

Sustainable Materiality Packaging Study for Meat Substitute Proposal

Bari Elliot Fall 2024

GRA4197C: Visual System Design

Important Terms to Know

Circular Economy: A model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible.

- **Biological Cycle:** the nutrients from biodegradable materials are returned to the Earth to regenerate nature.
- **Technical Cycle:** products and materials are kept in circulation through processes such as reuse, repair, remanufacture, and recycling.

Glutamate: an amino acid that is a major reason why meat tastes savory, or **umami**.

Greenwashing: a deceptive marketing practice that misleads the public into thinking that a company or organization is more environmentally friendly than it actually is.

Downstream innovation: Affects a product or material after its first use. For example, this can include, developing new collection, sorting, and recycling technologies.

Direct elimination: Packaging that does not serve an essential function can be regarded as unnecessary and directly removed without any significant adjustments, innovation, or loss of product value.

Innovative elimination: Packaging that does serve an essential function is indirectly eliminated through innovation, with the function being achieved in a different way. Upstream innovation is what allows this to be achieved, without negative unintended consequences.

Meat Substitute: A Food Source that Tastes like/resembles meat/fish/poultry, but is made from a different source, typically vegetarian or vegan friendly. Examples include:

- Tofu
- Tempeh
- Seitan
- Jackfruit
- Mushrooms
- Beans
- Chickpeas

Methylcellulose: a synthetic, tasteless, white or milk-white powder that is used as a thickener, gelling agent, and stabilizer in many foods

Polyethylene: a synthetic resin that is the most commonly produced plastic in the world.

- **Polyethylene terephthalate (PET):** a type of polyester resin that's commonly used for making plastic bottles and containers.

Polyvinyl chloride (PVC): a tough chemically resistant synthetic resin made by polymerizing vinyl chloride.

Upstream innovation: Rethinking products and services at the design stage. For example, this can include developing new materials, product designs, or business models.

Concept Summary

Over the summer, I was coming up with many different concepts, but I was putting my focus on the deliverable versus subject matter.

I realized I wanted to do something within the realm of food/consumer packaged goods, so I switched gears and turned my focus to **2024 market gaps**. The recurring trend that kept popping up in my search was the **higher demand of meat substitutes**. I thought this would be a great tie in to my food concept, while also referencing my interest in **environmentalism**. As a result, I decided to produce a completely environmentally friendly product in **every aspect of production**.

Current Packaging Trends

So, what are the different materials that are currently being used for the packaging of food?

Plastics

- **Polyethylene** is the most widely used packaging material globally due to its versatility. Common subtypes include PET, HDPE, and LDPE. PET (Polyethylene Terephthalate) is particularly prevalent in beverage packaging. PET bottles largely replaced glass containers because they are:
 1. Lighter
 2. Less fragile
 3. Safer to transport
 4. Reduce food waste from breakageThis shift has led food and beverage companies to widely adopt PET containers over glass bottles.
- **Polyvinyl chloride** (PVC) is another commonly used plastic packaging material. You might have seen it in the packaging of medicines such as tablet blister packs, cling films, water bottle sleeves, adhesives tape, and more.

Advantages of Plastics

- Low-cost food packaging materials
- Can handle both dry and wet food products
- Resistant to factors such as moisture
- Plastics provide the option of direct labeling
- Flexible packaging material

Disadvantages of Plastics

- Harmful to the environment
- Most plastic packaging reacts badly with hot food items
- Not easily recyclable material

Current Packaging Trends

So, what are the different materials that are currently being used for the packaging of food?

Metals

- **Tin** was the first metal used for packing food as early as 1810. Its major disadvantage is corrosion. Pure tin corrodes when in direct contact with the food item. That is why tin is coated with protective layers when used for packaging.
- While tin started the trend of metal packaging, **aluminum** is what drives it the most in today's world. Aluminum foil is commonly used in households as a form of food preservation. Laminated aluminum cans for beverages and containers in restaurants are also commonly used. The best thing about aluminum cans is they are easily recycled.
- While **steel** isn't one of the popular types of packaging materials like aluminum or tin, it still has a lot of applications. For instance, steel sheet is used to make containers, caps, and metal cans

Advantages of Metals

- Rigid packaging material
- Protects during transportation as well as on the shelf
- Pest resistant
- Moisture resistant
- Prevents air contamination
- Suitable for wet or dry food items
- One of the most recyclable materials.

Disadvantages of Metals

- Expensive packaging method
- Prone to corrosion without protection layers
- Non-flexible packaging material
- Reacts to certain food items (acidic foods)

Current Packaging Trends

So, what are the different materials that are currently being used for the packaging of food?

Glass

- **Glass** is one of the oldest packaging materials. Archaeologists have found glass bottles even near the tombs of the ancient Egyptian civilization.

Glass is also one of the most inert food contact materials, and can be used to pack anything whether it is dry, wet, or even acidic. Glass is used extensively to make glass containers and bottles in primary packaging for juices, oils, syrups, and other liquids.

Advantages of Glass

- Highly corrosion-resistant and food-safe material
- Glass containers are aesthetically pleasing
- Transparent containers reveal the contents to consumers
- Non-corrosive and inert to acids
- Ideal for preserving food long term
- Hygienic and the safest packing material for human health

Disadvantages of Glass

- Highly brittle – glass containers and bottles can easily break
- Heavy and expensive compared to other alternatives

Current Packaging Trends

So, what are the different materials that are currently being used for the packaging of food?

Wood Derivatives

- Regardless of the primary packaging or secondary packaging method, tertiary packaging often uses corrugated **cardboard** boxes and folding cartons.

Consumers do not see or interact with this packaging because retail outlets remove it before displaying food items on the shelf.

- **Paper and paperboard** are used as primary and secondary packaging materials by food manufacturers. It is a common choice in direct contact materials for dry food. But not for wet foods.

Paper packaging material is weak, but paperboard with added barrier properties has incredible strength. Boxes, trays, and cartons can be created using paperboard. There are many types of paperboard suitable for a range of food items.

Advantages of Wood Derivatives

- Low-cost food packaging materials
- Very lightweight
- The low cost, light weight, and rigidity of cardboard make it irreplaceable as a tertiary packaging material.
- Easy to print on paper and cardboard
- Corrugated boxes and paper-based materials are recyclable.
Recycled paper is commonly used in packaging.

Disadvantages of Wood Derivatives

- Limited to the packaging of dry food items
- Paper packaging is weak and easily tears

Current Packaging Trends

So, what are the different materials that are currently being used for the packaging of food?

Cellulose

- Many people think of **cellulose** as a type of plastic packaging. However, cellulose is actually a plant-based product, making it one of the few organic materials in packaging.
Cellophane sheets and shrink wrap are made using cellulose. While it looks like plastic, it is a completely biodegradable material.

Advantages of Cellulose

- Sustainable plant-based products, making them a green option
- Biodegradable within a few months without special treatment required
- Moisture and heat-resistant food contact material

Disadvantages of Cellulose

- Weak and offers no protection against impact
- Unsuitable for food items with a long shelf life

Current Packaging Trends

Based on several sources, what are the current common food packaging design trends?

- **Sustainable Packaging Materials**
- **Transparent Packaging Material**
- **Discreet but deluxe**
- **Crafted charm and rustic aesthetic**
 - Natural, Earthy Colors
 - Designs inspired by nature
- **Illustrated Designs**
 - Cartoons
 - Handrawn
 - Mascots
- **Clean and Simple Minimalist Designs**
 - Brutalist type
 - Limited Colors
 - Flat graphics
- **Maximalist Designs**
 - Distinctive shapes and vibrant colors
 - Bold Typeography
 - Hyper contrast
 - Saturated pastels
- **Retro Styling With Throwback Appeal**
 - 50s comeback
 - '70s retro design
- **Textured Packaging**
 - Motifs and Patterns
- **Personalized Packaging**
 - Hand-drawn aesthetics
 - Mascot variations
- **Smart Packaging**
 - Packaging that incorporates Interactive elements
 - Augmented packaging

Types of Meat Substitutes

So, what are the different substances that are currently being used as the base for meat substitutes?

Tofu

- Made of soybean curds pressed into blocks
- Free of cholesterol and low in saturated fat
- Half a cup has over 11 grams of protein
- Takes on the flavor of whatever you cook it with

Tempeh

- Made from fermented soybeans
- Half a cup has over 16 grams of protein
- Marinate tempeh before cooking to give it flavor

Seitan

- Made from cooked wheat gluten
- Half a cup has 8 grams of protein
- Takes on the flavor of whatever you cook it with

Jackfruit

- Full of vitamins, minerals, antioxidants, and fiber.
- 2.6 grams of protein per cup, more protein than most fruits
- Meat-like texture

Mushrooms

- Meat-like texture
- 3 grams of protein per cup
- Different varieties can be used for different meat dishes

Beans

- Filling protein/fiber combo
- 18 grams of protein and a whopping 15.6 grams of fiber per cup

Chickpeas

- Also known as garbanzo beans
- Half a cup of chickpeas offer over 7 grams of protein and 6 grams of fiber
- Low fat, no cholesterol, and plenty of vitamins and minerals.

Textured Vegetable Protein

- a meat replacement made of soy flour with the fat removed
- Half a cup has 17.5 grams of protein, but is higher in carbohydrates than other meat substitutes
- meat texture

Blends

- combinations of soy protein products, wheat protein products, and plant proteins
- highly processed and high in sodium

Meat Substitute Brand Competitor Analysis

Impostor meat products tend to overload on sodium, saturated fats, and added ingredients.

Impossible Foods

Product	Visual Identity
• Soy • Heme • Coconut/Sunflower oil • Methylcellulose/Food starch • Beef, Chicken, and Sausage	• Very Bold sans serif font • Strong use of red

Abbots

Product	Visual Identity
• Pea Flour • Chickpea Flour • Olive Oil • Beef, Chicken, and Sausage	• Serif Font • Clean • Sophisticated • Color Categorization

Beyond Meat

Product	Visual Identity
• Peas/Beans/Lentils • Avocado/Coconut/ canola oil • Potato/Pea/ Rice starch/ Methylcellulose • - Beet/Lemon Juice	• Very Bold sans serif font • Strong use of green • steer/leaf logo

Unmeat

Product	Visual Identity
• Soy • Palm Oil • Potato/ Tapioca Starch, Yeast extract • Beef, Chicken, pork, fish	• Serif Font • color categorization • leaf/meat logo

Upton's Naturals

Product	Visual Identity
• Seitan • Jackfruit	• Old-timey circus look • color categorization • Man w/ mustache

Tofurky

Product	Visual Identity
• Tofu • Tempeh • Beef, Chicken, and Sausage	• Playful fonts • Blue Dominated • Color Categorization • cute illustrations

Project Background

Beginning my materiality study, I reached out to my network on LinkedIn for any advice or resources. I was introduced to the Ellen MacArthur Foundation upstream innovation strategies.

Upstream innovation is rethinking products and services at the design stage. For example, this can include developing new materials, product designs, or business models.

Applying the upstream innovation mindset can help to achieve **three** key **circular economy** innovation strategies:

- 1. Elimination:** Packaging is eliminated while user experience is maintained or enhanced. Decrease the amount of plastic in circulation to establish a circular economy.
 - **Direct elimination:** Packaging that does not serve an essential function can be regarded as unnecessary and directly removed without any significant adjustments, innovation, or loss of product value.
 - **Innovative elimination:** Packaging that does serve an essential function is indirectly eliminated through innovation, with the function being achieved in a different way. Upstream innovation is what allows this to be achieved, without negative unintended consequences.
Example: NOTPLA's edible and home compostable 'blobs' are made from renewable seaweed. The user-friendly replacement for bottles and sachets has partnered with Just Eat, Hellmann's, and Innovate UK to scale condiment sachets on Just Eat's UK delivery platform. 91% of users find Ooho sachets easy, or easier to use than regular sachets.
- 2. Reuse:** Packaging is reused, rather than discarded after one use, creating value for both users and businesses. There are **four** different business-to-consumer (B2C) reuse models:
 - I. Refill at home:** Users refill a reusable container at home with refills either delivered to the door (for example, through a subscription service) or bought in a shop. Users retain ownership of the main packaging and are responsible for cleaning.
 - II. Refill on the go:** Users refill the reusable packaging at a dispensing point away from home, such as in a store. Users retain ownership of the reusable packaging and are responsible for cleaning.
 - III. Return from home:** Users subscribe to a delivery and collection service that allows them to return empty packaging from home. A business or service-provider then takes care of cleaning and redistribution of the packaging.
 - IV. Return on the go:** Users purchase a product in a reusable container and return the packaging at a store or drop-off point after use. The packaging is either cleaned where it is returned or a business or service-provider takes care of the cleaning and redistribution.
Example: Loop is a global reuse platform, offered online and in store by major retailers, which operates with more than 400 major brands to supply more than 500 products in reusable packaging. With no need for users to clean and sort containers, empties are returned (at a 97% return rate) for professional cleaning, ready to be sold again.
- 3. Material Circulation:** Packaging is designed so that the materials it is made from can be recycled or composted. When packaging (both reusable and single use) can no longer serve its function, the material should be circulated through recycling or composting. Whilst such processes involve numerous downstream elements, (such as collection, sorting etc.), upstream innovation (such as material selection, and packaging design) is key to ensure the technical, practical and economic viability of the system. Looking at material circulation through the lens of plastic packaging, there are **three** main routes to consider:
 - I.** Choosing a plastic type (**e.g. PET**) and packaging design that can be circulated through a recycling route
 - II.** Choosing a plastic type (**e.g. PHA**) and packaging design that can be circulated through a composting route
 - III.** Choosing to substitute to **a different, non-plastic material** (e.g. paper) and designing that material for recycling or composting.
Example: In collaboration, packaging producers Mondi and Fiorini International created paper based packaging with a paper based window for pasta. The solution enabled pasta producer Girolomoni to replace non-recyclable flexible plastic packs, while maintaining a product view for customers. It has also been adapted for rice.

Upstream Innovation Strategies in Use

What strategies am I going to use within my own packaging design?

I am going to use **Elimination** and **Material Circulation** as strategies in my packaging design, conceptualizing innovative means of functional packaging, removing any unnecessary packaging elements, and utilizing materials that can be primarily composted and/or recycled.

Following the **Direct Elimination** method, I will not be using any unnecessary labels, stickers, adhesives, and any extra layers of material in my design.

What are possible materials I am considering in my packaging design?

All of these materials are viable options, it is all based on cost and accessibility. I found these resources through my own research and Emma Fanning, Sustainable Designer & Environmental Educator's blog, Little Fox.

Interior layer: Plastic-like material to protect the food from microbes:

Cellophane film

- Plant based and extremely Biodegradable
- Moisture and heat resistant
- Breathable so I have to consider meat substitute shelf life

Seaweed Plastic Sheets

- Plant-Based, Biodegradable, and edible
- Flexible
- Somewhat difficult to find not in bulk or B2B wholesale

Starch Based (wheat, corn, rice, and potatoes) Films

- Great for containing fruits, veggies, and dry goods
- inexpensive and abundant

Ink For Print: Plant-based inks

Inks make up 1% or less of the material used in a project:

Riso Ink

- Soy-Based Inks
- Printers create no pollutants or emissions and use little energy, making it the most eco-friendly option for printing

Exterior layer: Paper/Cardboard material for structural integrity:

Cotton-Based Paper

- Made from recycled cotton textile scraps
- Reduces the amount of clothing put in landfill
- Takes 200 years to biodegrade so it needs to continually be recycled

Hemp-Based Paper

- Rapidly renewable
- Creates a wide variety of paper types

Hay-Based Paper

- Saves straw from being burnt or plowed
- Gives the paper a yellow hue

Crush Eco-friendly fiber Papers

- Pulps repurposed from food waste
- The companion pulp affects the paper's color

Meat Substitute for Project

So, what meat substitute am I using for my project?

Mushrooms!

- **Mushrooms** are often called “earthy,” but their flavor is more complex. They contain **glutamate**, which gives them the savory “umami” taste typically associated with meat. This makes mushrooms an excellent meat substitute in plant-based meals, providing satisfaction and depth of flavor. Their ability to absorb sauces and seasonings allows for easy customization in various dishes.
- Mushrooms can have an unpleasant texture if not cooked properly. However, when prepared correctly, they offer a range of textures from tender and meaty to firm and chewy, enhancing plant-based meals. The texture can be fine-tuned through marinades, cooking methods, and cooking time, allowing for versatile use in various dishes.

Types of mushrooms I am considering using

Portobello Mushrooms

- Portobello mushrooms have wide brown caps with dark gills on the underside. They grow with stems, but these are sometimes removed before packaging. The flavor is classic mushroom: deep, rich and earthy.
- Used as a substitute for beef.

Oyster Mushrooms

- Oyster mushrooms have thin—or non-existent—stems. The caps look like rounded leaves and can be thick and meaty or thin and feathery.
- Used as a substitute for seafood.

Chicken of the woods

- Grows in a fan shape called a conk that can be bright yellow, orange or a combination of the two.
- Used as a substitute for chicken.

Target Audiences

Who would be interested in purchasing my product?

1. Environmentally and ethically conscious consumers:

- People who prioritize eco-friendly products
- Those looking to reduce their carbon footprint
- Individuals committed to zero-waste lifestyles
- Those concerned about animal welfare
- People who support companies with strong corporate social responsibility

2. Plant-based diet adopters:

- Vegetarians and vegans already interested in meat alternatives
- Flexitarians and reducetarians exploring plant-based options
- People reducing meat consumption for health or environmental reasons
- Those who align their dietary choices with environmental concerns

3. Health-conscious individuals:

- Those interested in clean eating and natural products
- People avoiding synthetic materials in food packaging

4. Millennials and Gen Z:

- Generally more eco-aware and open to sustainable innovations
- Often early adopters of plant-based products

Deliverables & Goals

Deliverables

- Custom - designed Packaging Dieline made from Sustainable materials
- Brand Identity that includes:
 - Logo Mark
 - Brand Font System (with custom type)
 - Brand Color Palette
 - Brand Tone and Voice
 - Imagery/photography/Textures
- Art Directed Campaign of finished product
 - Digital and print Advertising

Goals

- Research Upstream innovation strategies and materials to create a completely sustainable packaging design
- Create a brand identity reflective of the packaging that has a strong appeal to consumers
- Art direct a campaign reflective of brand identity and sustainable ideals
- Hypothetical or real concept for meat substitute containing no additives.

Timeline

