at that point there is a stronger sustainability argument for pouch over jar. As for the back of the pack, the top banner about packaging sustainability would have to be revised and a non-pack-related sustainability blurb should be added to raise awareness about Bertolli's sustainability initiatives.

Regarding the glass jar packaging

The glass jar packaging design should also be altered to reflect the sustainability strategy. For instance, information about repurposing could be added to the cap or label.

Sustainability

The format is relatively sustainable from a scientific perspective, based on the EcoAudits. Note that the EcoAudits had a limited scope so it is imperative that Bertolli conduct certifiable impact measurements to more concretely establish the pouch as a sustainable alternative to the jar. The pouch is currently less sustainable from the consumer and regulatory standpoints. The hope is that the sustainability cues will help bridge the gap between consumer perception and reality. Moreover, once the pouch is recyclable, it would be in better alignment with the regulations.

Desirability

The format is desirable from the consumer perspective, according to the studies conducted throughout this project. The graphic design would likely be well-received according to the results from the final consumer study. From a retailer's point-of-view, the pouch is likely desirable as it has been proven to have a high LOP in the pack testing. Another pack test with the final design could be conducted for validation.

Figure 5.2.3 - Pouch relaunch proposal

Feasibility

Since Bertolli already offers this format, they do not need to expend much effort to implement the new packaging design. Based on the implementation timeline, the new design can be implemented by the end of Q1 in 2024.

Viability

The cost of the pouch ends up being lower than the glass jar even with the added packaging fees. Once it is recyclable, the pouch format might become more expensive, but this will be compensated by the lower fees.

Final Evaluation

Requires more attention | Achieved

Fits with current brand image - The graphics evoke a more modern and organic brand image. While the design is not a huge departure from the current graphic design style, it is enough of a change that Bertolli should have some

internal discussions or conduct some tests to understand the implications of the style change before implementation.

Communicates claims and USPs - The designs introduce new relevant claims and maintain the existing ones.

Environmental impact improvement - In the short-term there is no improvement on the carbon footprint of the materials and manufacturing phase of the life cycle, but in the medium term there would be an improvement when the pouch becomes mono material and recyclable. Given time limitations, specific concepts to reduce the impact of the transport/logistics phase were not developed. This is an area for future work.

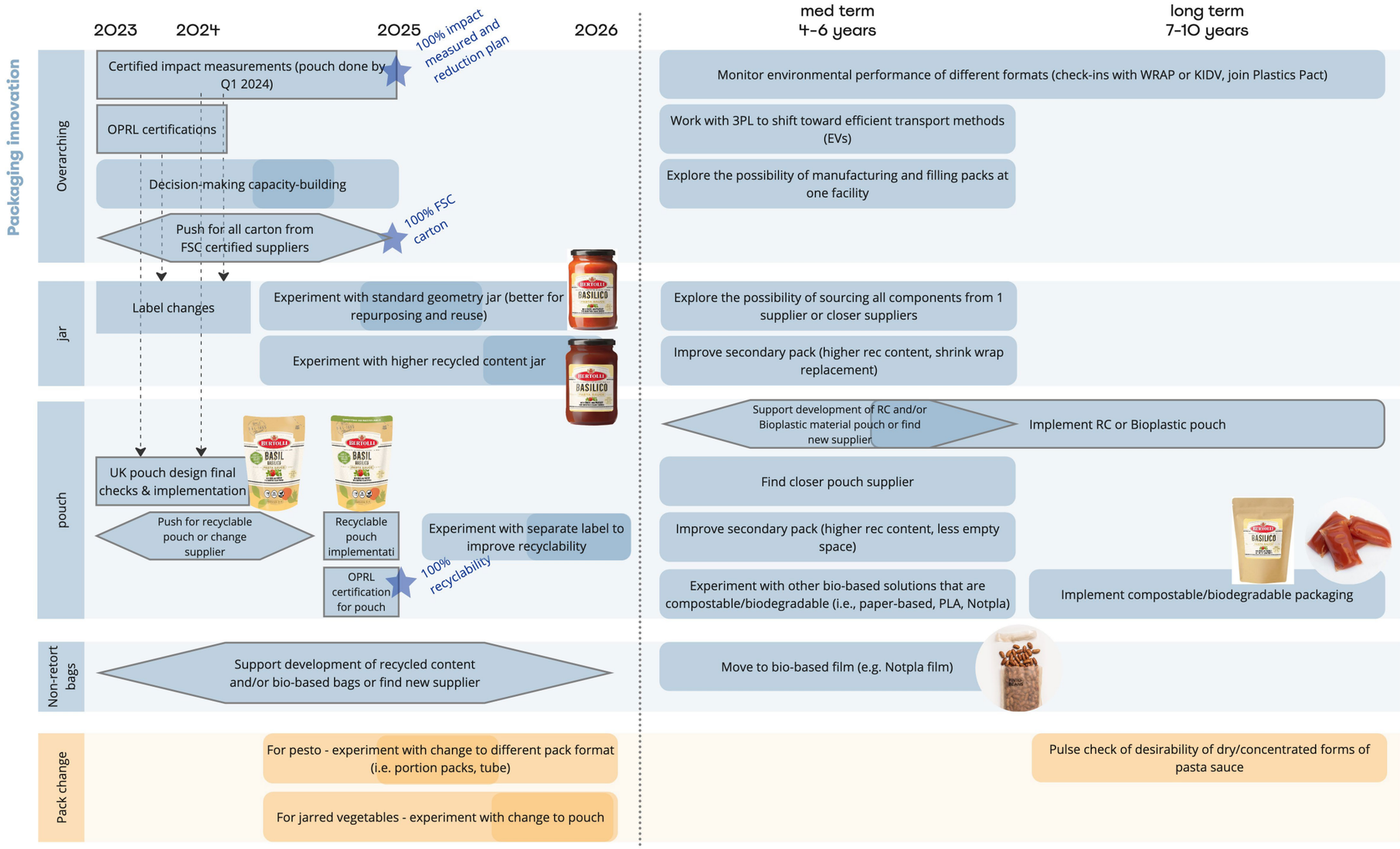
Cost - Implementing these packaging concepts will not be costly as they only involve artwork changes and minor changes to the die cut. Moreover, according to the cost analysis, the extra fees that will be charged by the UK government do not make a large difference on the cost.

Usability - The format is already considered high in usability because it is easy to handle, store, and open. Through the addition of the easy pour feature, the usability has been improved upon. However, no usability studies were performed to validate this improvement.

Consumer acceptance - Based on the consumer studies, the pouch format would be well-received by UK consumers. Another survey should be conducted if Bertolli wants to confirm that these specific pouch designs will perform well.

Retailer acceptance - Considering the good consumer acceptance and lower carbon footprint, one can presume that retailer acceptance would be high. However, this has not been validated in any way.

Figure 5.2.4 - Packaging roadmap with a defined timeline for the short-term and project suggestions for the medium and long-term



Implementation

Figure 5.2.4 depicts the packaging roadmap. It covers not only the pouch, but also other potential single-use packaging (SUP) developments in the short, medium, and long-term. Many of the proposed projects were ideas that surfaced during the ideation phase or are based on technology and regulatory trends identified during the trend analysis.

To implement the new pouch designs, the following steps should be taken:

- Consult the supplier about the change to the tear notches and some other potential minor changes (e.g., shift to a more sustainable ink if not done already, shift to the pouch without the Aluminium layer).
- Hire an environmental impact measurement service to conduct certifiable impact measurements on the pouch and the other products/packaging formats.
- Become a member of OPRL and have the recycling labels determined.
- Conduct some last pack tests to assess the artwork redesign, efficacy of the claims, and the usability of the pouch. Evidence that the pouch has a highshould be collected to make it more attractive to retailers. Regarding the claims, Bertolli could explore different phrasings, such as "uses less resources and energy" or "lower environmental impact," to see what resonates most with consumers.
- Update the website so that there is a comprehensive packaging sustainability page to back up the claims/messages. Ensure that the impact measurement is well-documented and that all possible questions that consumers might think of are answered somewhere on the website. For instance, what parts of the life cycle were included? What assumptions were made? What are the recycling rates and are the materials down-cycled?

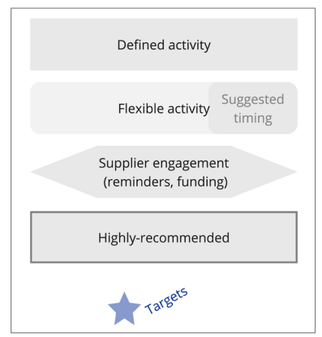
While implementing the new pouch design more thorough LCAs (according to the suggestions in Section 2.3) that consider secondary manufacturing and production processes and supplier changes could be conducted. This can provide Bertolli with some more certainty about which format is actually more environmentally-friendly.

Another thing to mention is that WTP was not measured since it was assumed that the consumer selling price would not be changed. If it is increased, WTP should be properly measured via consumer testing.

Future Recommendations

In the future, Bertolli should consider shifting to a clear pouch with a separate label (sticker or paper flap) as clear plastic is easier to recycle and has a higher market value thus contributing to a more circular economy (WRAP, 2022).

Also, Bertolli should consider strategies like finding closer suppliers and redesigning the secondary packaging. Redesigning the secondary packaging should be prioritised over finding new suppliers as the secondary packaging makes up 19% of the pouch packaging system's total energy consumption and 11% of its carbon footprint (according to the EcoAudits from Section 3.2). The transport phase contributes only 2% to the energy consumption and carbon footprint.



Bertolli should also monitor and support technological developments of pouches using more circular materials. Finding a pouch using recycled plastic material would be the first next step. Pouches that sandwich recycled plastic in between virgin layers of plastic are being developed and

could be ready for implementation in the medium-term, according to the consulted WRAP expert. A monomaterial pouch with at least 30% recycled content would be in alignment with the UK's packaging regulations, which would mean no extra fees. Bioplastic pouches would also be implementable in the medium-term as there are some suppliers already offering suitable solutions (FKUR, n.d.). Other bio-based solutions that are compostable or biodegradable (e.g., paper-based pouch with coatings, PLA pouch, seaweed-based pouch) are also on the horizon. However, it is likely that these solutions would only become applicable to Bertolli's pasta sauce products in the long-term as many of these solutions are not economically viable or not suitable for high water content food products or the retort process, yet (Choe et al., 2021). The decision to shift to bio-based materials should be carefully assessed as there are various trade-offs to consider, such as negative impacts on agriculture and the food production, and the uncertainty in proper waste management (Rosenboom et al., 2022). Clear communication of what the material really is and proper disposal methods should also be developed as public misconceptions of bioplastic and other bio-based materials could lead to improper disposal or littering (Choe et al., 2021).

Regarding other packaging formats and product lines, the following recommendations are proposed:

- Jar - Change the label to include impact measurement info, repurposing tips, and the OPRL label. Explore geometry and material changes for a more circular jar (e.g. improved repurpose-ability, reusability, and increased recycled content).
- Non-retort bags (toasts) - Experiment with new materials.
- Pesto - In the consumer interviews, it was learned that the participants who use pesto sometimes experience spoilage and had some complaints about the jar format (e.g., always needing to use a small spoon to dispense pesto, takes up space even when almost empty). Therefore, Bertolli could experiment with different pack formats - with a focus on portion-packing to prevent food waste.
- Jarred vegetables - Experiment with the pouch format as it may have a lower environmental impact than the glass jars.
- Pasta sauce and pesto - Experiment with dry or concentrated forms. The consumer interviews imply that consumers are currently not interested in such options. However, in the future, the norms may change making it a more desirable option.

In these packaging innovation projects, the holistically sustainable packaging rubric could be used. Bertolli should implement a system for measuring and collecting relevant data. And select, (buy/subscribe to,) and learn to use an eco-audit tool to inform decision-making.

Long-term Ideas

To expand their business in a sustainable way and drive innovation in their product categories, Bertolli could explore different business/packaging models. The trend analysis suggests that D2C/delivery services will continue to grow in popularity. At the same time, reuse and refill packaging models are becoming more commonplace. Therefore, alongside SUP innovation, Bertolli should assess new business/packaging models.

Regarding the D2C ideas, Bertolli should first assess:

- Who are the potential partners and are they interested in a partnership?
- Is there consumer interest in the different value propositions gained by going D2C (e.g., personalization, subscription, rewards)? Do the benefits outweigh the costs involved in hiring an ecommerce agency, fulfilment and shipping partners, and online sales/advertising talent?

If either route is promising, there are some interesting packaging opportunities that Bertolli could explore. For one, they could explore lower impact SUP (e.g., thinner materials, less parts, renewable or bio-based materials). Bertolli can consider biomaterial packaging like Notpla's seaweed-based Ooho flexible portion-packs. Based on some preliminary research, it was found that the Ooho material can withstand heat up to 200 deg C. Therefore, it is likely that this packaging can undergo pasteurisation. This should be confirmed with the packaging supplier. Another potential route, depending on if the logistics partners are also onboard, is reusable packaging.

For the reuse model, Bertolli should:

- Discuss with potential reuse partners (e.g., Loop, Pakt, Mach Mehrweg Pool (MMP), Dizzie, Circolution) the following metrics: participation rate, percentage of repeat customers, average number of cycles before breakage or loss, cost per packaging unit (including service costs), environmental impact metrics based on previous pilots
- Discuss with potential reuse partners what changes would need to be made to the packaging design and what kind of reuse system would be used (i.e., individual vs. pool, managed vs. unmanaged pool)
- If possible, participate in pilots (e.g., pilot of producer-refilled pasta sauces or pasta/toasts in retailer bulk dispensers)

Once it is determined that Bertolli would like to move forward with reuse, they should:

- Work with producers to make changes to the packaging formats (e.g., thicker glass)
- Develop new pack formats (e.g., tiffins for toasts)
- Adapt the filling lines for the refill (e.g., filling bulk dispensers for pasta or toasts, implementing new food safety check protocols)
- Check that new formats are robust enough and that brand perception and usability are still high

Figures 5.2.5-7 depict what the packaging could look like for the different long-term ideas.

Figure 5.2.5- Bertolli pasta sauce in a meal kit box. (Packaging concept - recyclable, bio-polymer pouch with paper label)

Figure 5.2.6 - Italian Meal Kit Idea featuring a reusable shipping box, paper-based pouches for the pizza sauce and pasta, and bio-based portion-packs for pesto.

Figure 5.2.7- Producer-refilled packaging (Scrocchi and pasta sauce) and bulk dispenser for pasta (and other dry goods)

Roadmap

The roadmap below shows the actions that Bertolli should take in the short-term, medium-term, and long-term to implement the long-term ideas.

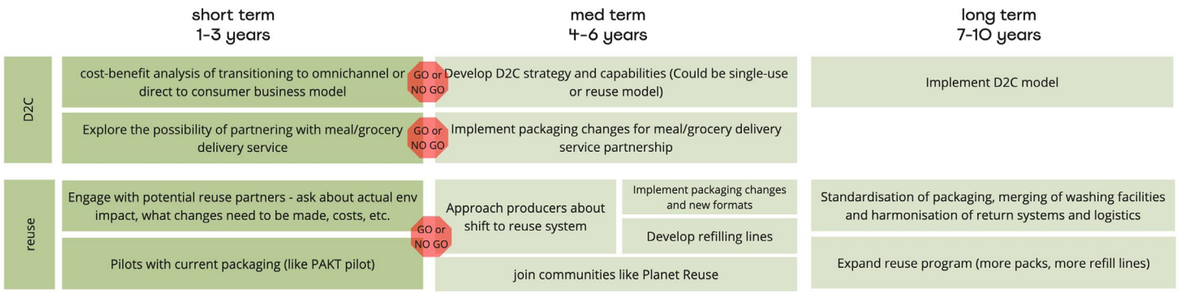


Figure 5.2.8 - Long-term idea implementation roadmap

6 Conclusion

In this final chapter, the key contributions, general recommendations to Bertolli, and limitations of the project are discussed. Finally, I reflect on the project and my learnings.

6.1 Conclusion

6.2 Reflection

6.1 Conclusion

Key contributions

The main mission of this thesis was to find the sweet spot for brand and packaging sustainability for Bertolli. Using the self-coined concept of "holistic sustainability" as a North star, two frameworks (that are transferable to other projects) were developed: the sustainability strategy framework and the holistically sustainable packaging rubric.

Following the sustainability strategy framework, a suitable and meaningful sustainability strategy for Bertolli was developed. The tailored strategy helps Bertolli contribute to a more sustainable future in a way that is unique, thoughtful, and feasible.

Short-term, medium-term, and long-term packaging concepts were developed using methods from literature and findings from consumer research activities. It was concluded that Bertolli should focus its efforts on the pouch as the most promising format for holistic sustainability. Based on a trend analysis, it was identified that, in the long-term, D2C and reuse models should be considered. Implementation of the proposed packaging designs would help Bertolli's pasta sauces stand out when they launch in the UK and elevate the brand image through the sustainability claims and messages.

The various studies conducted over the course of this thesis build on the existing literature about consumer behaviour toward sustainable packaging. More specifically, the consumer interviews shed a light on UK consumers' opinions toward packaging formats and how they view sustainable packaging. The pouch variant study examined consumers' perception of various packaging cues.

In summary, this thesis offers

- a review of relevant literature about sustainable packaging and consumer behaviour
- UK consumer research about the perception of (sustainable) packaging
- a sustainability strategy framework
- a sustainability strategy for Bertolli
- a holistically sustainable packaging rubric
- packaging concepts and roadmaps

General recommendations to Bertolli/ Enrico

For successful sustainability integration, all functions need to be engaged (e.g., product development, HR, marketing, branding, public relations, sales, and customer service) (Roadmap for Integrated Sustainability, n.d.). Therefore, it would be wise for Bertolli/Enrico to hire consultants to guide them through the process of integrating sustainability into the brand or company and to help with communications and reporting.

As eco-labels become more popular and relevant to consumers, Bertolli should consider getting all of their products' impacts measured by a service and labelling the products accordingly (Gorre-Langton, 2022). This would help Bertolli stand out against competitors and promote transparency about sustainability in those product categories and in the food industry, in general.

Since UK consumers are convenience-oriented, Bertolli should accentuate convenience features of their products. Moreover, to increase consumer buy-in for the authentic Italian USP, Bertolli's marketing should emphasise the benefits of authentic Italian-ness.

Future research

Future research could be conducted into ways to empower consumers to adopt more sustainable consumption practices. The pouch sustainability cues and messages were proven informative, and thus implementing the proposed design would be a step in the right direction. However, much more could be done to empower consumers. Research could be done into the concepts proposed in Appendix H and techniques to bridge the gap between consumers and producers.

Some other areas of research are: integrating digital technology into packaging and food waste and disposal habits.

Limitations

Even though the LCA process was researched fairly extensively, due to time constraints and limited data availability, only simplified EcoAudits were conducted. Therefore, the calculated impacts may not be very accurate and only show one part of the picture (i.e., CO2 emissions and energy). Extensive LCAs should be conducted to verify the results presented in this thesis.

Health risks of the packaging materials were not researched in this project. The presence of potentially harmful chemicals like PFAs in plastic packaging should have been studied and considered when comparing packaging formats (Seltenrich, 2020).

Another limitation is that the consumer research did not use representative samples. Thus forth, the conclusions cannot be generalised to the UK population. To add, all of the studies were conducted online. More realistic and deep data might have been collected if in-person activities were conducted (i.e., accompanied shopping trips or in-person interviews).

Certain aspects of the packaging were not as comprehensively studied or scientifically tested as they could have been. For instance, a more calculated approach toward evaluating specific packaging cues or claims could have been taken. Moreover, more thorough research into the cost of different packaging options could have been done.

Due to time constraints, the developed frameworks and the sustainability strategy were developed independently and not validated by experts. Ideally, the strategy would have been co-created with the company leadership and other employees to ensure proper alignment with the company's overarching strategy and to generate buy-in from internal stakeholders.

6.2 Reflection

Through this project, I learned a lot about the field of sustainable packaging, strategic thinking, and expectation management. There are some specific things that I believe could have gone better and would like to improve upon for future projects.

Scoping - I changed the scope of the project several times unnecessarily. This happened because I was never entirely sure what I should work on or what I really wanted to do. I think the core issue was that I did not feel very excited about the outcome being just some niche packaging design concept. This led me to research extra subjects and a less relevant idea direction (the consumer empowerment concepts). The time spent on these tangents would have been better spent focussing on the packaging designs (the original project scope) and developing them into turnkey solutions. In the future, I think I would like to be more honest and strict with myself about project scoping.

Synthesis and reflection - Over the course of this project, I realised I have a tendency to rush into new activities before properly synthesising and reflecting upon the insights from the previous activities or overall process. This meant that, in the end, there were a lot of loose ends to tie. I also realised there were some missed opportunities for achieving a more polished or well-justified outcome.

Communication - I think I could have been more proactive in my communication with the company. There were times when I would either ask for feedback too late or would not follow-up on certain things leading to confusion on both sides (e.g., bumping meeting invites). I also could have more clearly communicated my background and learning goals to my company mentors. This would have helped me in getting the support I needed.

In the end, while it was a challenging experience, I am happy with the final outcome and proud of myself for how much I was able to learn in just a few months.

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Appendices

A - Stakeholder cards

B - Sustainability background

C - Consumer interviews

D - Holistically Sustainable Packaging Rubric

E - Ideation

F - Pouch variant survey

G - Final consumer study

H - Consumer empowerment concept development

I - Project Brief

J - Pack testing results, EcoAudits, Sustainability Strategy Spreadsheet

Appendix A

Retailers/Distributors

Who are they?
Enrico customers
Interest: What do they want?
How are they affected?
Want packaging that aligns with their sustainability targets
Influence: How will they get it?
requiring reporting from producers

Producers

Who are they?
Currently, HAK and Zwanenberg
They produce the pasta sauce, fill the packaging, and pack it on pallets for distribution
Interest: What do they want?
How are they affected?
packaging that fits with their existing machinery and workflows; reach their sustainability goals (optimizing materials and operations)
Influence: How will they get it?
constrain packaging specs to capabilities; could also be convinced to invest in new tech

Suppliers

Who are they?
Variety of suppliers across the globe supplying raw materials for the sauce and for the packaging
Interest: What do they want?
How are they affected?
Want to keep Enrico as a customer; Keep profits up; likely not concerned about sustainability and could see it only as a cost
Influence: How will they get it?
Change prices or material qualities depending on market dynamics and customer demands

Government officials

Who are they?
They pass laws and regulations about climate change, packaging and packaging waste
Interest: What do they want?
How are they affected?
Ensure that the UK meets it's promised targets to reduce their impact
Influence: How will they get it?
Passing new regulations, taxing companies, and enforcing regulations

Consumers

Who are they?
People who buy the pasta sauce product
Interest: What do they want?
How are they affected?
Low price, great taste and quality, feel-good purchase -> environmentally-friendly purchase
Influence: How will they get it?
Buying products that fit their criteria and not buying products that don't; writing reviews or sharing products with others (pos or neg); determine the fate of the packaging at end of life

Competitors

Who are they?
Dolmio, Loyd Grossman, Sacla, Mutti, Heinz, Napolina
Interest: What do they want?
How are they affected?
Good market share and brand equity (threatened by newcomers like Bertolli)
Influence: How will they get it?
react to Bertolli's value proposition by differentiating or meeting similar specs + a bit more (i.e., more sustainability claims)

Waste management

Who are they?
Manage packaging waste
Interest: What do they want?
How are they affected?
Packaging that is easy to sort and recycle; keep their system profitable; abide by regulations
Influence: How will they get it?
Work with legislators and other orgs to establish design-for-recycling standards; advance their capabilities by investing in new tech; export packaging waste to get some pay-off

Enrico

Who are they?
Brand owner of Bertolli, Producer for Jean Baton and other private label products
Interest: What do they want?
How are they affected?
Reduce their scope 3 emissions (i.e., packaging); export to UK with differentiated products/packaging that are still acceptable to consumers
Influence: How will they get it?
support research efforts (financially, providing feedback/expertise)

NGOs and Knowledge Institutes

Who are they?
WRAP, KIDV
Interest: What do they want?
How are they affected?
To meet their goals - advising companies; supporting relevant research or innovations
Influence: How will they get it?
support and provide expertise

Appendix B

Sustainable development

The concept of sustainability evolved throughout the 1970s and 1980s. The definition of sustainable development according to the WCED is "the development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). This definition recognizes sustainability as having a temporal dimension and a social dimension. The temporal dimension is about making trade-offs between the present and the future concerning environmental issues, and the social dimension is about trade-offs between consumers and others in terms of ethical issues.

In the 1990s, Elkington (1997) popularised the treatment of sustainability in terms of the "Triple Bottom Line'' (TBL). It proposes that the financial bottom line should be complemented with social and environmental bottom lines. However, this view has been criticised for only perpetuating business-as-usual approaches because it does not recognise the limits imposed by the environment (biosphere) on economic and social activity. In contrast, the strong sustainability model is one that prioritises environmental sustainability due to society's and the economy's dependence and impact on the natural environment. This approach is often modelled with nested circles. Following this model, in this project, the focus is on the environmental side of sustainability as a means to allow for better economic and societal outcomes.

In 2015, the United Nations created a series of comprehensive goals that outline the meaning of global sustainability. It is becoming common practice to use these SDGs (Sustainable Development Goals) as a way to structure a company's sustainability mission. In the case of this project, the SDGs of interest are Climate action, Responsible consumption and production, Life below water, Life on land. These goals were considered while developing ideas and creating concept selection criteria.

Sustainable Product Design

In the area of product design there are several different approaches toward sustainability. For instance, there is the field of eco-design, which encompasses various strategies to reduce the environmental impacts of products and services. These strategies were grouped into three areas by Fletcher & Goggin (2001): product-focused, results-focused, needs-focused.

The danger with blindly applying these strategies is that without considering the system dynamics and consumer behaviour, the "improvements" can backfire (Fletcher & Goggin 2001). Walker (2006) also criticises these approaches for not asking the fundamental question: what is the meaning of products in our lives? The paper proposes that sustainable designs are ones that fulfil all three types of needs: functional, social/positional, and inspirational/spiritual. Therefore, it is important to critically analyse the meaning of packaging and understand consumers' attitude and behaviour to different sustainable packaging strategies.

Another approach which is interrelated with eco-design is cradle to cradle or circular design. The governing principle of this approach is that waste equals food: materials at a product's end of life shall feed biological or technological cycles so that products can be regenerated endlessly. This means that in the area of packaging, recovery of materials is more important than minimising packaging from the start (Wever, 2014).

Sustainable Packaging Frameworks

Framework/Guidelines	Author	Description	When to use
Packaging for sustainability framework	Sustainable Packaging alliance (SPA)	Uses SPA definition as a framework for evaluating packaging sustainability	Brainstorming, Concept refinement, and Concept evaluation
Definition of sustainable packaging	Sustainable Packaging Coalition (SPC)	Uses SPC definition as a framework for evaluating packaging sustainability	Brainstorming, Concept refinement, Concept evaluation
Global Protocol on Packaging Sustainability 2.0	Consumer Goods Forum	Metrics for evaluating packaging sustainability	Concept evaluation
Sustainable Packaging Guidelines	Australian Packaging Covenant Organization	Sustainable packaging principles and considerations	Concept refinement
Responsible packaging code of practice	INCPEN	a code of practice for optimising packaging and minimising waste	Concept refinement
Packaging sustainability checklist	FDF and INCPEN	a checklist covering choice and design of packaging for functionality, reuse/recovery/recycling, and transport	Concept refinement
Envirowise: A guide to packaging eco-design	INCPEN	Provides guidelines for design for minimisation, design for reuse, recycling, and recovery, and design for compostability	Concept refinement
Framework for sustainable food packaging design	(Grönman et al., 2013)	Packaging design process incorporating various design methods	Brainstorming, Concept refinement, Concept evaluation
Green packaging development prioritisation guidelines	(Molina-Besch, 2016)	Proposes three prioritisation areas for improving packaging based on a literature review	Concept refinement
Food Packaging Sustainability Framework	(Santi et al., 2022)	Evaluates the presence of "levers" and thus the sustainability potential of packaging	Concept analysis and refinement

Appendix C

Pasta Sauce Products and Packaging: UK Consumer Needs, Wants, and Perceptions

Informed consent form

You are being invited to participate in a research study titled **Pasta Sauce Products and Packaging: UK Consumer Needs, Wants, and Perceptions**. This study is being carried out by Miki Hansen from the TU Delft as a part of the MSc study Industrial Design Engineering. The research will be overseen by Dr Lise Magnier and Sijia Bakker-Wu (graduation committee) and the results will be shared with Enrico Food (graduation internship company).

The purpose of this research study is to understand **UK consumers' values and needs when it comes to purchasing and using Italian style cooking products and packaging**, and will take you approximately **60 minutes** to complete.

In this study, I will be asking you to answer a few questions about your experience with Italian-style cooking and pasta sauce products, your opinion about some hypothetical pasta sauce products, and your thoughts about sustainable food packages based on the images you bring in.

The interview will be recorded for note-taking purposes. The data and insights from the screener survey and interview will be used to develop sustainable and user-centric packaging concepts for an Italian-style cooking brand. The insights (which may include anonymized and aggregated data) will be summarised in my graduation report, which will be published to the TU Delft Repository.

As with any online activity the risk of a breach is always possible. To the best of our ability your data will remain confidential. I will minimize any risks by restricting access to the data to only myself, storing data in a secure data drive managed by the TU Delft ICT department, and destroying it after the investigation has ended. Only anonymized and aggregated data will be shared with others.

Your participation in this study is entirely voluntary and you can withdraw at any time. You are free to omit any questions.
Feel free to ask questions if you don't understand something or want to know more. If you have any questions at a later time, you can contact Miki Hansen, via m.o.hansen@student.tudelft.nl or +31 0616354228

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
A: GENERAL AGREEMENT – RESEARCH GOALS, PARTICPANT TASKS AND VOLUNTARY PARTICIPATION		
1. I have read and understood the study information dated [/ /], or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	☐	☐
2. I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	☐	☐
3. I understand that taking part in the study means that: - My name and signature will be kept on this form. - My answers to interview questions are noted and will be recorded on video. - The photos that I share will be saved for notetaking and further analysis.	☐	☐
4. I understand that I will be compensated for my participation by a 30 GBP eGift Card that will be emailed to me upon completion of the study, and NO further compensation.	☐	☐
5. I understand that the study will end (ultimately) on August 23, 2023.	☐	☐
B: POTENTIAL RISKS OF PARTICIPATING (INCLUDING DATA PROTECTION)		
6. I understand that taking part in the study also involves collecting specific personally identifiable information (PII) [name, signature, video recording, email address (only for administrative purposes)] and associated personally identifiable research data (PIRD) [age, gender, household size, occupation] with the potential risk of my identity being revealed.	☐	☐
7. I understand that the following steps will be taken to minimise the threat of a data breach, and protect my identity in the event of such a breach: anonymization and aggregation, secure data storage in a TU Delft drive, encryption, blurring of video after notetaking, deletion of data at the end of the project. In addition, no connection will exist or be made between personal data (such as name and signature) in this form ('informed consent'), and video recordings.	☐	☐
8. I understand that personal information collected about me that can identify me, such as my name or email address, will not be shared outside the study team.	☐	☐
9. I understand that the (identifiable) personal data I provide will be destroyed at the end of the project.	☐	☐
C: RESEARCH PUBLICATION, DISSEMINATION AND APPLICATION		
10. I understand that after the research study the de-identified information I provide will be used for the graduation report.	☐	☐

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
11. I give permission that screenshots from the video, images that I have shared via email or during the interview with the researcher, and/or my answers (quotes) can be used as examples or illustrations in the report. In these cases, the researcher will ensure that I am unrecognizable/anonymous. This means that the researcher will *blur* faces in the video images, and will NOT mention names in images or quotes. Subsequently, I agree to waive all my moral rights to the extent this is possible regarding the images that are shared with the researcher.	☐	☐

Signatures

_____ _____ _____

Name of participant [printed] Signature Date

I, as researcher, have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

_____ _____ _____

Researcher name [printed] Signature Date

Study contact details for further information: Miki Hansen, +31 0616354228, m.o.hansen@student.tudelft.nl

Interview Guide

Bertolli Pasta Sauce: UK Consumer Needs, Wants, and Perceptions

Qualitative Consumer Research

Method

1 hr online interviews; 10 participants recruited via convenience sampling and screened using the following screener survey: https://forms.gle/1vKHUgkaZ1EBSPU27

Participant Homework

Gather the following - 1 image of a pasta sauce product that you like buying (could be your favorite sauce, could be just a sauce that you get regularly); 4 images of sauce/liquid-food/beverage package(s) that represent sustainable packaging to you

Informed consent form

Stimuli

Slides that will be screenshared
https://docs.google.com/presentation/d/1z8FvRo24aNRuMYPZJEiie513wsI95nC0Es7UxFgBoqc/edit?usp=sharing

Research Questions

1. What are UK consumers' needs/wants when it comes to pasta sauce and pasta sauce packaging?
2. What sustainability attributes/cues are appealing when it comes to pasta sauce packaging?
3. What are the perceptions (positive and negative) of sustainable sauce packaging?

Interview Script

Intro (5 min)

Thanks for joining me today for this interview! I am Miki and I am a Masters Student at TU Delft in the Netherlands. I am working with an Italian food brand for my thesis project. I want to understand what you value when it comes to Italian style cooking products and packaging. I'm originally from the US and have only lived in the UK, London specifically, for around a month in the past and the company I;m working with is actually a Dutch company so….

If you haven't done so already, please read and sign the consent form.

Thanks for sending over the consent form and the images!

As you might have read in the consent form, we will be recording the interview and taking a few notes for research purposes as per your consent.

Before we start I want to say that there are no wrong answers. You are the expert of your experience and you are free to share any thoughts that come to mind.

I also want to mention that I might interrupt you sometimes due to time constraints. I'm sorry if it's a bit abrupt. I want to hear all of your thoughts, but we only have a short time so I want to make the most of it.

Do you have any questions before we start?

Start screen recording.

Tell me a bit about yourself. Where are you from and what's your occupation or hobbies? How long have you been living in the UK for and whereabouts are you living?

What are your thoughts about and associations with Italian cooking?

When, why, and how do you cook Italian? (how often, what dishes, for what occasions, how many people; make sure they aren't talking just about pasta)

Where do you usually go grocery shopping?

Pasta sauce - general (20 min)

In the survey you mentioned that you use pasta sauce (once a month). What attracts you to buy pasta sauce?

Do you always use pasta sauce from the store when making pasta or do you also like to cook from scratch?

When you shop for pasta sauce, what things do you look for? *(Use laddering to get to the why behind their answer(s).)* Possible answers: price (promotions), quantity, brand, flavour, origin, ingredients (allergies, quality ingredients, no preservatives, no added sugar), sell-by date, convenience, good packaging (*Show image of shop shelves with pasta sauce.)*

(Cmd Shift S) Start screen sharing. Make sure annotation is allowed.

Now, I would like to talk about the pasta sauce product that you like buying. *Show the image they submitted.* **Tell me a bit about it - Why did you buy this product? and Why do you continue buying it?**

- **Sainbury's own brand (I know I'm not paying a premium for brand names)**
- **Organic & vegan. I expect higher quality ingredients than the cheaper Sainbury's own brand pasta sauces**
- **Glass packaging**

Could you describe your experience with this pasta sauce product -from bringing the sauce home to cooking with it to cleaning up? *(show slide with generic pasta sauce journey to help them tell the whole story.)*

- Things to cover - **transport** mode, **storage** method, **time** between purchase and use, **used all at once or not, cooking** method, amount of **food waste**, **disposal** ritual (washed? recycling or trash?)

- Also, during the storytelling uncover what they (dis)like about the product.

Pasta sauce packaging (15 min)

Here are some hypothetical pasta sauce products that I want to ask you a few questions about. Imagine that all of these pasta sauces have the same nutritional value, ingredients, and expiry date. *Show slide with 5 products*

What are your first thoughts when you see these products? Anything stick out to you?

What do you see as the pros and cons of these packaging formats?

Structural packaging cues | **What do you think about the packaging materials and shapes?** (For pouch, what materials do you think it's made out of? Do you think this would be recyclable?)

Which packages are you more drawn to buy and which ones would you not buy/avoid?

What changes would convince you to buy it?

Show slide with unconventional products

Now, I will present two less conventional pasta sauce products. First, we have pasta sauce powder. What are your thoughts on this product? Is this something you would buy? Why or why not?

Secondly, pasta sauce that comes in packaging that you return and get reused. What are your thoughts on this product? Is this something you would buy? Why or why not?

Stop sharing

Sustainable pasta sauce packaging (15 min)

What is your definition of sustainability?

How about in the context of food products?

How about in the context of packaging?

You mentioned that you consider ___ factors when purchasing pasta sauce, where would sustainability land amongst those criteria? (In other words, how important is sustainability?) - Could be product sustainability or pack sustainability, ask for clarification.

Start sharing again. Show slide for rating.

How would you rank the packages in terms of sustainability? (Ask follow-up questions to understand how they arrived at the ranking.)

Stop sharing.

Another thing you might consider besides packaging structure is labels and logos. Do you look for any environmental/sustainability labels, logos, or certifications on the packaging before purchasing a product? If so, what are they?

Show slide with environmental labels

Are you familiar with any of these labels?

Which labels would you want to see on pasta sauce packaging? Why?

Are there any labels that would actually repel you from buying the product if you saw it on the pack? Why?

Show slide with images.

Now, I would like to discuss the images you brought in of sustainable food packaging.

Construct elicitation | **Could you tell me a bit about each picture and how it represents sustainable packaging to you? Feel free to annotate the screen to point out specific elements.**

- **Is said attribute attractive to you? Why or why not?**
- **Do you use this kind of packaging?**
    - If yes, **What is motivating you to use it? Do you often try to buy environmentally-friendly products? Why or why not?**
    - If not, **What is holding you back from using it? Do you ever try to buy environmentally-friendly products? Why or why not?**

Missing images | **Are there any pictures that you weren't able to find?**

The most representative picture | **Which packaging would you consider the most sustainable? Why?**

Opposite images | **If you were to bring an image of an *unsustainable* food packaging, what would it look like?**

Stop sharing

Wrap-up (3 min)

Is there anything else that you would like to share?
Do you know anyone who you think would be interested in participating in this interview study?

I will send you a gift card through ___ service. Do you have a specific shop you would want the gift card to come from? So you can expect an email in the next day or two from that company.

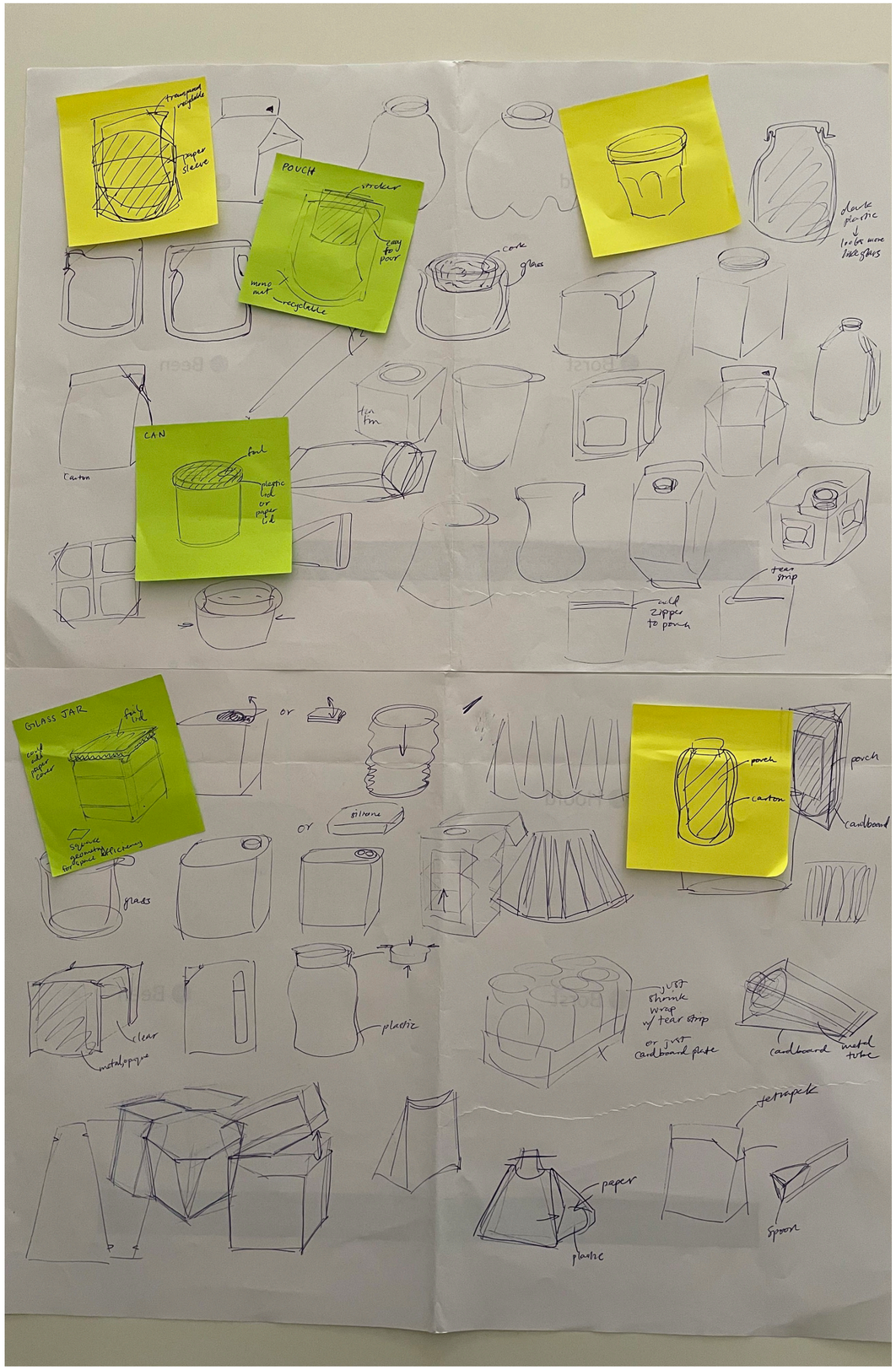
Appendix D

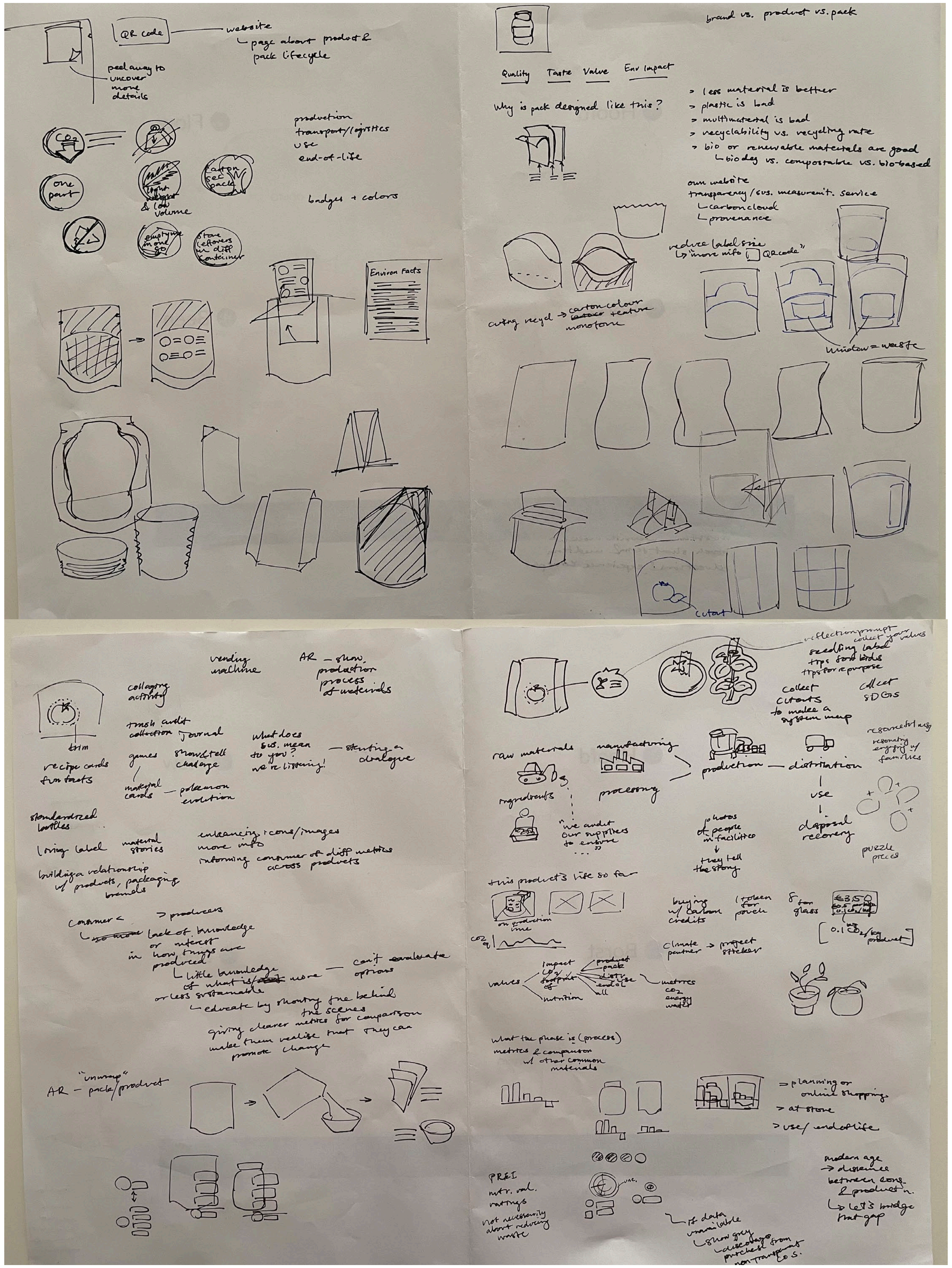
category	criteria	scope	evaluation method	1	2	3	4	5	Weight	Score	Score2	Score3
effective	influence on food waste behaviour	pack form, detailed design	user test	>=16% of contents wasted	12 - 16%	8 - 10%	4 - 8%	0 - 4%	1			
	influence on disposal behaviour	pack form, detailed design	user test	<=20% proper disposal	20 - 45%	45 - 70%	70 - 95%	>95%	1			
	shelf life	pack form	producer/supplier data	<= 8 months	8 - 12 months	12 - 16 months	16-20 months	>20 months	3			
	supporting more responsible or sustainable consumption	detailed design	user test (possible metrics - feeling more well-informed, trustworthiness, change in behaviour after 1 month)	<= 3 out of 10 (average)	3 - 5	5 - 7	7 - 9	> 9	2			
	alignment with labelling/marketing codes	detailed design	check with regulations	Y/N					0			
efficient	Material carbon footprint	pack form	EcoAudit / LCA	>= 0.3 kg CO2-eq./kg product	0.2 to < 0.3 kg CO2-eq./kg product	0.1 to < 0.2 kg CO2-eq./kg product	0.05 to < 0.1 kg CO2-eq./kg product	< 0.05 kg CO2-eq./kg product	3	choose footprint or ReCiPe	5	4
	ReCiPe scores	pack form	EcoAudit / LCA	>= 4.60E-05	3.1E-05 – <4.6E-05	1.6E-05 – < 3.1E-05	0.1E-05 – < 1.6E-05	< 0.1E-05	0			
	inbound transport load efficiency	pack form	producer/supplier data	High-weight material delivered in final form, non-nestable	Medium–low-weight material delivered in final form, non-nestable	High–low-weight material delivered in final form, nestable	High–medium-weight material delivered unformed (e.g. rolls, blanks or in bulk)	Low-weight material delivered unformed (e.g. rolls, blanks or in bulk)	1		5	4
	outbound transport weight efficiency	pack form	calculations with pack specs	<= 60% product weight on pallet (of total pallet weight)	60% – < 70% product weight on pallet (of total pallet weight)	70% – < 80% product weight on pallet (of total pallet weight)	80% – < 90% product weight on pallet (of total pallet weight)	90% product weight on pallet (of total pallet weight)	1		5	4
	outbound vol efficiency	pack form	calculations with pack specs	<= 30% product volume on pallet (of total pallet volume)	30% – < 50% product volume on pallet (of total pallet volume)	50% – < 60% product volume on pallet (of total pallet volume)	60% – < 70% product volume on pallet (of total pallet volume)	70% product volume on pallet (of total pallet volume)	1		4	5
cyclic	renewable content	pack materials	producer/supplier data	<= 20% renewable content	20%–60% renewable content	60%–80% renewable content	>80% renewable content (non-FSC certified)	>80% renewable content (FSC certified or similar third-party certification for biopolymers)	2		1	3
	rec content	pack materials	producer/supplier data	<= 5% recycled content	5% - <25% recycled content	25% - <50% recycled content	50% - <75% recycled content	75-100% recycled content	2		1	2
	separation and sorting	pack materials	internal assessment	Packaging consists of composite material that does not allow for material separation	Packaging consists of composite material/several material layers that are separated in the existing recycling process	Packaging consists of several materials that consumers can easily separate** before sorting (3 or more different materials)	Packaging consists of two materials that consumers can easily separated before sorting	No need for separation and sorting:- Packaging consists of one type of material, or- Returnable package that is part of an organized deposit system	1		5	2
	circular economy value	pack materials	consult experts or waste management resources	Main packaging material is not recycled in currently existing recycling system (non-separable composite materials, PVC, black-coloured polymers, EPS and PS)	Main packaging material is part of an open-loop material recycling system where recycled materials lose value quickly (downcycling),	Main packaging material is part of an open-loop material recycling system where recycled materials lose value over time (downcycling),	Main packaging material is suitable for closed-loop recycling but partly recycled in open-loop systems (due to dyes, lacquers, alloys. etc.)	Main packaging material is part of a closed-loop packaging material recycling system with no/minimal share of virgin material input or reused package that is part of an organized deposit system	2		4	2
	amount of non-recycled waste	pack form	producer/supplier data	>=39 g non-recycled waste/kg product	30 – < =39 g non-recycled waste/kg product	22 – < 30 g non-recycled waste/kg product	13 – < 22 g non-recycled waste/kg product	<13 g non-recycled waste/kg product	1			
	waste incineration impact	pack materials	consult suppliers, experts or waste management resources	Material that potentially contributes to hazardous air emissions from waste incinerators (e.g. PVC)	Material with low energy content (e.g. glass and metals)	Non-chlorinated fossil-based polymers	Fibre-based material or biopolymer made from renewable feedstock	Fibre-based material or biopolymer made from renewable feedstock with sustainability certification (FSC certified or similar)	1		3	5

	littering risk	pack form	internal assessment	Light-weight package format (film, wrap, bag) with small and/or light-weight separable components (opening strips, straws, perforated parts)	Light-weight package format (film, wrap, bag) with solid and reclosable cap or without any separable components	Heavy/rigid package with small and/or light-weight separable components (opening strips,caps, straws, perforated parts etc.)	Heavy/rigid package with reclosable cap	Heavy/rigid package without any separable components	1		2	4	
	littering impact	pack materials	producer/supplier data	Package consists of impact 50% non-biodegradable polymers	Mixture of materials with < 50% – 25% non-biodegradable polymers	Mixture of materials with < 25% – > 0% non-biodegradable polymers	Mixture of materials without non-biodegradable polymers (e.g. steel and cardboard)	Package consists of 100% biodegradable material (biodegradable in nature)*	1		1	3	
safe	non-hazardous materials	pack materials	producer/supplier data	Certified fulfilment of legislative requirements for direct food contact materials and EU PPWD heavy metal limits (complete packaging system) by suppliers	Fulfills level 1 requirements plus certified by suppliers that packaging materials are free from PVC/other chlorinated plastics (complete packaging system)	Fulfills level 2 requirements plus certified by suppliers that packaging materials contain no bisphenol A (primary package)	Fulfils level 3 requirements plus certified by suppliers that direct food contact packaging material does not contain engineered nano-materials and is not treated with preservatives or disinfectants (exeption for hydrogen peroxide)	Fulfils level 4 requirements plus certified by suppliers that no chemicals from the SIN list are intentionally added into packaging materials (complete packaging system)	2				
desirability	consumer quality perception	detailed design	user test	more than 25% lower rating than benchmark	10% lower	No change	10% higher	more than 25% higher	2		4	3	
	consumer taste perception	detailed design	user test	more than 25% lower rating than benchmark	10% lower	No change	10% higher	more than 25% higher	2				
	consumer authenticity perception	detailed design	user test	more than 25% lower rating than benchmark	10% lower	No change	10% higher	more than 25% higher	2		3	4	
	ease of handling and opening	detailed design	user test	<= 3 out of 10 (average)	3 - 5	5 - 7	7 - 9	> 9	1				
	ease of understanding claims, instructions, and ingredients	detailed design	user test	<= 3 out of 10 (average)	3 - 5	5 - 7	7 - 9	> 9	1				
viability	likelihood of purchase	detailed design	user test	<= 3 out of 10 (average)	3 - 5	5 - 7	7 - 9	> 9	3				
	cost	pack form	producer/supplier data	Less than 10% of total cost	10% - <15% of total cost	15% - <20% of total cost	20% - <25% of total cost	> 25% of total cost	2		3	4	
	alignment with regulations	detailed design	consult experts or regulations		Complies with current requirements and incurs large fees	Complies with requirements and incurs small fees	Complies with requirements and incurs no fees	Complies with current and future requirements and incurs no fees	2		3	4	
	alignment with retailer demands	detailed design	consult experts or published retailer demands			Complies with current requirements		Complies with current and future requirements	3				
	brand fit	detailed design	user test and internal assessment	<= 3 out of 10 (average)	3 - 5	5 - 7	7 - 9	> 9	2		4	3	
	differentness	detailed design	user test and internal assessment	<= 3 out of 10 (average)	3 - 5	5 - 7	7 - 9	> 9	1		4	3	
feasibility	manufacturability	pack form	consult producers/suppliers	Requires new supplier and extensive development/investment to implement	Requires new supplier but requires some further development/investment	Requires new supplier but doesn't require much further development/investment	Requires some development/investment to implement	Can be implemented with minimal changes to current processes	3		5	3	
	robustness (product wastage)	pack form	producer/supplier and 3PL data	>5% product waste due to packaging failure	4.5 – < =5% product waste due to packaging failure	3 – 4.5% product waste due to packaging failure	2.5 – 3% product waste due to packaging failure	<2.5% product waste due to packaging failure	2				
									Totals	0	105	101	

Appendix E

158




QR code
website
page about product & pack lifecycle
production
transport/logistics
use
end-of-life
badges + colors
Environ Facts
brand vs. product vs. pack
Quality
Taste
Value
Env Impact
why is pack designed like this?
less material is better
plastic is bad
multimaterial is bad
recyclability vs. recycling rate
own website
raw materials
manufacturing
production
distribution
use
ingredients
processing

Appendix F

Pasta Sauce Packaging Questionnaire

Hi there! My name is Miki and I am conducting a study to understand the perception of different packaging options for pasta sauce products. This survey should take approximately 3 minutes to complete.
This research is conducted as part of a Masters thesis in Industrial Design Engineering at TU Delft. The collected information will be used for research purposes and may inform a company's design decisions. Your responses will be processed anonymously and stored in a secure data drive managed by the TU Delft ICT department.
Your participation in this study is entirely voluntary and you can withdraw at any time.
If you have any questions feel free to reach out to m.o.hansen@student.tudelft.nl

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Please take a few seconds to review these pasta sauce product options.

Product A
£3

Product B
£2,50

How likely are you to purchase Product B over the Product A?

- Extremely unlikely
- Somewhat unlikely
- Neither likely nor unlikely
- Somewhat likely
- Extremely likely

Please provide a rationale for your response to the previous question.

How does Product B's ***packaging*** compare to Product A's packaging in the following respects?

	A lot lower	Lower	Equal	Higher	A lot higher	Don't know/can't tell
Attractiveness	○	○	○	○	○	○
Carbon footprint	○	○	○	○	○	○
Environmental burden after use	○	○	○	○	○	○
Functionality	○	○	○	○	○	○

What are your thoughts on the ***pasta sauce*** contained in Product B as compared to the pasta sauce contained in Product A?

	A lot worse	Worse	Similar	Better	A lot better
Taste	○	○	○	○	○
Quality of ingredients	○	○	○	○	○
Naturalness	○	○	○	○	○

To what extent would you agree with the following statements if Bertolli launched Product B on the market?

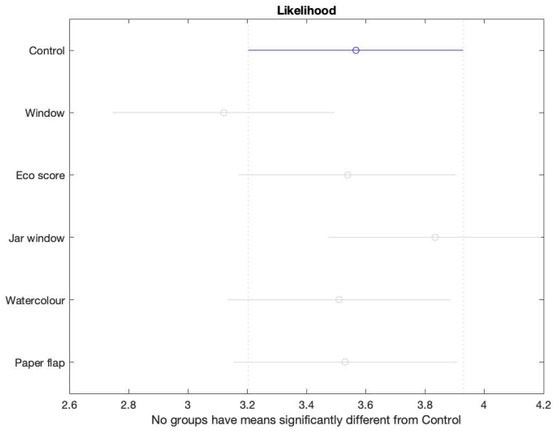
	Do not agree at all	Do not agree	Neutral	Agree	Totally agree
Bertolli is an authentic Italian brand.	○	○	○	○	○
Bertolli cares about the environment.	○	○	○	○	○
Bertolli is an innovative brand.	○	○	○	○	○

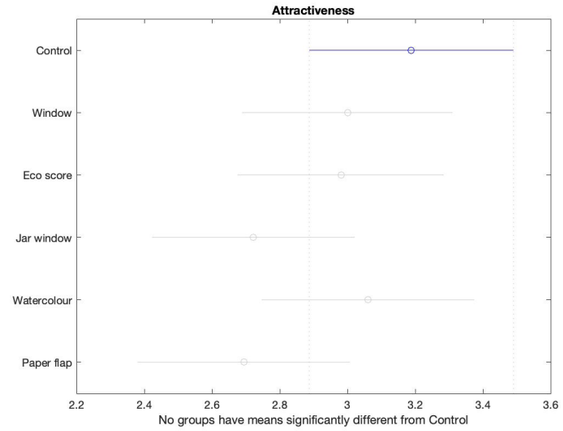
One last question...
How often do you use store-bought pasta sauce?

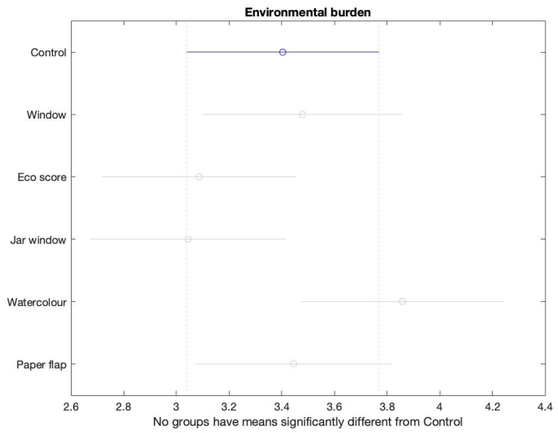
- Several times a week
- Once a week
- Once every two weeks
- Once a month
- Once every three months
- Less often than once every three months

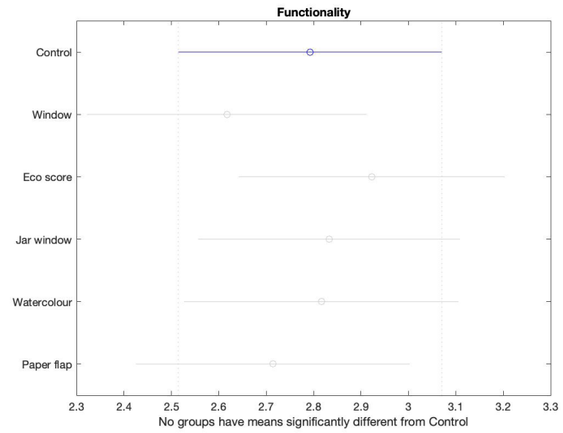
← →

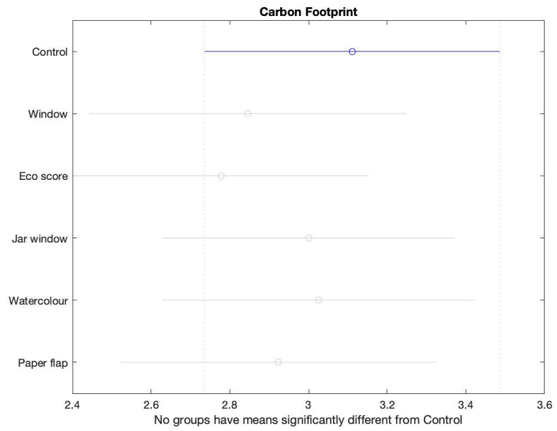
Figures showing multiple comparison analysis

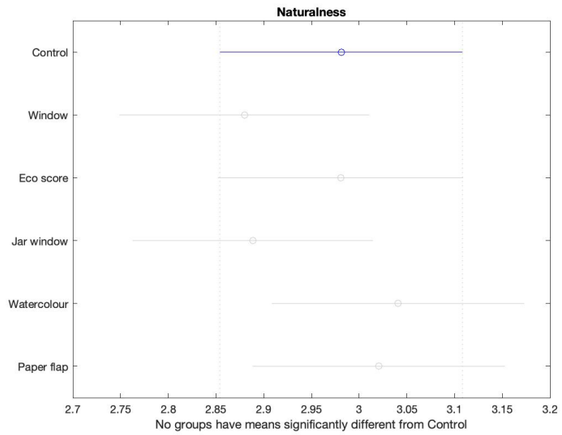


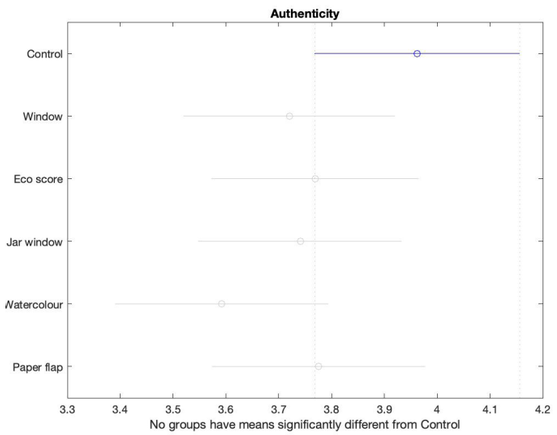


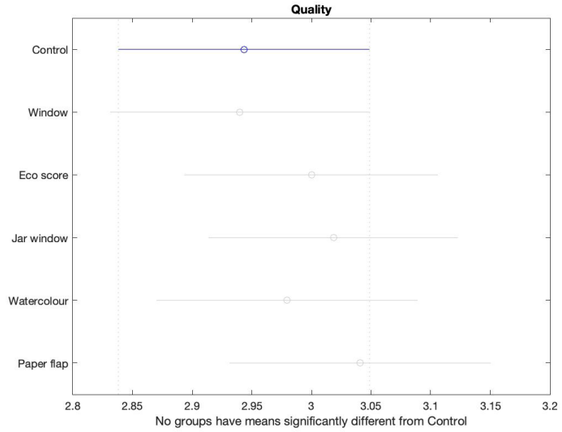


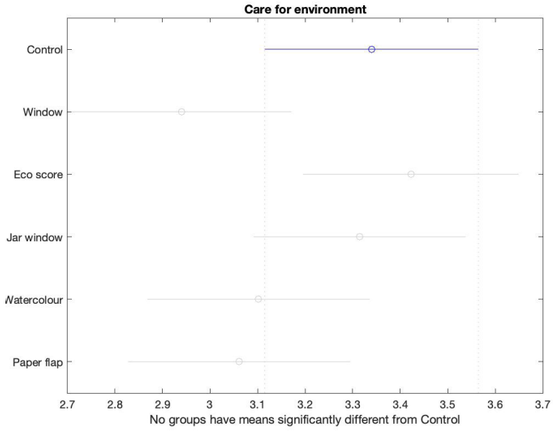


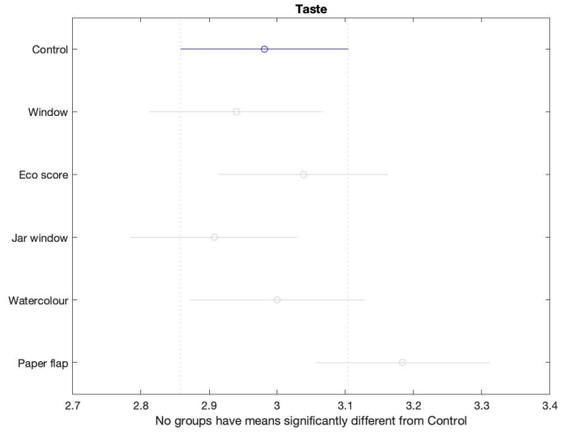


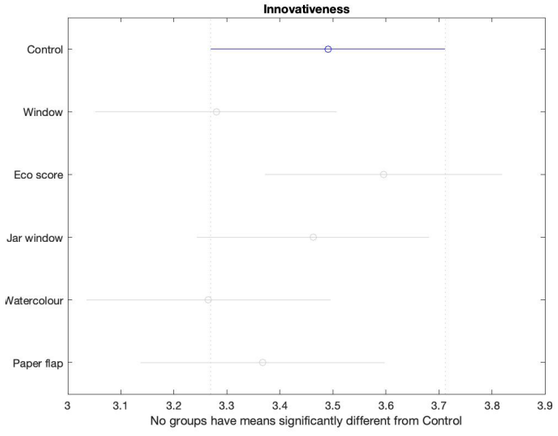












Appendix G

Pasta Sauce Packaging Questionnaire

Hi there! My name is Miki and I am conducting a study to understand the perception of a hypothetical pasta sauce packaging concept. This survey should take approximately 5 minutes to complete. This research is conducted as part of a Masters thesis in Industrial Design Engineering at TU Delft. The collected information will be used for research purposes. Your responses will be processed anonymously and stored in a secure data drive managed by the TU Delft ICT department. Your participation in this study is entirely voluntary and you can withdraw at any time. If you have any questions feel free to reach out to m.o.hansen@student.tudelft.nl

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What are the first three words that come to mind when you see this packaging design?

To what extent do you agree with the following statements?

	Totally disagree	Disagree	Neither agree nor disagree	Agree	Totally agree
The packaging design would catch my eye in the store.	○	○	○	○	○
I feel confused by the packaging design.	○	○	○	○	○
The packaging design makes me want to try the product.	○	○	○	○	○

To what extent do you agree with the following statement: The pouch is a sustainable alternative to glass jar packaging.

- Totally disagree
- Disagree
- Agree
- Totally agree
- I don't know or can't tell

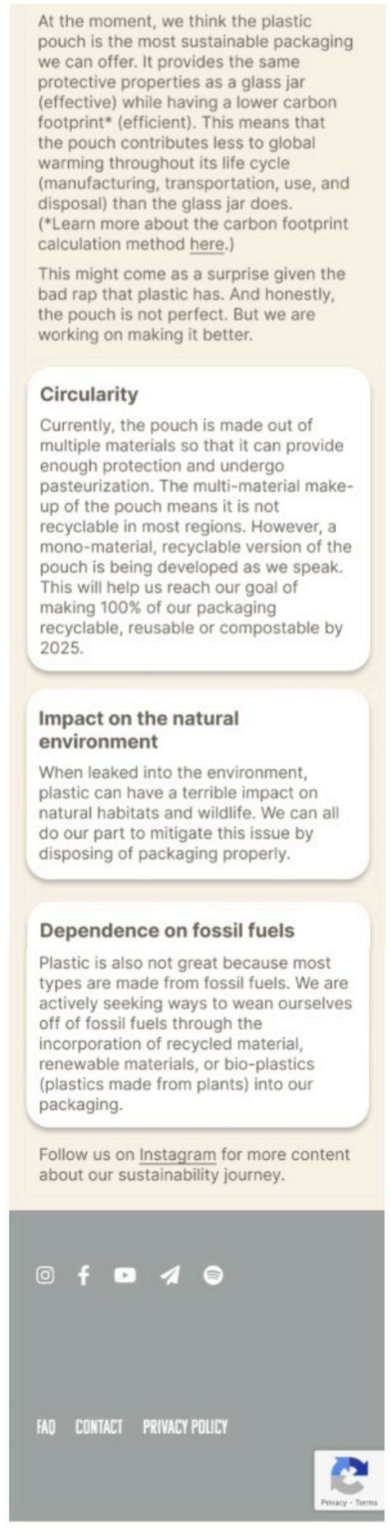
Please elaborate on your response to the previous question.

Please take a look at the back of the packaging and the highlighted area:

To what extent do you agree with the following statements:
The information in the highlighted area on the packaging...

	Totally disagree	Disagree	Neither agree nor disagree	Agree	Totally agree
is understandable (not confusing).	○	○	○	○	○
is believable.	○	○	○	○	○
is relevant to me.	○	○	○	○	○
makes me more likely to buy this product or from the brand.	○	○	○	○	○

Now, imagine that you have scanned the QR code on the back of the packaging and you are taken to the webpage previewed below.
Please take a minute to skim the webpage preview...



To what extent do you agree with the following statements:
The information on the webpage...

	Totally disagree	Disagree	Neither agree nor disagree	Agree	Totally agree
makes me feel well-informed about the topic of packaging sustainability.	○	○	○	○	○
makes me more likely to buy this product or from the brand.	○	○	○	○	○

What more would you like to know about the packaging or packaging sustainability to feel more well-informed or drawn to buy the product/from the brand?

One last question...
How often do you use store-bought pasta sauce?

- Once a week
- Once every two weeks
- Once a month
- Once every three months
- Less often than once every three months
- Never

Pasta Sauce Packaging Questionnaire

Hi there! My name is Miki and I am conducting a study to understand the perception of a hypothetical pasta sauce packaging concept. This survey should take approximately 3 minutes to complete. This research is conducted as part of a Masters thesis in Industrial Design Engineering at TU Delft. The collected information will be used for research purposes. Your responses will be processed anonymously and stored in a secure data drive managed by the TU Delft ICT department. Your participation in this study is entirely voluntary and you can withdraw at any time. If you have any questions feel free to reach out to m.o.hansen@student.tudelft.nl

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What are the first three words that come to mind when you see this packaging design?

To what extent do you agree with the following statements?

	Totally disagree	Disagree	Neither agree nor disagree	Agree	Totally agree
The packaging design is visually attractive.	○	○	○	○	○
The packaging design makes me want to try the product.	○	○	○	○	○

To what extent do you agree with the following statement: The pouch is a sustainable alternative to glass jar packaging.

- Totally disagree
- Disagree
- Neither agree nor disagree
- Agree
- Totally agree

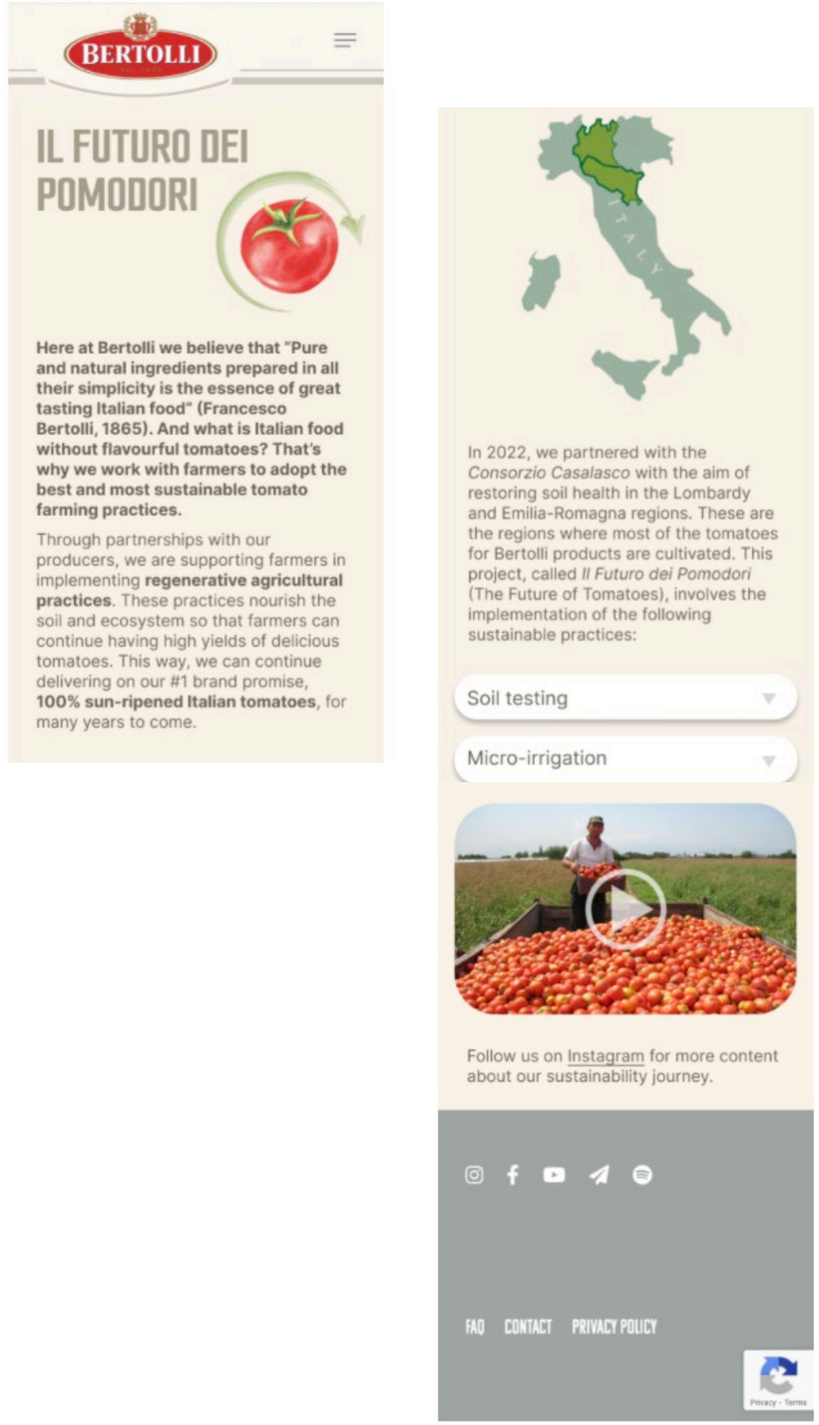
Please elaborate on your response to the previous question.

Please take a look at the back of the packaging and the highlighted area:

To what extent do you agree with the following statements:
The information in the highlighted area on the packaging...

	Totally disagree	Disagree	Neither agree nor disagree	Agree	Totally agree
is relevant to me.	○	○	○	○	○
makes me more likely to buy this product or from the brand.	○	○	○	○	○

Now, imagine that you have scanned the QR code on the back of the packaging and you are taken to the webpage previewed below. Please take a minute to skim the webpage preview...



To what extent do you agree with the following statements:
The information on the webpage...

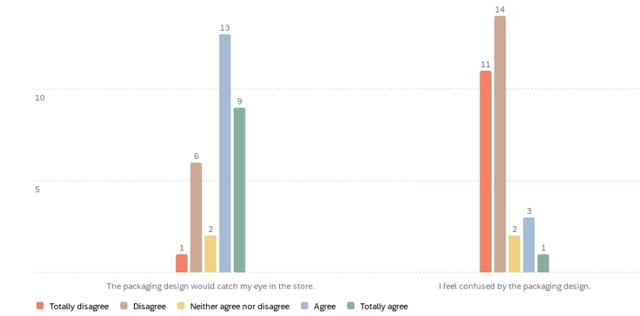
	Totally disagree	Disagree	Neither agree nor disagree	Agree	Totally agree
is relevant to me.	○	○	○	○	○
makes me more likely to buy this product or from this brand.	○	○	○	○	○

One last question...
How often do you use store-bought pasta sauce?

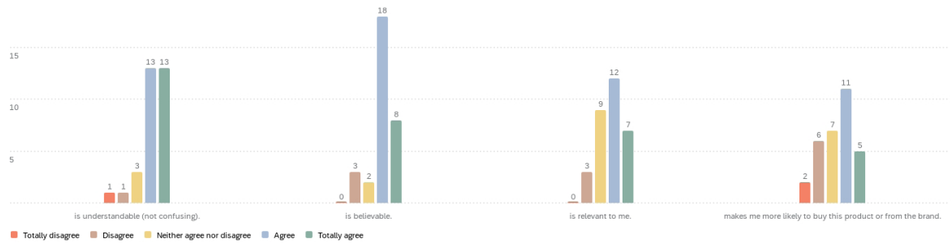
- Once a week
- Once every two weeks
- Once a month
- Once every three months
- Less often than once every three months
- Never

Graphs that were not included in main text

To what extent do you agree with the following statements? 31



Please take a look at the back of the packaging and the highlighted area: To what extent do you agree with the following statements: The information in the highlighted area on the packaging... 31



Now, imagine that you have scanned the QR code on the back of the packaging and you are taken to the webpage previewed below. Please take a minute to skim the webpage preview... To what extent do you agree with the following statements: The information on the webpage... 31

Please take a look at the back of the packaging and the highlighted area: To what extent do you agree with the following statements: The information in the highlighted area on the packaging...

Now, imagine that you have scanned the QR code on the back of the packaging and you are taken to the webpage previewed below. Please take a minute to skim the webpage preview... To what extent do you agree with the following statements: The information on the webpage... 31

Appendix H

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Consumer Engagement Concepts

Given my vision of empowering consumers to make more informed decisions, I started thinking of ideas that could achieve this vision – pack-related and non-pack-related.

Background research

When it comes to communicating sustainability, Yang et al. (2021) found that green empowerment ads increase purchase intention more than green appeals.

But what is empowerment?

Consumer empowerment is "when a company signals a sense of consumers' control over its decisions" (Yang et al., 2021) Empowerment is about "holding the perception that one has the authority to take action… when they come to value their own potential and their capacity for self-growth and learning" (McGregor, 2005).

To empower consumers, they need to learn the language of critique, language of possibility and potential, and language of action (McGregor, 2005). This is done by prompting the consumer to think, "What is wrong with the current state of affairs?" "What kind of world do I want to live in?" and "What can I do to make me the kind of consumer that I want to see in my world?" Based on this and the research done into communicating sustainability (as detailed earlier), I formulated the following concept drivers: Notice, Reflect, Trust, Learn, Act.

Since the hope that the concept would lead to lasting change and "routine reflection" it is important to take a behaviour change perspective and understand what role education and empowerment can play in changing consumers' shopping behaviour.

According to Ran et al. (2022), out of the various behaviour change methods that can be utilised, education and awareness is the least successful on its own. Therefore, it is important to combine education with economic incentives or outreach/relationship building.

Ran et al. (2022) compiled a table of behaviour change techniques, which were incorporated into the concepts.

They also found that the most appreciated channels for supplying information are printed signage, store web pages, e-newsletters, digital signage in stores, and store apps. They recommend:

targeting pre-existing ideas about sustainability - health, packaging, locally produced food

target before, during, and after shopping

establish trustworthiness by having public authorities deliver or support the campaign

emphasizing how one's individual choices and actions contribute to higher level goals and that they are part of a collective effort

visualising their impact

Idea directions

I conducted solo ideation and filtered through some of the initial ideas using a pugh chart. This lead me to defining three potential idea directions:

Decision-making tools

employed BCTs:
info about social and env consequences
prompts, cues
self-monitoring of behaviour, feedback on behaviour
social support, social reward, and social comparison
goal setting
instruction on how to perform the behaviour
self-identity
credible source

Concept | Compass

tool is a crutch -does the compensatory decision-making for you - helps consumer build intuition - intuition is updated when there are new products via notifications about new products or new data/discoveries

provides inspo for cooking or shopping

reminder of values - like a friend who is asking you - do you really want that? (typical approach of sustainability is do you really need that? but this gives a bit of a twist on that)

implemented by government or some reputable third party

could also be a game or a limited time activity hosted by the grocery store and local government

Interactive pack elements

employed BCTs:
info about social and env consequences
prompts, cues
instruction on how to perform the behaviour

In-store installations

employed BCTs:
info about social and env consequences
prompts, cues
restructuring the physical environment
instruction on how to perform the behaviour

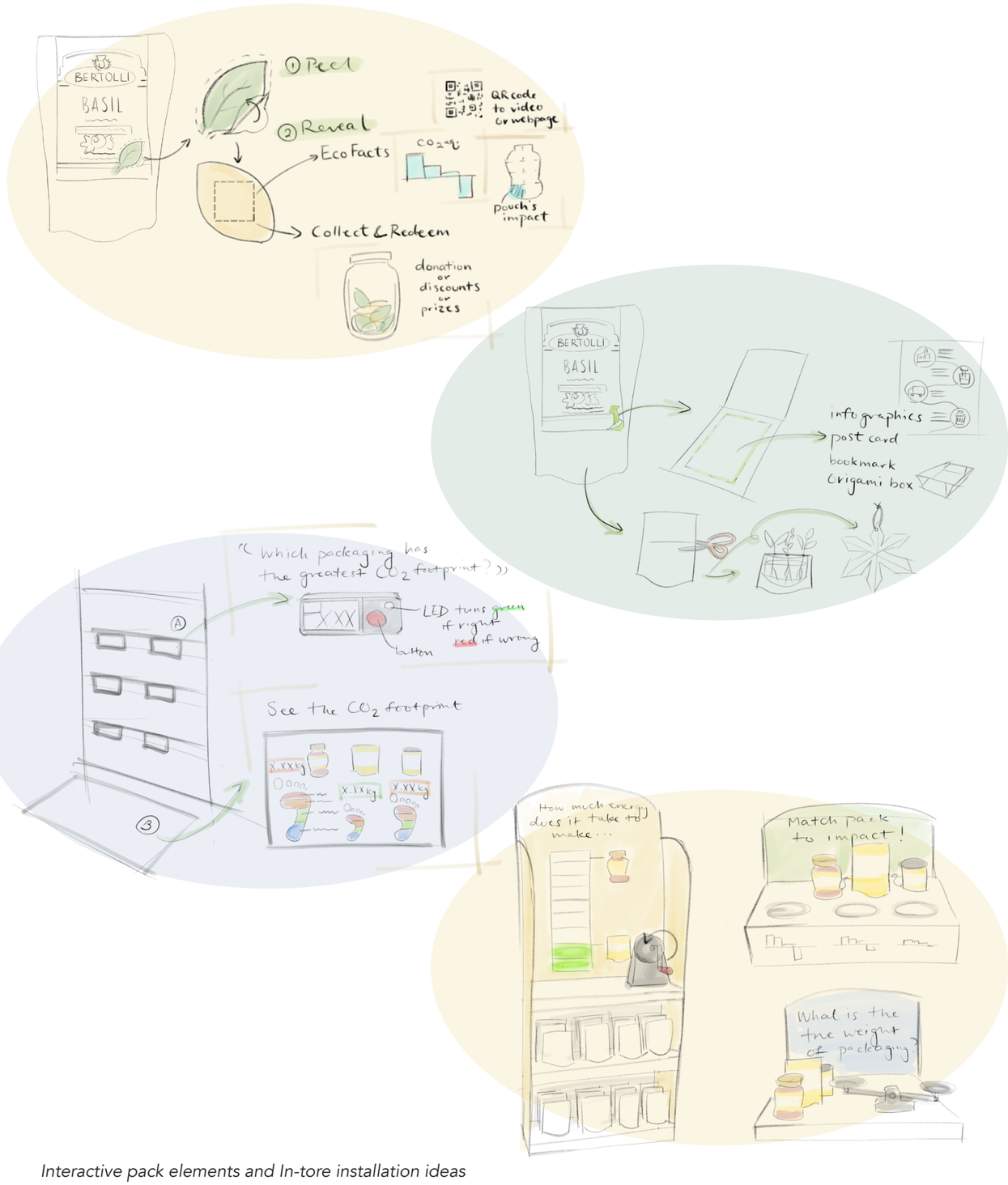
For the in-store installations - need to think about how it would help sell more Bertolli - would it turn people off from buying their jar?

Given time constraints, I was not able to develop concepts and mock-ups for all three directions. Instead I came up with pros and cons of each direction and decided to continue with the decision-making app feature. This decision was based on the facts that this concept would

- lead to continuous reflection and learning – not a one-time thing with a shallow impact
- be perceived as trustworthy - not a marketing gimmick
- be personalisable – catered to a person's values
- be dynamic – constantly updated

The main weaknesses of the concept are that there is a barrier to accessing the feature and it is not engaging or fun. Unlike the pack element or installation, you cannot serendipitously encounter the app feature. You have to be a user of the store app. Moreover, without adding a fun aspect or the right incentives, consumers may not be motivated to keep using the feature.

Compass concept (Decision-making tool)



Interactive pack elements and In-tore installation ideas

Compass: Concept Development

Accompanied Shopping Trips (ASTs)

To develop the Compass concept further, I conducted Accompanied Shopping Trips (ASTs). The research questions were:

What are consumers' values (related and unrelated to sustainability) when it comes to various product categories? What sustainability values resonate with consumers?

How can value reflection change consumer behaviour? Opportunities and limitations

What information would consumers want access to and how should it be presented?

What features and incentives should there be to increase the desirability of the app concept?

Method

pre-shopping activity - asked what kind of grocery shopper they are, what sustainable shopping means to them, and what they see their role being in the marketplace (passive or active consumer). Then, we wrote out their grocery list and grouped items into product categories and listed tehri priorities/values for each category

in the store - I ask them to verbalize their thought process and asked questions to get them thinking about the values they listed earlier - "does that product correlate with your values? Are you able to find a product that aligns more with your values? What information are you missing or what information would you like to know in order to make a more informed decision? If you are not purchasing the one that is more aligned, why not? What are the barriers?

After checkout, I presented my concept to get their feedback

I conducted this activity with two peers. I did not recruit a more diverse sample due to time constraints and also because I wanted to target people who already have a good knowledge of sustainability so that there could be a more nuanced discussion. The assumption here is that people from the general public would not be able to say what information they are missing because they might not be aware of what information is relevant in the first place. I believe that the general public will be more informed about sustainability issues and metrics in the future - to a similar level as these IDE students.

Takeaways

Before the grocery store

A lot of decisions are predetermined by what people want to cook and how they cook. To shift people's thinking from product-centric to need-centric, maybe the "list" function could prompt the user to list the meals they are making rather than ingredients.

Depending on the product category, the more sustainable or value-aligned options are only accessible at other stores. However making a change to the concept based on this insight is out of scope if the feature is situated in a store's application.

Spectrum of motivation level

When shopping, one participant did not check for information that could help inform their decision-making even when prompted, while the other participant was very proactive about seeking information. The app feature can be helpful for both types of consumers as it would do the heavy-lifting of compiling and analysing information. The question is how to convince adoption by consumers who are not very discerning.

Conflicting values

With the first participant, there was long discussion of how to navigate deciding between the meat product with a 1-star "Beter Leven" animal welfare score and the product with a 3-star rating, but at more than double the cost. If the feature is calibrated to prioritise price higher than animal welfare, then the consumer would either become comfortable with always getting the "worse" option from a sustainability perspective or feel hopeless when reminded that they cannot live up to their moral intentions. Perhaps the concept can somehow support finding a middle ground (i.e., once every five times, get the more expensive meat).

Reward/Incentives

The participants suggested the following rewards/incentives: earn points to plant a tree (digitally and in real life as a part of a reforestation project), discounts

The tree idea is actually already implemented in the AliPay app and according to the participant, it is a well-utilised feature that their friends are very invested in. Therefore, it has good potential to elevate the experience of using the feature and even foster social interaction.

Food Lab Meeting Feedback

I also attended a meeting with faculty members, researchers, and PhD students who focus on Food and Eating design to receive feedback on the idea.

The main feedback I received was: from a behaviour change standpoint, it is unclear whether consumers will want to spend the extra mental effort to use the feature since shoppers often want to be in and out of the store quickly and their decision-making processes are unconscious and habitual in nature.

Based on this feedback, I came up with the idea of implementing the feature as a nudge where consumers are given a suggestion immediately after scanning a product that is not the "ideal" choice given their values. The issue with this is that this does not help consumers learn how to make better choices.

Since this concept path was deemed not the most relevant to the project, the concept was not developed further. However, there is potential behind the concept and the following next steps could be taken:

- Wireframing and lo-fi mockups to test the flow and how to best present and visualise the metrics
- User-testing to understand desirability and any usability issues
- Develop a plan for how the feature would work (i.e., where the data would come from, what kind of algorithm would be used, etc.)
- Pitch the idea to retailers or an existing platform like Yuka

Takeaways

Given that part of Bertolli's sustainability mission could be to educate and empower, they should consider some of these ideas as ways to fulfil the mission in a creative way that goes further than just posting articles on their website.

Moreover, it is likely that this sort of sustainability filtering will become more popular in the future. Just like how health information has become more ubiquitous in the past years and is quite important to consumers now, sustainability metrics will also become more relevant to consumers. This is especially likely as more companies collect and publish environmental impact metrics due to regulations and/or their brand strategy.

It is important that Bertolli takes a proactive stance in this area. They should stay well-informed about sustainability innovations and adapt their products so they can stay competitive from a sustainability standpoint. This is assuming that consumers will have an increased ability and motivation to make decisions based on sustainability.

Appendix I

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Personal Project Brief - IDE Master Graduation

TU Delft

Sustainable Food Packaging that Resonates with All Stakeholders

project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 14 - 03 - 2023

23 - 08 - 2023 end date

INTRODUCTION **

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

Food packaging serves many functions, from product protection to extending product shelf life to enabling convenient or effective usage (i.e., portability, resealability) to communicating relevant information or brand image to consumers. However, packaging has a negative impact on the environment due to the carbon footprint of the materials used, production processes, and transportation. Plus, the use of plastic in packaging contributes to society's reliance on fossil fuels. 40% of all plastics are produced for packaging applications (Geyer et al., 2017). Looking specifically at the food industry, 37% of the food sold in the EU is packaged in plastic (Break Free From Plastic et al., 2022). Much of this packaging is used only once and then enters the waste stream thus contributing to society's waste and pollution problem. In 2010, 79 million tonnes of packaging waste was generated in the EU (Da Cruz et al., 2014). With only 30% of this packaging being recycled (Thomson et al., 2018), much of this waste ends up in landfills or in nature, leading to grave environmental consequences. Given all of these issues, sustainable packaging design has become an increasingly important area of interest for consumers, governing bodies, retailers, and producers/brands alike.

Enrico food wants to develop more sustainable packaging solutions to address consumer, customer, and regulatory demands. However, there are many considerations and constraints to designing sustainable food packaging including food safety/shelf-life, manufacturability, logistics, and consumer perception and behaviour. It is also important to consider how the packaging industry will change over time, especially with the shift toward circular systems (i.e., reusable packaging solutions). Therefore, research must be conducted on disentangling this complex issue to realise a pasta sauce packaging design that balances desirability, feasibility, viability, and sustainability. Since Enrico food wants to expand to the UK market in the coming years, the scope of the research will be limited to the UK market.

When it comes down to the design of the pasta sauce packaging, a wide variety of material and recycling technologies can be considered to improve the packaging design thanks to recent advances in material science. There are also many studies of consumer preferences and perceptions of packaging design that can be leveraged to inform the packaging design/sustainability strategy.

An interesting challenge that might need to be overcome in this project is the mismatch between perception and reality of the environmental-friendliness of different packaging designs. Consumers often do not consider the resource intensity of producing certain materials or the packaging design's impact on transportation and food waste when evaluating sustainability (Otto et al., 2021). The aspects that are more salient to consumers are biodegradability, recyclability, and the use of renewable materials, leading to an inaccurate appraisal of packaging options (Norton et al., 2022). Therefore, either a solution that achieves a good match between perception and reality or strategy that compensates for or debunks consumer misconceptions must be found.

If it is deemed that a reusable packaging system is the best option, implementation challenges (i.e., new business model, reverse logistics, consumer adoption, etc.) would need to be addressed.

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introduction (continued): space for images

Sources:

Break Free From Plastic, Rethink Plastic Alliance, & Zero Waste Europe. (2022, July 12). Packaging at the core - Zero Waste Europe. Zero Waste Europe. Retrieved March 13, 2023, from https://zerowasteeurope.eu/2022/07/blog-packaging-at-the-core/

Da Cruz, N. F., Ferreira, S. R. G., Cabral, M., Simões, P. N., & Marques, R. C. (2014). Packaging waste recycling in Europe: Is the industry paying for it? Waste Management, 34(2), 298–308. https://doi.org/10.1016/j.wasman.2013.10.035

Geyer, R., Jambeck, J., & Law, K. L. (2017). Production, use, and fate of all plastics ever made. Science Advances, 3(7). https://doi.org/10.1126/sciadv.1700782

Norton, V., Waters, C., Oloyede, O. O., & Lignou, S. (2022). Exploring Consumers' Understanding and Perception of Sustainable Food Packaging in the UK. Foods, 11(21), 3424. https://doi.org/10.3390/foods11213424

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Thomson, H., Illingworth, K., McCoach, H., Jefferson, M., Morgan, S., 2018. PlasticFlow 2025: Plastic Packaging Flow Data Report. Wrap 58.

image / figure 1: Sources

TO PLACE YOUR IMAGE IN THIS AREA:
- **SAVE THIS DOCUMENT TO YOUR COMPUTER AND OPEN IT IN ADOBE READER**
- **CLICK AREA TO PLACE IMAGE / FIGURE**

PLEASE NOTE:
- **IMAGE WILL SCALE TO FIT AUTOMATICALLY**
- **NATIVE IMAGE RATIO IS 16:10**
- **IF YOU EXPERIENCE PROBLEMS IN UPLOADING, COVERT IMAGE TO PDF AND TRY AGAIN**

image / figure 2:

PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

The goal of the project is to understand what makes the most acceptable sustainable pasta sauce packaging from multiple perspectives (consumers, producers, brands, retailers, legal representatives). Bertolli's pasta sauce packaging will be redesigned for improved sustainability and high stakeholder acceptance in the UK market.

The following are structured themes and research questions that define the project scope:
Theme 1: Sustainable food packaging
RQ1.1: What does the system surrounding food packaging look like (i.e., historical and future trends, stakeholders and their relationships, regulations, processes, life cycle, etc.)?
RQ1.2: What frameworks for defining and evaluating the sustainability of packaging design exist and what is a suitable framework for Bertolli's pasta sauce packaging?

Theme 2: Consumer perception
RQ2.1: What factors, relevant to packaging design, are considered when consumers make a purchase decision?
RQ2.2: What are the considered factors and market conventions (i.e., familiar packaging form factors) for the UK market?

Theme 3: Packaging design/strategy
RQ3: How can pasta sauce packaging be designed for improved sustainability and high consumer acceptance in the UK market?
If there is a conflict between ideals or a gap between actual sustainability and perception, how can that gap be bridged in the long-term?

ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

The aim of this graduation thesis is to determine how Bertolli's packaging could be designed to achieve their sustainability goals and a successful launch of their pasta sauce in the UK market. The result of this thesis is a design concept and roadmap for Bertolli's pasta sauce packaging based on desk research, interviews, and consumer research.

Systemic design methodology (i.e., inquiring, framing, formulating, facilitation, and reflecting) will be applied to analyse the context (Ryan, 2014). Multiple perspectives surrounding sustainable food packaging design will be studied to develop a blended approach toward the ideal sustainable packaging solution based on stakeholder values (pertaining to desirability, feasibility, and viability) and across multiple timescales (i.e., 2, 5, and 10 years in the future). This framework will be used to inspire and assess pasta sauce packaging concepts and decide on a final concept and implementation strategy. The concept will be tested and iterated upon based on expert feedback and consumer research. The framework will be documented so that Enrico food can adapt it and apply to future packaging projects.

PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 14 - 3 - 2023 23 - 8 - 2023 end date

Improving Food Packaging Sustainability without Sacrificing Stakeholder Acceptance

Miki Hansen

	March				April				May				June				July				August			
Active days	1	5	5	3	3	4	5	4	4	5	3	5	4	5	5	2	5	5	5	4	0	5	5	5	3
Days worked total	1	6	11	14	17	21	26	30	34	39	42	47	51	56	61	63	68	73	78	82	82	87	92	97	100
Project week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ACTIVITY	6-10	13-17	20-24	27-31	3-7	10-14	17-21	24-28	1-5	8-12	15-19	22-26	29-2	5-9	12-16	19-23	26-30	3-7	10-14	17-21	24-28	31-4	7-11	14-18	21-25
MILESTONES																									
Kickoff		14 Mar																							
Midterm										12 May															
Green light																			14 Jul						
Report																									23 Aug
Graduation (Presentation)																									
PHASE 1: **DISCOVER**																									
Researching sustainability frameworks and related strategies																									
Information gathering about food packaging industry/system (desk research, interviews)																									
Researching consumer values/ perception of packaging and related strategies																									
UK market/consumer research																									
PHASE 2: **DEFINE**																									
Synthesis and Vision																									
PHASE 3: **DEVELOP**																									
Ideation																									
Downselection and concept development																									
Concept representation (mock-up)																									
Feedback from stakeholders																									
Refined prototype/strategy																									
Consumer perception study																									
Other evaluation activities																									
PHASE 4: **DELIVER**																									
Final prototype/strategy																									
Implementation plan and Road map																									
PHASE 5: **DOCUMENTATION**																									
Midterm report																									
Final Report																									
Presentation																									

The project is split into four main phases: Discover, Define, Develop, and Deliver. This process is loosely based on the double-diamond model.
In the "Discover" phase a mix of primary and secondary research will be conducted to answer RQ1.1, RQ1.2, RQ2.1, and RQ2.2. The focus of the second phase is to process the insights to define the design vision. In the "Develop" phase, a redesign or strategy concept will be developed and iterated on (thus answering RQ3). The "Deliver" phase will involve finalising the concept, developing a plan for implementation, and a roadmap for evolving the packaging design further down the line.
This schedule is subject to change as the project evolves.

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, ... Stick to no more than five ambitions.

Competencies:
The intention with this project is to round out my design competencies and put theory into practice.
In ACD and AED, I learned various methods for user research, vision formation, ideation, and concept development that I hope to further prove in this project. Moreover, the individual part of ACD helped me develop my project planning skills, which I intend to improve upon during this graduation project. Specifically, I hope to develop a system for staying inspired and motivated, since I have had trouble with that in the past when working on individual projects.

While I have acquired the competencies relevant to concept development and embodiment thanks to ACD and AED, I still need to develop my context analysis and vision formation skills. Thus forth, I plan to learn and apply systemic design methods and the ViP method during this project.

In the Consumer Behaviour elective I learned about various consumer behaviour theories, which were used to analyse an existing product. In this project, I hope to put these theories into practice when designing my own concept/strategy.

While I have learned some methods for integrating and evaluating sustainability, I want to achieve a deeper understanding of sustainability and apply the specific concepts and methods that I learn in the process to this case.

Ambitions:
My first ambition is to hone my ability to "zoom out." I want to be able to analyse the whole packaging system including the relevant processes/flows, interactions between stakeholders, and historical and future trends. This can be done by learning and applying methods like GIGA-mapping and ViP. The hope is that through this system-level analysis I can identify potential design opportunities.

Moreover, I want to achieve a deeper understanding of sustainability and sustainable design methods (i.e., sustainable transitions, circular systems, ecodesign strategies, LCA methods). While I have been exposed to various methods over the past year and a half, I want to continue to add new concepts and tools to my toolbox and develop my own process for incorporating sustainability into my design practice.

Finally, I want to build and test my concept(s) to a high fidelity. At the end of the projects I've worked on in the past, I usually ran out of time or energy to systematically validate my design. I want to challenge myself to iterate on my concept at least twice and test the final prototype for desirability, feasibility, and viability in a structured and comprehensive way.

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.