



Research into the Intersections of Sensorial Experience, Cultural Identity, and Sustainable Preservation in Craft Chocolate Packaging

**D+FA
Research and Design (RAD)
Wilson School of Design**

**Principal Investigator:
Iryna Karaush B. Arch., MASA (UBC), MBA
(SUMAS)**

**Research Assistants:
Jodh Sidhu
Angela Huang
Johanna Jucutan
Andrew Chin**



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Introduction

Reducing Food Waste Through Craft Chocolate Packaging: Intersecting Sensorial Design, Cultural Identity, and Circular Economy Principles

Project Summary

Packaging pollution is a critical global issue, with the food industry as a major contributor. This project addresses the challenge by focusing on craft chocolate packaging—an often overlooked area—to explore sustainable redesign strategies. The primary goal is to reduce food waste and apply circular economy principles by developing packaging that extends shelf life, repurposes byproducts, and minimizes environmental impact.

Throughout this investigation, the design process was applied by breaking the project into distinct phases: research, problem identification, conceptualization, and prototyping.

Secondary research methods included visual anthropology, observational research, and literature review, providing cultural, contextual, and historical insights into current packaging practices. For marketing analy-

sis, web-based research and digital trend analysis were employed to understand consumer behaviour, market positioning, and competitive landscapes.

The primary research was conducted within the local business landscape through a series of interviews with local craft chocolatiers, including Cocoaro, Kasama, Gem, and Hype. These conversations provided multi-perspective insights into the current state of the local craft chocolate industry, highlighting key challenges related to packaging, sustainability, and consumer experience.

For the scientific component of the investigation, a faculty member from the KPU Physics Department, Dr. Flavio Ruiz Olivarez, provided expertise on the physical properties of packaging materials and helped identify existing material-related issues, such as moisture control, barrier effectiveness, and thermal insulation.



Additionally, Johanna Jucutan, one of the research assistants, engaged with chocolate producers in Colombia, one of the world's leading cocoa-producing countries. Her fieldwork contributed valuable global context, revealing differences in packaging practices, production constraints, and sustainability approaches from the source side of the supply chain.

Across the research phases, the following key problems were identified:

Consumption Experience – Current packaging often overlooks the sensorial and ritual aspects of consuming craft chocolate, reducing the opportunity for meaningful interaction between the consumer and the product.

Shelf Life and Preservation – Many artisanal packaging solutions fail to adequately protect against moisture, light, and temperature fluctuations, leading to compromised quality and reduced shelf life.

Transportation time is limited to 2–3 months due to the risk of melting, primarily caused by the lack of thermal insulation in current packaging. This often results in sugar or fat bloom, which negatively affects both the appearance and flavour of the chocolate, compromising its overall quality by the time it reaches consumers.

Cultural Identity and Storytelling – Packaging often lacks representation of the cultural identity of both the chocolate and its makers. This disconnect weakens the narrative value and limits opportunities to differentiate craft chocolate from mass-market alternatives.

To address the issues of consumption experience, preservation, and cultural connectedness, three distinct design themes were developed and iterated into concept directions:

Sensorial and Ritual Experience

This theme explores how packaging can enrich the experience of consuming craft chocolate through sensory and emotional engagement. Concepts include multi-layered unwrapping that encourages mindful consumption, and reusable elements that support rituals of sharing or gifting. Thermoactivated paper reveals fingerprints, fostering personal connection and inviting others to engage. Auditory elements, like a shaker-inspired design, add playful sound. The packaging is hexagonal-shaped for enhanced structural integrity and to provide additional thermal and breakage protection.

Scientific and Functional Preservation

This theme focuses on enhancing chocolate preservation through materials and forms that manage temperature and moisture. Concepts include biodegradable barrier films, temperature-sensitive smart labels, and structural designs that stabilize contents during transport. A hexagonal package, housing sectional chocolate, enables intuitive opening and spill prevention, while optimizing space in secondary containers. Another concept explores a square tetrahedron shape, offering similar spatial efficiency with added surface experimentation—textures mimicking chocolate or textiles—and sparking discussion on future biomaterials. Both the hexagon and tetrahedron are easy to produce and support collectible series design. The tetrahedron also bridges sensorial and scientific themes.

Cultural Storytelling and Identity

This theme weaves local and origin-based narratives into packaging through graphic language, material choices, and forms inspired by cocoa pods and traditional chocolate-making tools. The aim is to connect consumers with the people and places behind the chocolate, celebrating its cultural roots. Some concepts playfully reimagine famous artworks—such as a Dali-inspired “melting” chocolate form—merging education with delight. This approach overlaps with the sensorial theme by sparking emotion while deepening cultural awareness.

Next Phase: Collaborative Testing and Cultural Co-Design

The next phase of this research involves collaborating with local craft chocolate makers and packaging companies to evaluate the potential for redesigning and reshaping conventional packaging. This phase aims to test how alternative forms and materials can prolong the distribution season, protect the delicate sensory qualities of craft chocolate, and differentiate it from mass-produced products. Through participatory and co-design methods, this phase aims to elevate the perceived value of craft chocolate, support local producers and businesses, and strengthen the connection between packaging, place, and people, enabling more effective circular economy practices.

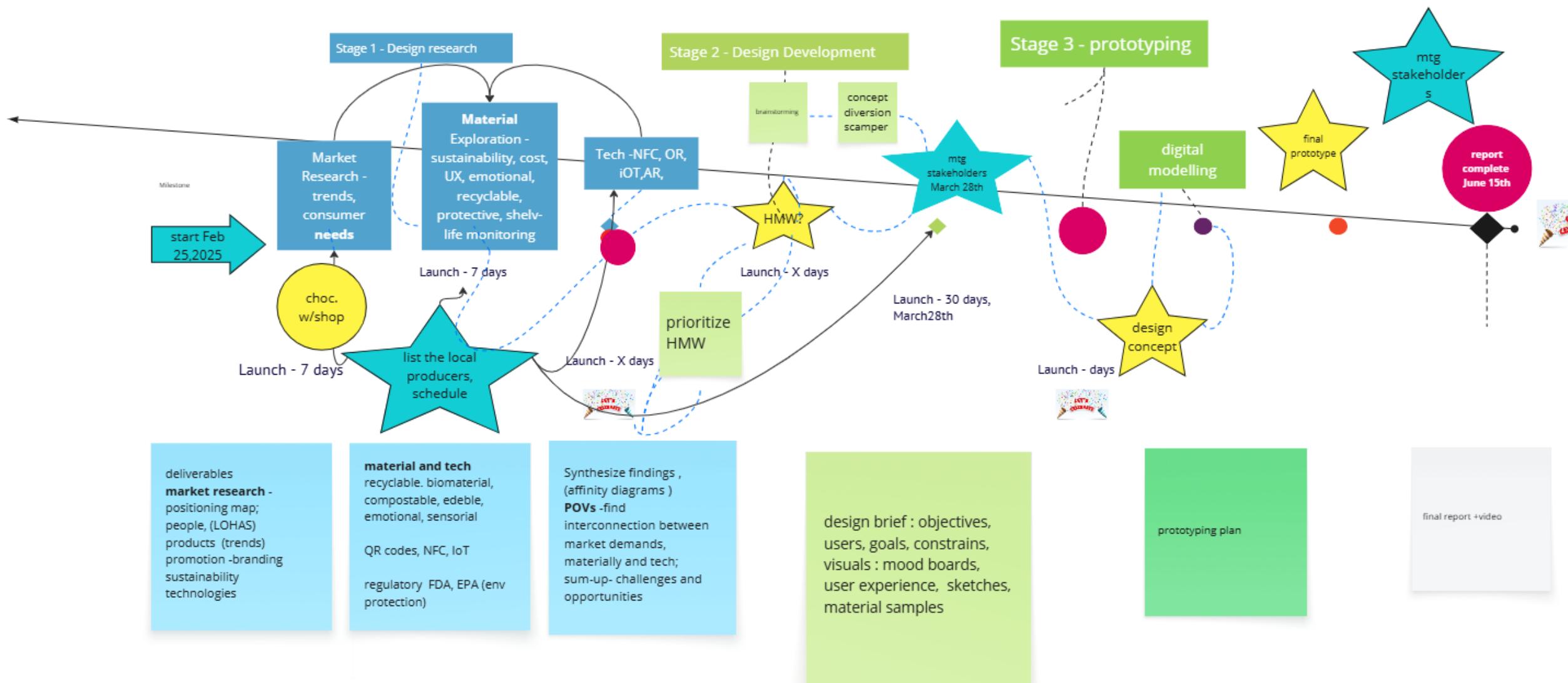


Timeline

The D+RA Chocolate Packaging project was planned to be completed within four months, with an ideal wrap-up deadline of May 30. Weekly meetings were scheduled to check in on the project's progress and ensure the deadline was met. We utilize Miro throughout the stages to compile research on various aspects of craft chocolate packaging. The Miro board comprises information such as materials science data, inspiration, market research, interviews with local craft chocolatiers and experts, cultural insights, and more. After getting a general understanding through the two stages of design, we identified the issues of the craft chocolate industry.

For example, bland consumption experiences, poor preservation of chocolate during transportation, and a disconnect between the chocolatiers and consumers.

Our goal is to explore new methodologies for reimagining craft chocolate packaging. To expand the scope of our investigation, we've divided the team into three focus areas: sensory, technological, and cultural. The Sensory team will engage the senses through experiments such as thermo-activated, fingerprint-revealing paper. The Technological team will explore structural forms, such as hexagonal patterns, to enhance durability and functionality. The Cultural team will draw on rich narratives inspired by the origins of cacao and its artistic heritage.



PHASE 1: Secondary Research

Research Methodology & Evolving Focus

Our research began with four key areas: sustainability, materials and technology, visual anthropology, and market research. We reviewed academic literature, explored the properties and packaging innovations of chocolate, and analyzed local chocolatiers in Vancouver. This revealed key gaps—limited sustainable materials, lack of interactivity, and inadequate protection. These findings helped us refine our focus on designing smart chocolate packaging that prioritizes chocolate protection, sustainability, and user experience.



Exploring Sustainability

In this phase, the research examined the material science of chocolate and its complex packaging needs. The entire chocolate production process was mapped—from cocoa bean fermentation and drying to the precise tempering that creates chocolate's signature gloss and snap, revealing its sensitivity to heat, humidity, and light, which can lead to blooming, melting, or flavour loss.

In response, the study explored sustainable alternatives to conventional plastics and foil, such as cocoa-husk biocomposites, plant-based waxes, and cellulose films with natural moisture regulation. While these materials showed potential for compostability and biodegradability, the research uncovered a critical gap: most eco-friendly packaging options fail to meet the rigorous preservation standards required for premium chocolate, forcing a trade-off between sustainability and product integrity within the principles of the circular economy.

Takeaway Points – Exploring Sustainability in Chocolate Packaging:

Chocolate is sensitive to environmental factors such as heat, humidity, and light, which can lead to melting, blooming, or flavour loss.

The full chocolate production process was mapped to understand packaging demands, from fermentation to tempering.

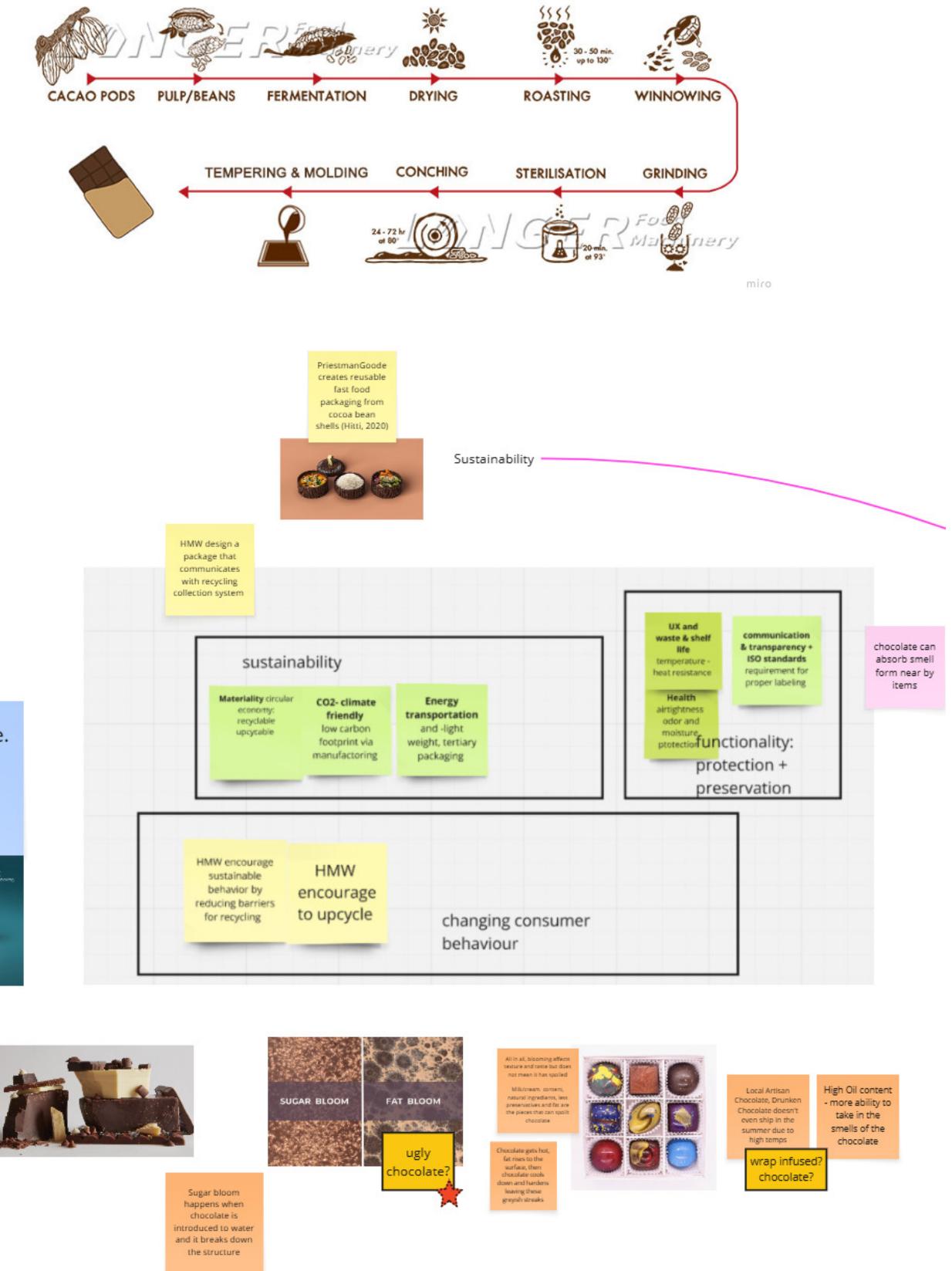
Sustainable material alternatives explored include cocoa-husk biocomposites, plant-based waxes, and cellulose films with natural moisture control.

These materials offer promising eco-benefits within compostability and biodegradability.

However, a key challenge was identified: most sustainable packaging options do not meet the preservation standards necessary for premium chocolate.

The study highlights a trade-off between sustainability and product integrity, revealing a tension within the circular economy goal.

THE PROCESS OF MAKING CHOCOLATE



Exploring Materiality and Technology

The research explored bio-waste materials and smart technologies to address the complex needs of chocolate packaging. Prototypes included mycelium cushioning grown from cocoa agro-waste, cellulose films reinforced with cocoa butter for moisture control, and pressed husk-fibre containers designed for thermal stability.

Smart solutions featured plant-based temperature-sensitive inks, humidity-regulating liners from rice husk ash, and RFID tags printed with conductive biopolymers for real-time tracking. These innovations demonstrated how agricultural byproducts and smart technologies can enhance both product protection and user experience. This integrated approach shows that sustainable chocolate packaging can also be luxurious.

Takeaway Points –
Bio-Waste and Smart Technologies in Chocolate Packaging:

Bio-waste materials like cocoa agro-waste and husk fibers were used to develop sustainable packaging prototypes.

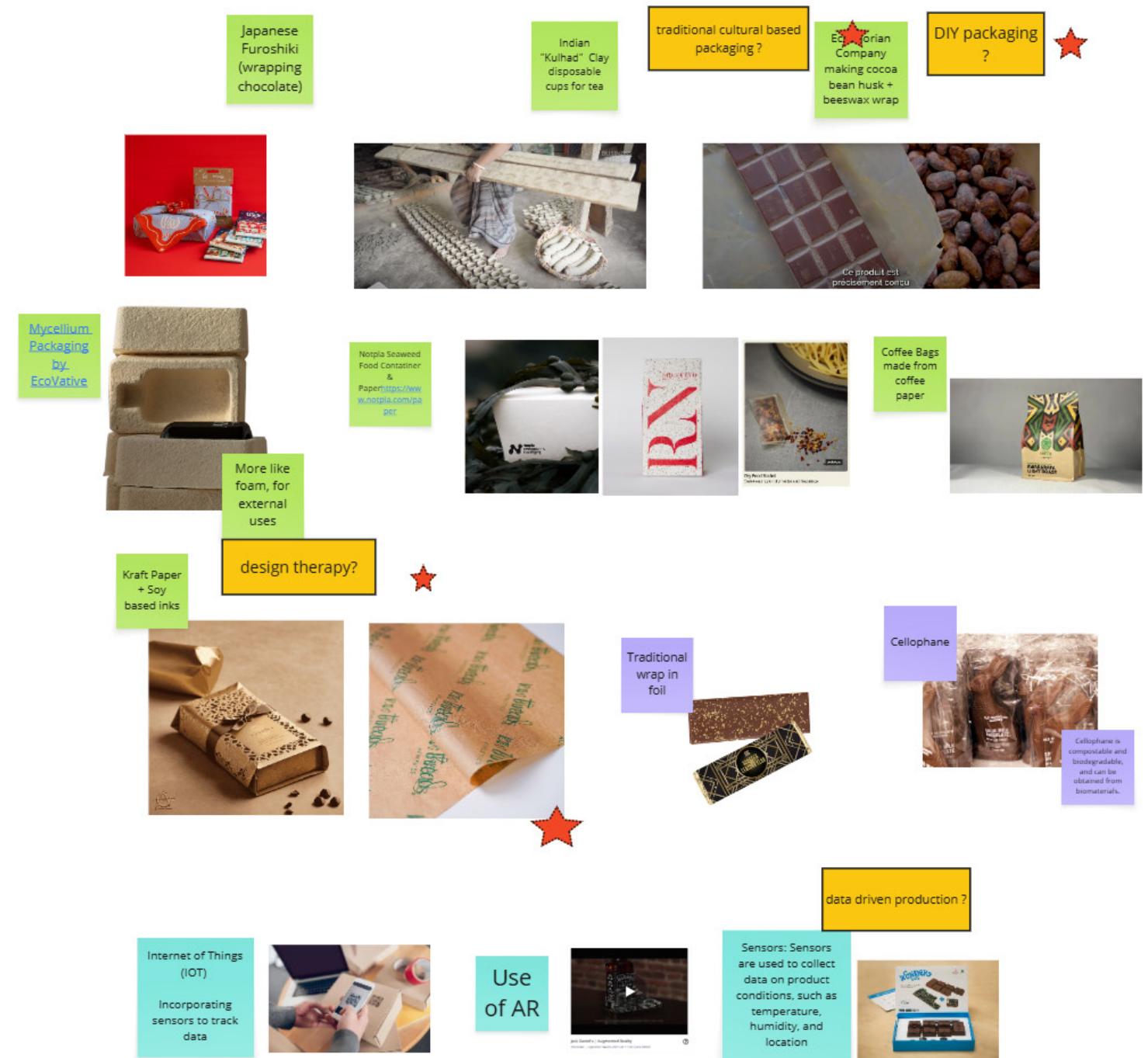
Innovative materials included mycelium cushioning, cocoa butter-reinforced cellulose films, and thermally stable husk-fibre containers.

Smart technologies explored included temperature-sensitive plant-based inks, rice husk ash humidity liners, and RFID tags with conductive biopolymers.

These solutions aim to enhance both the protection and tracking of chocolate products in real time.

The research highlights how agricultural byproducts and smart tech can be combined to improve performance and sustainability.

Demonstrates that luxury and sustainability can coexist in high-end chocolate packaging design, combining environmental responsibility with high-performance design.



Exploring Visual Anthropology

This phase of the research employed a literature-driven methodology in visual anthropology, investigating chocolate's origins and artistic representations to understand its sensory and cultural impact. Through detailed analysis of historical records—from Olmec cocoa rituals to colonial trade documents—the study mapped how chocolate's material culture has carried layered meanings across civilizations.

The focus then shifted to contemporary chocolate art installations, examining works such as chocolate-covered subway tiles and immersive wall displays that elevate chocolate from confection to experiential medium. These artistic interventions revealed how chocolate's material properties—its ability to melt, its aroma, and the contrast between its glossy surface and grainy melt—can inspire packaging that engages multiple senses.

This research framed chocolate not only as a historical artifact but also as a living artistic material. It proposed that packaging can serve as a narrative object, embedding cultural memory

while offering immediate sensory delight, and ultimately reimagined the chocolate wrapper as an interactive, storytelling medium.

A literature-based visual anthropology approach was used to trace chocolate's cultural and sensory significance. Historical research spanned from Olmec cocoa rituals to colonial trade, revealing chocolate's evolving symbolic meanings.

The study examined contemporary chocolate art installations, showcasing chocolate as a multi-sensory, experiential medium.

Chocolate's material properties—melting texture, aroma, and visual contrast—were explored as sources of design inspiration.

Packaging was reframed as a narrative object that conveys cultural memory and sensory engagement.

The research proposed that chocolate wrappers can become interactive storytelling media, blending history, art, and design.

History

Grown for thousands of years by the Olmec people of Mesoamerica

Consumed as a drink mixed with maize and spices, still today in Mexico + Central America

First brought to Europe by Spanish, thought of as health drink, similar to coffee

First chocolate bars not created till mid 19th century in England

Stollwerck GOLD DIE NEUE SCHOKOLADE

FRY'S CHOCOLATE CREAM

Chocolate bar made with cacao pulp chunks

Packaging colour affected the taste of chocolate for test subjects (Baptista et al., 2021)

chocolate as the unique form of edible currency (Samuels, R. (2024, July 1).)

lick and lather by J. Antoni ("Lick and Lather," 1993)

Peter Anton's Giant Chocolate Sculptures

Nendo. (n.d.). Chocolate paint 2.

Chocolate as edible tools from ancient Sicily (Tucker, 2017)

3D printing of fine Belgian chocolate in intricate shapes (Griffiths, 2020)

Edible chocolate room, invited to touch, smell, taste (Designboom, 2014)

Nendo created a chocolate bar that plays with different texture and flavour (Designboom, 2016)

Choc. truffles like jewelry in jewelry counter

wine, Shroom chocolates, weed chocolates - mixing it with mind altering substances? why?

Chocolate in a regretful eating way

Guilty chocolate - as a pleasure

chocolate in a romantic setting

chocolate for sharing vs. eating by yourself

Lamp made of chocolate that melts with heat from bulb (Treggiden, 2014)

Chocolate that can be arranged to spell words, creating messages on box as choc melts at low melting point (Catrina, 2010)

Wall tiles inspired by chocolate bars (Wong, 2016)

M&M grabbable playful vs. chocolate truffles you can feed someone

What makes a chocolate feel "sexual" versus guilty vs cheer up / for kids

What shape would each of these ideas be represented by?

Smells

Sensory experiences

Texture

Creating experience

Storytelling

Multi-sensorial experience

Chocolate as spicy/savory vs. European sweet

why is high quality chocolate connected with Europe i.e. Switzerland vs. where they come from (Central and South America)

The 9 different types of chocolate are made within the same size, 26x26x26mm, featuring pointed tips, hollow interiors, smooth or rough surface textures—and, while the raw materials are identical, the distinctive textures create different tastes.

Each chocolate is directly named after Japanese expressions used to describe texture.

1. "tubu-tubu" Chunks of smaller chocolate drops.
2. "sube-sube" Smooth edges and corners.
3. "zara-zara" Granular like a file.
4. "toge-toge" Sharp pointed tips.
5. "goro-goro" Fourteen connected small cubes.
6. "fuwa-fuwa" Soft and airy with many tiny holes.
7. "poki-poki" A cube frame made of chocolate sticks.
8. "suka-suka" A hollow cube with thin walls.
9. "zaku-zaku" Alternately placed thin chocolate rods forming a cube.

Local Chocolatier Breakdown

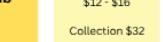
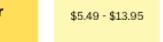
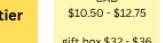
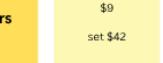
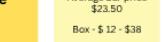
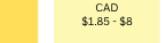
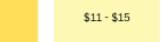
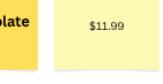
Marketing Research

The potential target audiences we identified are local chocolatiers who offer high-quality chocolates but lack the same level of quality packaging design.

We created a breakdown list of local chocolatiers in Vancouver, as shown in Figure 1, detailing their price ranges, types of bars or shapes, current packaging, and other relevant information.

The local chocolatiers shown include:

Cocoaro Craft Chocolate
The Chocolate Project
Crimp and Crumb Chocolates
Koko Monk Hot Chocolate Lounge
Star Choco-Bar
Drunken Chocolatier
East Van Roasters
HYPE Chocolate
Gem Chocolate
The Good Chocolateier
Thomas Haas Chocolate
Beta5
Kasama Chocolate
Chocolate Arts
Kaaj Artisan Chocolate
Living Louts.

Chocolatier	Price range	Bar	Shaped	Package	Location and contact info	Other
 Cocoaro Craft Chocolate	\$6.67 - \$9.50			Bars are hand-wrapped with handmade traditional chiyogami paper, and some are wrapped in craft paper. Paper wrapper and cardboard	538 Victoria St, New Westminster, BC V3L 1G1 (604) 499-2462	1. "In Japanese, when you have 'good kokoro', it means you have a good spirit". 2. Japanese Chiyogami (Yuzen) Papers are used in a variety of arts and crafts. 3. They host events
 The Chocolate Project	CAD \$10 - \$16 Subscription Box - \$60.00			Bars are wrapped with craft paper, cardstock paper, and paper wrappers with graphics, images, and artworks in different styles	1311 Blanchard St, Victoria, BC V8W 0B5 (250) 595-8466	1. They have classes educating chocolates 2. They also sold jams 3. They carry chocolate from different makers
 Crimp and Crumb Chocolates	CAD \$12 - \$16 Collection \$32			Paper and Cardboard + transparent windows + plastic box	(778) 879-6284	Each box will come with a best-before card as a reminder. They had an Advent calendar for Christmas.
 Koko Monk Hot Chocolate Lounge	\$5.49 - \$13.95			Plastic bags & boxes + cardboard boxes	2883 W Broadway, Vancouver, BC V6K 2G6 (604) 732-7262	*The package is very boring
 Star Choco-Bar	\$5.49 - \$13.95			Plastic bags & boxes + cardboard boxes	5651 Goring St, Burnaby, BC V5B 0A3 (604) 366-3065	can't access the website
 Drunken Chocolatier	CAD \$10.50 - \$12.75 gift box \$32 - \$36			Plastic bags & boxes + cardboard boxes	233 W Broadway #108, Vancouver, BC V5Y 1P5	They offer chocolate workshops
 East Van Roasters	\$9 set \$42			Paper box + paper wrapper	233 W 319 Carroll St, Vancouver, BC V6B 2.4 (604) 629-7562	*The package had its cohesive graphic design language, but the method used is boring
 HYPE Chocolate	\$9 Average bar price \$23.50 Box - \$12 - \$38			Bars are wrapped in plastic bags, and shaped chocolate is wrapped in a plastic box	855 E Hastings St, Vancouver, BC V6A 1R8	HYPE 1 is a silhouette of the Jordan 1 sneaker
 Gem Chocolates	CAD \$3.5 - \$16.50 Gift box \$19 - \$110			Plastic bags and paper boxes & bags	2029 W 41st Ave, Vancouver BC V6M 1Y7 (604) 263-9878	*The package is very boring
 The GOOD Chocolatier	\$9.95 - \$11.95 Gift box \$60 - \$70			Plastic bags and paper boxes & bags	1978 W Broadway, Vancouver, BC V6J 1Z2 (604) 256-5560	*The packaging graphic is sick but the method is very boring
 Thomas Haas Chocolate	CAD \$1.85 - \$8			Paper box	2539 W Broadway, Vancouver, BC V6K 2E9 (604) 736-1848 OR 998 Harbourside Dr, North Vancouver, BC V7P 3T2 (604) 924-1847	*Seems like they might be willing to pay extra for a luxury packaging design for their chocolate
 Beta5	\$11 - \$15			paper box	409 Industrial Ave, Vancouver BC V6A 2P8 (604) 669-3336	Establish in 2011
 Kasama Chocolate	\$12 - \$19.50			Paper wrapper	1244 Cartwright St #2, Vancouver, BC V6H 3H8 (236) 455-2490	*The packaging graphic is sick but the method is very boring
 Chocolate Arts Permanently Closed					1620 W 3rd Ave, Vancouver, BC V6J 1Z2 (604) 739-0475 Permanently Closed	
 KaaJ Artisan Chocolate	\$11.99			Paper wrapper	(778) 775-8767	*The packaging graphic is nice, but the method is very boring
 Living Lotus	\$11.99 - \$14.99			Paper wrapper and boxes + plastic bag	780 E Cordova St, Vancouver, BC V6A 1M3 (604) 250-0993	*The package is very boring

We first ranked them in three price ranges: low, mid, and high, as illustrated in Figure 2. Then we plotted them on the y-axis, representing price ranges, and added an x-axis labelled 'Packaging Design', as illustrated in Figure 3. However, it did not provide too much information about the potential direction.

So, we changed the y-axis to the chocolate design and ranked them again in Figure 4. The graph now shows a white space where no local chocolatiers are located. Many of them offer high-quality-looking chocolates but use basic and boring packaging, such as plastic bags.

Therefore, the potential target audiences we identified are local chocolatiers who offer high-quality chocolates but lack the same quality packaging design.



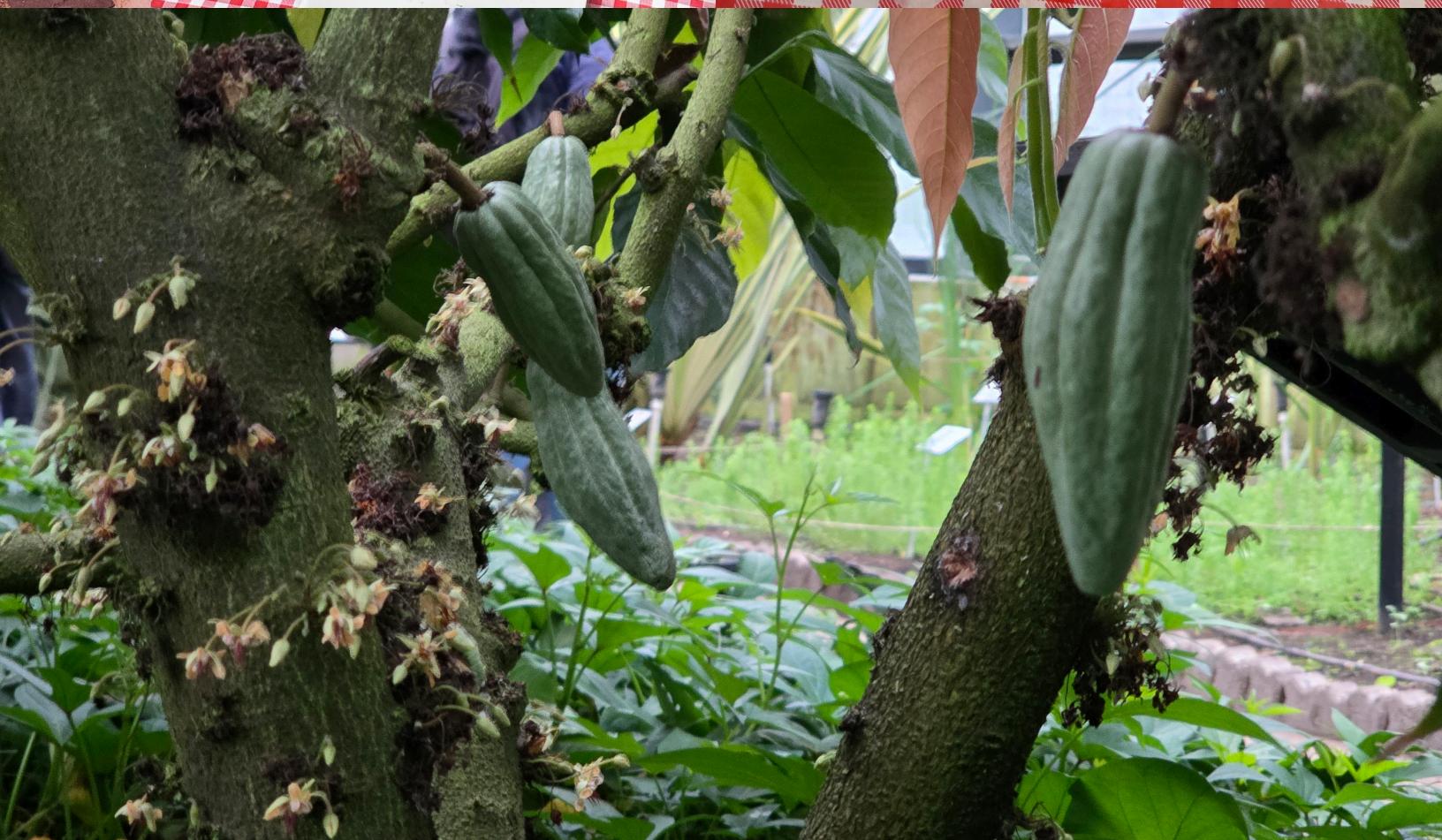
Figure 2. A chart ranking the price ranges of the local chocolatiers.



Figure 3. X-axis of price ranges and y-axis of packaging quality of the local chocolatiers.



Figure 4. X-axis of chocolate design and y-axis of packaging quality of the local chocolatiers.



PHASE 2: Primary Research

In the second phase of the project, we engaged with various stakeholders in the craft chocolate industry and consulted experts to deepen our understanding. We participated in a hands-on workshop at Cocoaro Craft Chocolate, where we learned the full process of transforming cocoa beans into chocolate bars, covering roasting, winnowing, grinding, tempering, and moulding. This practical experience gave us a foundational understanding of chocolate crafting. We also gained insights into the challenges of maintaining quality, storage, and transportation from industry experts such as Margaret Inoue, owner of Cocoaro Craft Chocolate.

Following this, we conducted a series of interviews and site visits with local craft chocolatiers in Vancouver, each offering unique perspectives. Maylayna Pincott from Hype Chocolate highlighted the importance of branding and the difficulties of transporting products through hot climates during a phone interview. Her team is actively seeking innovations for sustainable packaging. Vincent from Kasama shared, via video interview, the ongoing struggle to balance sustainable materials with shelf-life requirements. Mimi from Gem Chocolate demonstrated during an on-site visit how packaging design can significantly influence the perception of chocolate, either elevating or undermining its value.

We also held a conversation with Dr. Flavio Ruiz from the KPU Physics Department to deepen our understanding of the physics behind ideal packaging. Our discussion focused on how packaging form affects temperature regulation, protection, and transportation efficiency.

A trip to Colombia provided further connection to the origins of cocoa. During a visit to Rosa's cacao grove in the rainforest, traditional fermentation and drying methods were observed, alongside the resourceful, low-waste practices of local growers. This experience highlighted the contrast between small-scale, artisanal chocolate production and industrialized methods, reinforcing the need for innovative packaging that honours both sustainability and cultural authenticity.

The demand for packaging solutions that enable cultural and sensory storytelling, control moisture, and mitigate thermal instability is clear. Phase two marked a shift from theoretical research to a practice-driven approach, laying the groundwork for Phase three, which will explore potential solutions addressing these challenges, benefiting everyone from cocoa farmers to chocolatiers and consumers alike.

Future of Craft Chocolate

Cocaro

Hype

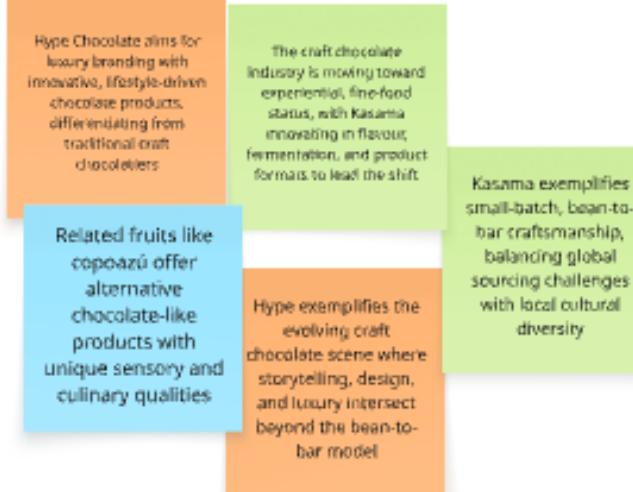
Kasama

Gem

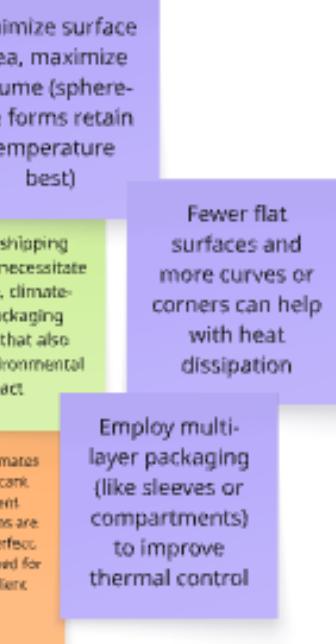
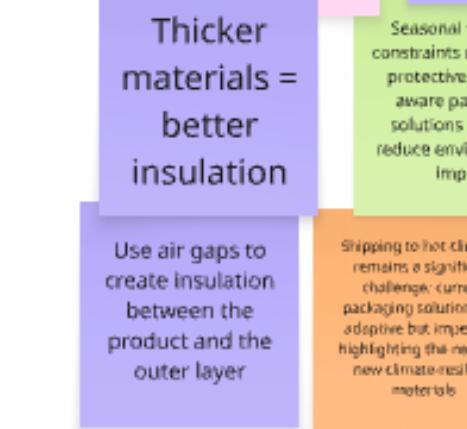
Dr. Flavio Ruiz Oliveras

Johanna's Trip

Thermal Protection



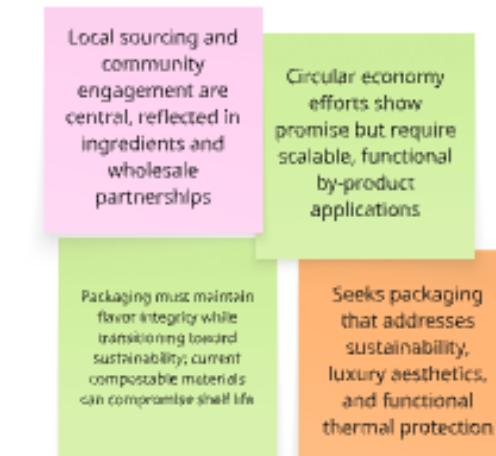
Packaging Expectations



Community Engagement

Artisanal Chocolate Making

Sustainability





Workshop and Interview with Cocoaro

We participated in an immersive workshop at Cocoaro Craft Chocolate with Margaret Inoue, where we learned the entire process of transforming cocoa beans into chocolate bars—from roasting, winnowing, grinding, tempering, to moulding. The session began with sorting raw cocoa beans, where participants learned to identify and remove imperfections that could affect the flavour quality. We then explored different roasting techniques, understanding how time and temperature influence the flavour profile, ranging from bright and fruity to deep and nutty.

While waiting for the roasting process, we engaged in guided chocolate tastings, using our five senses to compare bars with varying cocoa percentages. We learned that factors such as fermentation time, roasting methods, seasonal variations, and even storage techniques can all contribute to creating unique flavours. For example, some crafters intentionally expose chocolate to specific scents during storage to develop distinct taste notes.

The winnowing process was the most physically engaging part, where we manually separated cocoa husks from nibs and ground the nibs into a smooth paste using a stone grinder. Although machines can automate winnowing, doing it by hand gave us a direct connection to the transformation from coarse beans to glossy paste. At a certain stage, ingredients like sugar, milk powder, and vanilla are added to adjust the chocolate's grade and flavour.

This workshop offered valuable insight into the labour-intensive craftsmanship behind each chocolate bar and provided a platform to engage directly with local chocolatiers to understand their real needs. The knowledge gained enriches our ability to design packaging that honours the artistry and resources embedded in craft chocolate.



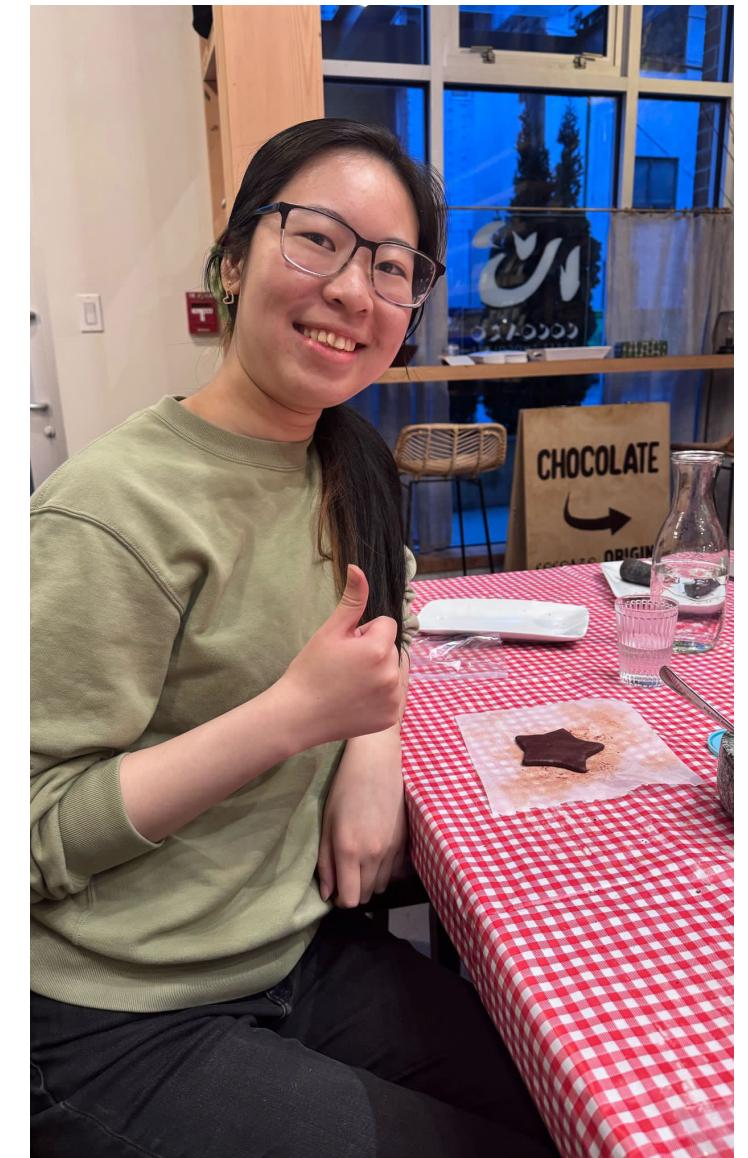
Key Takeaways:

The chocolate-making process is highly artisanal and sensitive, requiring precise control at every step to maintain quality and flavour.

Flavour profiles vary significantly based on fermentation, roasting, seasonal factors, and storage methods.

Manual processes, as winnowing, connect producers intimately with the material and impact the final product's quality.

We recognize Margaret's efforts to incorporate storytelling into packaging design; however, the small package scale and fine print limited its impact, and important factors like thermal exchange were not addressed.





Interview with Hype

Brand Overview & Packaging Challenges

Hype Chocolate is a bold, modern Vancouver-based chocolatier known for its high-end, design-forward approach. In just 2.5 years, they have collaborated with luxury brands like Louis Vuitton and Canada Goose, offering artisanal bars, custom-moulded chocolates, and hot cocoa mixes. Positioned at the intersection of food, fashion, and luxury gifting, Hype prioritizes customizable, lifestyle-oriented chocolate experiences over traditional bean-to-bar production.

Climate & Shipping Constraints

A major challenge for Hype is shipping chocolate to hot climates. Their current packaging strategy combines thermal linings, silver bubble wrap, and ice packs to mitigate heat damage while testing compostable plastic sleeves for sustainability. Despite these efforts, summer shipments remain limited in certain regions. This reflects a wider industry struggle to balance thermal protection with eco-friendly materials, making Hype particularly interested in innovative, climate-resilient packaging solutions that do not compromise luxury appeal.

Eco-Luxury Vision & Collaboration Potential

As Hype moves toward sleeker, more sustainable packaging, they seek materials and designs that align with their high-end partnerships—minimalist, giftable formats with customizable options for limited editions. Their new storefront will emphasize storytelling and retail experience, providing opportunities to explore experiential unboxing. Hype actively supports student research and experimental projects, welcoming collaboration around sustainable yet luxurious solutions. Their diverse product range - from lollipops to large corporate orders - makes them a compelling case study for packaging versatility.

Position in the Craft Chocolate World

While not strictly bean-to-bar, Hype represents a new wave of craft chocolate blending food with cultural storytelling. Their openness to material innovation and climate-smart design positions them as a forward-thinking player, ideal for projects that reimagine chocolate packaging as a multisensory, design-led experience.

Key Takeaways:

Hype Chocolate aims for luxury branding with innovative, lifestyle-driven chocolate products, differentiating from traditional craft chocolatiers.

Shipping to hot climates remains a significant challenge; current packaging solutions are adaptive but imperfect, highlighting the need for new climate-resilient materials.

The company seeks packaging that addresses sustainability, luxury aesthetics, and functional thermal protection.

Hype's openness to collaboration and support for student research presents valuable opportunities for design innovation and experimentation.

Their diverse product range and versatile packaging formats emphasize the role of packaging as both protection and experience.

Hype exemplifies the evolving craft chocolate scene where storytelling, design, and luxury intersect beyond the bean-to-bar model.



Johanna Jucutan



Kasama Chocolate



Iryna Karaush

Call with Kasama

Kasama Chocolate is a Vancouver-based bean-to-bar craft chocolate company celebrated for its award-winning bars and commitment to quality and community. Rooted in diverse cultural influences—including German, Swiss, Korean, South Asian, and Indigenous heritage—Kasama emphasizes transparent sourcing, flavor innovation, and collaborations with local chefs. Their name, meaning “together” in Tagalog, reflects their inclusive approach from bean origin to consumer.

Awards and Industry Recognition

Kasama is among the most awarded craft chocolate makers in the Americas, recognized at major international competitions for flavor complexity, tempering, aroma, and mouthfeel. Their bars are stocked by prestigious retailers and boutiques worldwide. Validation from professional judges and chocolate sommeliers has helped solidify their reputation as a top-tier craft chocolatier.

Sourcing, Sustainability & Cacao Shortage

Amid a global cacao shortage—especially in West Africa—Kasama actively diversifies suppliers and

invests in fermentation innovations, such as using champagne, banana, or papaya yeasts to develop unique flavor profiles. They produce approximately 4,000 bars per month, emphasizing small-batch quality over scale.

Packaging Challenges & Innovations

Kasama's packaging blends luxury and sustainability. Currently, bars are hand-wrapped in foil, preserving flavor and premium feel. Compostable sleeves and plastic alternatives have been trialed but negatively affect flavor after 3–4 months. Challenges include rising material costs, longer lead times, and pressure to reduce plastic. They collaborate with The Great Little Box Company to develop elegant, sustainable formats that enhance the unboxing experience with tactile bands, stickers, and foil reveals.



KASAMA [/ka-sa-ma/]

Tagalog (Filipino): *friendship, camaraderie, collaboration*



Shipping & Seasonal Logistics

Chocolate sales are seasonal, with peak shipping from September to March. Kasama uses insulated bubble wrap and reusable ice packs for wholesale shipments, balancing protection with environmental concerns. They are exploring integrated cooling solutions to improve efficiency.

Circular Economy & Shell Reuse

Kasama collects cacao shells (about 15–20% of bean weight) and supplies them for teas and papier-mâché boxes. Scaling reuse is labour-intensive, and the team is seeking meaningful, functional applications for byproducts that avoid “gimmick” approaches.

Consumer Experience & Education

Their vegan, dairy-free strawberry bar is a best-seller, appealing broadly. Other favorites include bars infused with whiskey or rum-soaked nibs and regionally inspired packaging that resonates with tourists and locals alike. Kasama has noted changing consumer habits, with some savoring chocolate and others consuming quickly. While direct education at markets has decreased, the company is considering packaging and storytelling as tools to guide consumer appreciation and proper tasting.

Industry Trends & Future Directions

Kasama sees craft chocolate increasingly aligned with fine wine and craft beer, moving beyond the candy category. Plans include launching 4–5 new flavors yearly, deeper fermentation experiments, expanding collaborations, and exploring new product formats such as sauces or culinary inclusions. Education and storytelling remain central to growing appreciation for craft chocolate, particularly in the Canadian market.

Key Takeaways:

Kasama exemplifies small-batch, bean-to-bar craftsmanship, balancing global sourcing challenges with local cultural diversity.

Packaging must maintain flavor integrity while transitioning toward sustainability; current compostable materials can compromise shelf life.

Seasonal shipping constraints necessitate protective, climate-aware packaging solutions that also reduce environmental impact.

Circular economy efforts show promise but require scalable, functional by-product applications.

Consumer education is evolving; packaging storytelling is a vital tool for guiding refined chocolate experiences.

The craft chocolate industry is moving toward experiential, fine-food status, with Kasama innovating in flavor, fermentation, and product formats to lead the shift.



Gem Chocolates Interview

Shipping Challenges & Seasonal Limitations

Gem Chocolates faces difficulties shipping their chocolate bark due to its irregular shapes. Operating from a small 525-square-foot retail space, they see strong potential to expand their ecommerce business across Canada. However, summer shipping—especially in July and August—is challenging because the chocolate melts. When shipping is possible, they rely on insulated packaging with ice packs, cardboard boxes, and scrunched paper for cushioning. Customer complaints about the lack of clear communication on summer shipping pauses led them to improve their website's user experience, ensuring customers are informed before checkout.

Packaging Preferences & Presentation Goals

Gem aims for packaging that is more presentable and giftable, with most products priced between \$36 and \$72. Currently, cellophane packaging is used but is seen as generic and not durable enough for shipping. Flat-packed packaging offers cost advantages and can be assembled in-store, while preassembled larger boxes provide a premium feel but at higher cost.



They balance cost and aesthetics carefully, preferring locally sourced magnetic boxes from Montreal (\$9 each) over cheaper alternatives from China, aligning with their ethical sourcing goals.

Branding & Aesthetics

Gem's signature Tiffany blue color is a strong brand identifier, comparable to Purdy's purple. Yet, customers often prefer white packaging to better highlight the chocolate. The company is exploring themed sleeves inspired by regional flavors and cultural heritage, such as vibrant Asian red boxes, to add variety and storytelling.

Accessibility & Inclusive Values

Inclusive hiring, particularly for differently abled individuals, is a core value. Packaging assembly is designed to be repetitive and manageable for varying motor abilities. They avoid complex elements like twist-tie ribbons, which are costly and require large minimum orders, in favor of simpler, user-friendly solutions.

Sourcing & Community Commitment

Gem sources high-quality chocolate wafers from Colombia, crafted by Swiss chocolatiers, and incorporates local ingredients like berries to support community economies. They maintain wholesale relationships, including monitoring warehouse conditions to protect product quality during shipping.

Customer Base & Shelf Life

About 80% of Gem's customers are local and value supporting small businesses. Their bonbons have a shelf life of four to six weeks, while caramels last up to six months, supporting both retail and wholesale distribution.



Key Takeaways:

Shipping irregularly shaped chocolate bark, especially in summer, remains a major challenge requiring effective insulation and clear customer communication.

Packaging needs to be durable, giftable, and cost-effective, with a preference for locally sourced materials that align with ethical sourcing values.

Strong brand identity is tied to signature colours but evolving packaging aesthetics (e.g., white backgrounds, themed sleeves) enhance product visibility and storytelling.

Inclusive hiring informs packaging design—simplicity and ease of assembly are prioritized to support workers with different abilities.

Local sourcing and community engagement are central, reflected in ingredients and wholesale partnerships.

Shelf life varies by product type, guiding packaging and distribution strategies for both retail and wholesale markets.

The Physics of Packaging with Flavio Ruiz

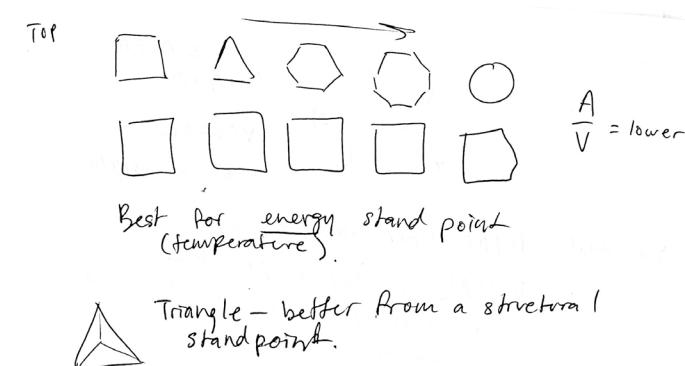
B.Sc. (UMR), M.Sc., Ph.D. (CIO)

From a physics perspective, this phase examines how the shape, structure, and materials of packaging impact chocolate products during storage and transportation. By understanding how heat moves, how materials insulate, and how physical forces like pressure and impact affect the product, we can design smarter packaging that keeps chocolate fresher, safer, and more stable, especially in changing temperatures or long-distance shipping.

We interviewed Dr. Flavio Ruiz Oliveras to understand how physics can inform packaging design, particularly the relationship between shape, temperature, and transport stability. His insights helped us think beyond aesthetics and consider how packaging can physically protect chocolate from heat and environmental stress.

From a thermal efficiency standpoint, the ideal packaging shape minimizes surface area while maximizing internal volume, because surface area is where heat is transferred. The closer the shape is to a sphere, the better it is at maintaining a stable internal temperature. In contrast, boxes with sharp angles and large flat surfaces lose heat more easily.

Interestingly, adding corners can help by directing heat outward, especially when paired with insulating materials. Dr. Ruiz also pointed out that air is one of the best natural insulators, so leaving space between the chocolate and the outer package can help regulate temperature. For example, a two-layer system—like how a coffee cup uses a sleeve, or how bubble wrap creates pockets of air—can greatly reduce heat transfer from hands or the environment.



He also explained that thicker wrapping materials slow down heat transfer, and that multilayered or “nested” packaging—using second- or even third-tier containers—can significantly reduce the risk of melting during transportation.

Key Takeaways for Packaging Design from a Physics Perspective:

Minimize surface area, maximize volume (sphere-like forms retain temperature best)

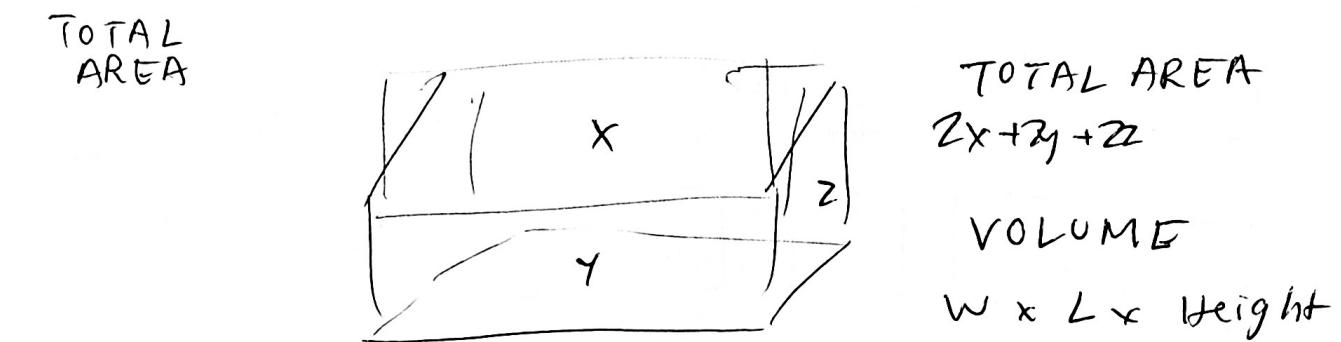
Fewer flat surfaces and more curves or corners can help with heat dissipation

Use air gaps to create insulation between the product and the outer layer

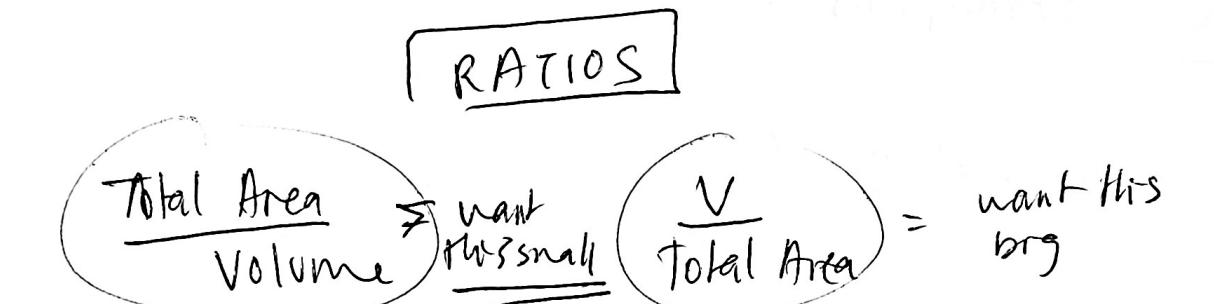
Employ multi-layer packaging (like sleeves or compartments) to improve thermal control

Thicker materials = better insulation

By applying these principles, we can design chocolate packaging that is not only sustainable and beautiful but also scientifically optimized for protection.



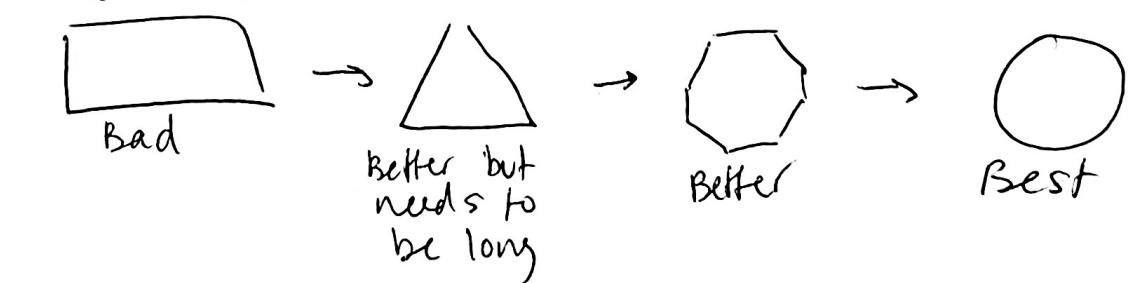
You want **TOTAL AREA** small as possible
VOLUME as big as possible
 The bigger the mass you can put in there.



The closer you are the sphere - the best.

The closer to a brick the worst.

(Granted these are all the same height)





Catalytic Experience Trip to Colombia

The researcher began by visiting the botanical gardens, where they saw cacao pods for the first time. Subsequently, they stayed for ten days at Calanoa Lodge in southern Colombia, near the borders of Peru and Brazil. Each morning, the group enjoyed drinking chocolate made from unsweetened, dried cocoa powder, traditionally whisked with a wooden molinillo, enhancing the rich and complex flavors.

During the trip, the researcher met Rosita, a nature guide from a neighboring community, who showed them her cacao garden. It was fascinating to observe the large cacao pods growing abundantly on the trees. Rosita demonstrated how she cracked open a cacao pod by smashing it against a tree trunk, splitting it into perfect vertical halves, and inviting the group to taste the sweet and tangy pulp surrounding the cocoa beans.

These seeds are typically fermented and dried in the sun during chocolate production. In this case, the vibrant yellow and red shells were used as makeshift cups after spitting out the seeds.

An interview with Rosita, translated by KPU instructor Fabricio Telo, provided insight into the traditional cacao processing methods. The seeds are first cleaned on a flat surface, then transferred into containers to ferment for two days before being sun-dried for approximately five days. Rosita emphasized the difficulty of this process in the rainforest, particularly during rainy periods, and stressed that skipping the drying step results in poor flavor development, as roasting alone produces bitterness. Once toasted, the beans become easier to open, allowing the papery outer shell to be removed, and the inner seeds are ground into chocolate.



This account aligned with previous learning at a workshop held at Cocoaro, led by owner Margaret Inoue, where it was explained that grinding causes the cocoa butter and solids to blend into the smooth consistency characteristic of chocolate bars.

The researcher also explored the cultural role of drinking chocolate in Rosita's Tikuna community. Unlike some ancient Mesoamerican cultures where drinking chocolate was ceremonial, here it is primarily enjoyed for its taste. Sacred or ceremonial drinks in the community are instead made from yuca.

Further conversations with Diego Samper, host at Calanoa, introduced related *Theobroma* family fruits, particularly copoazú (*Theobroma grandiflorum*), which was growing on the property and often served as juice. Copoazú seeds can be used to make cupulate, a product common in Brazil, which is butterier and naturally sweeter than cocoa, with a texture and color similar to milk chocolate but without milk.

Key Takeaways:
Experiencing cacao cultivation and processing firsthand underscores the importance of traditional methods—especially fermentation and drying—in developing chocolate's nuanced flavours.

The rainforest environment presents challenges, such as humidity and rain, that complicate essential drying steps critical for quality chocolate.

Cultural practices influence the consumption and significance of chocolate, with some communities valuing drinking chocolate primarily for taste rather than ceremony.

Related fruits like copoazú offer alternative chocolate-like products with unique sensory and culinary qualities.

Direct engagement with growers and hands-on workshops deepen understanding of the craftsmanship and labour behind chocolate production, informing more authentic and respectful design approaches.



PHASE 3: Moodboards and Inspiration

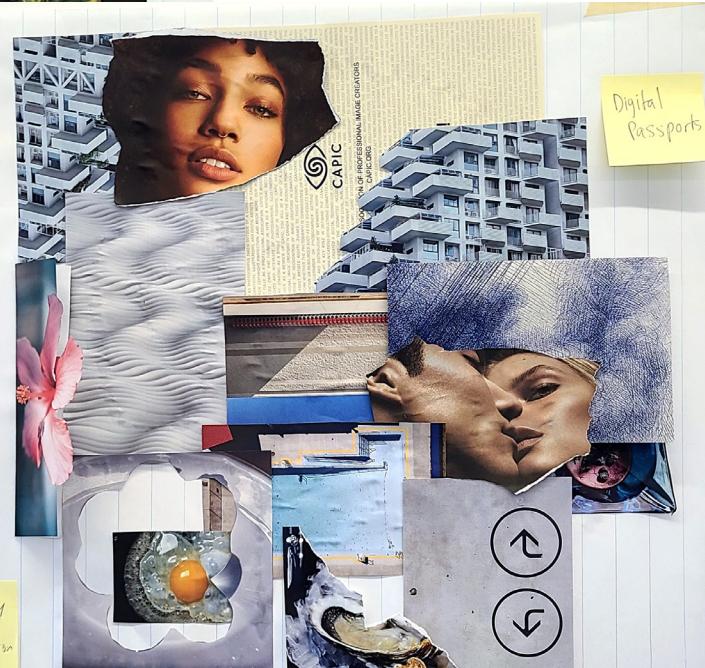


Moodboard 1: Nature & Organic Forms

Focused on natural textures, transparency, and organic shapes that evoke growth, openness, and connection to the environment. Keywords: Pain, nature, organic, growth, window, see-through, texture, openness, repetition.

Moodboard 2: Lightness & Connection

Focused on light blue tones and flowing, interlocking forms to express movement, connection, and softness. Keywords: Tech, track, love, layers, flowy, crossover, connection, interlocking, touch.



To guide our packaging design, we translated key themes from our research—texture, color, smell, and taste—into visual references. Our goal was to explore how these sensory elements could inform materials, form, and graphic direction.

We collected a wide range of images and, during a team meeting, created six physical moodboards, each reflecting a different sensory or emotional theme. This helped us visualize connections and refine the direction of our design.



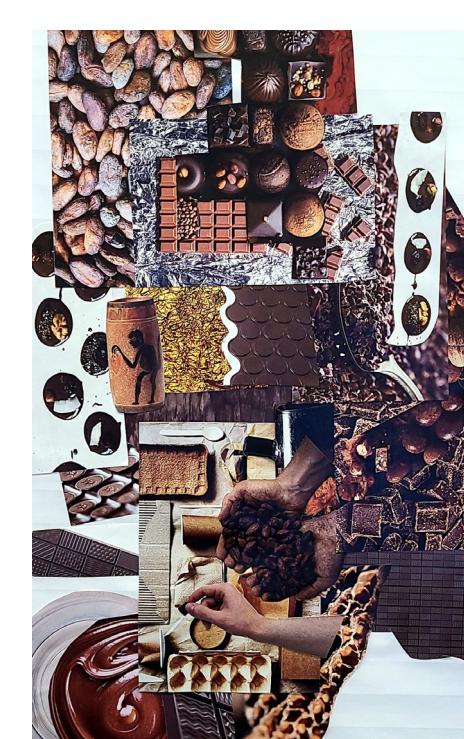
Moodboard 3: Silky Texture of Chocolate

Explored softness, flow, and layered materials inspired by the tactile feel of chocolate. Keywords: Soft, fabric, weave, ocean, glass, layers, smoke, crystal, clay, movement, flow.



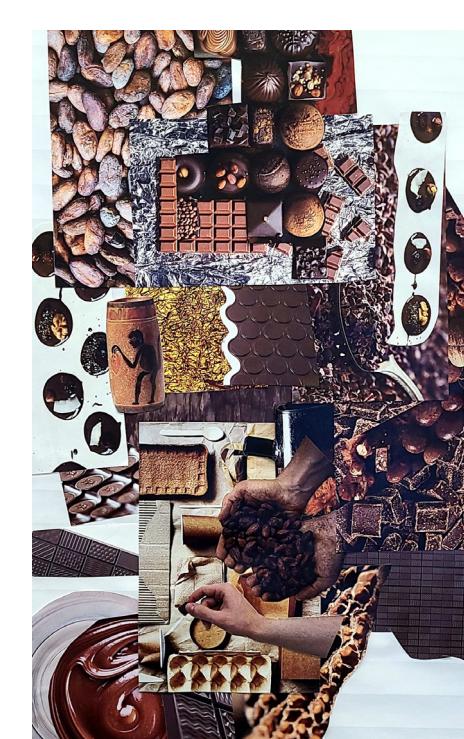
Moodboard 4: Bold Color & Craft

Featured vibrant colors like yellow, orange, blue, and black, paired with cultural and handmade references. Keywords: Basketball, croissant, old money, rich, newspaper, handmade, history.



Moodboard 5: Cocoa & Earthiness

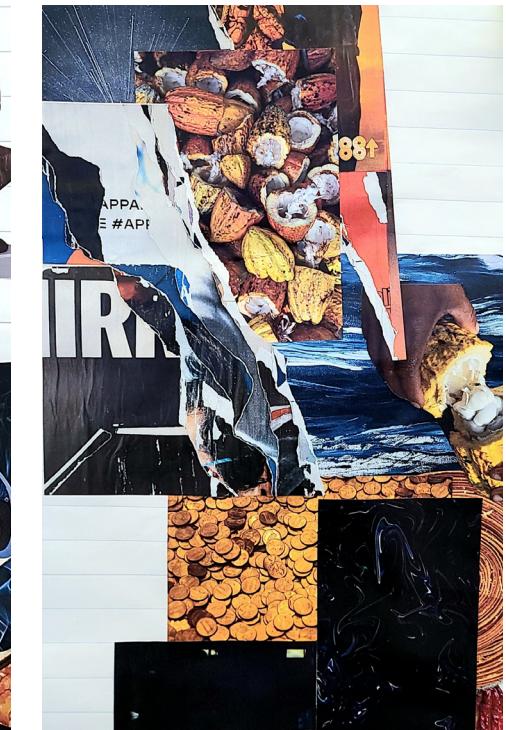
Grounded in chocolate's origins, with earthy tones, cocoa imagery, and textures that evoke craft and authenticity. Keywords: Earthy, bitter, origin, craft, tiles, puzzle.



Moodboard 6: Repetition & Pattern

Explored structured, repetitive patterns and tactile surfaces with cool, dark tones. Keywords: Tiles, interlocking, touch, cold, dark, wet.

This process helped us translate abstract ideas into visual cues, laying the foundation for our packaging design in terms of materiality, structure, and user experience.

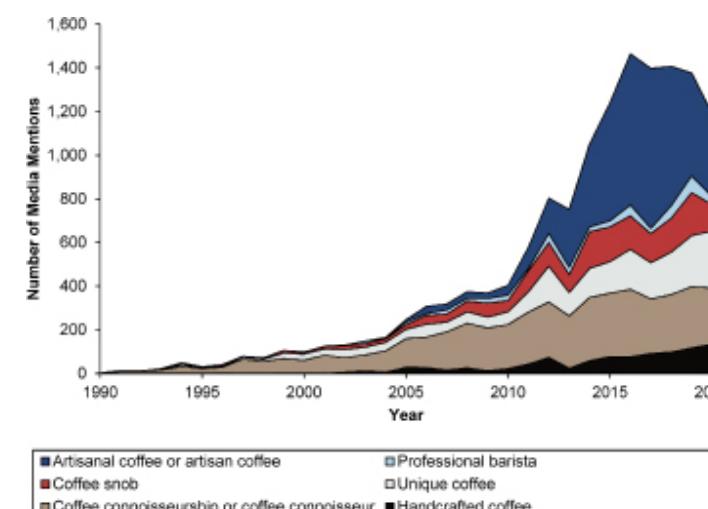


Sensorial and Ritual Experience

Food packaging is a critical aspect of the modern world that many of us take for granted. It is something we interact with daily and shapes the way we perceive and interact with the food we consume. The aim of this research is to understand the functions of chocolate packaging and reinterpret it in a way that better connects with the product it is designed to protect.

Chocolate has been consumed for thousands of years by indigenous peoples in what is today Central and South America (Lanaud et al., 2024). It has been viewed as an aphrodisiac, “the food of the gods” (Lanaud et al., 2024), or even a form of currency (Samuels, 2024). Because of its taste, perceived healing powers, and high status it has been revered by humans and a central part of many civilizations. Today however, chocolate has

Figure 1.



Note. Evolution of craft meanings in the coffee market, 1990–2020. Reprinted from A practice perspective on market evolution: How craft and commercial coffee firms expand practices and develop markets. Journal of Marketing, by Dolbec et al., 2022.

been colonized and spread across the world to produce cheaply manufactured treats that hardly resemble the origins of this beloved food. This project hopes to honour the origins of chocolate and reintroduce it as a product to be respected and savoured.

Figure 2.



Note. A Lamp Made of Chocolate: La Lumière au Chocolat by Alexander Lervik. Reprinted from Design Milk, by Treggiden, 2014.

Over the past couple decades there has been a massive surge of interest in craft or local products such as beer, produce, and coffee (Dolbec et al., 2022). Consumers value the quality and knowledge of where their food comes from and are willing to pay a premium for this. This is apparent in the coffee industry where individuals expect to know the origin of their beans and where it was roasted. This phenomenon has happened in the artisanal chocolate market but not to the same degree as coffee; it seems consumers do not place the same value on high quality chocolate as they do coffee. This seemingly leaves space in the market to foster an interest

in chocolate as it shares many characteristics and production processes with coffee. A major question of this research is how can we change consumers perception of craft chocolate and create a better relationship between the consumer and artisanal chocolate.

Thanks to the properties of chocolate, it can be molded, carved, or shaped in endless ways to create intriguing or creative designs that reflect the artist's intentions.

Alexander Lervik used the materiel to create a lamp that melts under the heat of a bulb (Treggiden, 2014) while Barry Callebaut 3D printed complex forms made of chocolate that would be impossible to create by hand (Griffiths, 2020). These examples represent the use of chocolate not as a food, but as a symbol of luxury, opulence, and sensuality. This speaks to the power of chocolate and the ways in which it can be manipulated to increase its perceived value.

The scope of this research however is to examine the packaging surrounding chocolate and influence the ways in which consumers may view it. Elevating the packaging beyond a means of protection results in an increase in the perceived value of the product and a deeper connection between the consumer and the artisanal chocolate.

Our senses (touch, smell, sound, taste, and vision) are the ways in which we interact with the greater world. These senses can bring us joy, pleasure, pain, and endless other forms of experience that connect us with those around us. As the world becomes more and more digital we lose opportunities to expose ourselves to these senses, therefore losing connection to what surrounds us. This is another problem this research is trying to address; how can we interrupt or confound the daily lives of individuals if even for just a

Figure 3.



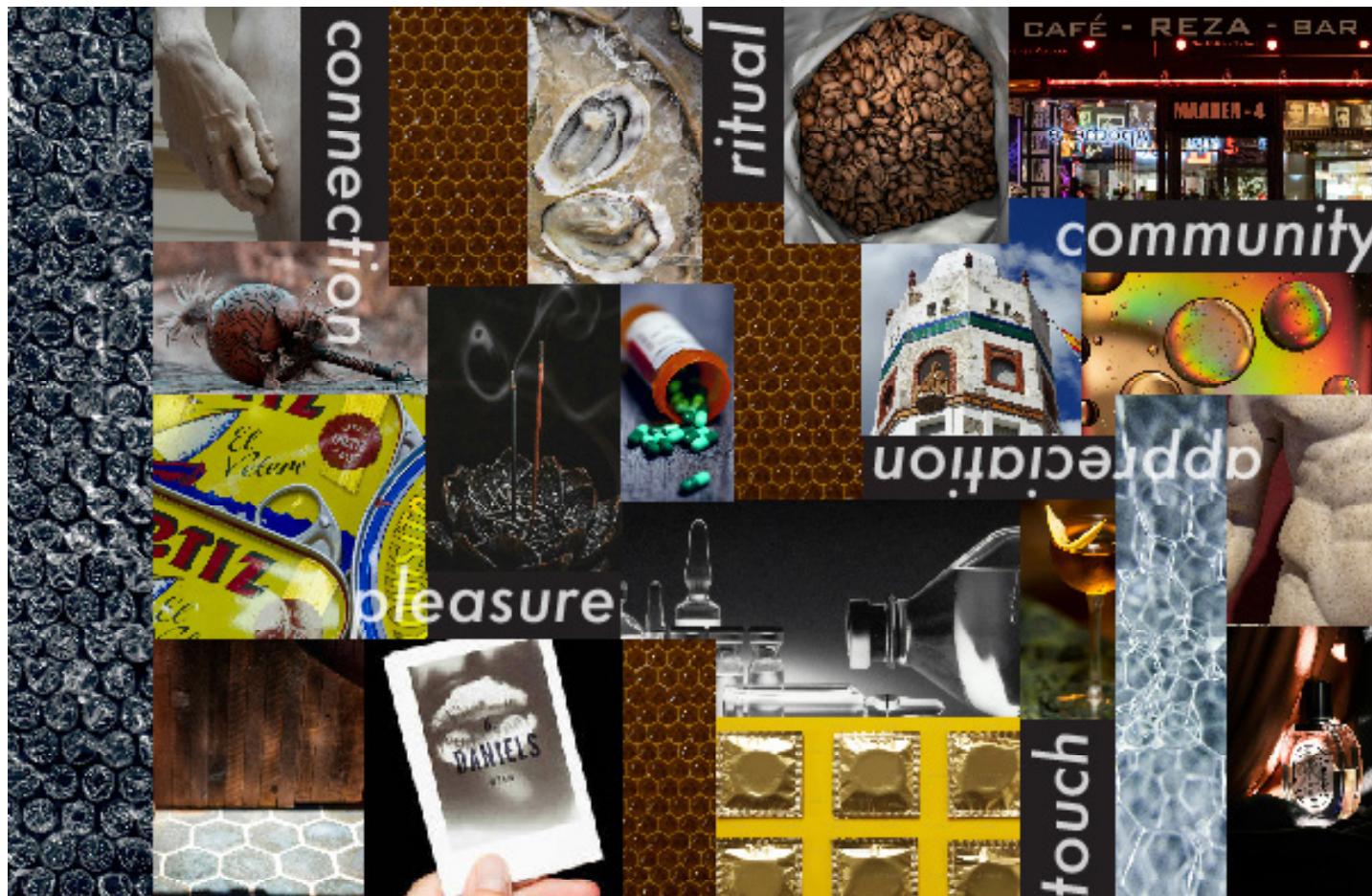
Note. Barry Callebaut 3D-prints intricate desserts in Belgian chocolate. Reprinted from Dezeen, by Griffiths, 2020.

moment. The three proposed packaging designs utilize sensory information in various ways in order to form a connection between the consumer and the product, its origins, and care needed to create it.

Packaging has become a necessity for large corporations down to small businesses. The proposed designs draw inspiration from a variety of people and industries to address the needs of craft chocolatiers and modern consumers. It represents a world where food is treasured, a product to be respected and not simply a means to consume calories.

Chocolate is the perfect metaphor for this as it is a food that has been viewed as sacred for thousands of years, even in the modern world chocolate is often treated as something to be savoured. These proposals represent the reverence given to chocolate by indigenous peoples, craft chocolatiers, and its simple ability to provide pleasure.

Moodboard & Design Language



The moodboard is a visual communication of the emotions and senses the packaging design is intended to evoke. The heavy use of black and dark colours reflects the packaging's sleek black outer presentation while the pops of yellow and oranges mimic the brightly coloured interiors. Repeating patterns and hexagonal shapes speak to the physical form of the design and its ability to be packed together. Images of human bodies communicate the sensation of touch and a feeling of intimacy while motifs of food and cafes carry the idea of slowing down to savour the moment. Medicine is another theme depicted to represent the ritual created around chocolate. Through the visual depiction of images, the moodboard brings attention to the senses and reflects the overall design language of the proposed solutions.

Concept Development



Concept Proposal



Following the research and development phase, design concepts were created to demonstrate the findings. These three concepts represent the knowledge and experience gained from the craft chocolate industry and present them in a creative way to push the boundaries of current packaging design. The proposals are titled Touch, Inhale, and Listen to reference the physical sense they are attempting to evoke. The use of the senses in these designs are intended to disarm the user and better connect them to the food product they are about to consume.

Taste is often the only sensory information associated with food but it is truly a full sensory activity that involves the five primary senses, touch, smell, sound, sight, and taste. The focus on the other senses in the proposed designs functions to redirect the user's attention and create a slower, more full bodied eating experience. Uniting all of the design concepts is the use of the black hexagonal shaped packaging featuring coloured interiors that reference the cacao pod. This shape allows the packages to fit tightly together without gaps while being more pleasant to hold and interact with compared to traditional rectangular packages. The use of this unconventional shape along with the integrated sensory feedback creates packaging that stands out from others and intrigues the consumer to slow down and connect.

Touch

The first proposed design focuses on the sensation of touch. This packaging is intended for use with small chocolates or bonbons stacked inside.

The paperboard hexagonal tube features a pushup bottom to release the chocolates one at a time from the top. The use of paperboard pushup tubes is commonly used for natural deodorants and lip balms but the use here is intended to slow the eating process and give access to the chocolates one at a time.

Figure 4.



Note. Image generated using ImagineArt from reference sketch.

Figure 5.



Inhale

Figure 6.



Figure 7.

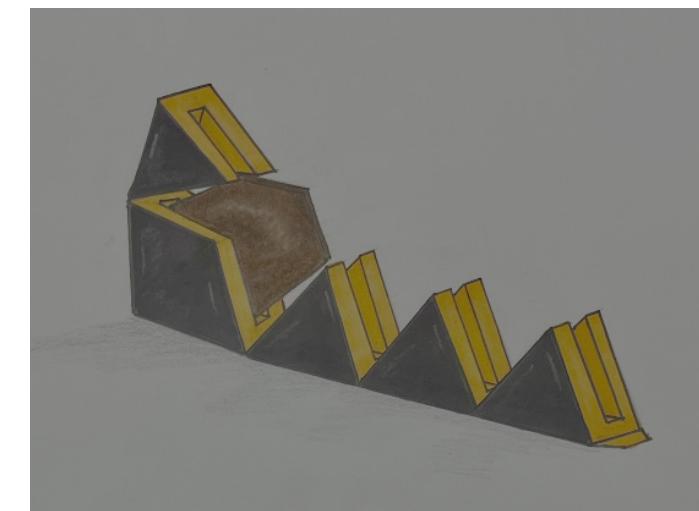


Figure 8.



The next proposed packaging design highlights the use of scent. This flatter, hexagonal package is composed of six equally sized triangles that unroll to reveal a chocolate bar inside. The opening process of the packaging allows it to become an experience, presenting the chocolate like a gift inside. The internal faces of the triangular segments will feature fragrance that has been micro-encapsulated that will be released as the package is opened and the surfaces are exposed. Different aromas could be used depending on the intention of the chocolatier. The smell of the rainforest could evoke the origins of the beans while the scent of lemons or coffee could influence the flavour profile of the chocolate itself.

The use of scent has endless possibilities and functions to draw user attention and influence their experience according to the desires of the artisan.

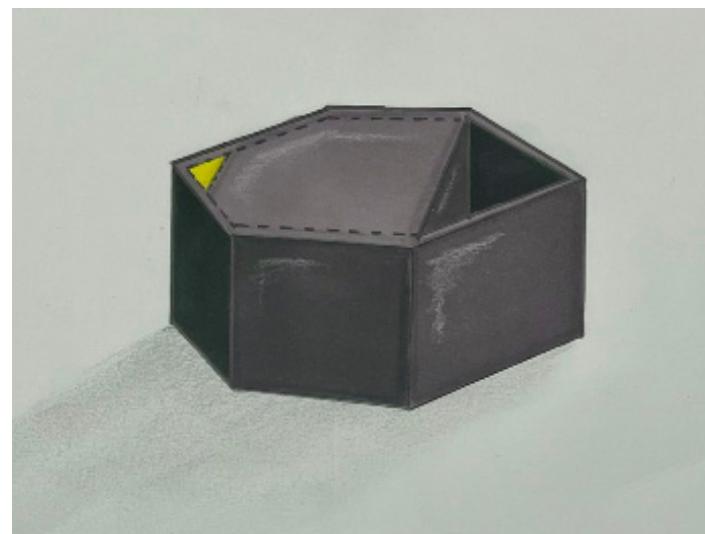
Listen

The final proposed packaging solution draws attention to its sound. It is created for the packaging of cacao nibs, a healthy food made from the cacao bean that has grown in popularity over recent years. The paperboard package has a perforated opening on the top and a handle segment. This handle encourages consumers to pick the product up and interact with it. Inspired by maracas used by indigenous groups in South America, this design can be shaken to hear the cacao nibs rattle inside.

The shape of this packaging acts as an invitation to be interacted with and listen to the sounds its contents produce.

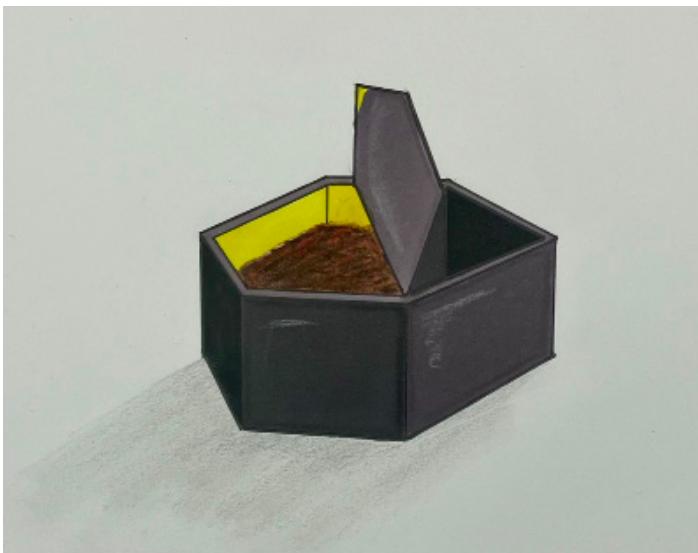
The proposed designs utilize all of our senses to influence the consumer. The first portrays touch, the second smell, the third sound, and all feature visually cohesive design to elevate the taste of chocolate. These solutions aim to reimagine the use of packaging and integrate sensory information to enhance user experience. Packaging is a critical aspect of any product but

Figure 9.



especially food. The artisanal chocolate market has potential for growth and with creative packaging solution it can reinforce its value and highlight the characteristics that make it unique.

Figure 10.



Future Concepts

Future technologies will have profound affects on the packaging of tomorrow and function to better connect with consumers. The first proposed concept focusing on touch can be greatly altered if imagining these inventions. Chocolate is something that must be closely thermally regulated to prevent melting, spoilage, and fat or sugar blooms. The thermo reactive ink could help to display this warning, turning yellow to red warning about increasing temperature when touched. This functions to reinforce the concept of touch but also educate the consumer on the importance of thermal protection and provide a visual guide.

Another possible route of future exploration could be the use of multi person opening. In order to foster the ideas of community and connection the packaging could require the touch of two different individuals to be opened. Awareness and connection to those around us and the greater world is a large component of this research and a concern it hopes to address. Uses of future technologies such as this could work to achieve these goals and give a greater appreciation of the chocolate itself.

Scientific and Functional Preservation

Rationale for Design Research in Chocolate Packaging: Focus on Chocolate Protection and Environmental Impact

The global chocolate industry, valued at over USD 130 billion, is facing increasing pressure to address both product integrity and environmental sustainability. One of the critical challenges in chocolate packaging is ensuring adequate protection against temperature fluctuations, which frequently result in chocolate spoilage. Two of the most common spoilage phenomena—fat bloom and sugar bloom—occur when chocolate is exposed to inconsistent or elevated temperatures during storage or transportation. These issues not only degrade product quality and shelf appeal but also lead to significant food waste (Hodge & Rousseau, 2002).

According to recent food science studies, up to 15% of exported chocolate products are returned or discarded due to appearance or texture issues linked to bloom. This problem is especially acute in regions with hot or humid climates, where maintaining a consistent cold chain is often cost-prohibitive or infeasible. As international demand for chocolate grows in Asia, Africa, and South America, so do the logistical and thermal protection challenges associated with long-distance transport in varying climate conditions (Alpha MOS, 2017).

In parallel, the environmental cost of chocolate packaging is becoming increasingly urgent. Most premium chocolate bars use multi-layer packaging, often combining plastic, paper, and aluminum foil, with the aluminum layer serving as the primary barrier against moisture, light, and air. However, this material is difficult to separate and recycle, leading to high levels of packaging waste. Globally, the confectionery industry contributes significantly to landfill-bound flexible packaging waste, with over 100 billion wrappers discarded annually (Business Waste, 2024).

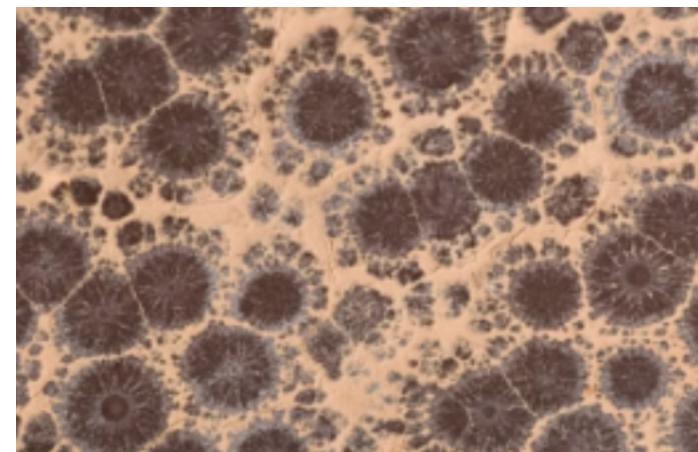


Figure 1. Chocolate bloom. (Orson Gygi, 2012)

Figure 2. Nbehmans via Getty Images iStockphoto

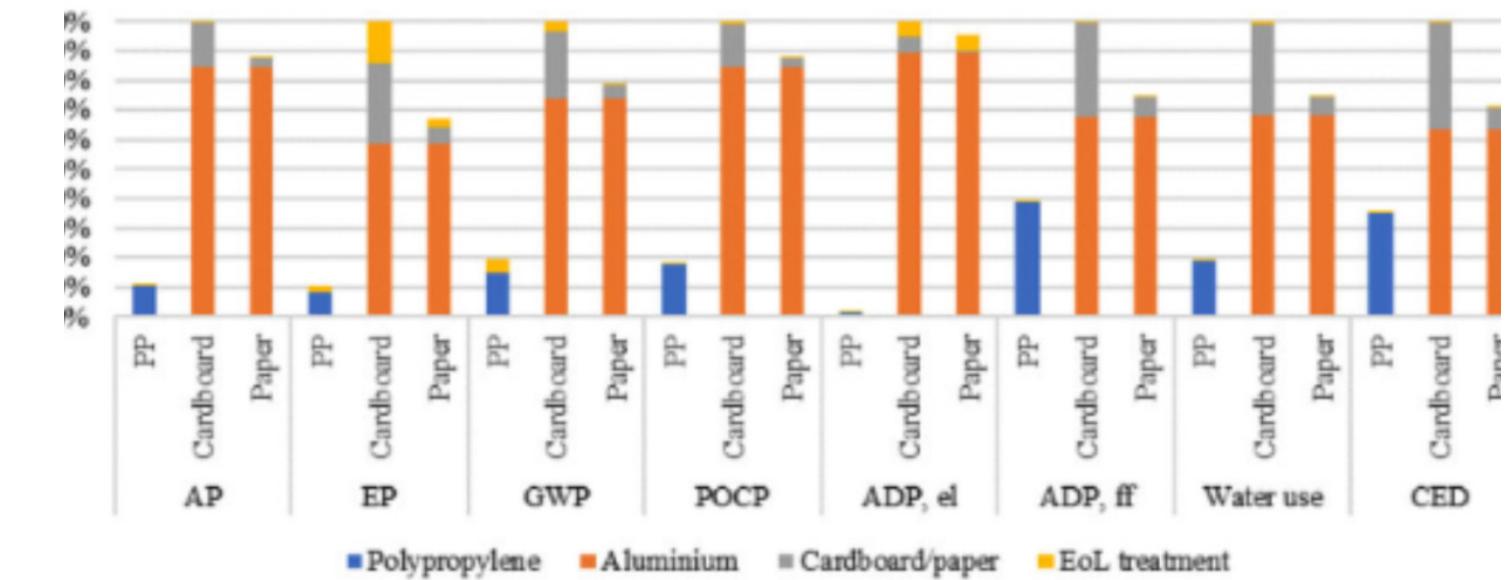


Figure 3. Environmental impact of chocolate packaging (Bianchi et al., 2021)

Compounding the problem is the rising cost and supply instability of aluminum, which is now subject to both geopolitical pressures and extraction-related environmental degradation. As of 2024, industry analysts report a 13% year-over-year increase in aluminum packaging costs, prompting manufacturers to seek alternative materials or innovative structural solutions (DeAnne Toto, 2024).

This research aims to address both challenges through a design-led investigation into next-generation chocolate packaging that provides thermal protection, moisture control, and material circularity. By examining the intersection of food science, material innovation, and experiential design, the study will explore how packaging can both protect the integrity of chocolate and red.

These global challenges related to chocolate packaging are also highly relevant to the local chocolatiers we interviewed (see Chapter: Interviews), raising questions on how to reduce its ecological footprint—without sacrificing brand identity or user experience.

Considering the growing expansion of the chocolate market, we can expect a corresponding increase in packaging waste and environmental concerns. This design research aims to explore innovative materials, forms, and technologies to mitigate temperature fluctuations and prevent product breakage.

How might we leverage innovative materials, forms, and technologies to create sustainable chocolate packaging that can protect against heat damage and physical breakage?

Functional Hierarchy



Figure 4. Functional Hierarchy

At the foundational levels of the pyramid, representing primary design needs, are Protection Against Breakage and Protection Against Heat. These are the overarching goals for the smart packaging.

Building upon these foundations, the next levels of the pyramid would detail the methods and features to achieve these protections. These include:

Material Selection: This involves choosing materials that inherently resist impact (for breakage) and insulation or heat reflection (for heat). Examples include durable plastics, shock-absorbing foams, and heat-reflective coatings. Also, exploring the possibility to integrate by-product materials e.g. coco beans husks.

Structural Design: This level focuses on the physical construction of the packaging to enhance its protective capabilities. This could involve reinforced corners, internal bracing, and design

elements that distribute impact forces or create air gaps for insulation.

Smart Features: This top level of the pyramid incorporates technology to actively monitor and mitigate risks. This includes integrating temperature sensors to track heat exposure, impact indicators to detect mishandling, and RFID tags for tracking and data logging, which can provide real-time information on environmental conditions during transit.

Each of these levels contributes to the overall goal of ensuring product integrity by preventing damage from heat and breakage. The pyramid structure emphasizes that material and structural considerations form the base upon which smart technologies can be effectively integrated to provide comprehensive protection.

Design Language

Concept Exploration One: Inspiration

The initial structural concept was based on a rectangular form, allowing the chocolate to be packaged in a simple rectangular pyramid shape. This shape is easy to construct by folding hard stock paper or materials incorporating cocoa bean by-products, such as husks. In the third round of iterations, thermal sensors were integrated to indicate temperature changes. These visual explorations were developed in the Bauhaus style, characterized by clean lines and pure colours.

Structural variations. Brainstorming with Gemini AI



Figure 5-6. Rectangular pyramid shape - exploring package opening to prevent spillage



Figure 7-8. Circular Economy: searching for new materiality, -using a bio ingredient, coco beans husks mixed into cardboard (coco bean husks is a by-product and works as thermal insulator



Figure 8-10. Exploring round shape to reduce thermal exchange.



Figure 11-13. Smart Features: exploring integration of thermal sensors that are to indicate temperature fluctuations of surrounding climate environment

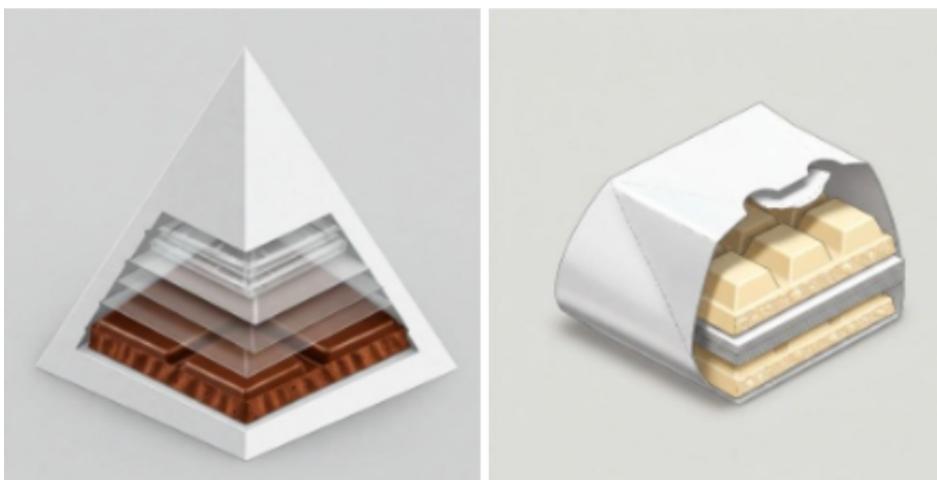


Figure 14-15. Rethinking structural layers, substituting conventional aluminium foil to biofilm (biodegradable materials) and corrugated cardboard to prevent breakage.

Physical Prototyping



Figure 16-18. Physical prototype of rectangular pyramid shapes

Concept Exploration Two

Searching for hexagon structure to achieve a minimum thermal exchange thus prevent chocolate bloom.

Inspiration & Mood board (Brainstorming with Gemini AI)

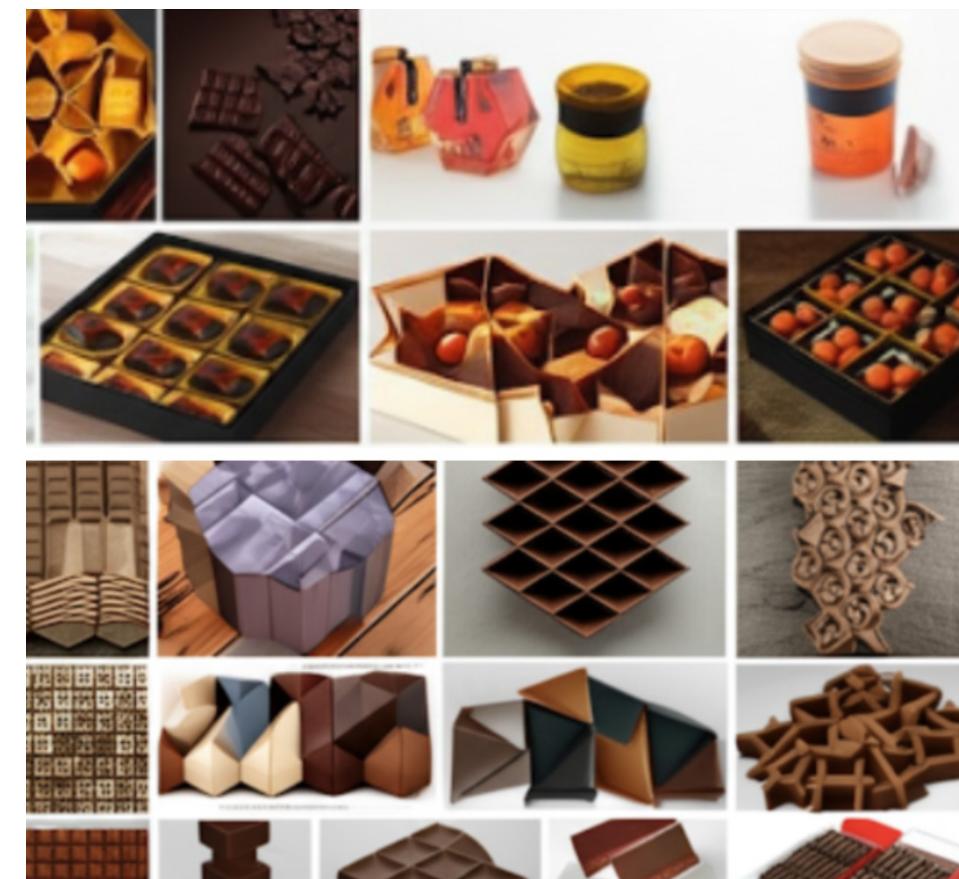


Figure 19. Inspirations

Iterations Series: Exploring Roundness and Visibility

This series of packaging iterations explores unique structural forms combined with transparent elements to showcase the chocolate inside. Figure 20 presents two joined cylinders with a front-facing window. Figure 21 introduces an arched form with a similar transparent feature. Figure 22 resembles a tall milk carton with multiple see-through panels, emphasizing both height and product visibility.



Figure 20-22. Explorations of unique structural forms combined with transparent elements

To explore shapes besides a box with a see-through window, allowing consumers to see what they are purchasing. Figure 21, with the arch, opens up ideas for the potential of different chocolate packaging shapes that can be stacked on top of each other. There was a concern about how the see-through window would not protect the chocolate from light. But ideas of different materials and colours of the see-through window can be tested to preserve the craft chocolate from light. For example, Roetell (2020) suggested that amber, cobalt, and green colours for bottles and jars can protect light-sensitive products. Things like UV/blue light protection from glasses can also be considered.

Iteration Phase: Stackable and Modular Packaging Concepts

This phase explores stackable and modular packaging systems designed to protect and showcase the chocolate.



Figure 23-25. Explorations of stackable and modular packaging systems

To explore the stackability of the packaging, inspired by Figure 21. However, the shape was not as interesting. These images prompt me to consider whether to design chocolate packaging for both bars and shaped chocolates, or just for one of them. The colour scheme of Figure 24 reminded me of food packaging for children. It consists of playful colours, which prompted me to use colour to show the temperature or condition of the chocolate.

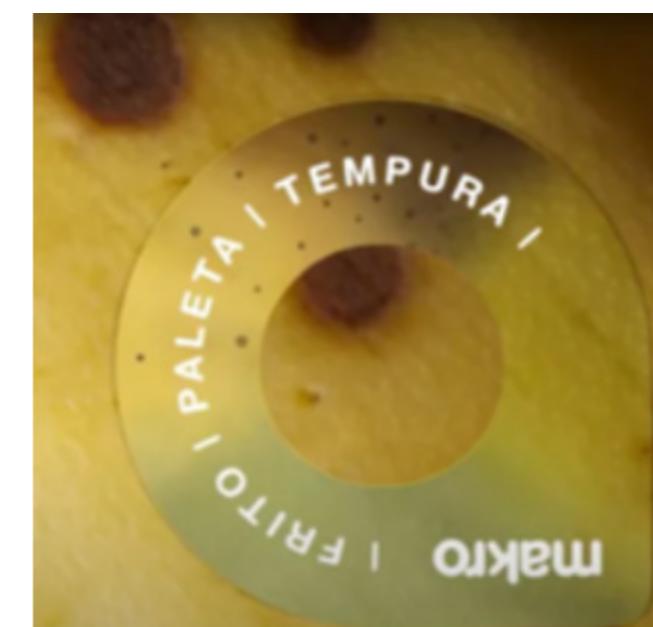


Figure 26. Rip Sticker by Makro/Grey Columbia

This concept is like a “Ripe Check” sticker, Figure 26, found on produce, which helps consumers determine the ripeness of the fruit. We can perhaps expand this idea to the chocolate package to indicate the environmental changes that occur during shelf life and transportation. Plus, ways to bring the condition back to normal to maintain the quality of the chocolate.

Iteration Phase: Experimental Forms and Smart Temperature Indicators

This set of iterations explores unconventional shapes and smart packaging features.



Figure 27-29. Explorations of geometric shapes and sustainable materials

Iteration Phase: Material Exploration and Familiar Forms



Figure 30-32. Explorations of geometric shapes and sustainable materials

To explore more about thermal indication, fun shapes, and new materials. Figure 32 further prompts the idea of working with cocoa husks, which the team have explored. Figure 27 inspired me to work with more angular forms to create organic shapes. For example, starting with a sphere, the shape that is better at maintaining a stable internal temperature, suggested by Dr. Ruiz, then adding corners to the shape.

Inspiration from design



Figure 33. Haxgon Honey, designed by Maks Arbuzov
Figure 34. Honey packaging designed by Studio Unbound

The Hexagon Honey, designed by Maks Arbuzov, caught my attention. The hexagon shape offered the feature of stackability. The honey packaging, designed by Studio Unbound, inspired to combine various materials, moving away from a conventional perception of the relationship between content and container, such as reversing and confusing, yet intriguing.

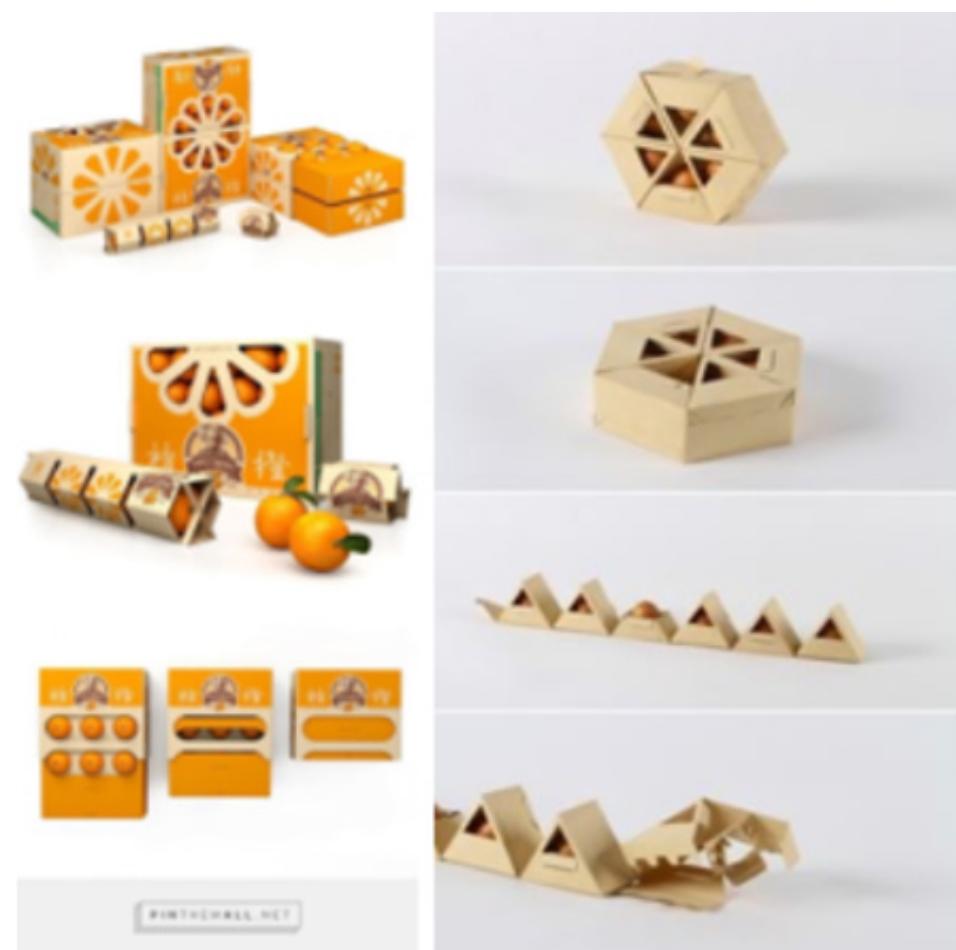


Figure 35. Chucheng Oranges, designed by Tigerpan
Figure 36. Hex-Egg-On, designed by Gil Rodrigues

Continuing the exploration of the hexagonal shape, which is easy to fold and recycle, and modify the scale and proportions. The inspiration derives from the separation of the orange into different sections using the packaging itself from Chucheng Oranges, designed by Tigerpan. The Hex-Egg-On, designed by Gil Rodrigues, was another inspiring project that utilized no glue or other adhesives, except for the packaging itself. Both package designs provide protection for the product using cardboard paper with different folding methods, which is cheap but still effective.



Figure 37. Plastic-free, biodegradable, and recyclable folding paper spoons by EcoTensil

Figure 38. The 'Monchi' snack box, designed by the A Nus Design Studio

The plastic-free, biodegradable, and recyclable folding paper spoons by EcoTensil and the 'Monchi' snack box, designed by the A Nus Design Studio, inspired ideas, such as adding tools to separate the chocolate into pieces for sharing, and utilizing the packaging to create pick up tools to avoid getting your hand dirty. These are interactive ideas to encourage consumers to connect with the packages and recycle them correctly.

Based on the gathered inspiration, the next concept features a hexagonal shape with a transparent surface, incorporating individual slots to protect each piece of chocolate and a built-in cut-out tool for handling the chocolate without direct contact. These ideas were sketched to further develop the concept and explore additional design possibilities.

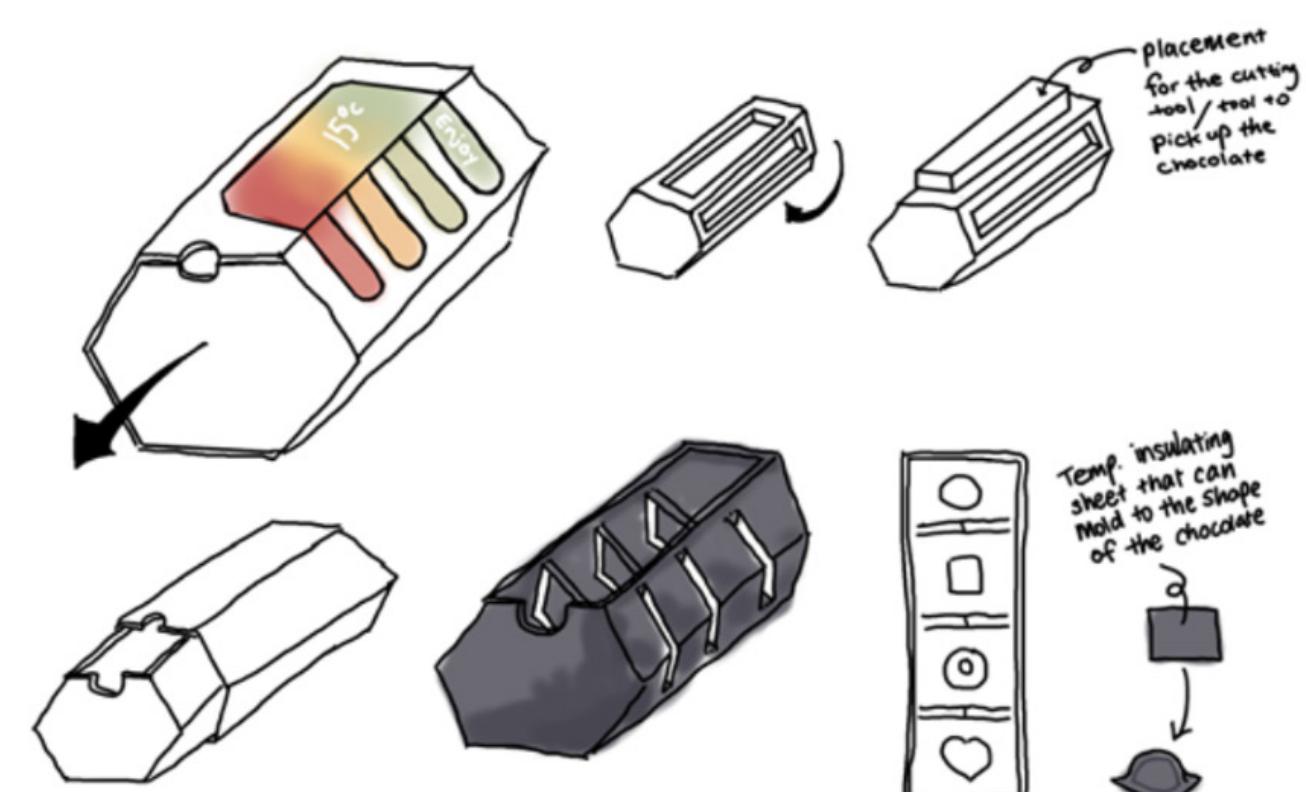


Figure 39. Idea exploration sketches

Ideas above include, first, a visual indication of the temperature display on the packaging. Second, an extra structure to further strengthen the structure of the extruded hexagonal shape. Third, extrude some surface instead of cutting it away, allowing space to store other items, such as a tool to cut the chocolate into pieces or a chocolate guide. Fourth, the packaging will have two components that slide out from one side. Fifth, separating the chocolate into different sections using the packaging itself. Sixth, investing in new materials like a temperature-insulating sheet that can form to the shape of the chocolate to protect the chocolate from heat.

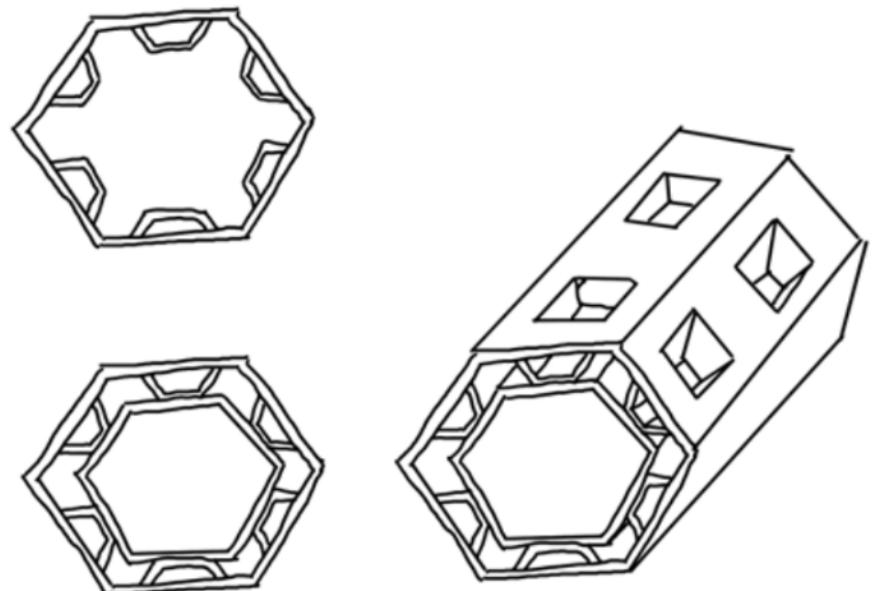


Figure 40. Idea exploration sketches continue

Another approach is to separate the first layer from the second layer to prevent the chocolate from melting by holding the packaging in place. This idea was inspired by Flavio's interview about heat and shapes.

Prototype Development



Figure 41-43. Prototype #1 in different views

Prototype #1 is a sliding container with a semi-circular notch on one side to indicate the opening mechanism. It includes separate compartments for differently shaped chocolates, drawing inspiration from the current packaging of Gem Chocolate. However, the overall structural integrity of the shape is not as strong as intended—particularly at the corners, which appear to be quite fragile. This weakness may be due to the material used, suggesting that further exploration with a more stable material would be beneficial in the next iteration.

Prototype #2 is another sliding container, similar to Prototype #1, but it is shorter and features multiple individual inserts to hold each chocolate. However, the shape is still weak and can deform if you pinch the corners. Creating slots to insert pieces to separate the chocolate and to strengthen the design can be explored next. Ideas of different pull tabs were also explored at this stage.

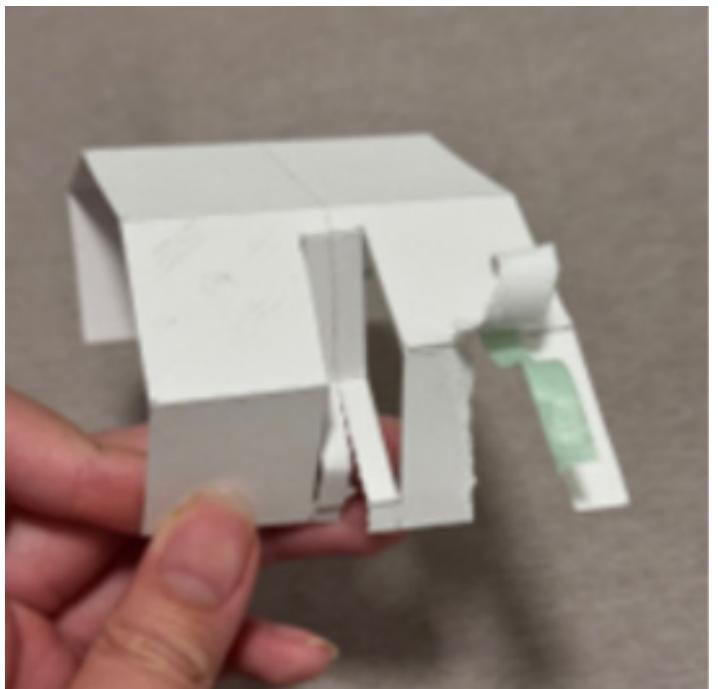


Figure 44. Pull tabs exploration

The prototype shown above serves as a strong starting point for exploring the placement, shape, and overall form of the packaging. However, continuing the exploration solely on paper appears to offer limited value at this stage. Given the current material constraints—limited to paper, wood, and fabric—there is an intention to create a more structured design by incorporating additional folds in the next prototype. Further exploration of various hexagonal box templates is also planned to introduce new perspectives. Additionally, there is a growing interest in investigating alternative materials and existing technologies to enhance and expand protective packaging solutions for craft chocolates.

Speculative Future Scenario

In conclusion, the exploration of protective smart packaging for chocolate addresses critical concerns around breakage, temperature fluctuation, and environmental waste. Through innovative material use and intelligent design, this research envisions packaging that not only safeguards the product but also enhances sensorial and cultural experiences while promoting sustainability.

Looking ahead, however, we can imagine a future where the very notion of packaging is radically redefined—or even rendered obsolete. In a speculative scenario shaped by climate disruption, ecological degradation, and resource scarcity, cacao cultivation may no longer be viable. As a result, chocolate itself could be synthetically bioengineered. This “smart chocolate” would possess self-healing properties and an antibacterial, auto-immune system—eliminating the need for protective packaging altogether. Synthesized from bacteria to mimic the sensory and molecular qualities of traditional chocolate, this future food would be its own packaging, blurring the boundaries between edible material, technology, and living system. Such a vision pushes us to question not only how we protect food,



Cultural Storytelling and Identity

Rationale for Design Research in Smart Chocolate Packaging: Focus on cultural storytelling and sustainable rituals.

The craft chocolate industry has increasingly adopted minimalist, high-end aesthetics that align with luxury products, such as wine and coffee. While this approach elevates chocolate's artisanal value, it often erases the cultural, ecological, and historical depth of cacao (Martin & Sampeck, 2015). Most packaging tells a story of indulgence rather than origin—obscuring chocolate's sacred roots in Mesoamerican rituals and its colonial transformation in Europe (Presilla, 2009; Leisley, 2018).

Global inequalities amplify this disconnect between producers and consumers. Cacao is primarily grown in tropical regions like Côte d'Ivoire, Ghana, and Ecuador, often by smallholder farmers who receive minimal economic benefit and rarely consume the final product themselves (ICCO, 2023; Sylla, 2014). Meanwhile, consumers in the Global North enjoy chocolate as a luxury, rarely aware of the social, environmental, or economic conditions at its source.



Image: *La Muse Bluse*

Filling the gap between cacao's origins and its consumers, marketers construct mythologies that mask this disconnection, which Roland Barthes describes as cultural myths that naturalize ideologies through signs and symbols. Since its popularization in Europe, chocolate has been wrapped in a romanticized narrative, especially in its association with femininity and desire (Robertson, 2009). This mythology has expanded into a broader exoticism, using language, imagery, and semiotics to build an alluring fantasy around chocolate as a luxury commodity (Duncombe, 2012). These fantasies often romanticize origin while promoting flavour combinations far removed from cacao's cultural roots, raising deeper issues of race, class, and otherness (Martin & Sampeck, 2015)



Images: (L-R) *the Dieline*, *bpando.org*

(Chocolate Class 2017)

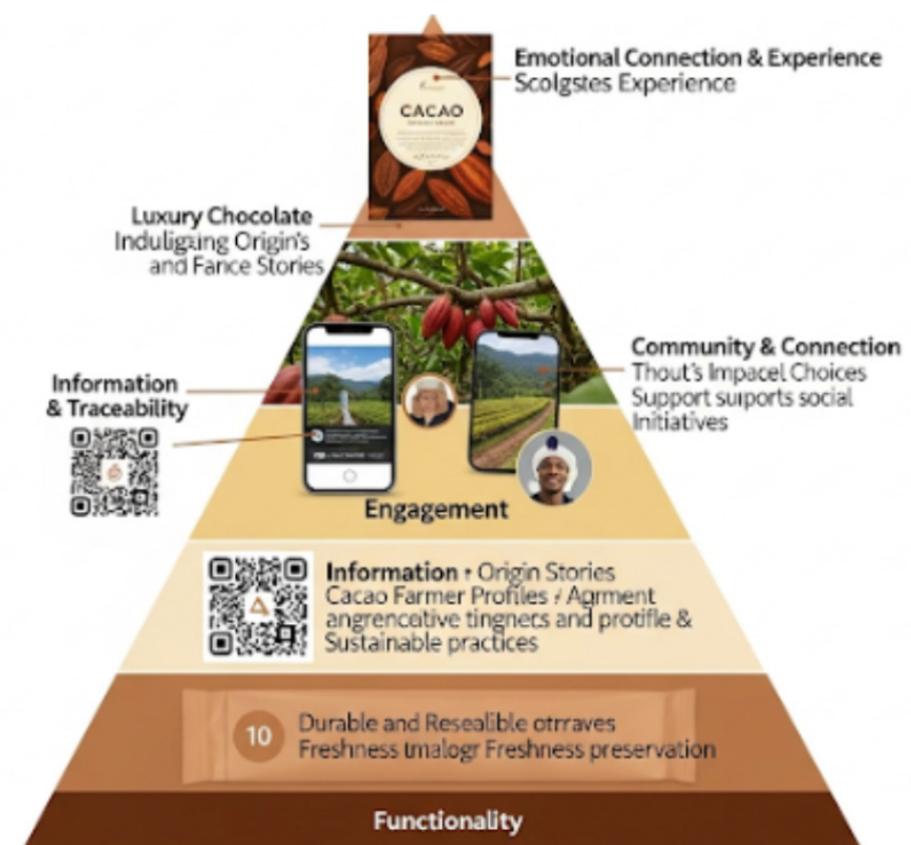
This design research aims to reframe chocolate packaging as a tool for connection, linking consumers not only to the product they enjoy, but to the people, places, and histories behind it. The disconnection between cacao producers and chocolate consumers has allowed exploitative systems, cultural erasure, and ecological harm to persist, often masked by aestheticized narratives and commercial mythologies. Through culturally grounded design, we seek to challenge these dynamics and offer more transparent, meaningful, and engaging experiences of chocolate.

Specifically, this project will explore how smart packaging technologies—such as NFC chips and QR codes—can be used for immersive storytelling that honors cacao's origins and makes visible its current challenges. We will investigate new structural forms that provoke tactile interaction and embodied learning, potentially drawing inspiration from ancestral tools and rituals once used in cacao preparation. These forms aim to foster a deeper emotional and sensory engagement between the user and the narrative of the chocolate.

Finally, we will examine how material innovation can support a circular economy model, prioritizing biodegradable, locally sourced, or reusable packaging solutions that reduce environmental impact while enhancing the cultural and educational value of the product. By merging smart technology, cultural storytelling, and sustainable design, this research proposes a new paradigm for chocolate packaging—one that invites care, reflection, and reciprocity between all participants in the cacao chain.

How Might We design smart, sustainable chocolate packaging that reconnects consumers with cacao's cultural origins, acknowledges the realities of its production, and provokes meaningful, multisensory interaction through form, material, and embedded storytelling?

Functional Hierarchy



Design Language and Inspiration

Conceptual Explorations:

Jute sacks, traditionally used to transport beans, were explored as packaging components. Far from being waste, these byproducts hold textural, aromatic, and visual qualities that evoke the geography and labor behind cacao cultivation. Integrating them into packaging allows for a deeper narrative expression—where the material is the message.



Interactive Technologies

Augmented Reality (AR) technologies can transform chocolate packaging into an interactive tool that connects consumers with cacao producers and their stories. By scanning the package, users can access immersive content, such as videos of farmers, maps of cacao origins, or traditional recipes shared by local communities. AR can also offer clear, engaging instructions for recycling or composting the packaging, supporting circular economy practices. This approach makes packaging not just functional, but a platform for cultural exchange, education, and sustainability.



Wage Bites: A Bar That Represents Labour Inequity
Each square of the chocolate bar is designed to represent a portion of the chocolate value chain, with one small, plainly wrapped square labelled “\$1: Farmer’s Daily Income” and the remaining 10 to 20 squares marked collectively as “\$10–\$20: Retail Profit Margin.” A gold foil accent highlights the profit squares, contrasting starkly with the unadorned appearance of the farmer’s square to visually underscore the disproportionate distribution of value. This design not only makes the income gap tangible but also uses the form of the chocolate bar itself to provoke reflection on equity and ethics in the cacao supply chain.



Cocoa Futures” Subscription Box

This monthly chocolate subscription box mirrors real-world cocoa conditions, with variations in bar size, delivery timing, or price based on actual market changes. Some months may bring smaller bars or delays, reflecting supply chain volatility due to weather or labor challenges. Each box includes a “Cocoa Stat” card with updates on harvest data, price shifts, and conditions in key regions.



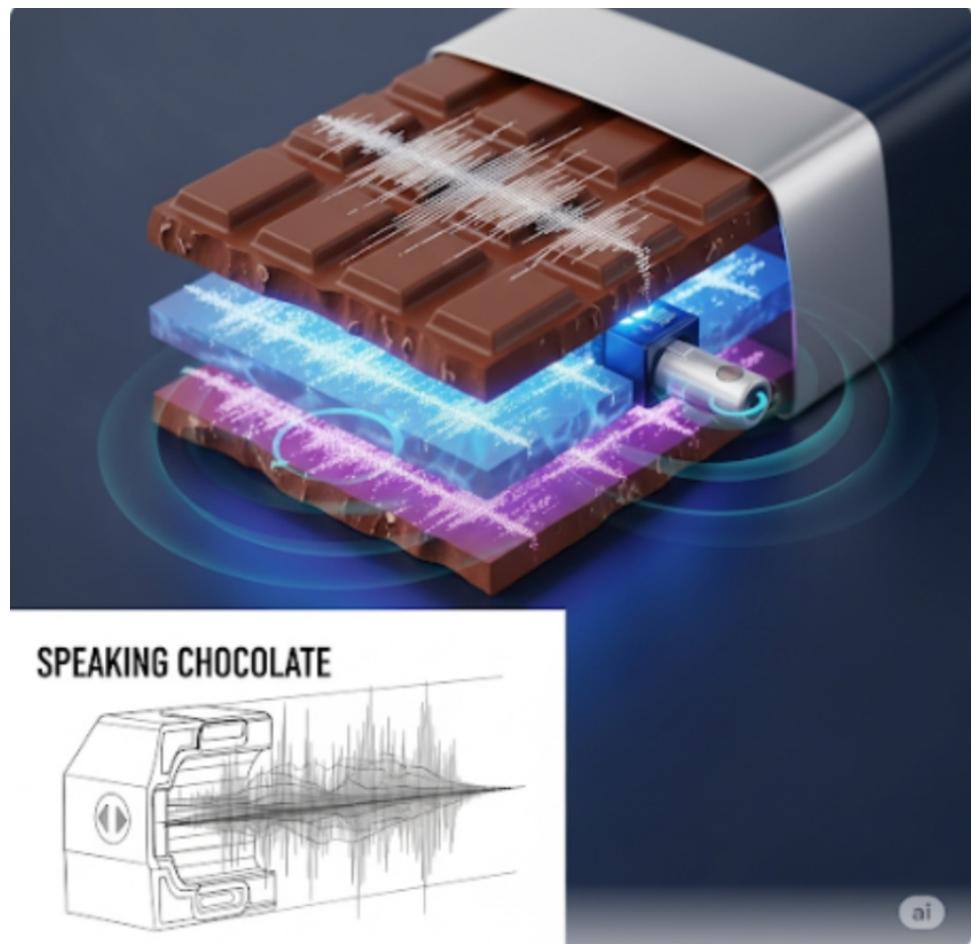
Heritage Unwrapped
This sophisticated chocolate package offers a premium experience, featuring a traditional molinillo tool for frothing chocolate, allowing users to prepare their beverages authentically. The integrated NFC technology provides a modern touch, enabling consumers to tap their smartphones to access exclusive content, such as recipes, brand stories, or even interactive experiences, enhancing engagement and providing added value beyond the product itself.



This blend of tradition and technology elevates the unboxing and consumption experience, making it both unique and memorable like Ghana and Côte d’Ivoire. An optional donation supports initiatives like fair wages or reforestation, making the experience more informed and socially conscious.

Speculative Future Scenario- Storytelling

In a future where multisensory experiences merge with food innovation, chocolatiers may use sonic inscription to embed personalized messages into chocolate through sound waves. This technology would involve a high-frequency acoustic transducer that modulates the chocolate's microstructure during tempering or moulding, allowing sound waves—such as a spoken message or melody—to be physically encoded within its crystalline layers. When scanned with a specialized reader or touched by a heat-sensitive device, these vibrations could be decoded into audible sound, enabling chocolate to “speak” the message of its maker or sender. This blend of craft, emotion, and futuristic technology transforms chocolate from a consumable into a medium of communication and storytelling. These technologies will enable producers to connect with consumers instantly, sharing their inspirations and challenges.



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Appendix

Secondary Research

As our team synthesized these findings, we regrouped our scattered insights into three targeted categories: smart technology (responsive materials that protect and communicate), sensorial design (packaging that engages touch, scent, and ritual), and cultural shifting (reconnecting chocolate to its origins while advancing sustainability).

What started as a wide-ranging exploration of history and art now directly informs these focused design pillars—ensuring our packaging solutions honor chocolate's past while innovating its future.

