Sachets at the Bottom of the Pyramid

Redesigning laundry detergent sachet packaging systems for impactful reduction of plastic waste in the Philippines

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Keywords: packaging design, single-serve packaging, single-serve sachet, sachet economy, plastic waste, bottom of pyramid, FMCG, BOP, sachet marketing, sustainable packaging, eco-friendly packaging, plastic waste reduction

Abstract

This project reimagines single-use plastic sachet packaging systems for laundry detergent powder in the Philippines to significantly reduce environmental harm.

Sachets are a flexible single-serve packaging which are typically multi-layered, making them almost impossible to recycle. In the Philippines, people at the Bottom Of (the economic) Pyramid depend on sacheted products because it's what they can afford out of their average NZD 2-6 income per day. In the Philippines, 164 million sachets are used every single day. For both Unilever and Procter & Gamble who operate in the Philippines, more than 50% of their market shares are from sachet sales. The Philippines also happens to be ranked at the bottom in world waste management scores.

Single-serve, single use and affordable sachets bring many benefits to consumers, small retailers and multi-national corporations, but the harm they create to its consumers and the environment now outweigh those benefits. This research uses different design methods to continue the delivery of affordable goods to the BOP market while eliminating plastic sachets.

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I also want to thank the New Zealand COVID-19 response team for keeping New Zealand a safe place to study and live throughout the pandemic.

Lastly, I would like to thank HEED for inspiring this research topic, and my UPSIDE family for always inspiring me to dedicate my work towards service. Lagi't-lagi, **para sa bayan.**

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Glossary

Sachet

Sachets are flexible, typically multi-layered single-serve, single-use packaging. Almost all fast-moving consumer goods can be found in sachets in the Philippines and neighbouring Southeast Asian countries.

MNC

Multi-National Corporations that operate, sell and have bases in more than one country. Examples of MNCs are Unilever, and Procter & Gamble.

BOP

BOP or Bottom of Pyramid refers to the members of society that earn less than $1500 per year. The term was coined by CK Prahalad who first suggested that this large population holds a collective purchasing power—an opportunity overlooked by multi-national corporations. He suggested that engaging in business with the BOP would bring in huge revenue for corporations and in turn lift members of the BOP out of poverty.

Sari-sari store

The direct translation of “sari-sari” is variety-variety.

Sari-sari stores, are small retail stores in the Philippines. These are similar to the Western concept of “mom and pop stores” (or, much smaller dairies) and are typically found within every 50 metres (two-minute walk) of each other in in middle-class to lower-class neighbourhoods.

These stores have preserved the piecemeal purchasing culture in the Philippines. Before sachets were manufactured by MNCs, it was already common practice for sari-sari store owners to repack products in single-servings, giving low-income members of society access to products they otherwise couldn’t afford.

These stores are usually house fronts converted into a store with metal grills and a small window for transactions. Sari-sari stores are believed to have been in existence before the Spanish colonisation in 1521.

Figure 1: Sari-sari store: Image licensed by author

FIGURE 2: VARIETY OF SACHETS SOLD AT SARI-SARI STORE. IMAGE SOURCE: (MALASIG)

FIGURE 3: SACHET WASTE. IMAGE SOURCE: (GAIA)

Source: Planet Custodian

Project origins + Foreword

Origins

I was born and raised in Manila, Philippines. Constantly exposed to our own and other people's struggles around me, I grew a strong sense of love for country and our people. That love was solidified by years spent in the University of the Philippines where most students develop a strong social consciousness. There, we were constantly asked to bear the responsibility of our people's future through whatever we majored in. I majored in Design where we built a student organisation that aims to serve the Filipino people through design. In our founding years (2015-2016), we had only begun to ask ourselves how we could do that, and I still carry those questions with me now. I hope this research shows the beginnings of answers to some of those questions.

In 2019, I was accepted in this programme under the condition of half a year's worth of postgraduate studies which included the process of picking a topic for this research and building a proposal. Before leaving the Philippines, I had just been involved with a plastic recycling project with a grassroots community of women. I still had many questions from the experience, and so the postgraduate programme gave me an opportunity to look into plastics and inclusive sustainability some more. The proposal submitted as a result of the proposal building process can be found in the appendix of this paper.

Foreword:

The Why, the How and the What

Why?

In Chapter 1, the problem is introduced by touching on the global plastic waste problem, how the world has reacted to it, and how difficult it is to solve this complex problem. It notes that efforts toward a solution commonly recognise that vulnerable communities (low-income communities) are most affected by the problem yet solutions commonly seen in market are priced beyond their individual purchasing power. This chapter further unpacks the link between single-serve plastic packaging and low-income communities and discusses the scale, context, and opportunity for inclusive sustainability. Finally, Chapter 1 includes research aims and objectives.

How?

In Chapter 2, research methods used in gathering and analysing data are discussed. The system around sachet packaging in the Philippines will be unpacked and understood in different depths, feeding into the creation of personas. In this chapter, the cast of personas are introduced and are positioned on journey maps that will inform the design strategies and iterations. The designs will also feed back into the journey maps as a tool for evaluation.

What?

In Chapter 3, the two design strategies used to create design proposals are introduced along with the design methods used in the process. The first design strategy uses a refill and reuse model, while the second strategy uses a disposable model. This chapter will show a few iterations, explaining key decisions made and how the research informed these designs. This chapter also discusses the evaluation of each design through the journey map and speculation, recommendations for further work and the conclusion the research project.

Chapter 1: Introduction

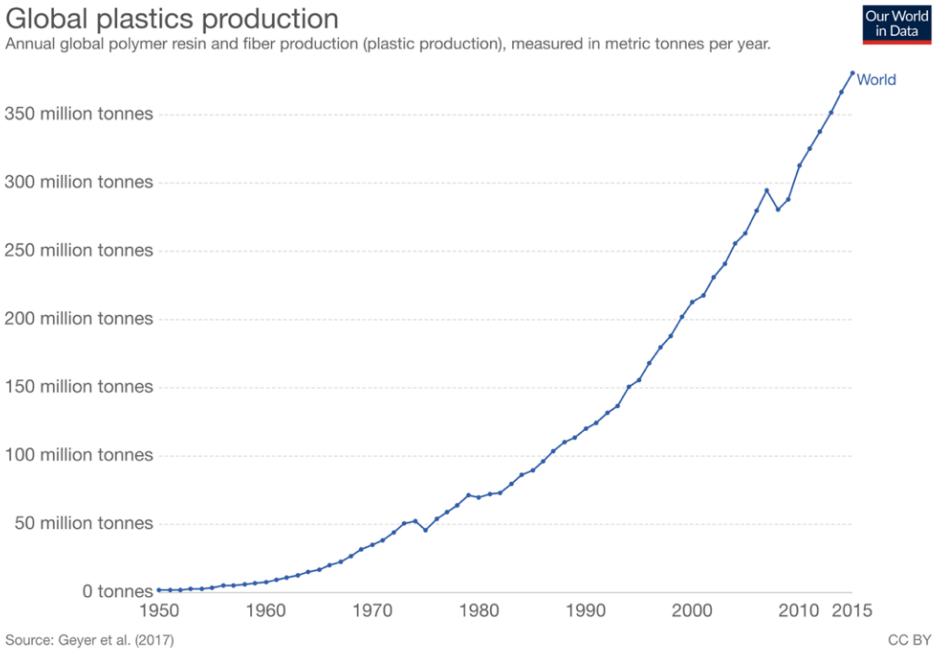
Context 1: Global plastic waste

Global plastic waste problem

Globally, we produce and consume more plastic than our systems and environment can handle. Plastic started out as a "miracle material" born out of war, that benefitted our environment for a while (Parker). It made vehicles lighter, reducing fuel consumption. It was an alternative to paper bags that required cutting down trees. Plastic gave rise to a more convenient and accessible form of consumerism (Parker). The use of plastic boomed when mass production began in the 1950's when two million tonnes of plastic were produced per year (Ritchie and Roser). Years later, production continued to grow despite the world's improving understanding of its negative environmental impacts (Ritschel). Figure 4 shows how plastic production has trended upward since 1950. Today, plastic has become an almost unavoidable material and is congesting and threatening our ecosystems.

The steep and continuing rise of plastic production is problematic because every piece of plastic ever produced still physically exists now and will continue to do so for at least the next 500 years (Gonzaga). Many scientists and researchers believe that approximately eight million metric tonnes of plastic enter the ocean per year on top of approximately 150 million tonnes of plastic already in the ocean (Ritchie and Roser). Some experts predict that by 2050, there will be more plastic in the ocean than fish (Ritschel).

Figure 4 : global plastics production since 1950 (Jambeck et al.)



In the past decade, there has been increased awareness and desire to act to reduce plastic waste. Consumers and large corporations have become more aware of the need to combat the global plastic waste problem. This is reflected in the recent trend in

academic literature that repeatedly cites the same milestone events in the history of plastic in the past decade including:

- Jambeck et al publication: “Plastic waste inputs from land into the ocean”
- Plastic Brand Audits led by Greenpeace
- Rise of Ellen McArthur foundation initiatives towards a circular economy
- China’s National sword policy cutting back their recyclable plastics imports
- Southeast Asian countries send back contaminated recycling imports from Canada, New Zealand, USA
- UN’s Sustainable Development Goals campaign launch

It is worth noting that a common theme among these events mentioned is the increasing recognition that the communities who have the least resources are most affected by the plastic waste problem. Communities are harmed when plastic waste is incinerated, when plastic clog water ways, when plastic fill up landfills, and when plastic spills into the ocean (GAIA).

The plastic waste problem is complex. Attempts to find the ultimate solution to the problem often run up against challenging questions like: Is recycling a real solution? Are bioplastics good or worse for the environment? Will the demand for paper in lieu of plastic put detrimental pressure on demand for trees? Does the responsibility for fixing the plastic waste problem lie with the consumer or the producer? Should living a sustainable lifestyle should come at a premium cost?

This creative research attempts to navigate these tensions through design.

The plastic packaging industry’s contributions to the problem

Plastic is around us all day, every day. It’s present in the construction of the room you are in, the chair you are sitting on, the electronics in your pocket or bag, the cards in your wallet, the clothes you are wearing, even in the binding of this exegesis. Plastic has become an almost inescapable material in the modern human lifestyle. Currently, no other use of plastic is more present in our daily lives than plastic packaging (Ritchie and Roser)—most of the things mentioned above were also packaged in plastic.

Plastic packaging covers a wide range of products and scales. Below is a visualisation of different applications of plastic packaging from manufacturing to commercial and consumer use.

Plastic packaging is the biggest contributor to the global plastic waste problem (Ritchie and Roser). In 2015, it accounted for about 42% of the world's total plastic production. In the same year, 141 of the 146 million tonnes of plastic packaging produced was discarded within the same year (see figure 5). Not only is plastic packaging the most produced plastic, it also has the shortest lifespan. The life of plastic packaging, from production to disposal averages a product lifetime of 6 months of less (Ritchie and Roser).

Because of the impact of plastic packaging, consumers and organisations like the United Nations and the Ellen MacArthur Foundation have pressured and supported businesses around the world to continuously innovate towards lessening their waste contribution. In 2016, the Ellen MacArthur Foundation published a paper called The New Plastics Economy which inspired Unilever to set the goal of halving their environmental footprint by 2030, by implementing changes to their business model, improving their plastic packaging as a major part of this.

Figure 5: Primary plastics produced vs. Discarded per year by industrial sector adapted from (Jambeck, et al)

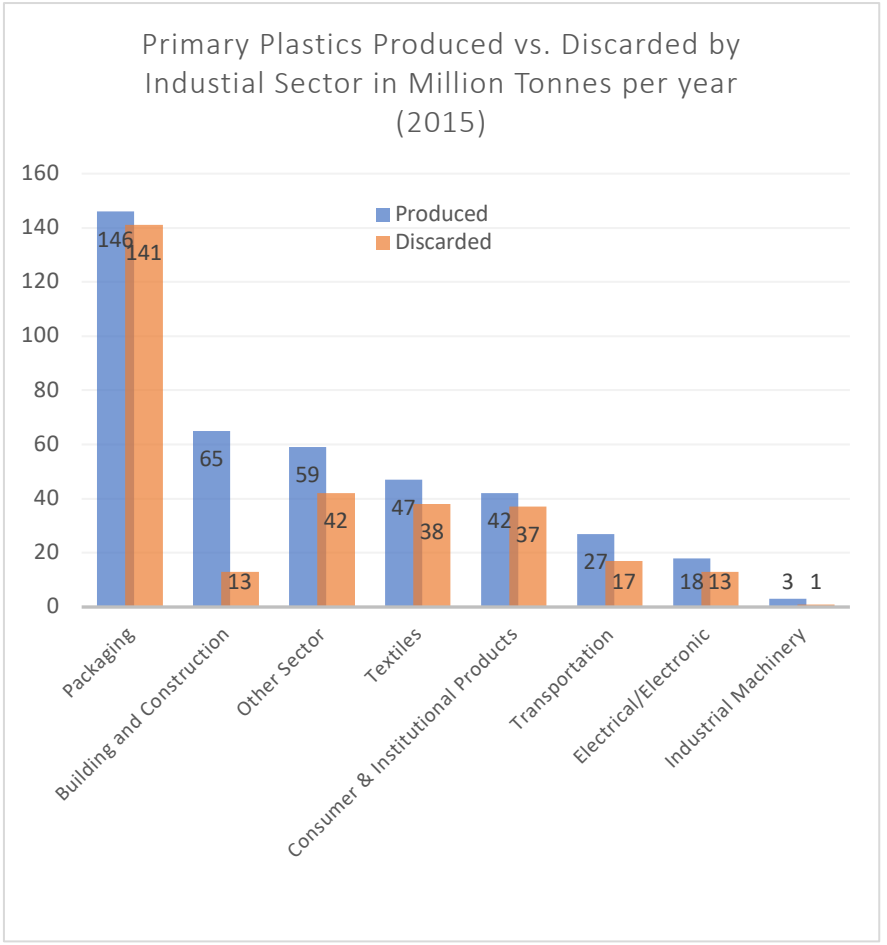
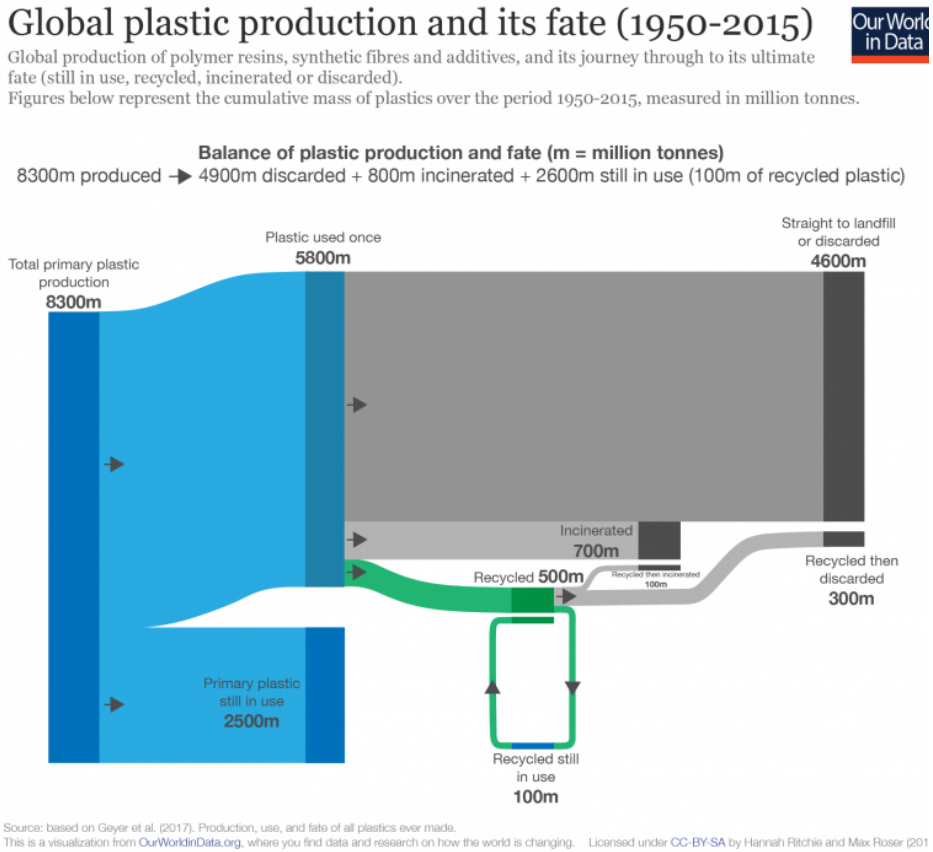


FIGURE 6: GLOBAL PLASTIC PRODUCTION AND ITS FATE (RITCHIE AND ROSER)



It is important to note that plastic packaging does have positive impacts despite its huge contribution to the plastic waste problem. Plastic packaging helps ensure that goods delivered to consumers are safe and uncontaminated from the moment it is produced which can take around 6 months in the globalised world. Packaging reduces spoilage, makes shipping more efficient, and even increases store security against shoplifting. It protects the products until use, and helps preserve the products, which affords convenience. It also makes our consumerist lifestyle convenient and generally affordable most of the time (Rundh).

In the case of low-income families in developing nations, smaller packaging sizes (plastic sachets) give them access to products that they could not otherwise afford. This research focused on plastic sachets which are single use, single-serve plastic packaging that currently has no value after its purpose to package products.

Single use, single-serve: the plastic sachet packaging industry

What is sachet packaging?

A sachet is a small, flexible package often made of multiple layers of different types of plastics or other materials adhered together. Sachets are designed to deliver products in single servings to sell individually for a low price. Because of their multi-layered composition, sachets do not have value after use. To be able to recycle the paper or plastic of a sachet, the layers would have to be separated and broken down individually. Even if this was easily done now (which it is not), flexible plastic falls under the category of difficult to recycle plastic.

Where is it used?

Sachets are used as different business strategies in different contexts. They are used for sampling, and they are also widely used as a marketing strategy to allow large multi-national corporations to penetrate huge markets of low-income economies in developing countries (PR Newswire).

Sachets are also used in developed countries like New Zealand. Goods such as coffee, sugar, flavoured oats and granola bars are still packaged in single-serve sachets. Many of these are sold in bulk in a box or otherwise prepared as free condiments (See figure 7). Some cosmetic products are also still in sachets, but mostly for giveaway sampling.

Figure 7: 26 pack sachets sold in New Zealand (purchased from New World Thorndon at NZD 13.99)

One of the predominant uses of sachet packaging today is to deliver goods to low to middle income communities in developing countries, especially in Asia. It is so widespread that the term Sachet

Marketing was coined after what it does—delivering goods in small doses for a small cost and small price (Singh et al.). Sachets and Sachet Marketing are used as a method to penetrate low-income markets or the Bottom of the Economic Pyramid popularly known as the BOP. Everyday necessities such as coffee, soy sauce, spices, juice powders, peanuts, shampoo, deodorant, hair styling gel and toothpaste are packaged in sachets for BOP markets. These sachet products can be found in supermarkets, where 'mom and pop' store owners (comparable to NZ dairy owners) purchase them in large bundles and resell them individually in their store for a small margin. Sachets are most successful in India, Indonesia and the Philippines (Singh et al.). The sachet marketing strategy has been employed by multi-national corporations like Unilever, Procter & Gamble, and Nestle. The strategy has also been used by telecommunications companies, power providers, and water providers to penetrate the BOP market (Simanis).

Figure 8 : Shampoo in Bottle and in Plastic Sachet (Image source: (Rana))

Figure 9: Cooking oil offered in bottles and sachet (image source: sabomarket.com)

Tiny packaging causing big problems

In 2019, the Global Alliance for Incinerator Alternatives (GAIA) report "Plastics Exposed" looked at investigated plastic waste and management in the Philippines. They found that Filipinos used almost 164 million sachets every day, totalling to about 59.8 billion pieces of plastic waste a year that cannot be recycled and have no value after their single use. According to not-for-profit organisation Break Free From Plastics, that year's plastic sachet waste is enough to cover the country's capital in a one meter deep layer of sachets (Alegado).

Figure 10: Brand audit conducted by GAIA (Source: Plastics Exposed, GAIA)

Even though sachets were initially used (not invented) by multi-national corporations for sampling, they have become an important tool for them and their low-income target market. Sachets enable those who have an unstable income of around 2.76 - 5.52NZD/day to afford their daily needs. In the Philippines, a sachet of shampoo is about 0.90NZD for 10ML compared to a bottle of shampoo which is 7.48NZD for 100 ML (Visconti). Sachets are very important to multi-national corporations like Unilever and Procter & Gamble who sell in Asia. According to Nulkar, in 2005-2006, the market share of sachets in Procter & Gamble's shampoo sales across

four Asian countries were always larger than bottles. This means that in the Philippines, Indonesia, India and Vietnam, consumers buy more shampoo in sachets than bottles. In the same article by Visconti, Unilever Philippines' VP for Corporate Affairs admitted that half of Unilever's global growth comes from Southeast Asia through sachet sales.

This research focused on the context of sachets in the Philippines, which required a deeper understanding of the BOP market.

Context 2: Money at The Bottom of (economic) Pyramid (BOPs)

Sachets are prolific in countries like the Philippines, Indonesia, India and Vietnam because of the large collective income available to business who manage to access the BOP market. In 1998, C.K. Prahalad and colleagues conceptualized the term "BOP" or Base/Bottom of the Pyramid and made a call to multi-national enterprises to engage with the poor through business to profit from the untapped market and to uplift those at the bottom out of poverty (Kolk et al.).

According to Anderson and Billou, in 2017, around 1 billion globally (1/6 of the global population) earned less than 1USD per day. Of those, 700 million come from the 20 biggest emerging economies. Taken together, their collective income is around 1.7 trillion USD. This huge market is still often described as untapped or young because businesses are still struggling to penetrate this market due to constraints such as "corruption, poor infrastructure, and non-existent distribution channels," (Anderson and Billou). However, India, China, and the Philippines were cited as countries where multi-national corporations have taken action in penetrating the BOP market, and have significantly profited from these attempts. The success was credited to the use of the sachet marketing 4As approach: Availability, Affordability, Acceptability, and Awareness (Anderson and Billou) and is mostly possible through sachet packaging and mom and pop stores or sari-sari stores (Philippines).

The research continues to expand, and the market continues to grow. Keating and Schmidt estimated that the BOP market is worth around 5 trillion USD in 2017, and that "it still ha[d] very low levels of formal competition" despite the size being larger than many whole nation markets (Keating and Schmidt). Businesses continue to desire to secure a share of

the growing market, which makes the BOP a very interesting subject for this research.

Figure 11: Artistic Visualisation of Economic Pyramid (source: UN World Development Reports 2002)

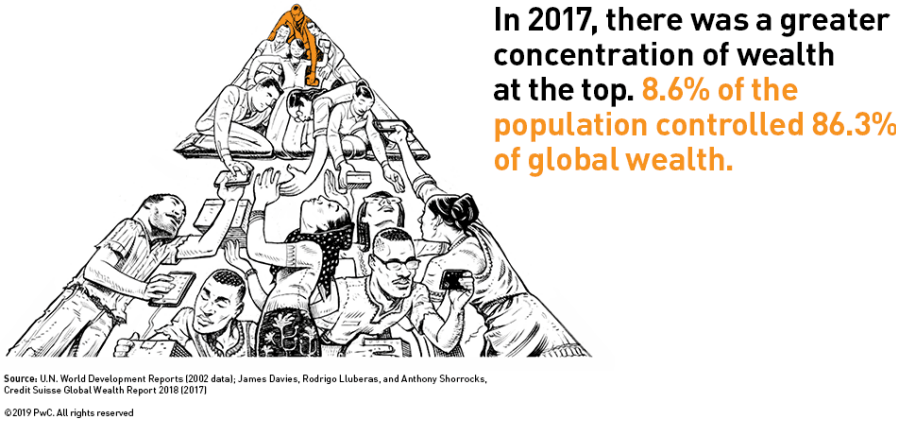


Figure 12: The world Economic Pyramid Source: Executive Research Associates (Pty) LTD, 2009

Exhibit 1: **The World Economic Pyramid**

Annual Per Capita Income*	Tiers	Population in Millions
More than $20,000	1	75-100
$1,500 - $20,000	2 & 3	1,500 - 1,750
Less Than $1,500	4	4,000

*Based on purchasing power partiy in U.S. $

Source: U.N. World Development Reports

The Bottom of the Pyramid market in the Philippines

The Philippines is consistently mentioned as one of three most important sachet markets in Asia for multi-national corporations. The BOP market in the Philippines represent around 41.5% of its population in 2007 where there were around 1.6 million 'mom and pop' stores (sari-sari stores) directly selling to this market (Hammond et al.). The Philippines, along with Indonesia, Vietnam, and India, is also one of the top ranked countries in terms of mismanagement of waste, and as a source of plastic waste leaking into the environment (Jambeck et al.). We are yet to see how these change with the tensions and shifts in plastic waste trade. Nonetheless, local contributions to those figures are still strong. In GAIA's Plastics Exposed report, they found that only 10 companies

were responsible for 60% of all branded waste found in the samples of the plastic waste audit. Their 2017 household brand audits showed that Unilever, Nestle, and Proctor & Gamble were found to be the top polluters in the Philippines (GAIA).

Sari-sari stores

Sari-sari are small retail stores typically found in every 20-50 meters within each other in middle and low-income neighbourhoods. Sari-sari stores is located in almost every corner of an urban city, while rural areas will have at least 1 in each area (Funahashi). Sari-sari stores both urban and rural will be a section of the owner's house converted into a storefront with grills and a small window for transactions. Urban sari-sari stores come in various sizes, but according to Chen, they are 2x2 meters on average, and will typically have a work station, a storage room, and a display set up. Sari-sari stores have been around so long that they have evolved into different sizes, with some big ones now supplying stock to small sari-sari stores. Some sari-sari stores also extend their store front with tables and chairs for customers to eat, drink or have a cigarette.

Figure 13: Sari-sari store (source: Grocke)

In low-income neighbourhoods, sari-sari stores are almost an extension of a household's pantry. Consumers do not have a lot of storage space to keep food and they cannot afford big grocery purchases. They purchase what they need as they need it from sari-sari stores which are just a few meters away.

According to the estimated figures provided by the Philippine Association of Stores and Carinderia Owners, there are around 1.3

million sari-sari stores nationwide where around 94% of Filipino consumers have visited at least once (Oxales)

Sari-sari stores will be discussed further in Chapter 2.

The opportunity:

Positive impact through inclusive sustainability

A closer examination of plastic sachet waste and the systems around it showed that there is definitely an opportunity to reduce plastic waste through inclusive sustainability. In the context of this research, inclusive sustainability means the inclusion of the largest demographic of society in Southeast Asia— the low to middle income population in efforts towards continuing life in a way that is sustainable for the planet we live in. The idea of sustainability in this research also includes business sustainability for corporations that have made sachet product price points possible, reducing the harm their operations create.

Research into reducing plastic waste through inclusive sustainability is important because the poorest population are most affected by waste, and the BOP market is a large market, that has the potential to significantly contribute to either the production or reduction of waste. This research is important because:

The poorest populations are most affected by waste, yet sustainable products are not affordable to this segment of the population.

The low and middle income populations are the biggest population segments, and are the most affected by waste, yet sustainable products are not affordable to them.

Many of the sustainable products today have a higher price than status-quo products. There are many factors that could be contributing to this. The most direct contributor is the scale of manufacturing prices and shipping prices in keeping with principles of economies of scale.

Not only are prices are higher, but purchasing green products also require additional resources and energy to purchase. Although the higher cost is not always an intentional premium price for more profit (e.g. cost of small-scale manufacturing), it leads to the same result of minimum impact for the environment, and it still leaves the most affected excluded from the solutions. There are billions more people in the bottom of the economic pyramid than there are at the top. In order to create large-scale impacts on the plastic waste problem, it is important to include this part of the population in the solution. The world has been talking a lot

about creating impact – this research could create an opportunity to do that.

The BOP market is an important and large market that has the potential to significantly add to or reduce plastic waste.

According to Funahashi, the potential for expansion into the BOP market in other developing countries is still large and is still overlooked. Keating and Schmidt gathered that all of the multi-national corporations have discussed entering the BOP market, and their motivation to enter the BOP market is not solely based on the desire for market share, but is also based on a desire to accomplish what they call a "'triple bottom line' of financial, social, and environmental drivers" (Keating and Schmidt).

The BOP is a very important market for multi-national corporations that have already been playing in it. For many of them operating in the Asian BOP market, more than 50% of their annual sales come from sachet products (Sy-Changco et al.).

Further, consumers who buy sachet products buy them more often than they would a bottled/boxed product. As visualised in figure 14, the equivalent of a 2.72kg Tide powder box is 24.5 pieces of sachets. That's a lot more plastic that cannot be recycled or decomposed compared to the box or bottle packaging that will likely have value as waste after use.

Figure 14: 2.72kg Carton laundry detergent vs. 74g laundry detergent sachet

Figure 15: Author's own, sachet image source: shoppee.com

Context Summary:

In summary, the context of this research is:

1.) There is a global plastic waste crisis to which plastic packaging is the largest contributor. Various solutions and products branded as sustainable are accessible to the few with the most resources, but inaccessible to a huge population who earn the least.
2.) Sachets are one of the biggest contributors to the plastic waste problem in many developing Asian countries with the least use and depend on in many developing Asian countries.
3.) The BOP market is the main target of sachet products—a market that is very important to multi-national corporations in terms of profit and growth.
4.) Rethinking sachet packaging is an opportunity to reduce the negative environmental impact of serving the BOP market who is also most affected by the plastic waste problem.

Scope and Limitations:

There are 4 points that cover the scope and limitations of this research:

1.) The context focused on is sachet packaging in the Philippines,
2.) the product focused on is laundry detergent powder,
3.) COVID-19 affected some parts of this research, and
4.) the 52-week research project's output focuses on design approaches that may contribute to further design iterations.

This research focused on proposing design approaches towards an alternative system for plastic sachet packaging in the Philippines as part of a 52-week (1 year) Master of Design programme. Because 1 year is a short period for a very complex research focus, some limitations have to be set for good quality outcomes. In order to produce a viable alternative packaging system within the timeframe, this project dealt solely with powdered laundry detergent. This was chosen among all other sacheted products because this product does not require as much regulatory compliance as food products do. Compared to other products, laundry detergent powder also afforded this research more flexibility and allowance for exploration because of its semi-solid form and semi-fluid movement. Lastly, laundry detergent powders, unlike food and cosmetics, are used on clothes not on humans. Designing for laundry detergent powder will allow a more focused process in designing an effective system that fits well within the context and helps eliminate plastic sachets.

The research was carried out in New Zealand, however, the context of the research itself was in the Philippines. The Philippines was in limbo and still had rising numbers of cases and deaths as the end of this research approached in March 2021. Because of the situation over there, initial plans of flying over for field research and employing research assistants to help collect more data was no longer possible. The effects of COVID-19 resulted on this research to rely on:

- secondary data,
- observation through secondary data,
- virtual field research through google maps,
- observations through video blogs,
- knowledge from lived experience; and
- a virtual interview.

Lastly, this research topic is a complex topic that involves an entire system and business that operates globally. Because of the limited time frame, COVID-19, and the scale of the topic, I focused on designing approaches backed up by well-grounded data that will hopefully contribute to the pool of research that aim to solve the plastic sachet waste problem.

Research aims

The aim of this research is to establish approaches ~for design that accommodates user behaviour and the current distribution system which members involved in the sachet packaging system operate within. The design approaches must allow the continued delivery of affordable fast-moving consumer goods (FMCG) to the BOP market while minimising plastic waste.

Research Objectives

The objective of this research is to design an alternative packaging system that should eliminate plastic sachet waste in the delivery of laundry detergent powder in the Philippines. To achieve this, there are a few things this research must do:

1.) Understand the success and impact of sachets in the Philippines
   a. The success of Multi-National Corporations in the BOP market through sachets and sachet marketing
   b. What systems of product delivery were in place for BOP markets before the invention of sachet packaging?
2.) Understand and analyse the journey of laundry detergent powder sachets from packaging to waste in the environment
   a. In understanding the journey of products from packaging to consumer purchase, I will be able to respond to prioritise and incorporate stakeholders' needs into the design of the alternative packaging system.
      i. Packaging process

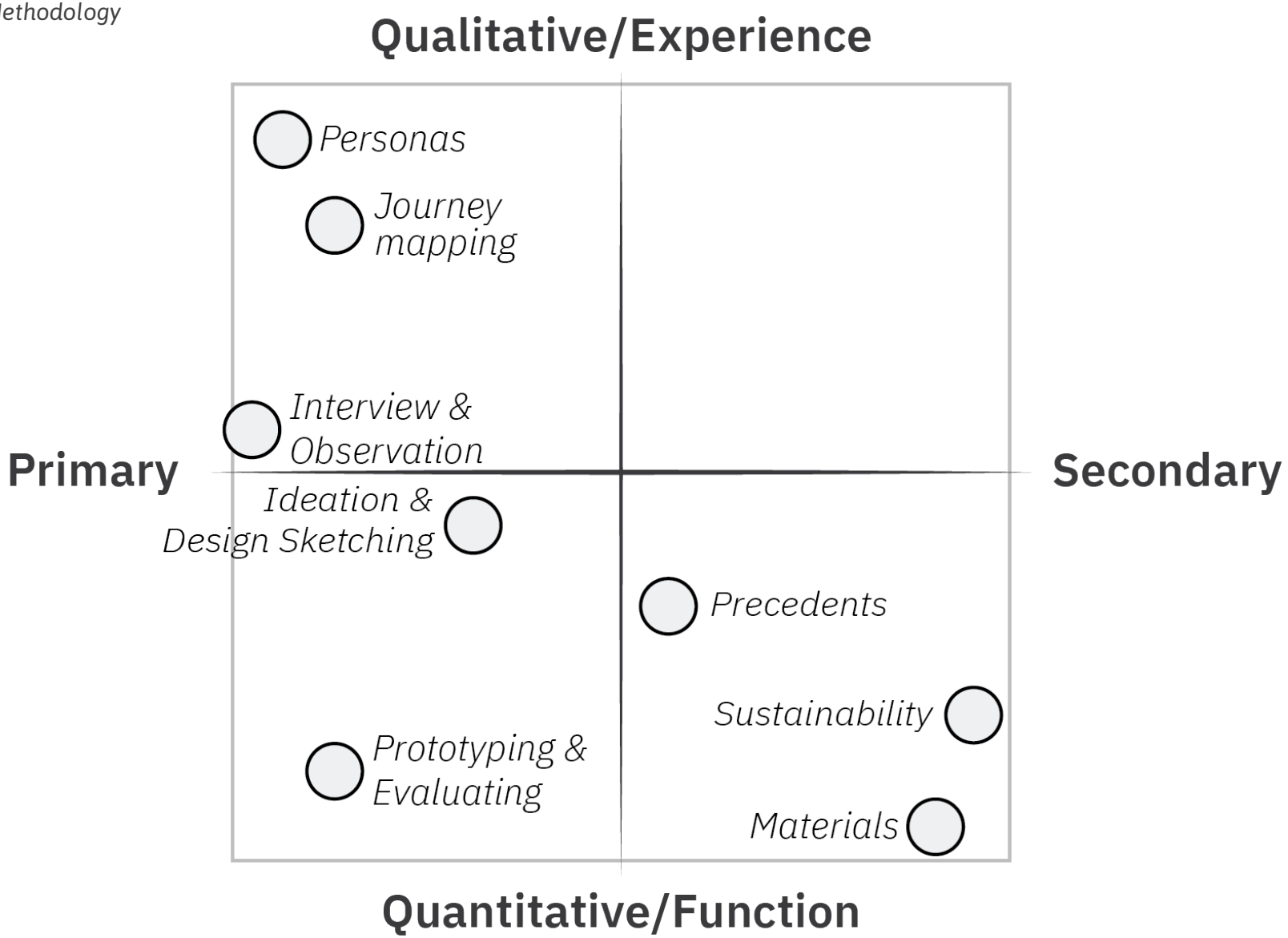
ii. Boxing/Storage
iii. Stacking
iv. Delivery
v. Display
vi. Sales and Inventory

3.) Understand who to designing for by creating a cast of personas representative of the users involved in the sachet packaging system. In no particular order, these are:
    a. High-ranking Multi-National Corporation officer (Unilever/P&G, etc)
    b. Project lead (Unilever/P&G, etc)
    c. Urban Mom & Pop Store owner (Sari-sari store owner)
    d. Rural Mom & Pop Store owner (Sari-sari store owner)
    e. End user (BOP consumer)
    f. Waste picker
4.) Develop a solution using analysed data using various design methods
    a. Personas
    b. Journey mapping
    c. Ideation
    d. Iterative design
    e. Prototyping & testing

Chapter 2: Research methods and processes

Methodology

Figure 16: Methodology



Methods

Initial Study

The proposal serves as a starting point by setting the context of the research and identifying where the project needs to be limited in scope. It was able to identify that there is opportunity for positive impact in reduction of plastic waste by reimagining sachets in the context of the Philippines.

In the proposal, a few design iterations produced were informed by various precedents and strategies without a specific product in mind. In Chapter 3 is a diagram visualising the design journey in over the initial study. The initial study informed how this research project would progress forward by provoking the questions of who and what this research was designing for.

Answering the “what” started by imposing a scope focused on laundry detergent powders and excluding bioplastics among the paths the research would potentially take. Through the initial design experiments and secondary research, it was decided that bioplastics are an emerging technology which we don’t know the full impact of yet. This is why bioplastics will no longer be explored further.

Excluding bioplastics in the research pushed out an unknown, allowing the research to focus harder on the things that can be understood in the context of the BOP market in the Philippines.

Personas

The use of personas is a method utilised in user-experience design to create a precise and focused representation of target users. This pre-development design method makes the design process efficient and cost-effective, when compared with the alternative method of seeking to understand the target user based on information gathered from testing a prototype. Personas are tools to create focused design criteria, while avoiding self-referencing, debates on what features to add to a design, or adding too many features into a design (Cooper). According to Goodwin, it is more effective to make design decisions based on the persona rather than getting into arguments based on opinions or design principles.

Both Cooper and Goodwin recommend that the cast of personas used in a single design project should be between 3-12. Despite there being more than one persona, it is recommended that designers focus on designing for one main persona while taking the other personas into secondary considerations. Based on Goodwin's recommended process of persona-building, and the scope and limitations of this research project, these are the steps followed:

- Step 1: Make an educated guess on what roles are involved in buying, maintaining, and using of the product. The entire system must be examined
- Step 2: Use at least 4 sources in observing each role's behaviour patterns and significance in the sachet packaging system
- Step 3: Identify and narrow down roles that are most relevant to the research aims and use them to create 6 unique personas
- Step 4: Create a journey map to understand how these personas interact with each other and sachets

Roles involved in the sachet packaging industry

Initial roles identified through an educated guess (step 1)	**Final roles considered in building final personas (step 3)**
Multi-national corporation head	Unilever CEO
Manufacturers	Unilever sustainability manager
Supermarkets	Urban sari-sari store owner
Sari-sari store owners ('mom and pop' store owners)	Rural sari-sari store owner
BOP consumers	BOP consumer
Formal waste management	Waste picker
Informal waste management (waste pickers)	

After a thorough review of literature related to multi-national corporations and sachets, sachet manufacturing, sari-sari stores, BOP consumers and waste pickers, The roles that should be focused on in this research were narrowed down to six roles. Manufacturers, supermarkets and formal waste management were not included. Information on these roles used to build final cast of personas will be discussed in detail below.

Manufacturers, supermarkets and formal waste management were not included in the identified final roles

- While manufacturing is an important factor for products meeting low price points. Manufacturers are replaceable in the context of sachet packaging ordered by multi-national corporations like Unilever. Their business depends heavily on the demands of multi-national corporations. Manufacturers were also excluded based on the premise that some feasibility of manufacturing will already be considered in proposed designs, and that a detailed manufacturing process and analysis is outside the scope of this project.
- Supermarkets were not included because though they are also crucial in delivering products to sari-sari store owners, because around 60% of FMCG goods are traded through sari-sari stores, they simply adjust to the needs of sari-sari store owners. In the Philippines, there are supermarkets that specifically target sari-sari stores. If specific products are demanded by sari-sari store owners, supermarkets will work to get it on their shelves. Supermarkets also compete against other business-to-business distributors of FMCG such as distribution companies or direct agents of multi-national corporations.
- Formal waste management was not included because this project assumes that formal waste mismanagement will remain dysfunctional until waste without value is reduced.

Discussion of observations each role

1.) *Multi-national corporation (MNC) CEO of Unilever Philippines*

a. *MNCs are aware of the importance of the BOP market*

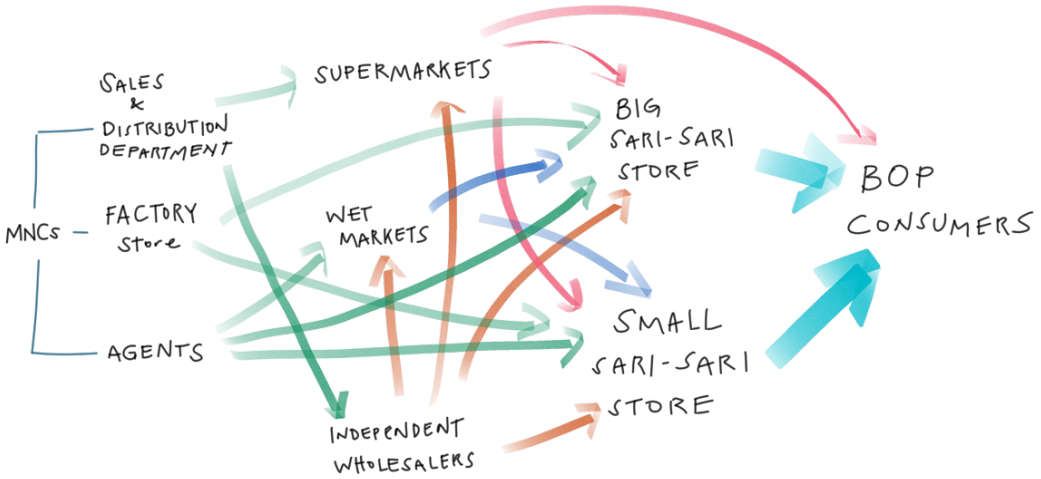
Multi-national corporations are aware of the importance of the BOP market to their business. In 2005, 68% of Proctor & Gamble's shampoo sales were from sachet sales in the Philippines (Sy-Changco et al.). They also understand this is a continuously growing industry. In 2015, Unilever saw that annual revenue in emerging markets between 2008-2014 rose 11% more than its western counterparts (Bor).

b. *MNCs understand that the most important channel of distribution to the BOP market is through sari-sari stores ('mom and pop' stores)*

They understand that their success in sachet sales depends on sari-sari stores where the majority of BOP trade happens (Matejowsky). Funahashi's diagram of the distribution chain of fast-moving consumer goods (FMCG) show that multi-national corporations have three ways of selling goods targeted to the BOP market.

Figure 17 below is an interpretation of Funahashi's diagram with Matejowsky's writing and the author's lived experience:

Figure 17: Author's interpretation of FMCG distribution chain to BOP consumers



c. *Multi-national corporations are attempting positive change by reducing plastic waste created. There is willingness to start testing ideas out.*

Among multi-national corporations that sell laundry detergent sachets in the Philippines, Unilever and Procter & Gamble rank highest as the biggest polluters in waste audits by Greenpeace and GAIA. Between the two, Unilever seem to have a more comprehensive plan to minimise plastic waste created by their products. They are aware of the negative effect of this audit, and they understand who they are serving sachets to. In early 2019, they launched The Refillery station for hair care products as part of their sustainability efforts. These were launched in malls such as Alabang Town Center, Glorietta 3 and Trinoma, known to be frequented by middle to upper class as opposed to malls like Ever Gotesco and SM Stores that are more targeted at the BOP. Customers had to reuse the exact bottle of their desired refill (Dove shampoo bottle only for Dove shampoo refill) and were otherwise asked to purchase a new 100% recycled transparent The Refillery bottle as shown in Figure 18.. This pilot was faced with a lot of criticism on Facebook and accused of "Greenwashing". The Refillery's reason for rejecting the reuse of any other bottle and unclean same variant bottles is to prevent issues created by contamination of either other products with Unilever products or old formulas mixing with new formulas. They did not provide bottle cleaning stations, but they accepted the bottles for future upcycling with the help of not-for-profits. According to Unilever, this was a pilot to observe Filipino consumer spending habits while "saving the environment" (Martelino). Despite The Refillery seeming like a skewed effort to combat the biggest plastic waste problem in the Philippines, this research recognises that it was still a step forward for Unilever in their commitment to combat their high plastic waste contribution.

Figure 18: Refillery branded bottle (source: Unilever)

2.) *MNC sachet marketing expert*

Within multi-national corporations, there are sachet marketing managers or managers tasked with handling the sachet account/s. In the Asia Pacific Journal of Marketing and Logistics, Sy-Changco et al interviewed eight marketing managers from different multi-national corporations that deliver FMCG in the Philippines.

In this research, I imagine that the CEO launches a new project to replace sachets and assigns it to the sachet marketing team. MNCs will always prioritise profit because that is the purpose of running a business, and the sachet marketing manager is the expert in sales at the BOP market. This is why I image that the CEO assigns the sachet alternatives project within the manager's department.

a. *A sachet marketing manager understands that sachets are successful because it addresses the BOPs demand for access to products without a big capital outlay*

In the interviews, all of the managers mention that the use of sachets in the Philippines was an answer to a demand. Before sachets became what it is today, it was already common practice for sari-sari store owners to repack products into smaller sizes. This practice and culture has been in place before the Spaniards colonised the Philippines and was recorded in western literature since. When the Philippines opened itself up to allow foreign business to operate locally, multi-national corporations capitalised on the sachet culture and incorporated the idea into what has evolved into modern sachet packaging (Sy-Changco et al.). It makes sense that there was a demand from BOP consumers for the foreign companies to meet the needs that have always been met by innovative local retailers.

b. *Sachet marketing managers also understand that distributing to sari-sari stores and meeting their needs are important to the success of sachet sales*

Like their CEOs, the sachet marketing managers also understood that distribution through sari-sari stores was important for sachets to continue succeeding. They also studied sari-sari stores and adopted pricing, sizing, and packaging design based on sari-sari store's needs. Multi-national corporations adjusted their products to meet the coinage system of the country which sari-sari stores already take advantage of (Sy-Changco et al.). Sachet marketing managers still have much to learn from

sari-sari stores' innovations to meet the needs of the BOP consumer (Nielsen and Samia).

c. *Managers recognise that consumers' increasing awareness of environmental concerns against plastic could decrease sachet sales*

Managers understand that globally, consumers are becoming more aware of the negative effects of plastic sachets on the environment. However, they are aware that this can only create a decline because poverty of the BOP is still the strongest driver of sachet sales, and no amount of climate change will make the BOP any richer. The only other threat of sachets being obsolete is if the Philippines rises to become a developed country (Sy-Changco et al.).

3.) *Urban sari-sari store owners*

a. *Sari-sari stores have been around a while and will likely be here for a long time*

As mentioned in this research, sari-sari stores are integral to the distribution of sachet products in the Philippines. A sari-sari store also known as a mom and pop store has counterparts in other countries. In India, mom and pop stores are *kirana* and in Indonesia they are *warungs*. Sari-sari directly translates to "mixed-mixed" and could be interpreted to mean "variety" in the context of small neighbourhood retail stores. Because there are so many sari-sari stores, urban stores and rural stores have to be described separately because they operate differently in some ways because of the different ways of life in urban settings vs rural settings.

According to Sy-Changco et al, sari-sari store retailing has been around since before the Spaniards colonised the Philippines in 1521, and have survived through the 300 years of Spanish rule, and a few more years of Japanese and American occupation.

b. *Sari-sari stores are small stores operated from homes, and are located very close to each other.*

An urban sari-sari store is located in almost every corner of an urban city and suburb. They are usually a section of the owner's house. Urban sari-sari stores come in various sizes, but according to Chen, they are 2x2 meters on average, and will typically have a work station, a storage room, and a display set up (Funahashi). Many urban sari-sari stores will have customised signages sponsored by companies like Coca-Cola or Telecommunications companies like Globe and

Smart. The store's name (typically "(owner's name)'s store" printed on uniform designs from each company. Signages are offered for free which serves as advertising for the company's brand.

Figure 19: Sari-sari store signage with corporation branding. Source: Google Maps

Note: Because of COVID-19, I had to find other ways to gain access into sari-sari stores. I conducted a virtual location survey using google maps to confirm how dense the sari-sari store locations are in a typical neighbourhood see next pages. This set up the imaginary setting of the urban sari-sari store owner persona.

It is worth noting that the left side of the map where sari-sari stores are very dense and high in volume are part of the BOP.

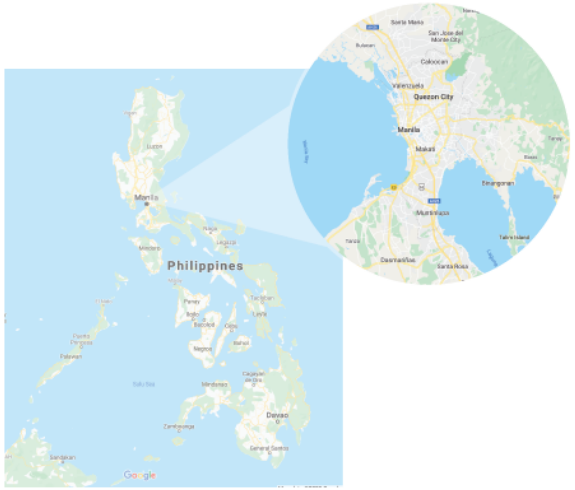
The right side of the map where sari-sari stores are spread out is a middle-upper class area surrounding a private school

Figure 20: Sari-sari stores plotted on Quezon city neighbourhood map (Author's own, Map image source: Google Maps

This side of the map is within a low-income neighbourhood. There was a sari-sari store for almost every 3 houses.

The yellow dots represent the sari-sari stores, and the pink dots represent what looked like market stalls.

The right side of the map only had these 4 sari-sari stores that could be seen from the google maps street view located around 2 neighbouring schools.



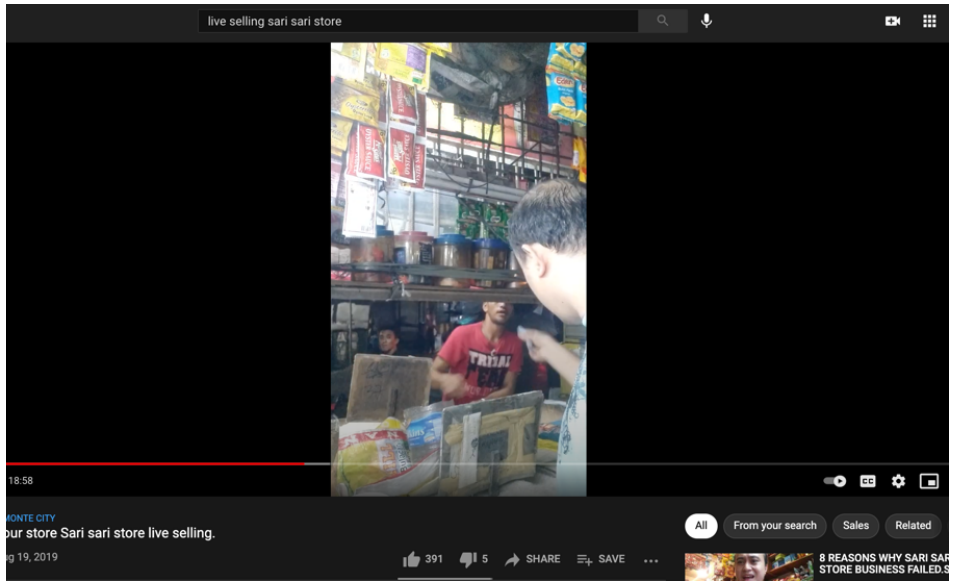
This is a map showing a neighbourhood familiar to the author. This is Teacher's Village which is across the University of the Philippines Diliman in Quezon City, Manila.

The left side of the map is denser while the right is more spaced out. These reflect house sizes and income level of neighbourhoods.

There is a rising trend in video blogging (vlogging) among sari-sari store owners to increase income through ad revenues earned by posting their videos on YouTube. This practice seemed more popular among urban sari-sari store owners than rural store owners. This was a source of rich insights, behavioural data, spatial data, etc. Various urban sari-sari store owner vlogs were watched an observed, and specifically watched vlog entries that were about their various operation routines, and live-selling sessions where they showed what a typical day of selling looks like on busiest hours.

Figure 22: Sari-sari store owner shares tips on growing business despite competition. Image source: youtube

Figure 23: Sari-sari store owner live streams selling at sari-sari store. Image source: Youtube



c. Urban sari-sari store owners choose the cheapest and/or most rewarding supply options

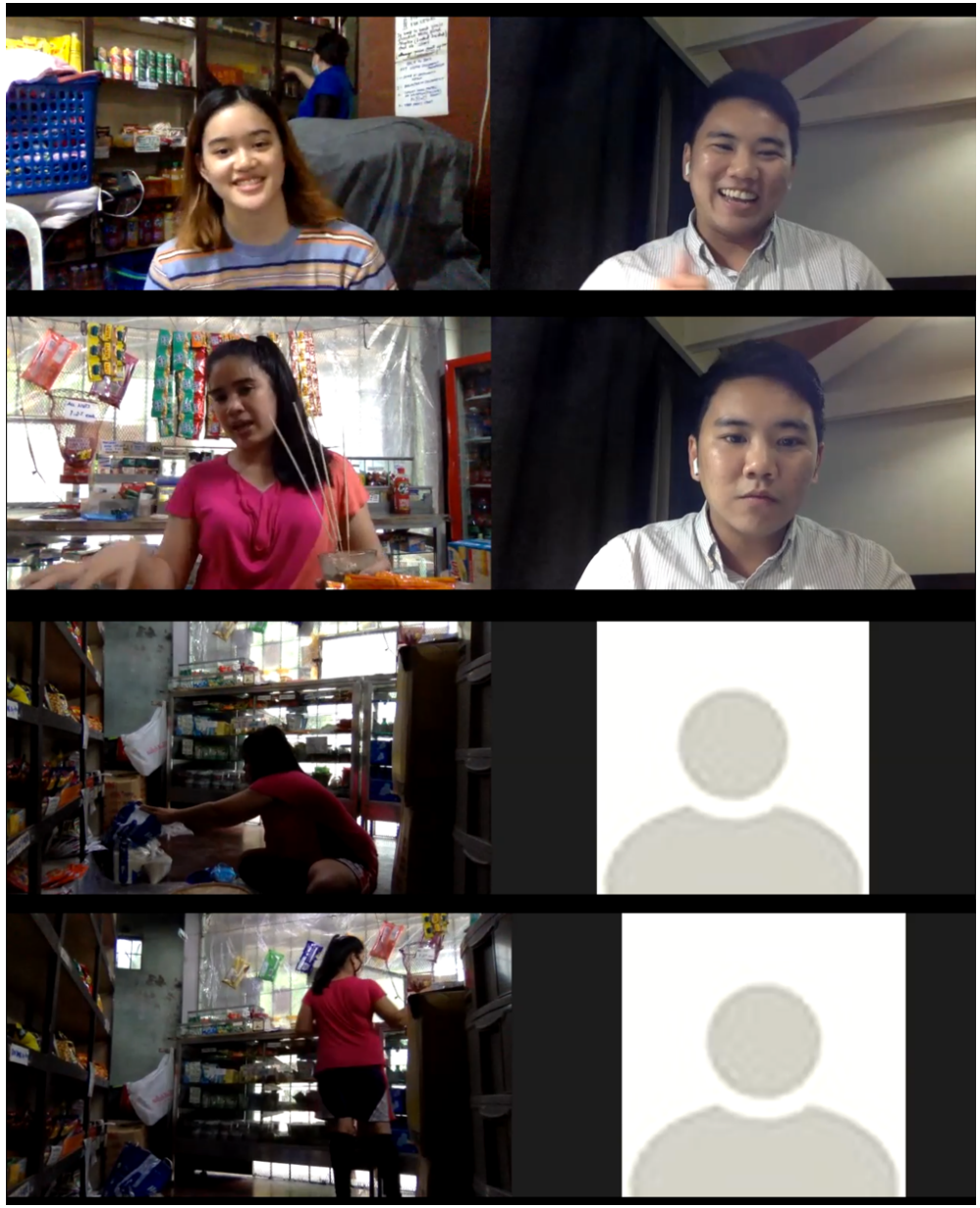
In the video blogs, it is of note that most urban sari-sari store owners prefer to buy what they logistically can at their favourite supermarkets because of the store loyalty points and credit card points that they earn. They prefer to

trade with agents and other distributors who deliver to their store when it comes to beverages and rice. Some of the bigger sari-sari stores aspired to become wholesalers for the sari-sari stores in their neighbourhood. Some of the vloggers I noted to follow such as 4S Vlogs created an episode on how to become a wholesaler, mentioning that wholesaling demand is created by smaller sari-sari stores who are just starting and have not yet acquired a vehicle.

d. Urban sari-sari stores are fast-paced

Urban sari-sari store owners/co-owners no longer see repacking as a worthwhile task except for older generations of sari-sari store owners. According to the sari-sari store owner and staff interviewed, repacking is now only worthwhile for rice which saves time spent on transactions and fills in idle time when the store is not busy as seen in third image in figure 24.

Figure 24: images from virtual interview and observation with Legaspi family's sari-sari store



4.) Rural sari-sari store owner

a. Rural sari-sari stores vary in type

A rural sari-sari store may be more of an inconsistent variable than urban sari-sari stores. Some rural stores are located closer to factories, but some of them are very difficult to reach in the distribution chain. Some rural areas are slowly being converted into urban areas as urban development spreads across the country.

Rural sari-sari store owners will often have an area to sit and hang out extended from the storefront. Some will have tables at night for customers who want to consume the alcohol they purchase from the store.

b. Rural sari-sari store owners are more lenient in extending a credit line to their community members

In rural areas, communities are more tight knit, resulting to families knowing each other for generations. This makes it easier to extend line of credit and/or makes it more difficult to deny a request for credit.

5.) BOP consumer/Sachet consumer

a. A large portion of BOP consumers earn less than 2 NZD a day, earned from a variety of sources

Because the BOP consumers earn less than 5 NZD a day when they earn money for that day, sachets are one of the few ways they are able to support their and their family's needs (Matejowsky). Many BOP consumers live in informal settlements where they pay very little to no rent. Sources of income in the BOP vary. Some do laundry and ironing for middle class families on an as-needed basis, some drive a tricycle where income is dependent on how many trips they make, and some do other casual jobs as needed. When there are no casual jobs, they go out in the streets to ask strangers for spare change or they collect recyclable waste to sell to junk shops. How much they get from it is based on the weight and value of what they've collected.

b. BOP consumers go to the sari-sari store four to five times a week

According to Anderson and Billou, BOP consumers go to the sari-sari store four to five times a week. This makes sense because consumers only buy what they need as they need or want

it. Funahashi mentions that a sari-sari store is an extension of a BOP household's pantry.

Based on the virtual store location survey conducted, in low-income neighbourhoods, a sari-sari store is located in at least every 5 houses which is what makes multiple trips an easy task. According to the sari-sari store staff that was interviewed, the most frequent purchase that persons who visit more than once a day make is cigarettes (by the piece). Sometimes, when adults are too busy or lazy to go themselves, it is common practice to task their children to buy on their behalf at the sari-sari store even for items prohibited to minors.

c. *BOP consumers often ration sachet contents for multiple uses*

For non-BOP consumers, sachets provide the convenience of a pre-measured amount of detergent needed for a load of laundry (manual or machine). If they feel that one sachet is not enough, using up another is of a small financial consequence. BOP consumers on the other hand are using almost a whole day's worth of income on a sachet of laundry detergent. Rather than using a sachet in one use, BOP consumers will ration a sachet of laundry detergent for multiple use.

d. *Note: There are also non-BOP consumers who purchase sachets*

The highest tier of minimum wage in the Philippines is 14.21NZD per day (*Current Real Minimum Wage Rates | National Wages Productivity Commission*). The cost of a 2.7Kg Tide laundry detergent powder from the supermarket is 8.63NZD while a bundle of six 74g tide sachets (equivalent to 0.4KG) are 1.64NZD ('MetroMart - Online Grocery Delivery').

According to Singh et al, people are becoming more aware of sachets' price unit being lower than larger packaging. This attracts customers who can afford larger packaging. The smaller packaging also makes consumers feel more in control of the amount they are using and the value they are getting from the product (Bor). In the Philippines, households who have live-in helpers also prefer to purchase sachet laundry detergent powder to prevent overconsumption by the helper/s or laundry lady.

6.) Waste picker

a. Waste pickers scavenge for valuable waste to sell to junk shops who will sell to recycling companies

Waste pickers usually go to landfills where formal waste management systems (kerbside collections, etc) dump everything they collect from households and business establishments. Some waste pickers located far from these landfills go around looking for anything they can sell to their local junk shop. The most common things they collect are PET bottles, glass bottles and metal cans/containers. These are also the easiest to collect when going door to door asking establishments to search their bins.

In 2020, a waste picker can sell unclean and wrapped PET bottles to a junkshop for 0.29NZD for one kilogram. Clean PET bottles can sell up to 0.38NZD per one kilogram.

Figure 25: Waste picker weighing collected waste at junk shop
Source: Interaksyon

b. Waste pickers pick up the slack of the lack of waste management systems

The Philippines ranks high in poor waste management in the world. In many cities, even if you segregate your household waste, it will end up in the same landfill area. Some local government units that are able manage some of their waste are able to make extra income from recyclables. Some townships like Barangay

Potrero in Montalban City were able to use this extra income to provide extra monthly wages of about 55NZD to waste workers.

Without waste pickers in the Philippines, plastic waste generated by the country would not be recycled.

c. Waste picking is hard, hazardous work

People do not choose to pick waste as an occupation. It is a source of income that does not require anything else but a bag and a hard day's work for a small return. Scavenging through other waste to find the ones with value can pose many health hazards to the pickers. They are constantly exposed to elements that could cut them and expose them to infections. Further, in some landfills, gangs of scavengers fight to secure a fresh batch of incoming garbage trucks (van Kote).

Final cast of personas

Personas Overview

BENJIE
the engineer CEO

The first Filipino Uniliver Philippines CEO in 3 decades. He is trained in engineering and practiced engineering within Unilever before he rose to the top.

ANNA
the corporate idealist

Believes she can create a positive impact to the world through a big corporation with a global reach. She is considered an expert in Sachet Marketing, and helped a TelComm company penetrate the BOP.

MAIN PERSONA

JAKE
the rising sari-sari store influencer

Jake is a sari-sari store owner, youtuber, and wholesaler. Many aspiring sari-sari store owners look to him for advice and information on this business.

NANAY
the neighbourhood mother

Owner of rural sari-sari store who is known to all of her neighbours in the same village zone. She hopes to turn her store into a wholesale store that supplies to other sari-sari stores.

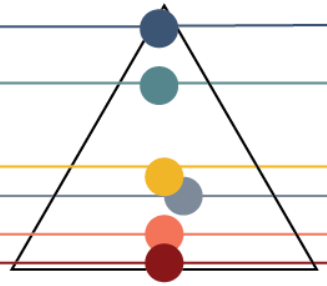
BHABY
the scholar

She is the first from her family to attend uni and can only afford to through a scholarship. She makes every peso count. She lives in a dormitory of 5 near campus.

RICHARD
the Freedom Island Boy

Lives on Freedom Island where the city's trash washes up. His father only earns NZD 6 per day to support him and his brother. He collects recyclables to sell to help put food on their table.

Income/year	Income/week	Income/day
>Php 3,976,000	>Php 76,462	>Php 10,890
>Php 1,988,000	>Php 38,230	>Php 5,447
Php 248,500-497,000	Php 4779-9558	Php 680-1,362
Php 74,500-248,500	Php 1,434-4,779	Php 204-680
Php 49,700-149,100	Php 956-2,867	Php 70-200
Php 9,940-49,700	Php 191-995	Php 27-136



Income/year	Income/week	Income/day
> NZD113,600	>NZD 2,185	> NZD 311
>NZD 56,800	>NZD 1,092	> NZD 156
NZD 7,100-14,200	NZD 137- 273	NZD 19-39
NZD 2,130-7,100	NZD 41- 137	NZD 6-19
NZD 1,420-4,260	NZD 27-82	NZD 3.90-11.70
NZD 284-1,420	NZD 5-27	NZD 0.80-3.89

Conversion rate used:
NZD1= Php35
1 year = 52 weeks

Name: **Benjie**
Occupation:
Unilever Philippines CEO
Age: **43**

Summary:

“Benjie, the engineer CEO”

Benjie is the first Filipino CEO of Unilever Philippines in 3 decades. He was an engineer by training and practiced within Unilever before rising to the top

Benjie grew up living a simple life in Tondo Manila, a hustling and bustling a wholesale outlet in the capital. For 2 years in the position, he’s been consistently visiting provinces and visiting homes of sari-sari store owners. Benjie is the first Filipino CEO for Unliever PH in 3 decades.

Benjie started in the factory team, moved to the Research and Development department and eventually became the Marketing Director of the Home Care Group.

Being an Industrial Engineer in training, he has a deep understanding of manufacturing system and distribution system within Unilever. His first assignment in the factory team was to maximise the distribution by adjusting sachet size and grouping.

Benjie is aware of the impact of sachets to the environment, but is predominantly concerned about the philosophy that rich or poor, everyone must have access to good quality products.

Benjie feels that in the near future, the Bottom of Pyramid Market will start pointing their fingers at Unilever for the effects of sachets the BOP is starting to feel. The middle class have already started reacting by creating their own refill systems. Products from Unilever are manually repacked, while products from local corporation ACS are directly supplied to these refill stores.

Benjie wants to get ahead of the game and invest wisely in alternatives if the CreaSolv Sachet-to-Gas project in Indonesia doesn’t work. Nonetheless, he wants a solution that the BOP and middle class can become obsessed with.

He recently assembles an R&D team to pitch solutions and fund external research on Sustainable Sachet Solutions. His vision is for the Philippines to have 50% less plastic waste from sachet products.

Concerns:
1.) That sales are not projected to go down
2.) That system pitched to him is evidence based
3.) That new system improves the business of sari-sari stores

Benjie's workplace

Benjie's city mansion

Image sources: Spot.ph, new.abs-cbn.com

Name: **Anna**
Occupation: **Unilever Marketing Junior Executive**
Age: **36**

Summary:

“Anna, the corporate idealist”

Anna believes she can create positive impact to the world from within a big corporation with global reach.

She is a sachet marketing expert, and was an intern at one of the biggest BOP market penetration using sachet marketing applications for telecommunications in the Philippines.

Anna believes that she can create a positive impact to the world from a big corporation with a global reach. She has been a huge fan of sachet marketing and a big a believer in the sachet economy.

She is one of the highest performing employee in Unilever, specifically in the Marketing Department. This led to her promotion to Marketing Junior Executive. She was also an intern to the team that worked with Smart Telecommunications in using Unilever’s sachet marketing model to help the telco penetrate the BOP market. Today, Anna is one of the youngest sachet marketing experts in Unliever PH.

Anna had just been assigned to lead the Sachet Sustainability Project opened by their CEO. She wants to be the person that puts Unilever Philippines at the forefront of the Unilever Sustainable Living Plan.

Anna cares about creating a new path for future corporate executives who want to make a real impact to the environment and people that is almost equivalent to the way these actions are marketed.

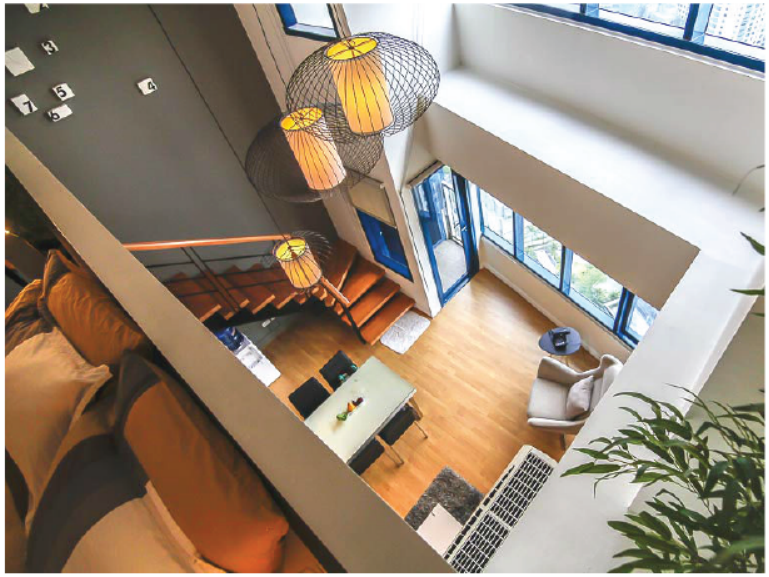
Anna’s Goals:
1.) To create the next big thing in sustain able and inclusive business
2.) To give Unilever the best image in Sustainability
3.) To meet CEO’s goals

Her priorities:
1.) Sales and Reach
2.) That things work because what does not work will bite marketing back

image by: Christian Paul Del Rosario

Anna's workplace

Anna's office floor



Anna's city apartment

Image sources: Spot.ph, Pexels.com, MakatiRent.com

MAIN PERSONA

Name: **Jake**
Occupation: **Sari-sari store owner and Youtube vlogger**
Age: **35**

Summary:

"Jake, the rising sari-sari store influencer"

Jake is a sari-sari store owner, youtub er, and wholesaler. Many aspiring sari-sari store owners look to him for advice and information on this business.

Jake owns an urban sari-sari store that is also wholesaler to smaller neighbourhood sari-sari stores. He is a young entrepreneur who provides for his family. His family includes his mother, 2 siblings, and 1 nephew.

Jake always wanted to have his own business and has been dreaming of this in his days working as staff then manager for a fast food chain in Manila. He's very proud that his long time dream of owning a business and providing for his ageing mother and his younger siblings is coming true. Jake left school early to start working to support the family. His desire to finish university is now being fulfilled by his youngest brother who he is supporting

Through his sari-sari store, he is able to support his nephew's school costs, and is able to employ his mother as storekeeper and his brother as the delivery guy and driver for the store. Through income generated from youtube ads and subscribers, he is able to grow his business.

Jake video blogs or "vlogs" about his personal experience as a sari-sari store owner. He vlogs about how much it costs to start up, up keep, and he talks about the daily struggles and victories of the store.

He also vlogs about different sales strategies he learned from managing a fast food chain where he used to work as a cashier for 7 years.

He started his sari-sari store business when he picked up his auntie's sari-sari store when it was about to close down. It was in a very good location, and his aunt was willing to give him the spot for a low price and a payment plan.

After 3 years of business, Jake is now also a wholesaler to most of the small sari-sari stores in his street (self-described as a grocery store), and has 40,500 subscribers on youtube.

Jake's store supplies come from:

- Puregold supermarket where he is a Gold Member (which means he purchases at least Php 500,000M per annum)
- Supply agents from Unilever, Coca Cola, and San Miguel consignment

Jake's Goals:

1.) To keep his business growing
2.) To try any new innovations that prove true in theory and post it on his youtube channel
3.) To keep discovering what works and what doesn't in this line of business

Jake's store Interior

Jake's typical sachet purchases

YouTube Sari-sari Vlogs
40.5k followers

Jake's YouTube Vlog overview

Supermarket where Jake buys supplies

Jake's club membership at supermarket

Images sources: Youtube, Bulacan Soap Station, PhilStar

Name: **Nanay**

Occupation: **Rural sari-sari store owner**

Age: **63**

Summary:

"Nanay, mother of the neighbourhood"

Nanay owns a rural sari-sari store and is known to all of her neighbours in the same village zone. Her store is one of the oldest stores there.

Now that more sari-sari stores are starting up, she hopes to supply them as a wholesaler.

Nanay owns a rural sari-sari store. One of her sons, daughter-in-law and 3 grandchildren live with her. Her son and his wife help with the sari-sari store and going on supply runs. 2 of her grandchildren who are 14 and 11 years old help with manning the store when the adults are our shopping for supplies.

Nanay established her sari-sari store 20 years ago to provide for her family after her husband passed away. She figured that this was a safe business because it gives their family access to everyday needs if left unsold. Some perishable and most non-perishable products will keep for long anyway too.

She competes with one Sari-sari store on the same street, and 12 sari-sari stores in the township. Nanay is very popular in her neighbourhood for her friendly service and patience with her credit line, especially to those who are struggling.

She extends credit lines to customers who she already trusts through a good track record, and she knows them all in her head. Nanay believes that relationship with customers is most important for success of store

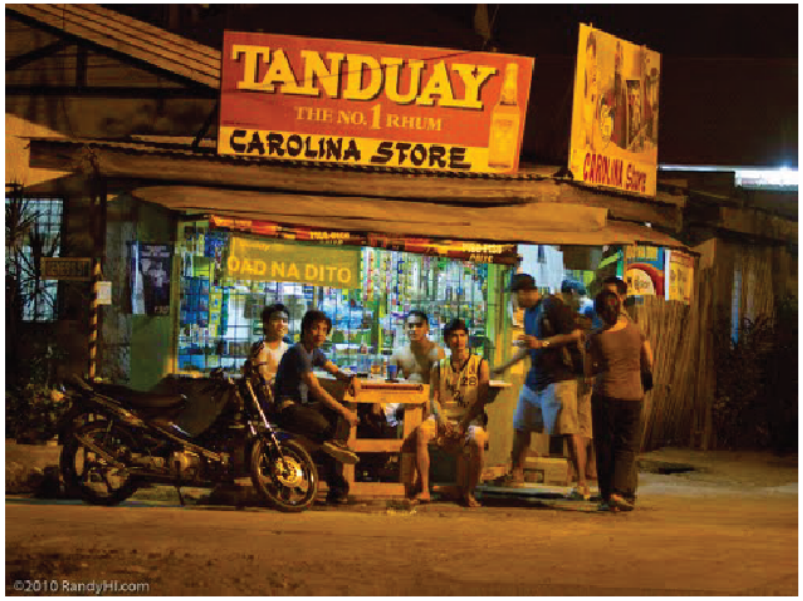
Buying supplies
- Buys in huge bulk to maximise cost of transportation since they are in a rural area.
- Shops every 8 weeks at the SM supermarket in the township
- Cigarette supplies are bought by consignment

Selling to Customers
- 7AM-9PM Sunday-Thursdays
- 10AM-1AM Fridays and Saturdays to accommodate drinkers

Nanay's Goals:
1.) Minimum disruption of business
2.) Eventually become a wholesaler for the sari-sari stores in her township
3.) Keep the store strong enough to pass on to her son

Nanay's store

Social activities at Nanay's store at night



Township mall where Nanay buys supplies from

Images sources: simplejoysofbeingafilipino.wordpress.com, smsupermalls.com

Name: **Bhaby**
Occupation: **Student (scholar), Part-time tutor**
Age: **19**

Summary:

"Bhaby, the family's hope"

Bhaby is the first member of her family to attend university. She can only afford to go through a merit scholarship.

Her family is depending on her to pull them out of poverty.

Bhaby is the first person in her family to attend university. She was able to get a scholarship and has a very small budget for living costs at her dormitory room which she shares with 3 other students. She receives a small monthly allowance from her scholarship and government stipend totalling to Php 5,000 or NZD 162. She also tutors as part-time work to help sustain her studies, and earns approximately Php 2500 or NZD 70 monthly from it. This gives her a budget of Php 7500 / month depending on how many jobs she gets. On a good month, she sends Php1000 back to her family to support them.

She's usually left with PHP 150 for laundry detergent, laundry service, shampoo, conditioner, and other cosmetic products. To make the budget fit, Bhaby buys only what she needs and tries to make those supplies last for as long as possible. She buys all that she needs from the sari-sari store next to her house. Sometimes she also just walks home from uni to save on money. Not riding public transportation once will afford her 2 sachets of shampoo.

She purchases shampoo, conditioner, laundry detergent in sachets at the sari-sari store for convenience and to accommodate getting paid tutorial fees twice a week at Php 412 each payment, and gets paid her allowance at the end of the month, and usually comes in late.

When she's really out of budget, sometimes she steals a little shampoo from her roommate who can afford a bottle of shampoo and won't be able to tell the difference if she took a squeeze or two.

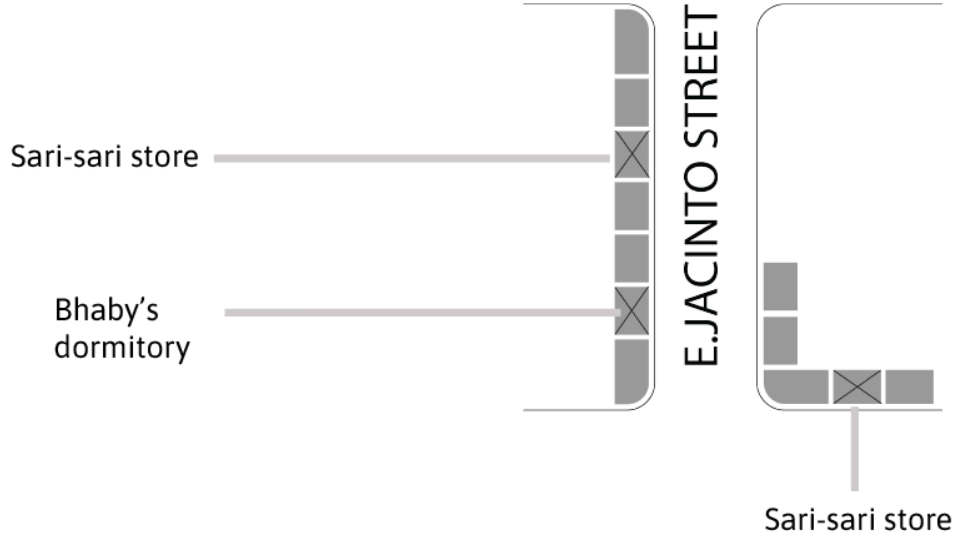
Baby's Goals:

1.) Finish university to earn a good-paying job
2.) Be able to afford expenses by the week
3.) Be able wash her clothes, take a shower everyday
4.) Have enough money for transportation to job

Item	Monthly Budget	Weekly Budget
Rent and Utilities	1500	~250
Food	1500	~375
Course costs	1000	~250
Transportation	600	~150
Entertainment	450	~112
Sundry	150	~38
Total	5200	~1300
Send to family	1000	~250

Street of Bhaby's dormirtory

Bhaby's dormirtory room



Bhaby's typical public transportation vehicle

Image sources: Google maps, locanto.ph, up.edu.ph

Name: **Richard**
Occupation: **Waste-picker, Out of school youth**
Age: **9**

Summary:

"Richard, the Freedom Island boy"

Richard lives on Freedom Island where the city's trash washes up on its shores. His father only earns ~NZD 4 a day on casual and informal tradie work. Richard quit school to pick waste to help support his family and to keep his younger brother in school.

Richard is the 2nd son of 6 kids. 4 of his siblings were given up for adoption because their single father could no longer provide for all of them after his wife left.

Richard was fed coffee and sugar instead of baby milk. His father earns NZD4/day from construction work around their neighbourhood when there is work available.

His father used to be a fisherman, but since trash started washing up on Freedom Island, this was no longer an option. When he cant find construction work for the day, he waste picks on the shore.

Their family of 3 usually eats salt with rice once to twice a day, sharing one fish on a good day. Richard's younger brother age 6, goes to public school, often with an empty stomach.

He used to go to school, but quit last year due to the upkeep of living in their neighbourhood, where flooding has worsened due to drains being clogged by plastic waste.

He has been scavenging since to help the family get by. Richard's younger brother helps everyday after morning class, and on the weekends. They collect plastic bottles and tin cans and sell it to a junk shop for NZD 0.30 for 1 kg of junk, which takes them at least 3 hours to collect. Everyday, they sift through hundreds of sachet bags to collect waste that will earn their keep.

They pay NZD 8/month to live where they live, and pay NZD 4/week for the illegal electric connection that only goes on from 3PM-5AM

Richard has 3 sets of clothes. One for school that his younger brother uses, and two for daily use.

They don't have a bathroom in their home, so they use a method called "flying saucer" which means they defecate in a plastic bag and throw it into the dumpsite just outside their window.

Richard's Goals:
1.) Earn enough to eat for the day
2.) Keep his younger brother in school

Freedom Island shores

Richard collecting valuable waste

Other child wastepickers

Richard sharing a cup of rice with salt with father and brother

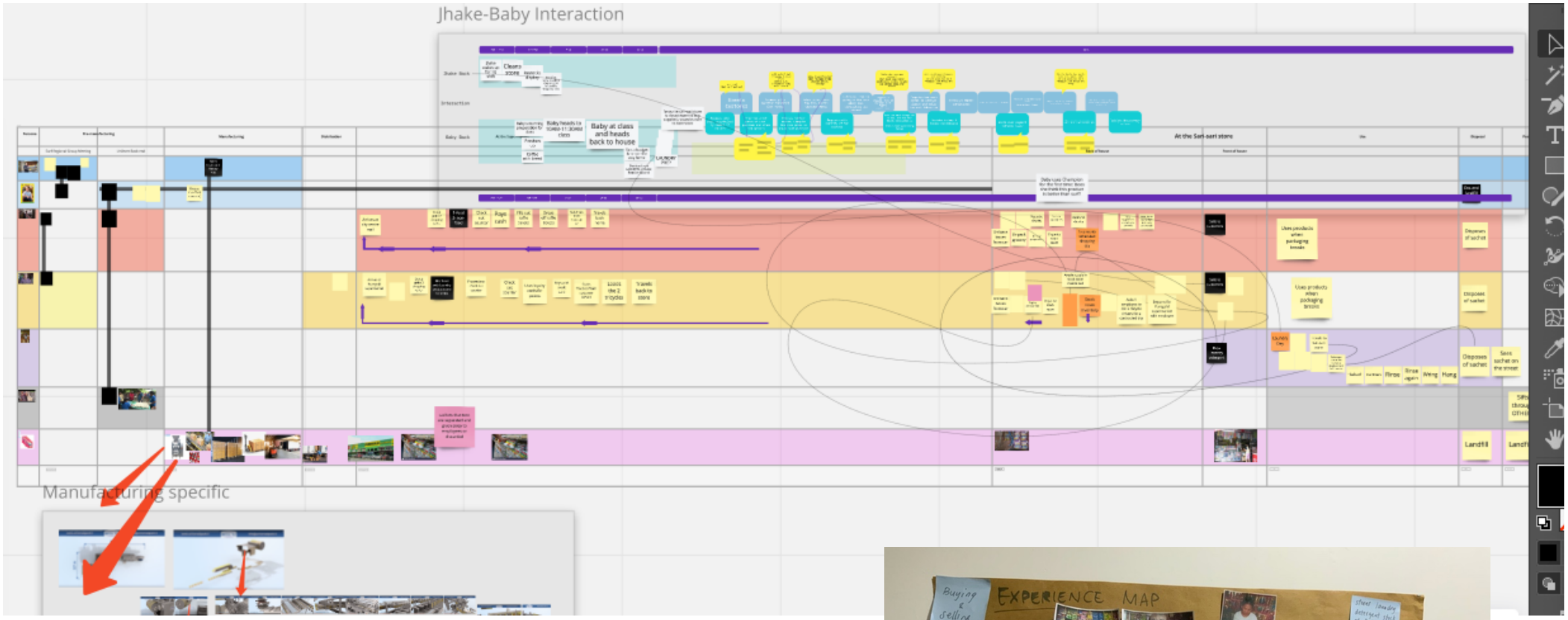
Richard's family's unwashed pillows

Younger brother helping Richard collect waste

Image sources: Greenpeace, npr.org, youtube.com

Journey Map

The journey map illustrates the personas' interactions with the product and with each other. It is a tool for me to understand who and what to focus on when I was designing the proposed strategies. In the next page is an overview of the journey map.



Draft Journey Maps created on Miro (top) and paper (bottom right)

Occasional store inspection

Every now and then, Anna does product placement inspections at supermarkets, ensuring that sachets are properly displayed and stored.

Frequent supply trips

Jake tops up supplies 1-2 times a month depending on supplies and big sales in different supermarkets. He purchases a lot and films the shopping activity

Unpack, price, display

Nanay unpacks the laundry detergent sachet along with other products. She makes a decision on pricing, and directly displays product

Selling transaction

Nanay takes an order, carefully tears off a sachet, computes change, records sale, gives change and product for every transaction with a customer

Purchasing at sari-sari store

Bhaby walks a minute to store, looks around for desired laundry detergent, asks price, checks for brand that looks bigger, asks for price and decides based on perceived value. Baby buys a snack and a cigarette using change.

Once a month supply haul

Nanay only tops up her store supplies once a month when she, her daughter and son-in-law drive together to the supermarket. She buys around 20x3 brands of laundry detergent sachets.

"Might as well" purchase

Bhaby rarely buys from the supermarket but when she finds herself in one with friends, she purchases 1 or 2 items she needs

Unpack, inventory, price check, prepare, display, store

Jake makes an inventory of his purchases, double checks pricing, displays new sachets, cuts up old sachets, and stores the rest of supplies in storage room

Selling transaction

Jake takes an order, retrieves pre-cut sachet, computes change, records sale, gives change and product for every transaction

Purchasing at sari-sari store

Richard was asked by father to pay money owed to store next door and one laundry detergent sachet and rice

Touch points

Supermarket

Sari-sari store

Benjie, the engineer CEO

The first Filipino Uniliver Philippines CEO in 3 decades. He is trained in engineering and practiced engineering within Unilever before he rose to the top.

Anna, the corporate idealist

Believes she can create a positive impact to the world through a big corporation with a global reach. She is considered an expert in Sachet Marketing, and helped a TelComm company penetrate the BOP.

Nanay, the neighbourhood mother

Owner of rural sari-sari store who is known to all of her neighbours in the same village zone. She hopes to turn her store into a wholesale store that supplies to other sari-sari stores.

1 sachet, 3 washes

Richard uses 1/3 of the sachet for 1 load of clothes, 1/3 mixed with water in a bottle for dishes, and stores the rest for future use

1 sachet, 2 washes

Bhaby goes straight to doing laundry as soon as she gets home from the store. She uses half for coloured clothes, and half for white clothes on the same day

Occiasional use of stock

Both Nanay and Jake use stock with packaging damage. They also occasionally take detergent sachet from their stock when they run out of personal supplies

Disposal after use

Everyone throws the sachet away once empty. Nanay, Jake, and Bhaby will throw it away after one day, and Richard will throw it away once all used up

Benjie and Wesley do not use sachets

Post-campaign disposal

Anna oversees disposal of sachets collected from sachet waste collection campaign

Backyard burning

Because garbage trucks only stop by Nanay's area, she burns fallen leaves and sachets littered around her store front

Littered on the street

Jake occassionally sweeps up littered sachet on the street infront of his store. Some were thrown there while some were washed up toward his store after flooding in the area.

Bhaby occasionally walks past littered sachets on the street.

The struggle and the sift

Richard's father used to be a fisherman until the shores of Freedom Island became polluted with plastic waste, mostly sachets.

Richard sifts through sachets to find valuable plastics and other materials he can sell to the junk shop to help his dad earn some money for the day

Consumer use

Disposal

Jake, the rising sari-sari store influencer

Jake is a sari-sari store owner, youtuber, and wholesaler. Many aspiring sari-sari store owners look to him for advice and information on this business.

Bhaby, the family's hope

She is the first from her family to attend uni and can only afford to through a scholarship. She makes every peso count. She lives in a dormitory of 5 near campus.

Richard, the Freedom Island Boy

Lives on Freedom Island where the city's trash washes up. His father only earns NZD 4/day to support him and his brother. He collects recyclables to sell to help put food on their table each day.

Discussion of journey map

The first iteration of the journey map included pre-manufacturing, manufacturing, and distribution. However, because of the minimal amount of touch points there, only being with the CEO and the manager when pitches and decisions are made. There were also media releases with waste collectors being given rice (in plastic bags) or laundry detergent in exchange for their empty sachets which really did happen in 2019 in partnership with local government units but was insignificant to the design process. There are also 2 parts to the journey map. The first is an overview of touchpoints from the Supermarket to Disposal, and the second is a closer look into the main persona's touch points with the sachet, including his interaction with the BOP consumer. These were both improved using data from an interview and observation session with a sari-sari store in Quezon City, Philippines over Zoom video call.

At the supermarket

At the supermarket, the manager interacts with sachets when he does occasional visits to ensure that sachets are placed where the company wants them or paid for. Both sari-sari store owners purchase sachet laundry detergent powder stocks here. They purchase them by the bundle, depending on how much they need to stock up at the store. Jaake, being a bigger sari-sari store will purchase more and more often while Nanay only makes supermarket trips based on a schedule rather than based on need. If nanay ran out of laundry detergent at the store before their scheduled supermarket run, she would wait and ask her customers to check the other store. Bhaby also occasionally purchases laundry detergent power at the store, but only if she finds herself at the store with friends by chance and if her budget allows the purchase then.

At the sari-sari store

At the sari-sari store, both sari-sari store owners unbundle the sachets, restock the hanging display if needed, and pre-cuts them from the strip of sachets with scissors to avoid any accidental tears (wastage) during transactions, and store them on the shelves or the stock room. Nanay's stocks will usually last longer/sell slower because of the pace of rural laundry needs, which is why she interacts with them longer than Jhake does as his stocks sell faster. The bars lined on the left of the sari-sari store section represent the back of house, while the bars lined on the right represent the front of house or when they are interacting with sachets as part of a transaction with a customer.

Bhaby will visit the sari-sari store once a week—laundry detergent being the main purpose of the visit. Richard on the other hand will have very few opportunities to purchase laundry detergent from the sari-sari store. He will likely be able to buy 1 once a month and ration out the sachet with his family.

Consumer use

Sari-sari store owners will occasionally use their own stock, especially if a sachet tears and can no longer be sold to customers. They will also use their own stock if they happen to run out of their personal supply.

Bhaby will use everything in the sachet on the same laundry day but will use half for coloured washes and half for whites. She will also occasionally sprinkle detergent on clothes as needed throughout the handwashing process.

Richard will use 2/3 of the laundry detergent in a sachet for his family's month's laundry and they will dilute the rest of it in a plastic bottle which they will use to wash their dishes throughout the month.

Disposal

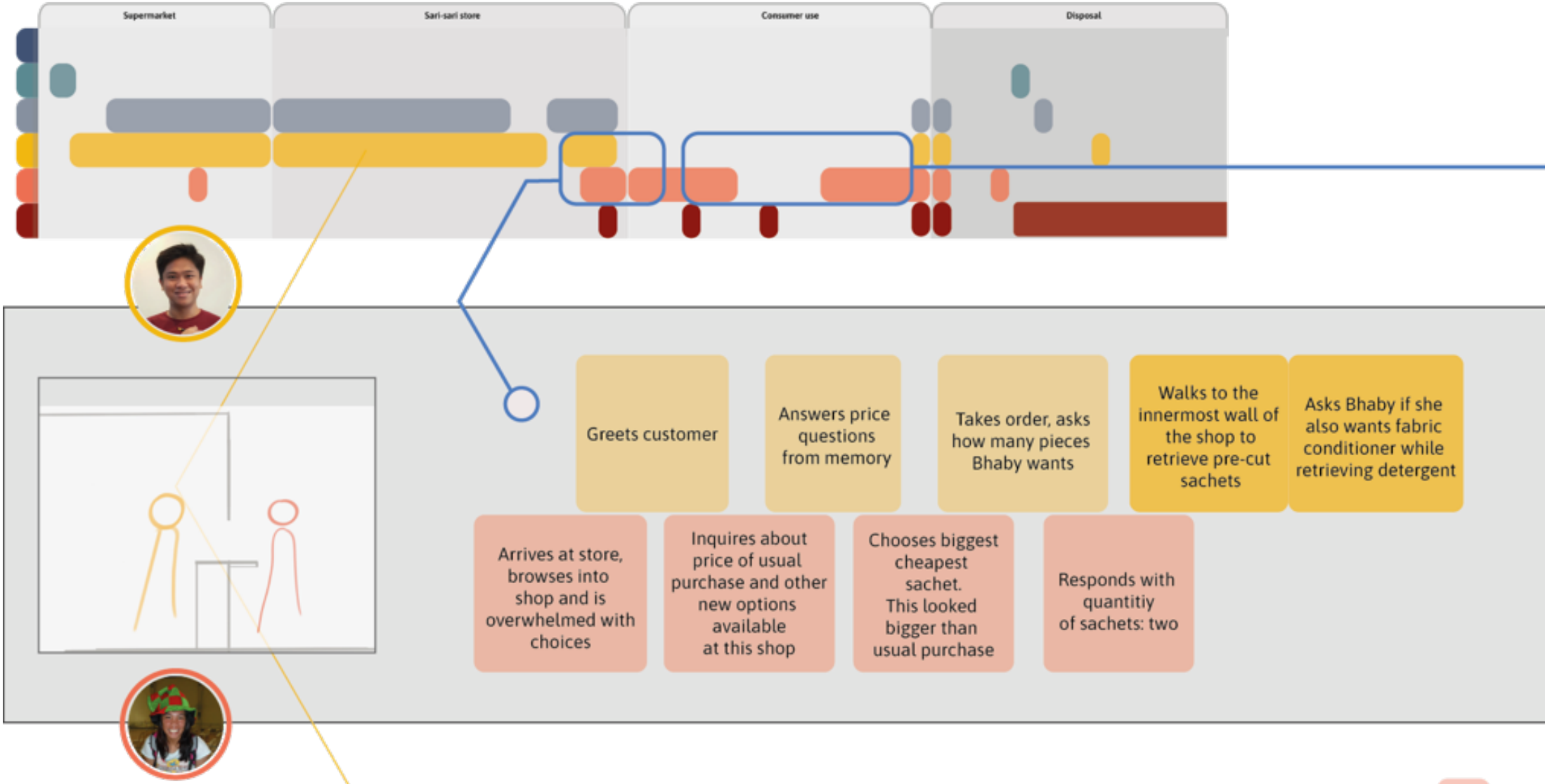
It is common practice to shake out any remaining product in the sachet into the laundry and soak the sachet in water to ensure everything gets used. Everyone but Richard will throw the sachet in a bin, while Richard takes their trash straight to the landfill where he collects recyclable waste.

Richard goes straight to the shore everyday instead of going to school. He sifts through waste-full and sachet-full water and land to collect plastic bottles and metal that he can sell to the junk shops around who then sell them to recycling companies. When his bag/sack is full of plastic bottles, he makes the walk to the junk shops, and does another trip for the day. He then gives the coins he earns to his dad.

Summary

It is apparent in this visualisation that sari-sari store owners have the most interaction with sachet laundry detergent products. It also shows on the map overview that once the sachet has been opened and used, it no longer becomes an immediate problem for everyone except for the waste picker who sifts through sachets every day to collect valuable waste that will earn him money. It is occasionally seen by the sari-sari store owners and the end consumers when littered on the street, and the manager when they dispose of promotional sachet collections.

The sari-sari store owners interact with the sachet the most even if they are not the main users of the product. This is why the ways that they interact with sachets were examined more closely. The next spread zooms into a journey map of a transaction between Jake and Bhaby.


Supermarket
Sari-sari store
Consumer use
Disposal
Greets customer
Answers price questions from memory
Takes order, asks how many pieces Bhaby wants
Walks to the innermost wall of the shop to retrieve pre-cut sachets
Asks Bhaby if she also wants fabric conditioner while retrieving detergent
Arrives at store, browses into shop and is overwhelmed with choices
Inquires about price of usual purchase and other new options available at this shop
Chooses biggest cheapest sachet. This looked bigger than usual purchase
Responds with quantitiy of sachets: two
Recap:
Unpack, inventory, price check, prepare, display, store
Jake makes an inventory of his purchases, double checks pricing, displays new sachets, cuts up old sachets, and stores the rest of supplies in storage room
Bhaby interactions
Jake interactions
Touch points with sachet
Bhaby
Jake

Asks how much she owes so far and how much fabric conditioner is, considering additional purchase

Tells how much total is without and with fabric conditioner

Decides to add 1 fabric conditioner

Retrieves fabric conditioner

Walks back to front with items, writes order in notebook and hands over items to Bhaby through window

Takes sachets and Hands over 50-peso blil

Receives payment, calculates change, walks to cash box and returns with change

Receives change, gives back PHP 5 coin and asks for a cigarette stick

Takes coin and retrieves cigarette on front table

Thanks Jake, lights up cigarette with lighter attached to store front and walks home

Bhaby handwashes clothes in dormitory bathroom

Chapter 3: Design

Design limitations

This research project explored a highly complex problem that operates on a global scale. In recognising that, this 52-week research project will not result to an “ultimate solution” proposition. Rather, it dove deep into data and analysis resulting in representations of appropriate design strategies towards the ultimate solution. Hopefully, these serve as a strong starting point for the next designers and researchers to push forward towards a solution sustainable for the environment and businesses alike.

The design process and iterations will be explained in quite a linear manner to keep iterations within the same design strategy. The design process was not linear with ideas often crossing between design strategies.

Design methods used

Sketching

Sketching was done on both paper and a digital tablet using the Autodesk Sketchbook and Concepts Apps. Some changes to designs were ideated by sketching on top of previous sketches or prototypes.

3D CAD Modelling

Autodesk Fusion 360 and Shapr3D were the software programs used for CAD modelling. CAD modelling was used as a tool for ideation as well as rendering realistic images and animating functions. In Fusion360, the sheet metal mode was used to prepare flat patterns for laser cutting of the final prototypes.

Prototyping

Prototyping was used for design sketching when iterations needed to be analysed. Some prototypes were just made out of simple forms to represent ideas, and some were more refined.

Foam forming, vacuum forming, paper folding, 3D printing, and laser cutting were used for prototyping.

Learning by making and doing

Playing out some of the movements executed by the personas in touch points provides valuable insight for the design process. Some functions of design iterations also had to be tested without refined prototypes.

Iterative design

Some of the design iterations were thought of and developed over a repetition of ideating, sketching, prototyping and analysing.

Materials used for final prototypes

Plain white foam core was the material used for both final prototypes. By keeping the prototype plain and of a low resolution, the designs are abstracted to an extent, communicating that it is not an end solution design, but a starting point towards the end solution.

Designs from initial study

Designs from the initial study were important starting points before starting the new design process. These will be shown in the next pages before moving on to the Design Strategies.

MATERIAL PRECEDENTS

Precedents focused on the examination of materials used were compiled to understand the context of what is already out there and what innovations were unfolding.

High value plastics were added to the mix under the assumption that user experience changes should be minimal for the bottom of the pyramid (BOP). The BOP is mostly focused on survival and cannot afford expensive changes.

Examining high value plastics can put the project in a better position for impactful reduction of plastic sachets.

Reusable high-value plastics

Biodegradable paper

Bioplastics

SYSTEM PRCEDENTS

System precedents developing internationally in line with the notion of sustainability were collected from examples given by the Ellen MacArtur foundation to understand how expert recommendations are manifested in design.

International Trends

Systems already exisiting in the Philippines that reuse containers, and/or create less waste were also compiled. The refillery-- a trial of the systems that followed interntaionally tested in the Philippines was also included.

Existing Locally

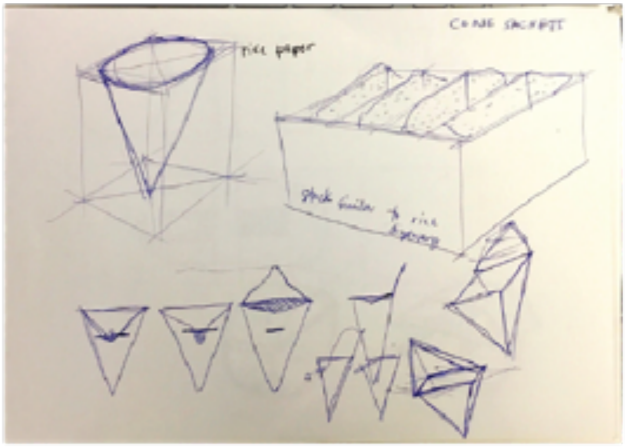
Systems that do not necessarily create less single-use plastic such as rice dispensaries were also included to challenge how design outputs in this proposal can mimick functions Filipinos are familair with.

Function Familiarity

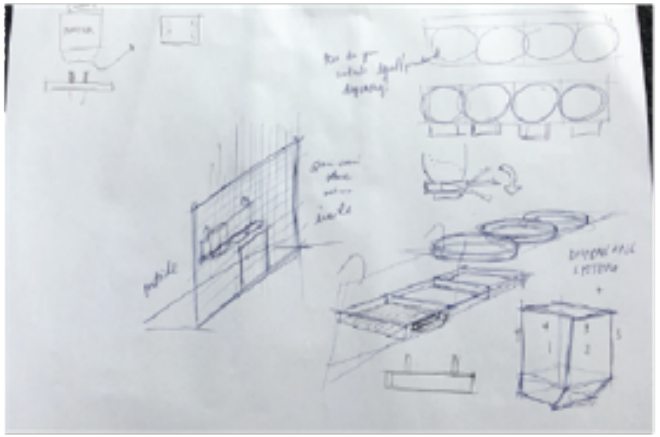
Initial Design Experiments

The first iterations were called experiments since they were created using the ideation process through sketching. These were catalysts to further iterations.

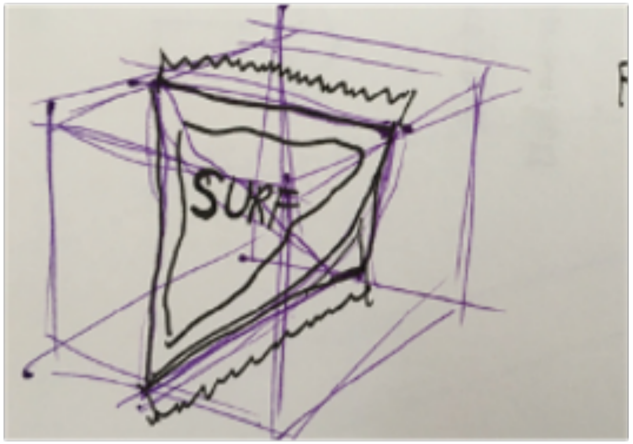
The ideas were a response to the "what if" questions based on the precedents examined prior to sketching. This process also contributed to the decision to limit the research to laundry detergents.



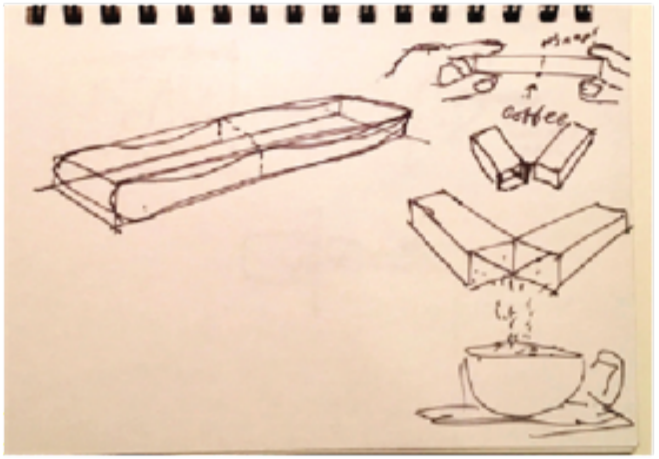
Imagining laundry detergent dispensed like rice with cone sachets



Hanging carton dispensers



Rice paper sachet changing the material only



Coffee sachets snapped like egg into mug

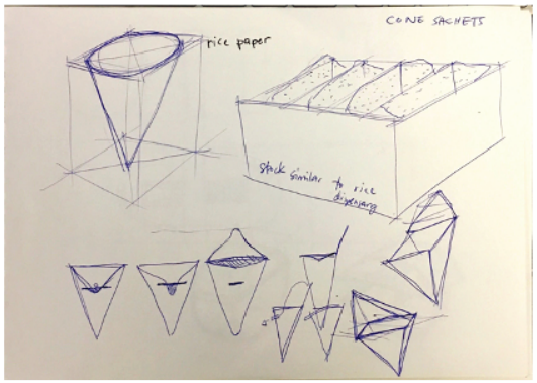
Cone sachets

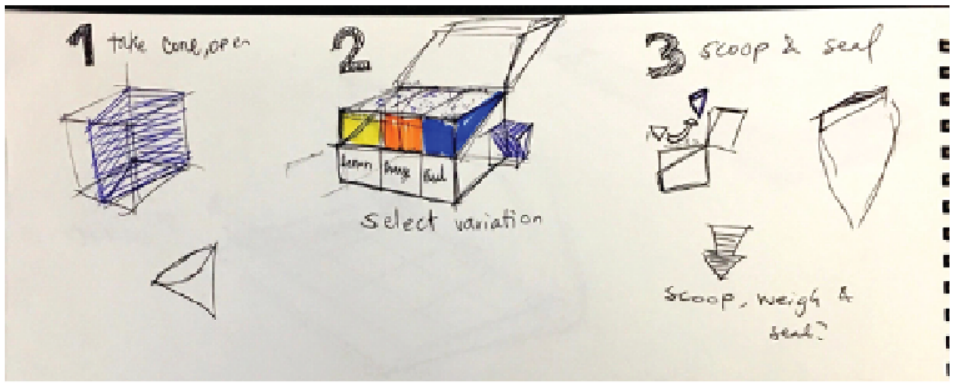
The cone sachet design experiment responds to the question: “what if we distributed detergent the way we distributed rice?”

The idea incorporated the scoop-fill-seal model used in dispensing rice with slight changes such as: pouring into paper cones instead of plastic bags.

This idea uses the existing carton structure used for laundry detergents, adding flattened paper cones on the side.

The cones are sealed via folding which is not a secure seal, but imagined to not matter due to the proximity of stores to houses.



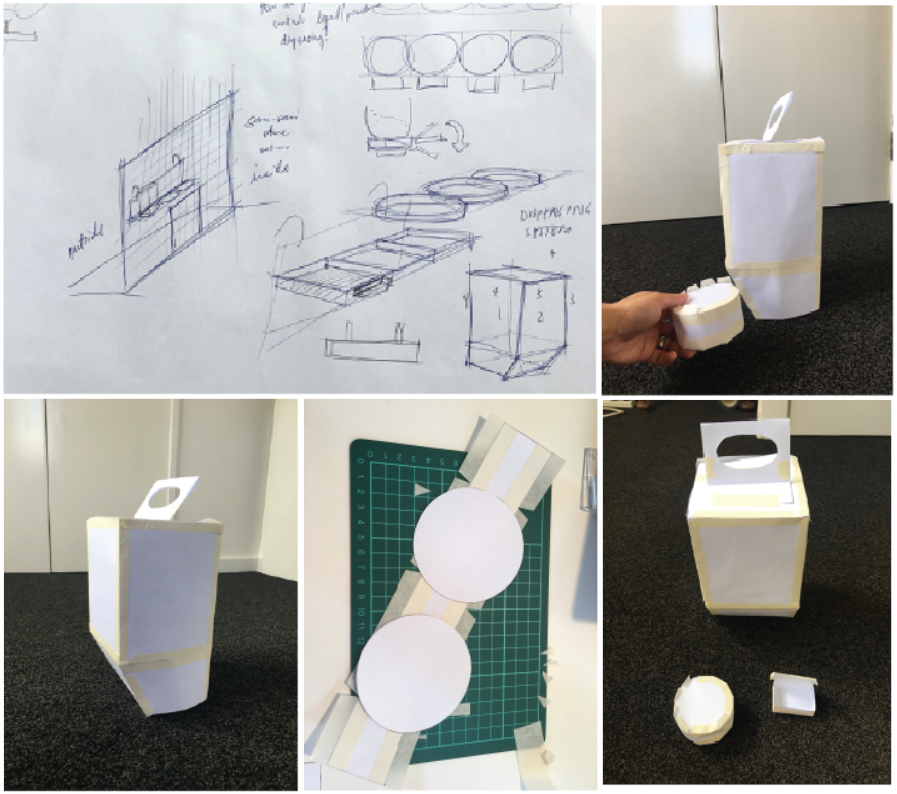


Carton Dispensers

Exploring the dispensing idea further, sachets are typically hung in the store, serving as display and saving storage space.

The idea has 3 components: A carton container, a special dispenser, and small containers that fill up when inserted into special dispenser.

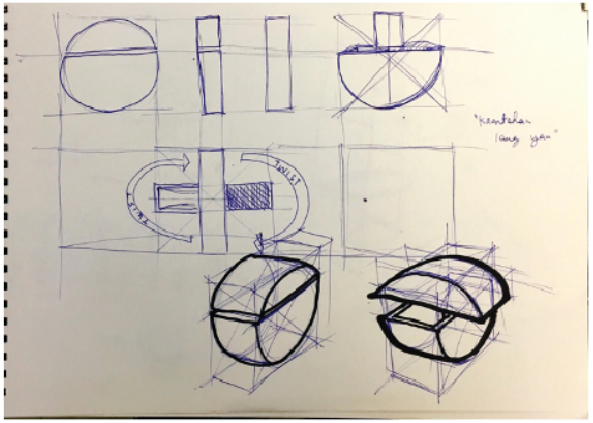
Techniques used in prototyping with paper are referenced to Paul Jackson’s Structural Packaging

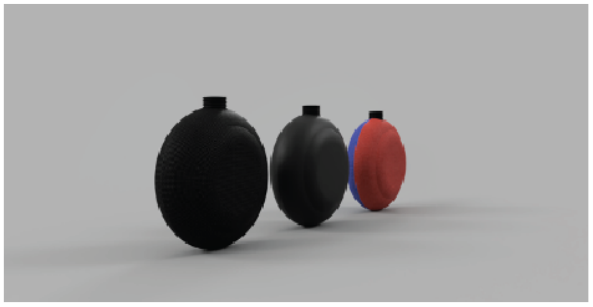


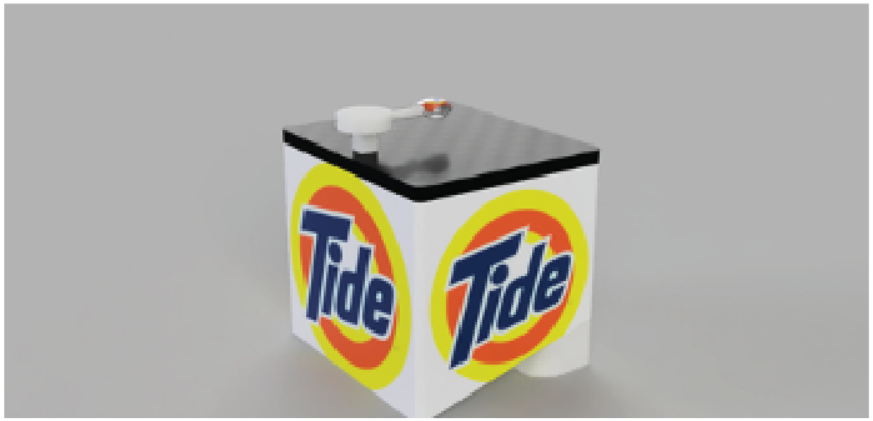
Beetle Experiment

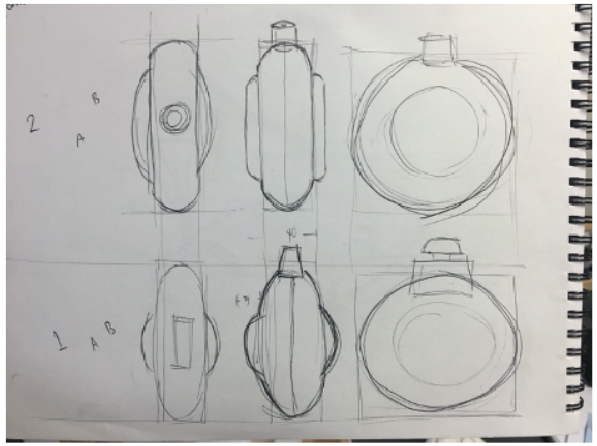
This experiment originally imaged shampoo and other liquid detergents in a reusable container to replace bottles, and to bring to stores to refill. The bottle evolved in shape when imaged to mimic the squeezing done on some bottles and sachets.

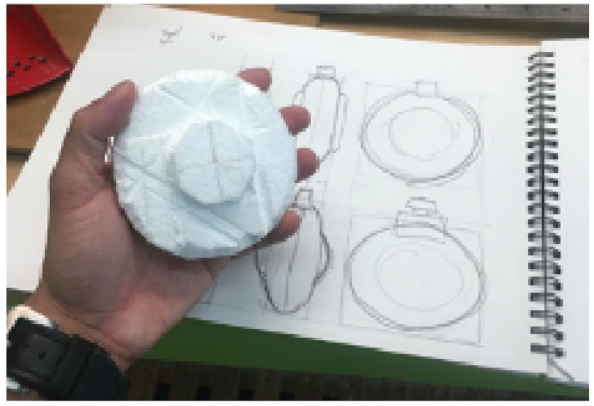
The experiment was taken further using Fusion 360, and eventually branded with laundry detergent brands.

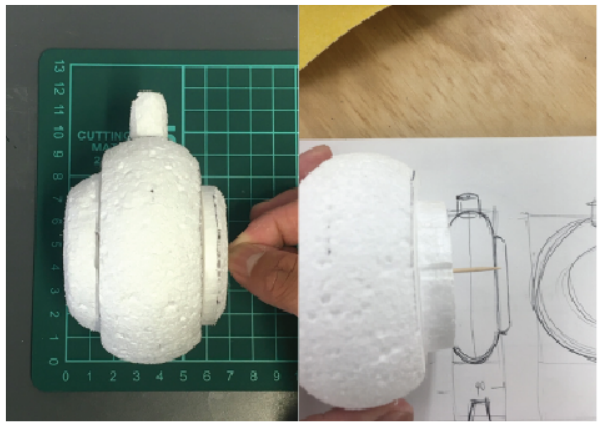




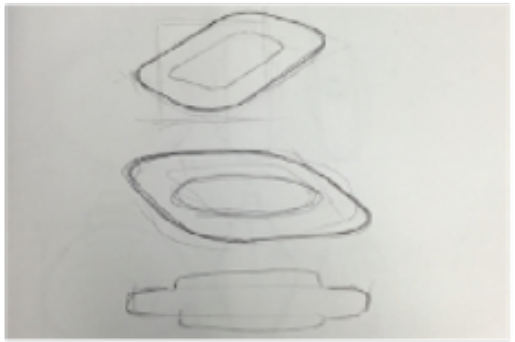


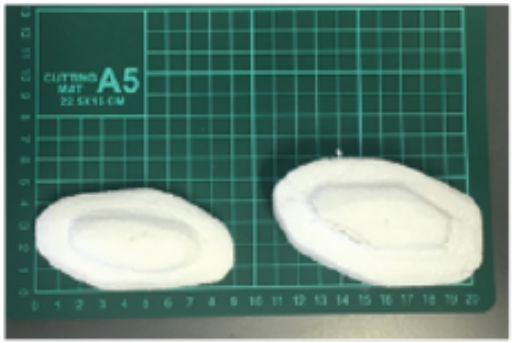


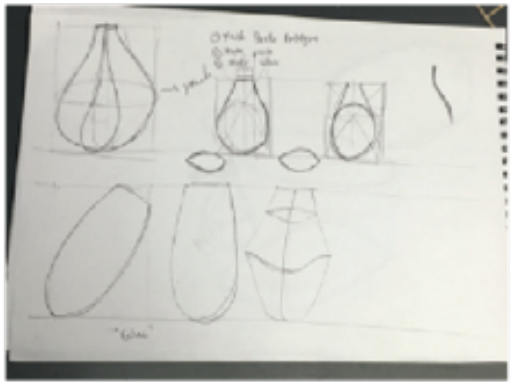




The idea was further explored using design sketching through prototyping. Foam blocks were used to play around with the shape and size of the design.







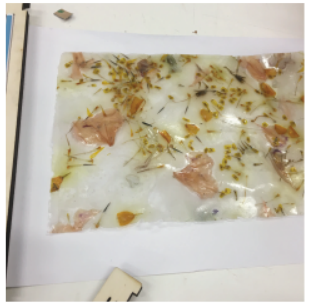
The iteration eventually circled back into shampoos after a shampoo sachet arrived from India through a colleague. The experiment was pursued further into squarer and longer shapes.

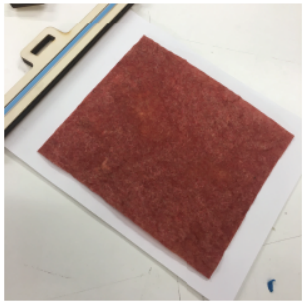
This stage of the design experimentation led to questions like “who am I designing for?”, “what [product] am I designing for?” which served as a starting point in the beginning of the year-long research project.

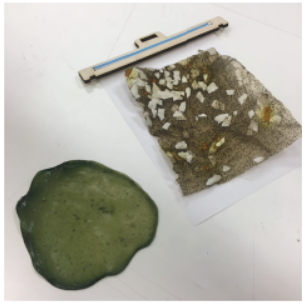
Bioplastics Experiment

To better understand bioplastics better, a bioplastics workshop was requested with Fablab Wellington. Using orange peels, a bioplastic sheet was created.

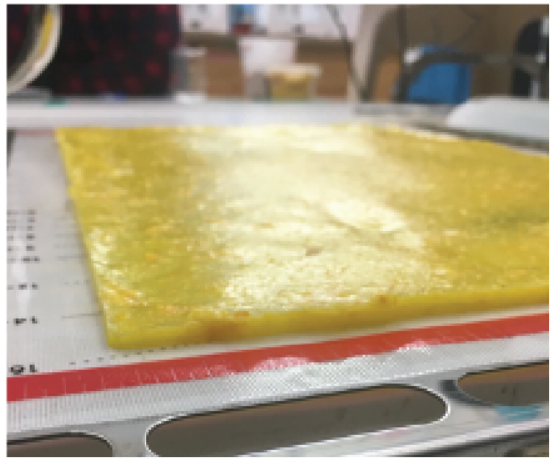
Several papers about were also reviewed, which eventually led to the decision not to pursue bioplastics because it is an emerging technology which the full impact of is still unknown.

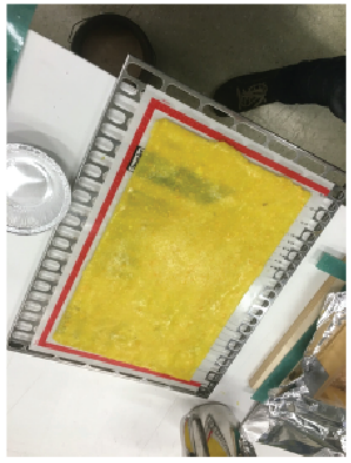






Past bioplastics work created by FabLab Wellington





Design Criteria

In creating the design criteria, it is important that the main persona Jake is placed at the centre of considerations. In placing him there, it is important to remember his context and his goals.

The design criteria must also adhere to the 4A's of the sachet marketing strategy: Affordability, Availability, Awareness, and Acceptability (Anderson and Billou).

Affordable – The product must be available in single serves of at least 75g which is the typical sachet serving size of laundry detergent powder. Because estimating the actual manufacturing price of a design proposal is outside the scope of this research, I have to rely on the fundamental idea of using already existing technologies and materials used in packaging targeted towards the BOP market.

Availability – If Jake is able to purchase the same bulk amount he normally would with sachets, then it can be assumed that stock will always be available in Jake's store. Jake must also be able to purchase at least 3 variations of laundry detergent at a time.

Awareness – The proposed systems must also fit the display desires of Jake. The product must always be visible and must fight to stand out in the visually noisy store front

Acceptability – Jake will only accept the new system if it works well within his requirements and goals for the sari-sari store. Change in the way the product is purchased, the time and effort it takes must be minimal for it to be accepted. It must also be accepted in the small space that the sari-sari store has to ensure it does not delay business as usual.

The design criteria are as follows:

- Create minimal changes in shopping and selling logistics for Jake,
- contains odour,
- does not have folds that hides/wastes products,
- can be grouped into around 30-40 sachet equivalents,
- does not exceed 3.5kgs,
- has enough flat surface for brand placement,
- has sizing relatable to sachets,
- does not take up too much space at the store,
- can serve as a display at the store,
- does not require new construction at the store,

- does not cost set up capital and;
- eliminates plastic sachet waste from product.

Key Decisions

No bioplastics

Bioplastics is still considered new technology that still costs a lot of money. The Philippines ranks poorly in waste management performance for existing waste, and new materials whose effects the world does not fully understand yet will not be helpful in the long run.

No electronics

There have been various suggestions towards going electronic in the form of vending machines or electronic desktop dispensing machines.

Electronics require maintenance and additional technology skills which can complicate things with the main persona Jake and the wider sari-sari store owner group. If a machine breaks without easily being able to repair or replace it, the system will not be accepted by store owners. Finally, electronics create a whole new set of waste which is counterproductive to the goals of this research project.

No weighing scales

While the use of weighing scales are familiar to the Filipino market because of rice dispensaries, the use of weighing scales in any refillery experience takes a significantly longer time. The transaction must be as similar as possible to the plastic sachet transaction.

Design strategies

Refill-Reuse Design Strategy

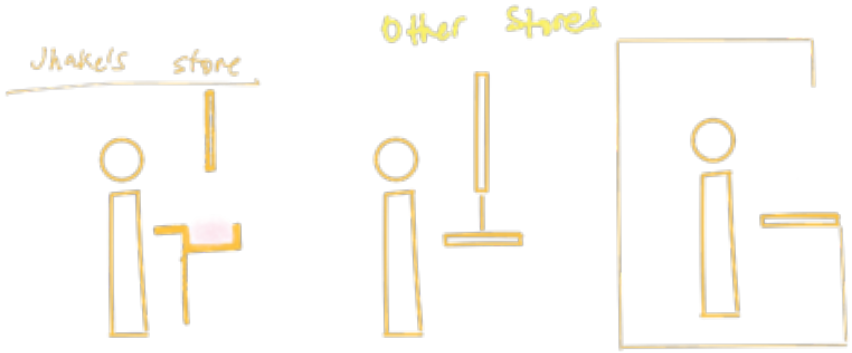
The first design strategy being Refill-Reuse was identified s based on recommendations of organisations like the Ellen MacArthur Foundation and the Global Alliance for Incinerator Alternatives towards zero-waste refill systems. This was identified as a viable strategy because of the sari-sari store location and density. In addition, before plastic sachets were produced by MNCs, there is evidence that sari-sari store were already repacking and redistributing products. A sari-sari store is almost always a 10-minute walk away from anywhere in the city, which gives the refill-reuse strategy an advantage.

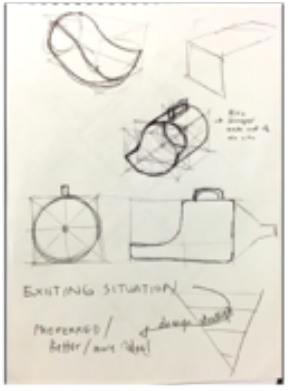
Refill-Reuse Design Iterations

Design Criteria:

Minimal changes in shopping logistics
Minimal changes in selling logistics
Contains odour
Construction does not waste product
30-40 sachet equivalents
Does not exceed 3.5kgs
Surface for brand placement
Sizing associated with sachet
Does not take up too much space at store
Does not cost capital for set up
Eliminates plastic sachet waste

Without the proper affordances, refilleries like the ones above will result to plastic bag filling stations, the way rice is being currenty dispensed.





As a starting point, this design was reviewed. This design has many failing points in relation to the design criteria. The following are worth highlighting:

- **X Minimal changes in shopping logistics**
- **X Minimal changes in selling logistics**
- **X Construction does not waste product**

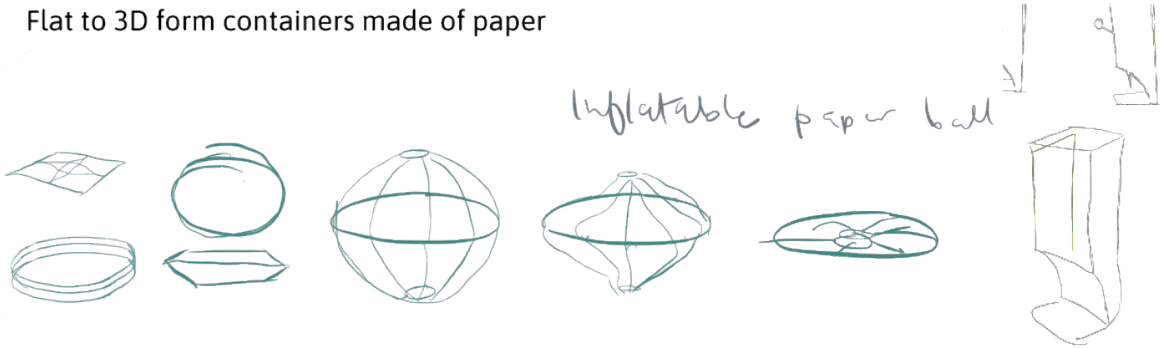
In addition to failure points are the following questions:

Who will bear the burden of the special refillable container?
Will the flexible bottle be valuable at the end of life cycle?
How much additional storage will it cost Jake?
Why shouldn't Jake just fill up plastic bags the way rice is sold?
Are there more common shapes to assume lower container cost?

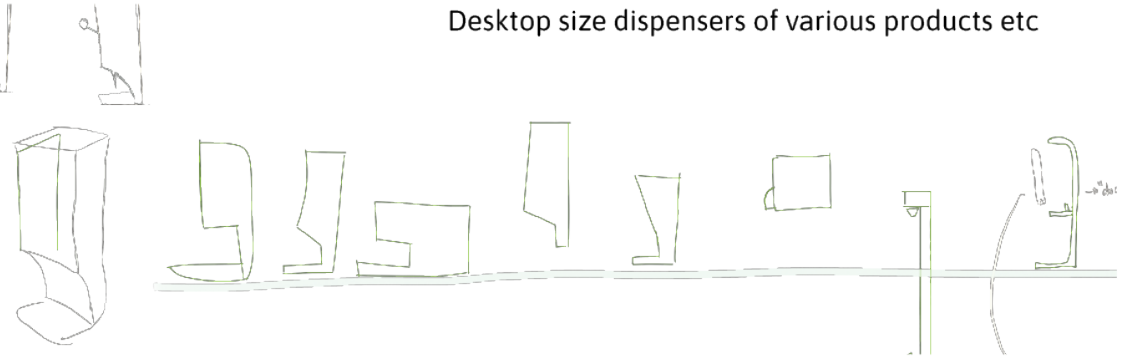
To answer these questions, further exploration was done.

Exploring simpler container shapes

Flat to 3D form containers made of paper

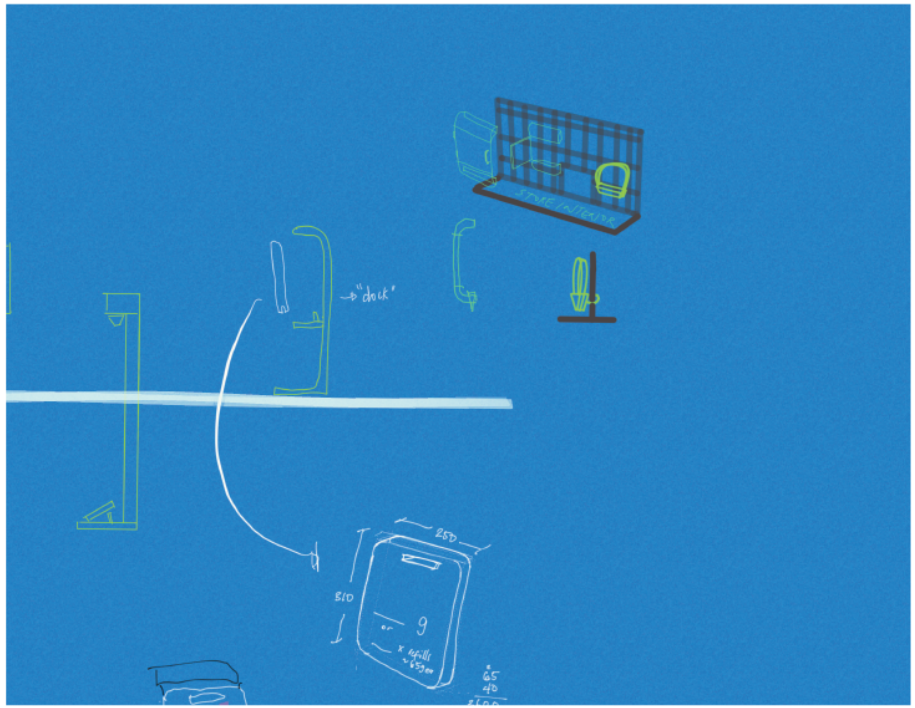


Desktop size dispensers of various products etc



imagining a container that inflates requires a dispenser that matches the packaging for it to work.

Sketching the dispenser and imagining this sequence led to further exploration of desktop dispensers



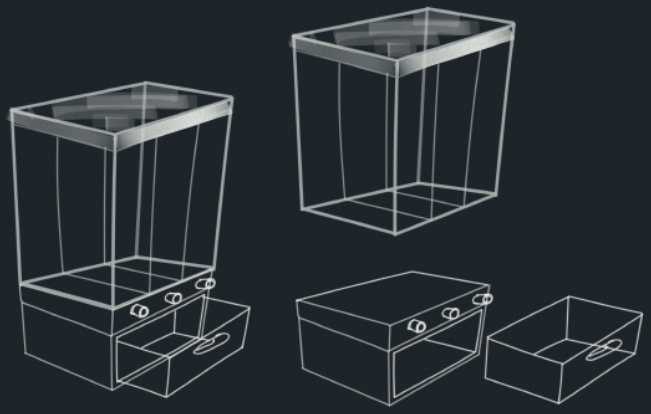
First version of the Dock concept

The concept of a “Dock” felt very fitting for the direction I wanted to be heading.

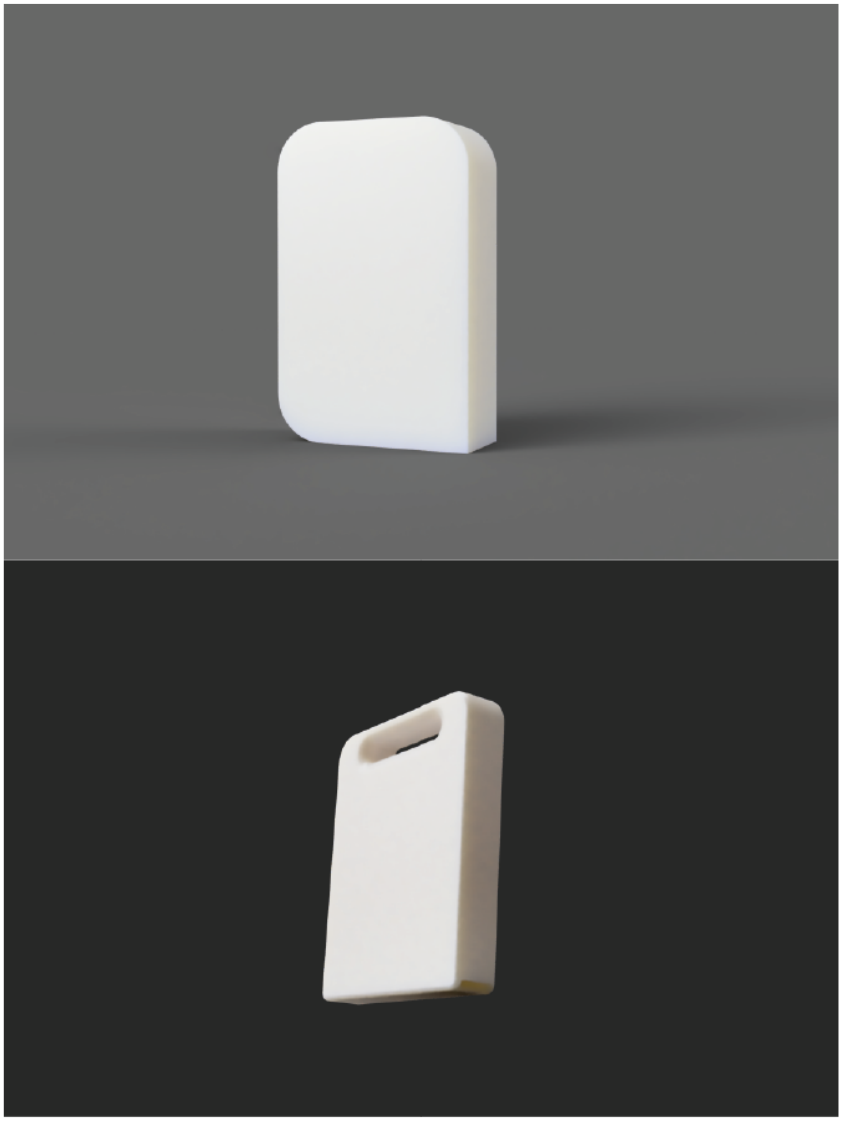
I wanted Jake to have the ability to purchase something from the store and plug it into his system.

A dock can be associated with electronics and chargers. In the same way different brands of smartphones can be charged to a C-USB charger, different containers can ideally fit into the same dispenser.

Dry grains dispenser designed for homes
image source: Wish.com



Deconstruction of existing dispenser homeware



Turning point

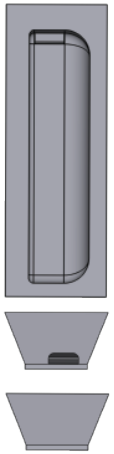
Container exploration now more centered to Jake.

Earlier, the container was still for Bhaby’s use even if the intention of designing it was for Jake to conveniently fill it for Bhaby.

Above are first shapes of container.

Laundry detergent brand decals added to CAD models, testing the concept

Container



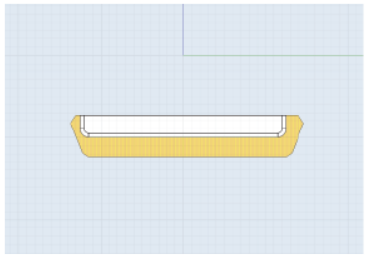
Dock (Dispenser)

Cibatool prototype of early dock dispenser iteration.

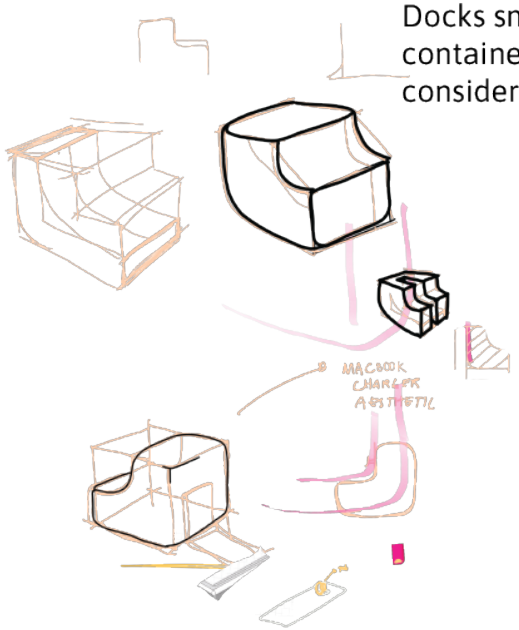
Tilt added to design to let powder detergent flow towards corner exit.

Dock Dispenser v3

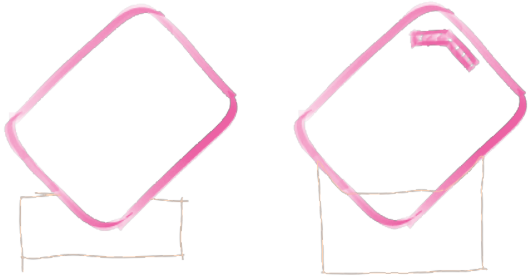
Third Dock Dispenser iteration. Colour added to CAD model to see container location while make adjustments to the dock.



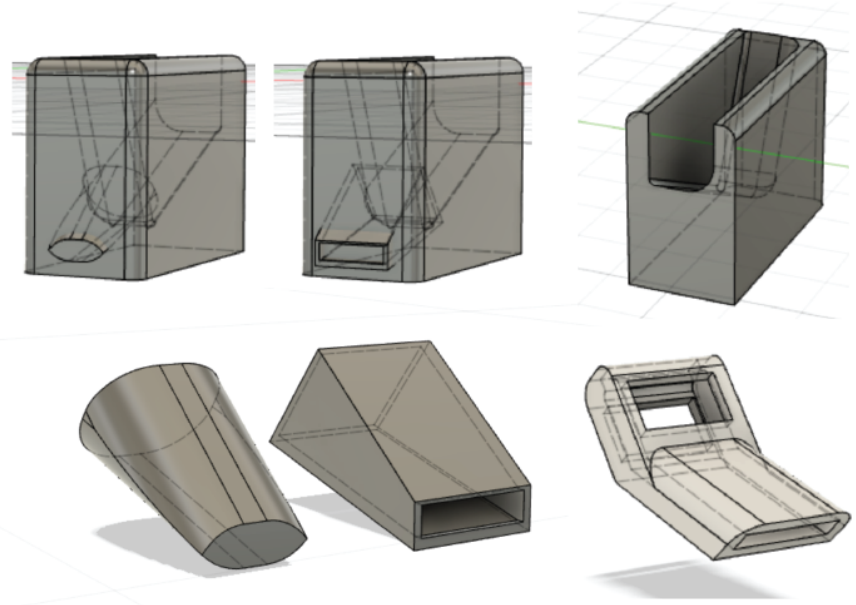
Dock internal shape design prior to change while prototyping



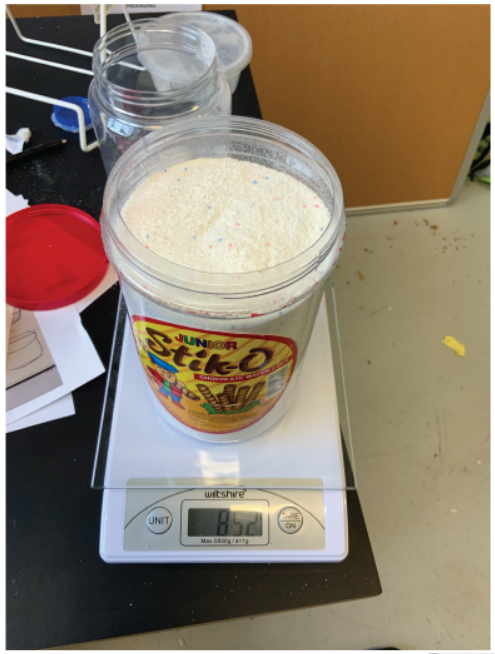
Docks smaller than container were considered



Added rotation to increase Tilt to design and to reduce dock size



How does laundry detergent flow from the container out of the disppenser?



How big should the dock dispenser be?
How many sachets should fit into the container?
How can it still be familiar to Jake?

I filled different familar containers with laundry detergent to help me determine a size for the dock dispenser.

I also weighed some of the to see how many 75 grams (1 sachet) can fit into the containers.

I eventually found a 5KG detergent bag at a store in the city, which is similar to the big bags sold in the Philippines. I prototyped a rough 1:1 scale container to represent and test how the size feels.

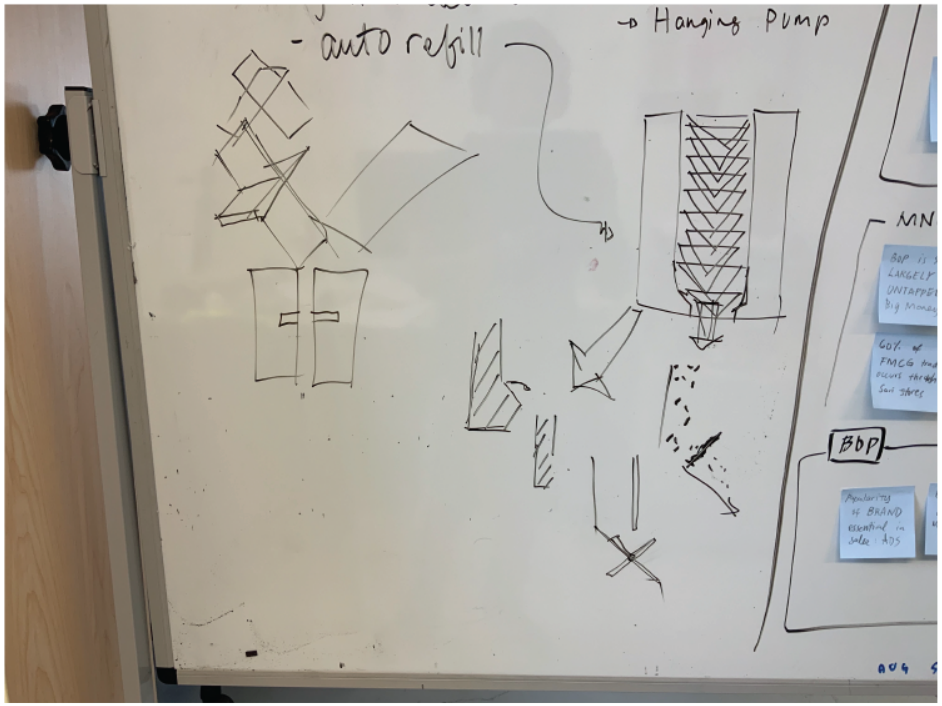
two 1:1 rough prototypes against a foam core 1:2 container prototype

Other ideas: Auto-Fill Cones

The design process was not linear. Often times, I'm juggling a few design ideas at a time, while refining some of the research and data.

Throughout the design process, many attempts to answer questions evolve into a different design idea which can be attached to an iteration, but can also start an entirely different design.

The autofill cones was briefly explored as I tried to figure out how the paper cone ideas can be developed and how and where the dock dispenser should dispense t.o

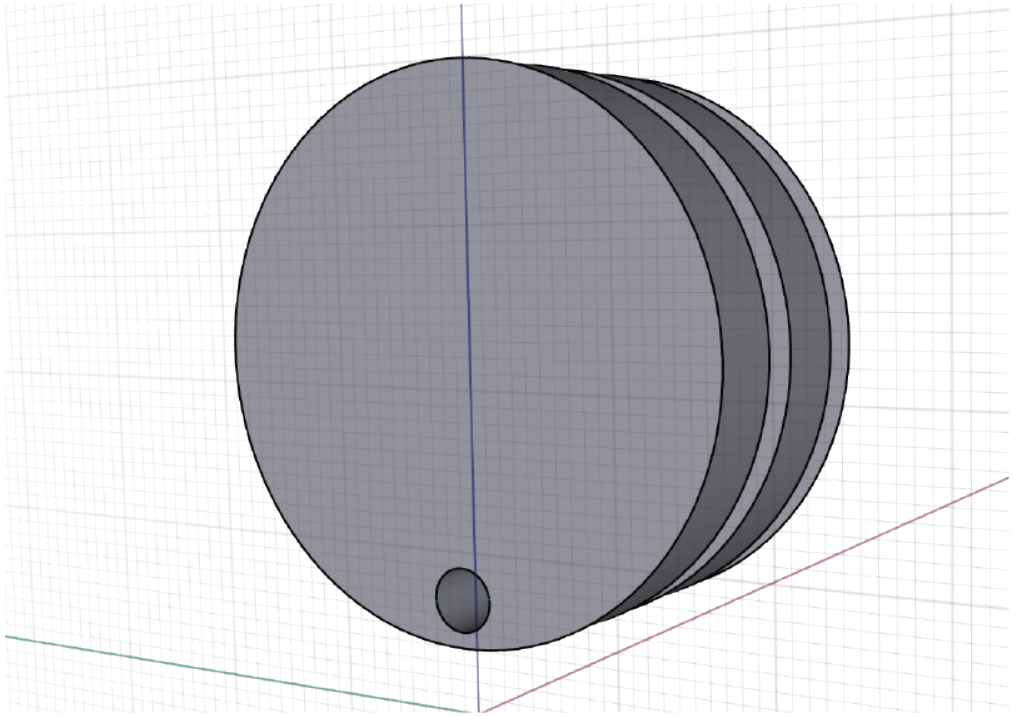


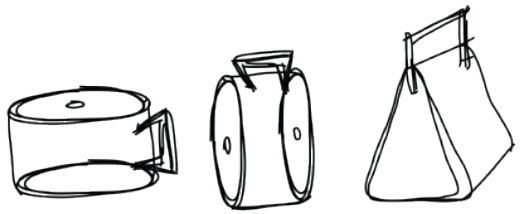
Other ideas: Film Tin Iteration

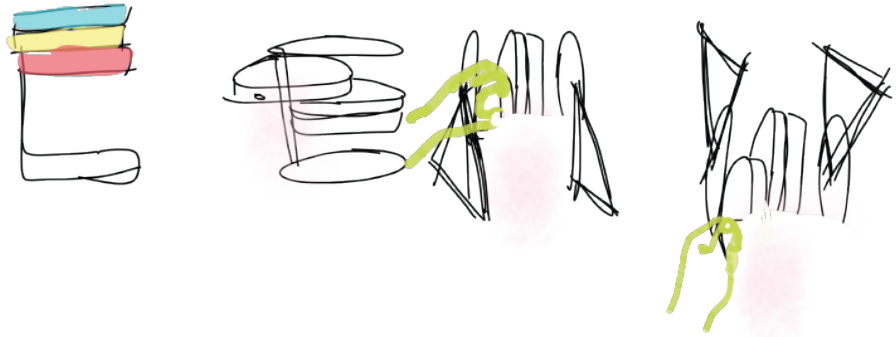
Some ideas come to mind while designing between the two design strategies.

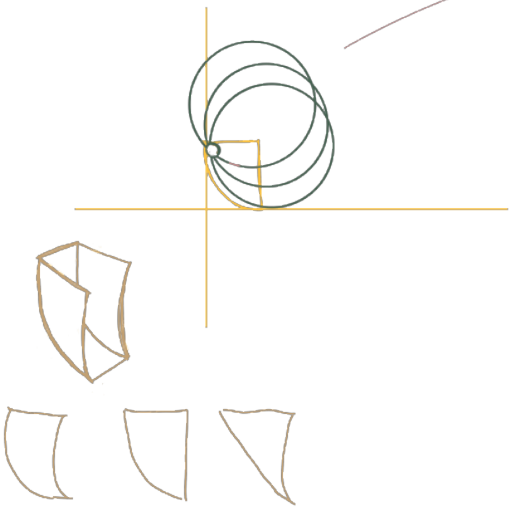
The Film Tin iteration exlores the use of short, cylindrical shapes similar to a film tin.

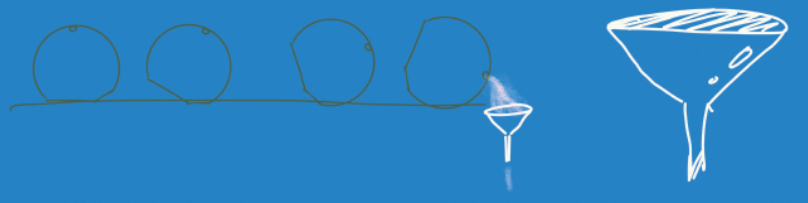
The rolling motion is used as a way to move powder detergent around out of the exit point.

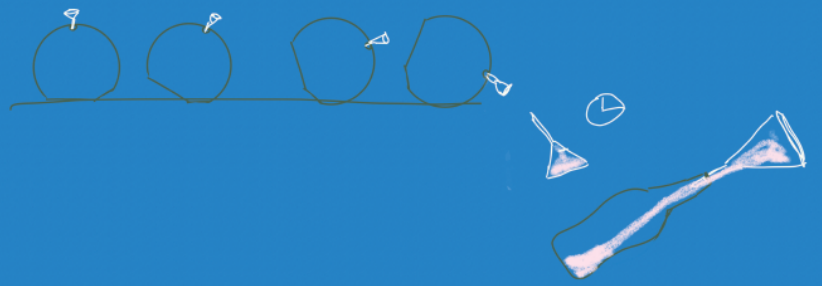


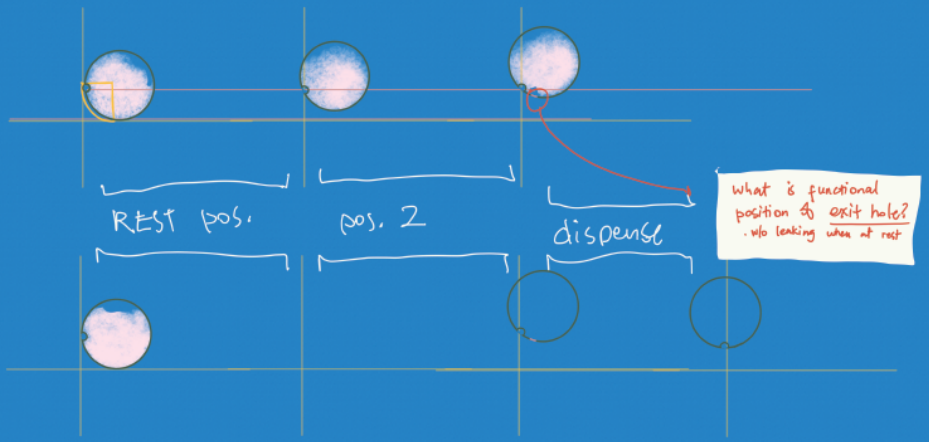


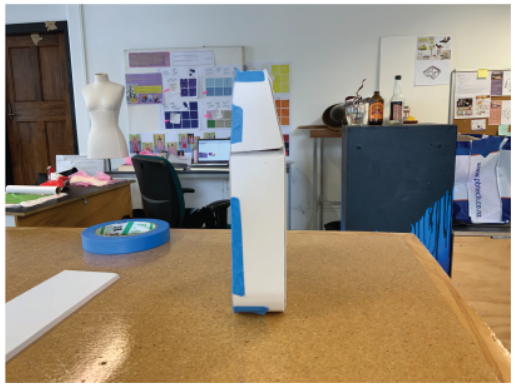
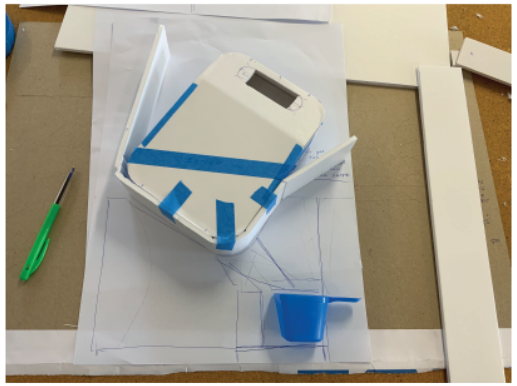


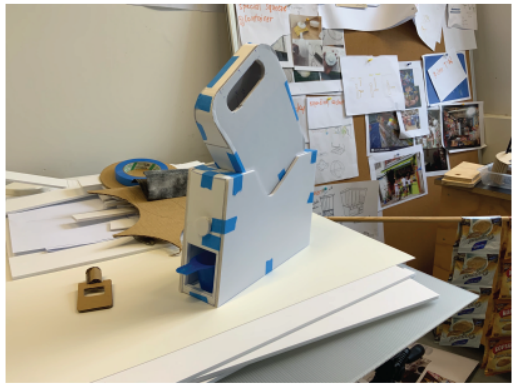

Test w/ Acrylic sheets + Glue Gun

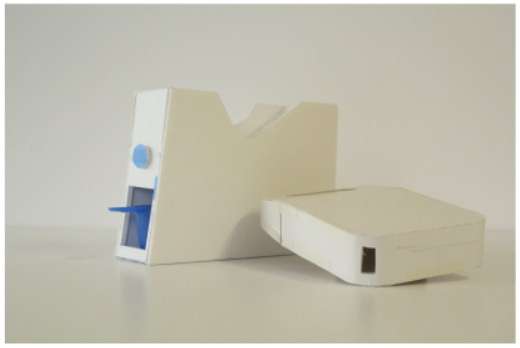





REST pos.
pos. 2
dispense
what is functional position of exit hole?
- w/o leaking when at rest



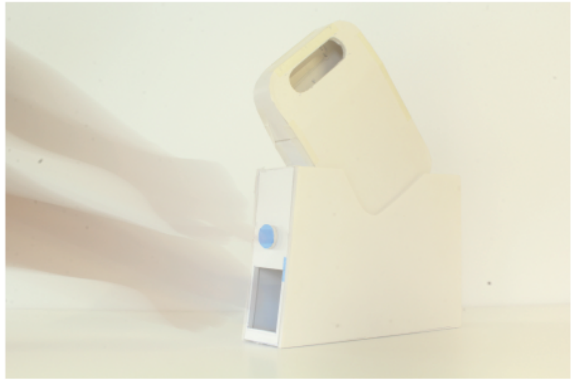


Dock Dispenser v4

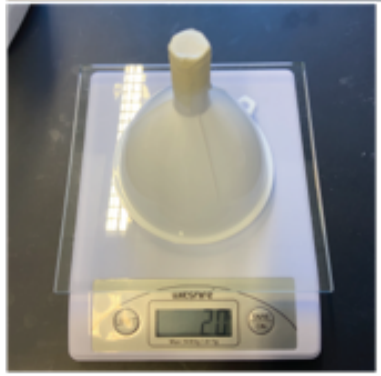
Foam core was used to build a prototoype of the dock dispenser. Before building the dipenser, the container was built. As soon as I was able to experience handling the container, I decided that it must be fully supported by the dispenser, and so the overhand was extended to a full length for the container to fully sit on.

In this iteration, a button was placed to represent the same home rice dispensing, with a laundry detergent scoop inserted to catch the dispensed powder.

Prototype Scale - 1:2



On the right, the early paper cone idea represented by an orginami prototype was used as consumer packaging within this iteration. This brings back the need to put affordances and signifiers to push Jake away from using the cheap and already familiar plastic bag.



Funnels

Funnels are highly present in refillery models in the world. Funnels allow the ease of filling up bottles with smaller nozzles.

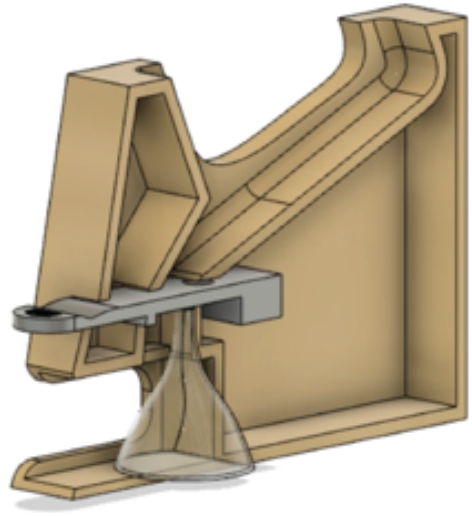
Using funnels instead of a scoop could still result to Jake filling up plastic bags, but it at gives him the option to pour the powder into a plastic bottle if he or his customers wanted him to.

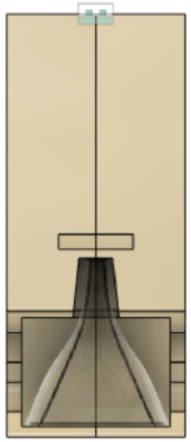
I filled up a funnel that fits the 1:2 scaled prototype and it can hold around` 20 grams of laundry detergent powder.

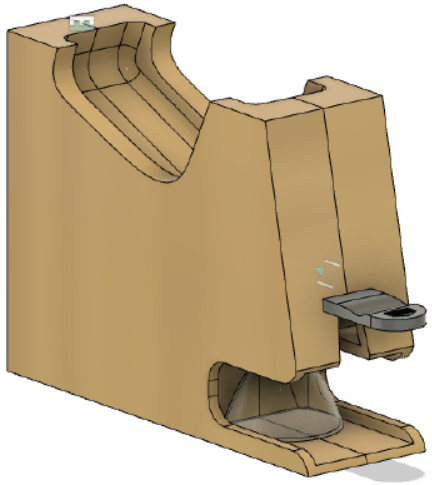
Dock Dispenser v5

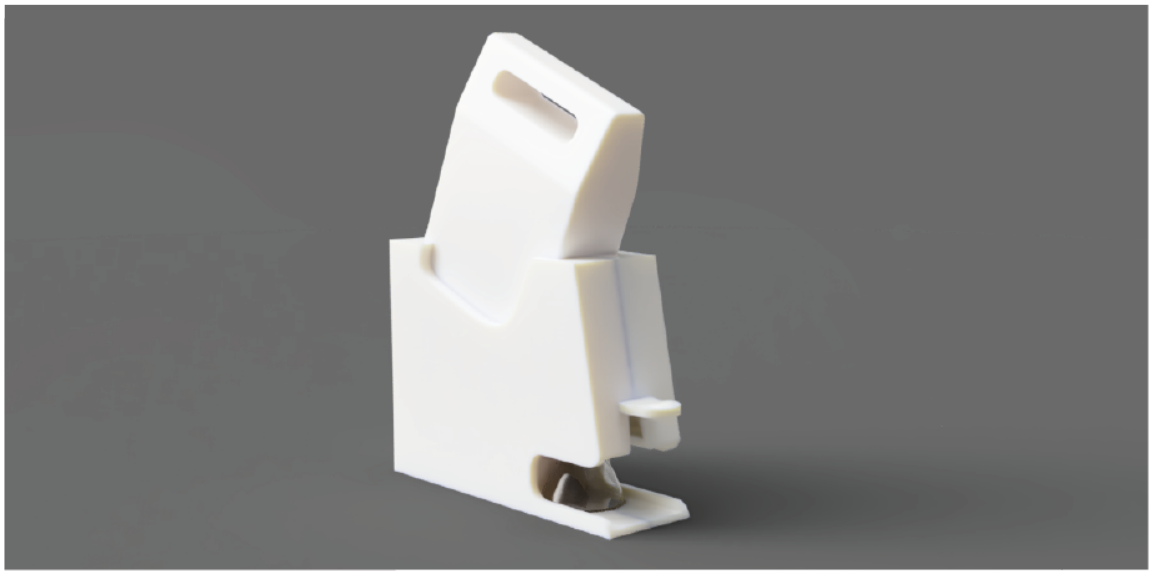
The funnel was incorporated into the design, adding a handle and closing the bottom, creating a single entry-exit point into the funnel. This may discourage Jake from replacing the funnel with a regular scoop or cup.

Adding the funnel also required a slightly different dispensing mechanism. A pull valve and a redesigned flow path were added to make this design iteration work.



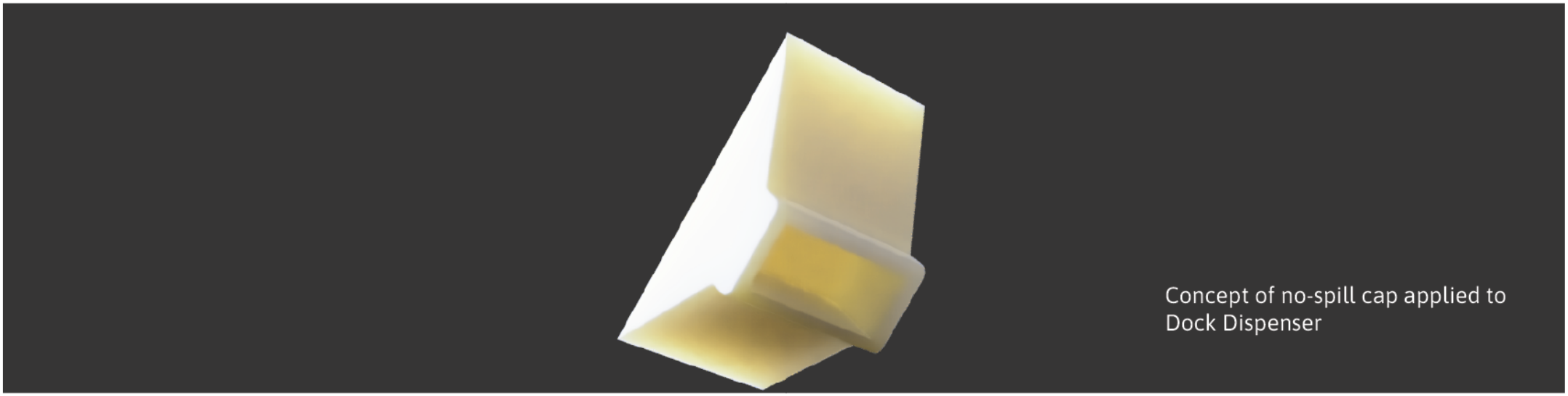




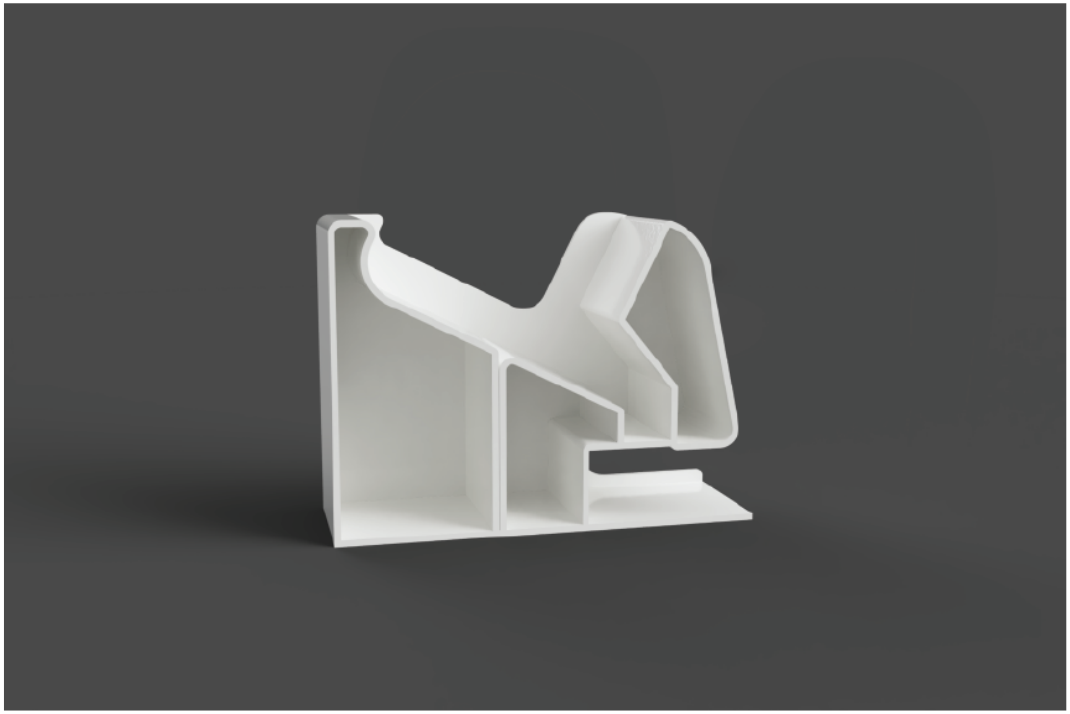


The final piece of the puzzle is how the container will be sealed until it is plugged into the dock.

The author notes that existing systems in water refilleries can be applied to the Dock Dispenser. Water gallons plugged into dispensers that is used around the world have no-spill caps that allow the bottle to open only upon plugging into dispenser in a “puncture” function.



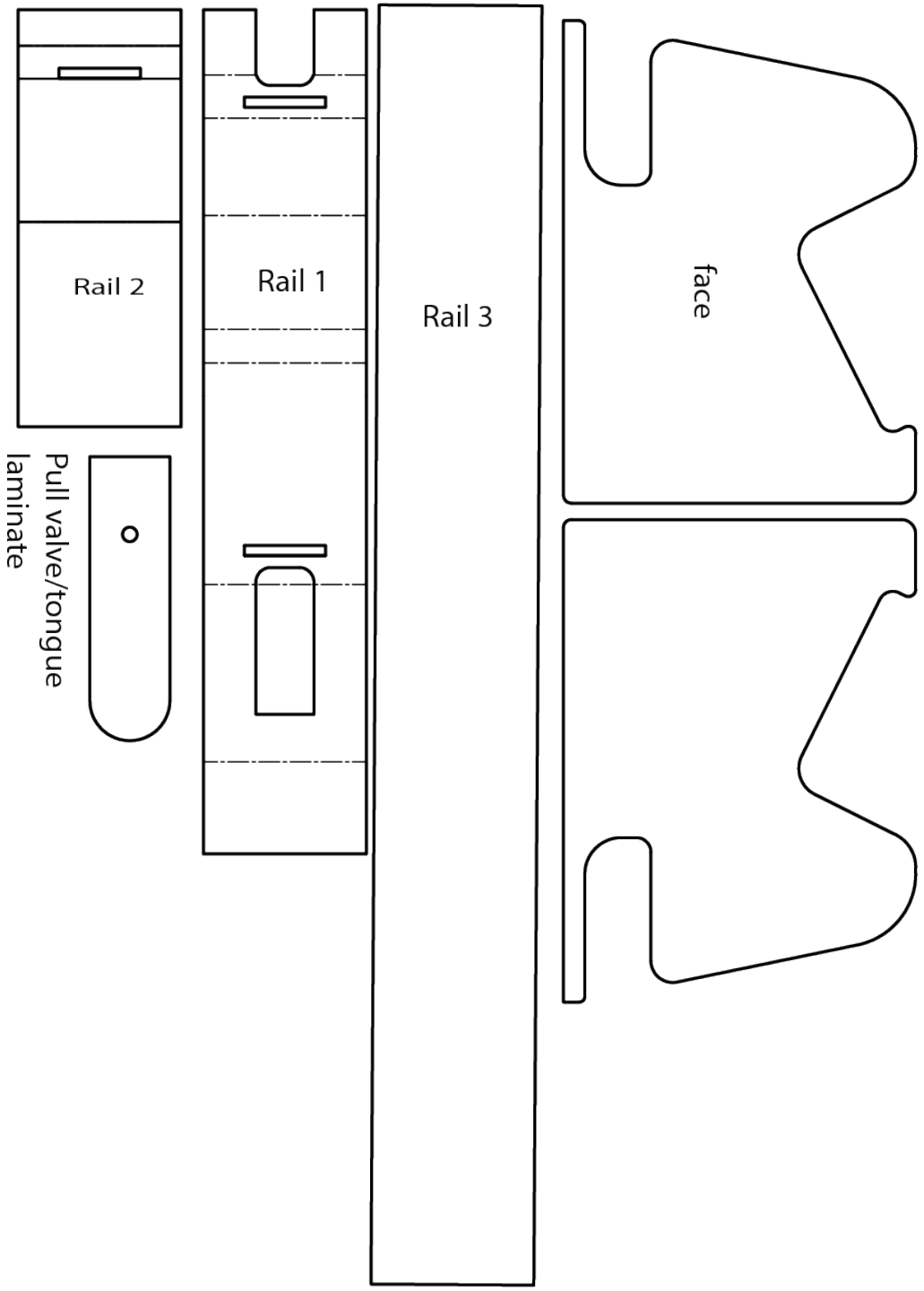
Concept of no-spill cap applied to Dock Dispenser



In preparing final prototypes, I used Fusion360's sheet metal function to generate flat patterns to laser cut and assemble.

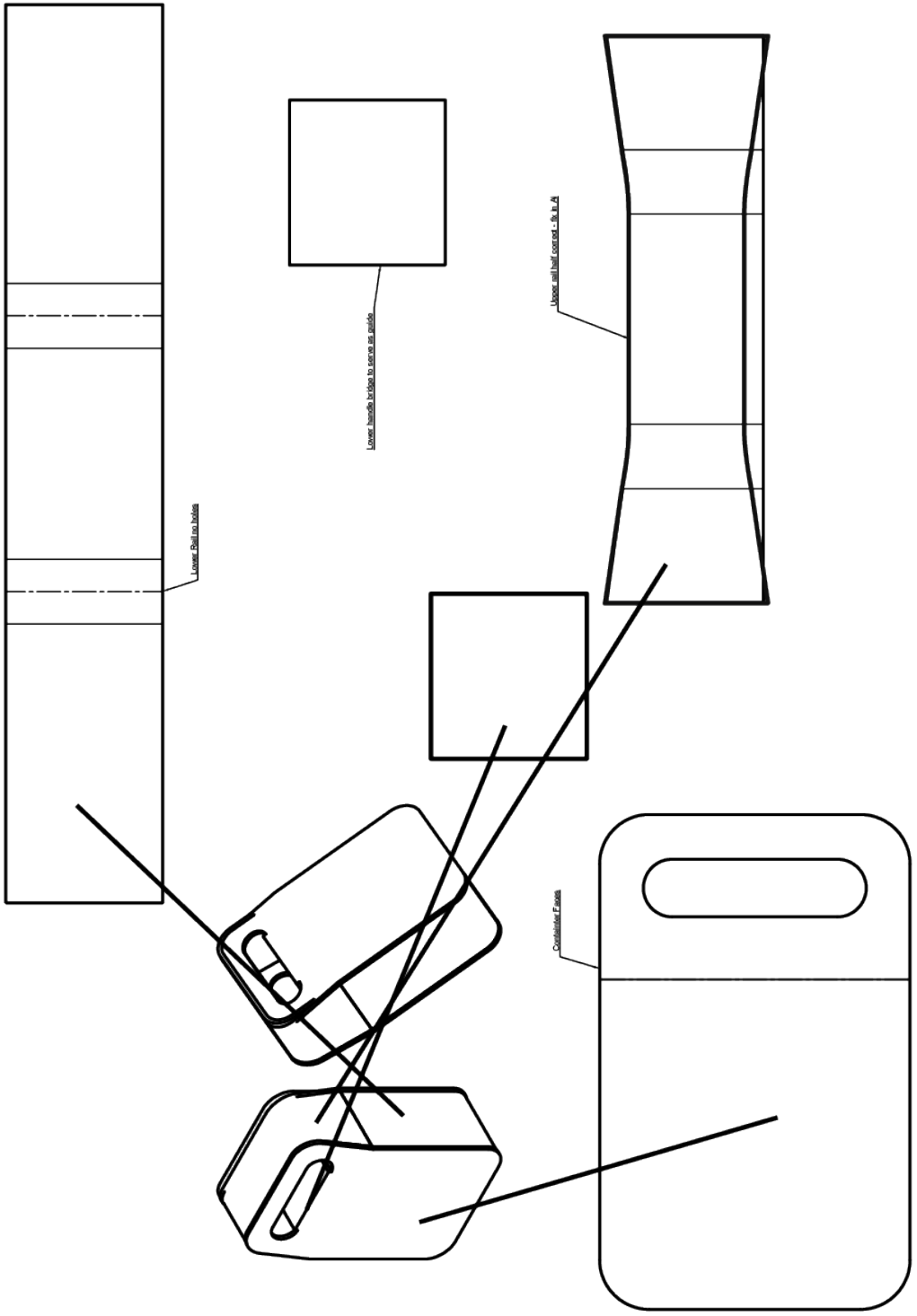
Some minor changes were made, adding curves to soften corners and create a child-friendly dispenser, given that many sari-sari stores have their young watch and operate the store every now and then.

On the right are the flat patterns generated through Fusion360 and into the Drawing function.



As I prepared the components to match a 1:1 scale, some of the proportions were adjusted accordingly.

On the right are the flat patterns generated to laser cut pieces of the container for assembly.



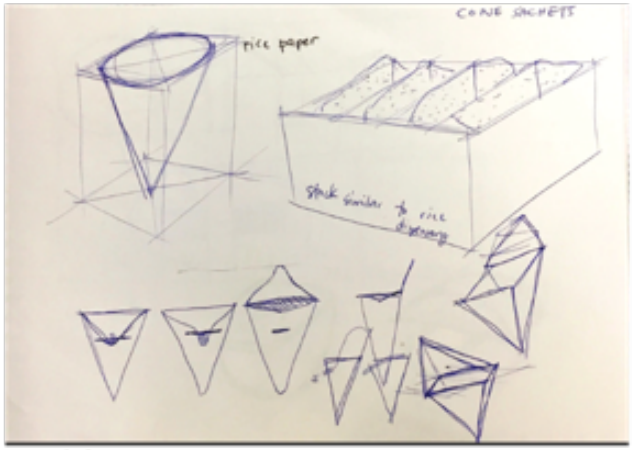
Overview of Dock Dispenser Iterations

Disposable Design Strategy

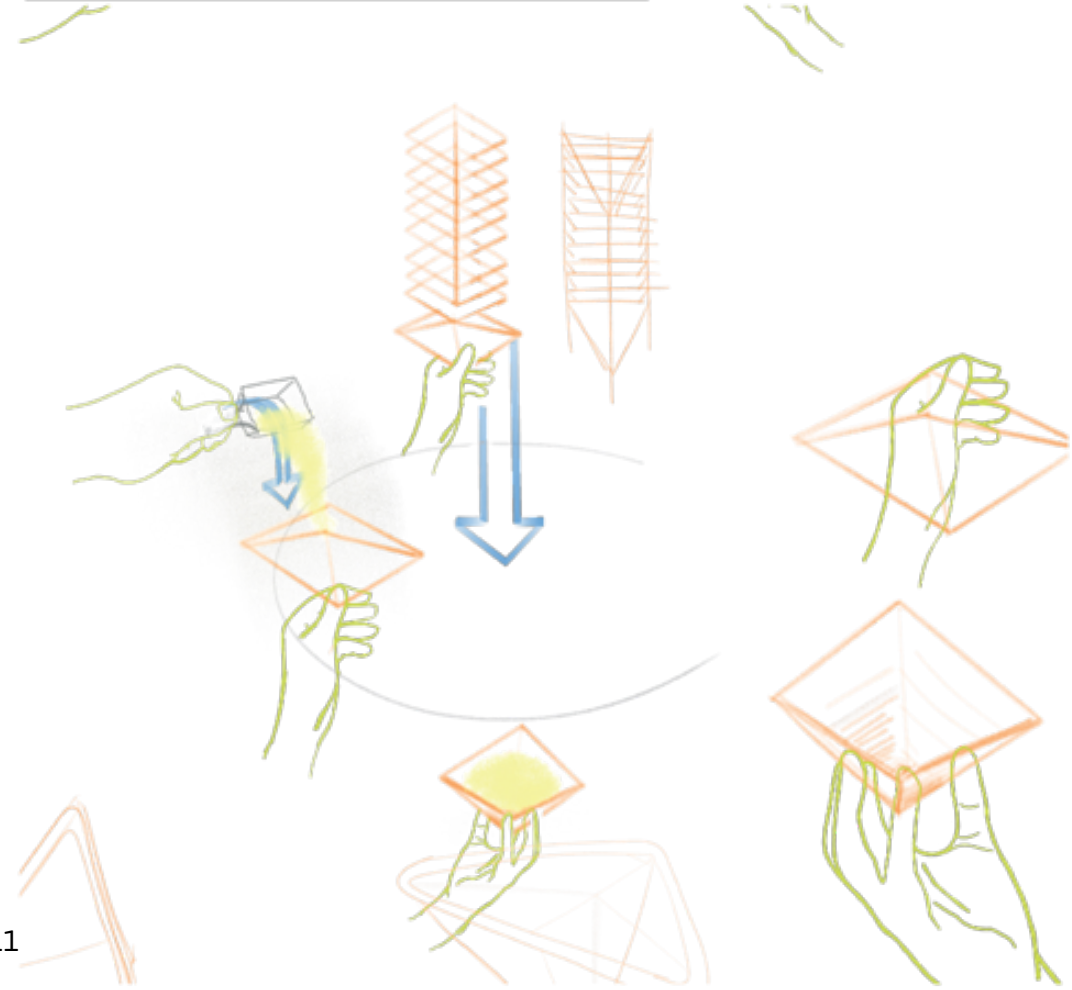
The Philippines is one of the lowest ranking country in waste management. Many people also litter especially when there are no waste management systems around. BOPs in particular who live in informal settlements usually do not have a waste management system in place for their community. In settlements near rivers and creeks, it's common for households to use the bodies of water as a giant communal trash bin for all waste they produce including human waste.

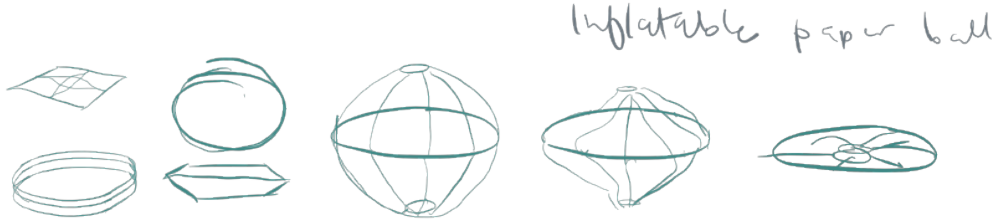
This approach aims to accommodate this reality, and still achieve the goal of redesigning the sachet to primarily work for Jake, the urban sari-sari store owner persona.

Figure 26: Polluted creek behind BOP community in Manila. Image source: (Villanueva)



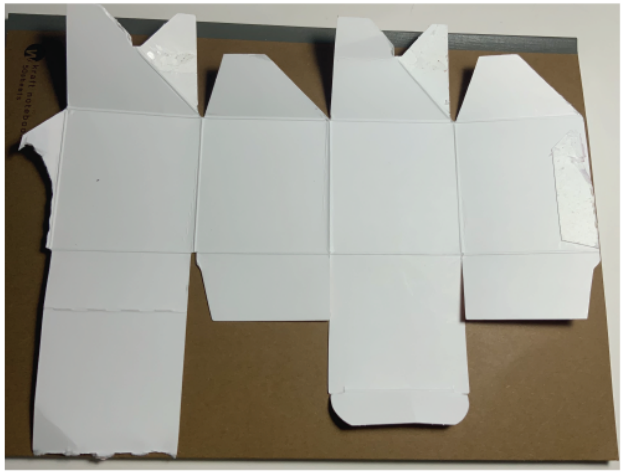
The cone was something that was worth looking back at and exploring further to start off with the disposable strategy. The cone has the potential to resolve some of the issues with the design iteration below.





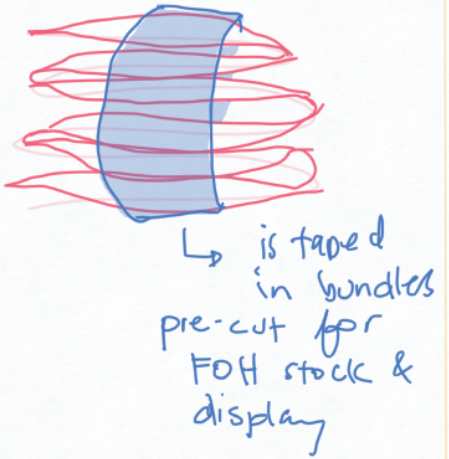
Although the inflatable paper balls evolved more towards the refill strategy, it was also thought of in consideration of the disposable strategy

A point of reference for flat to 3D paper folds are box packaging patterns already widely used.



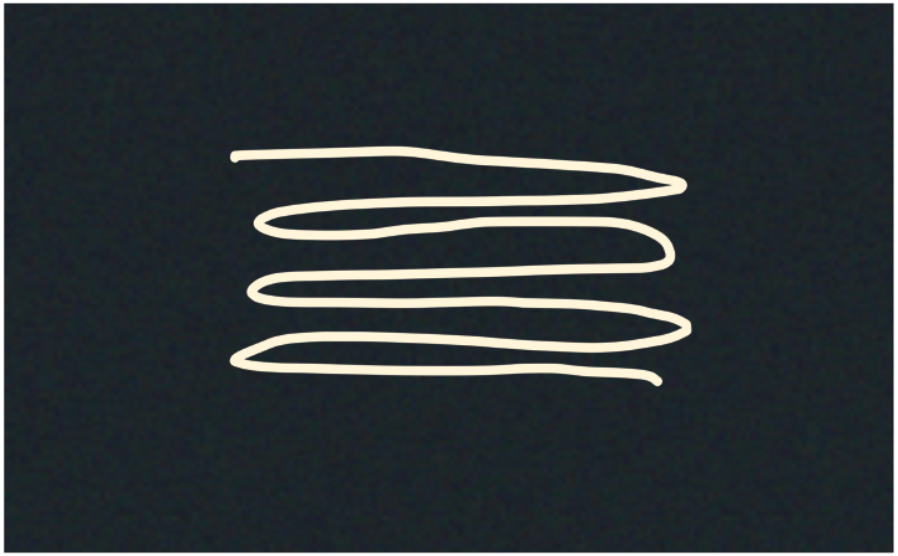
Flat pattern of box packaging

This small experiment did not result to much, except to serve a reminder that paperlike materials can be dynamic and complex



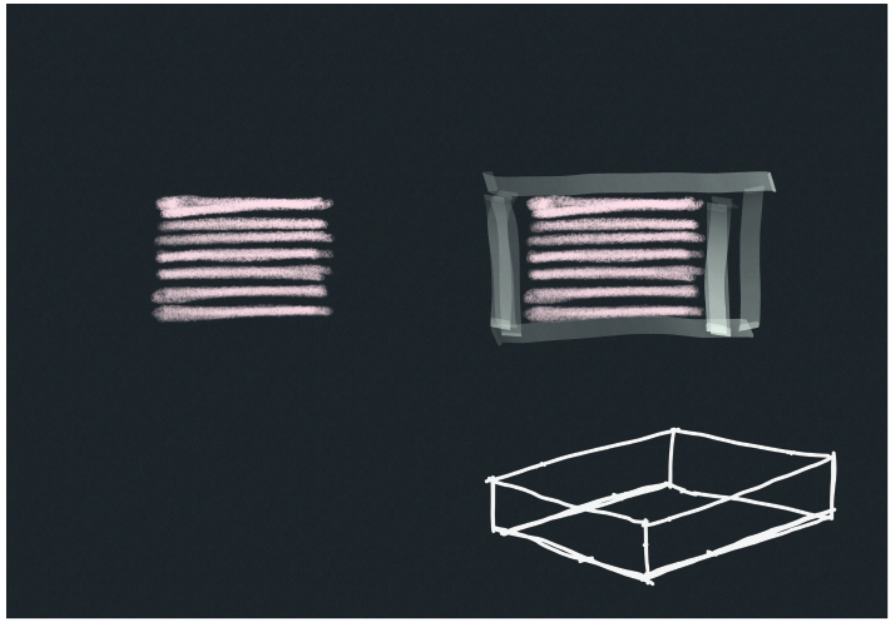
How sachets are sold in supermarkets

Simplifying the form that sachets are sold in

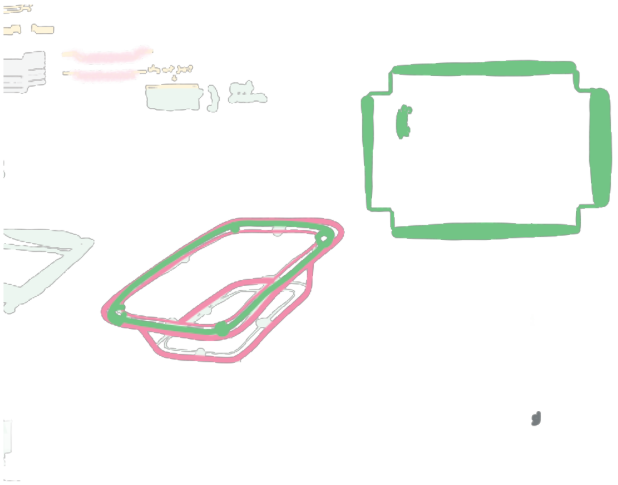


In using the disposable design strategy, the new form it takes must function as close as possible to the way plastic sachets currently are.

By changing too much, it may not be an acceptable change.

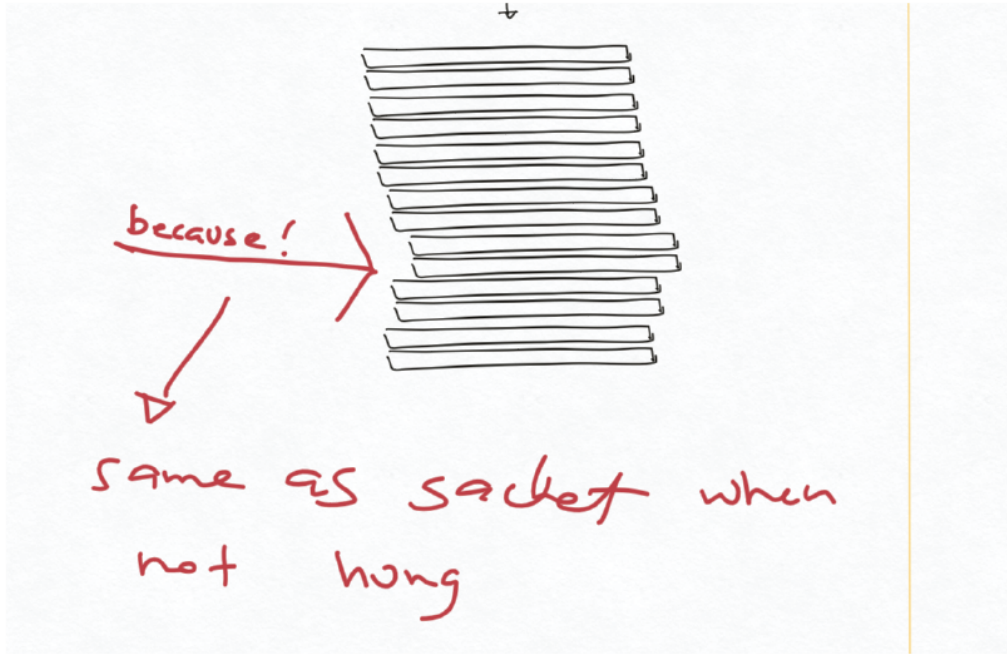


Imagining sachet boxes' space efficiency

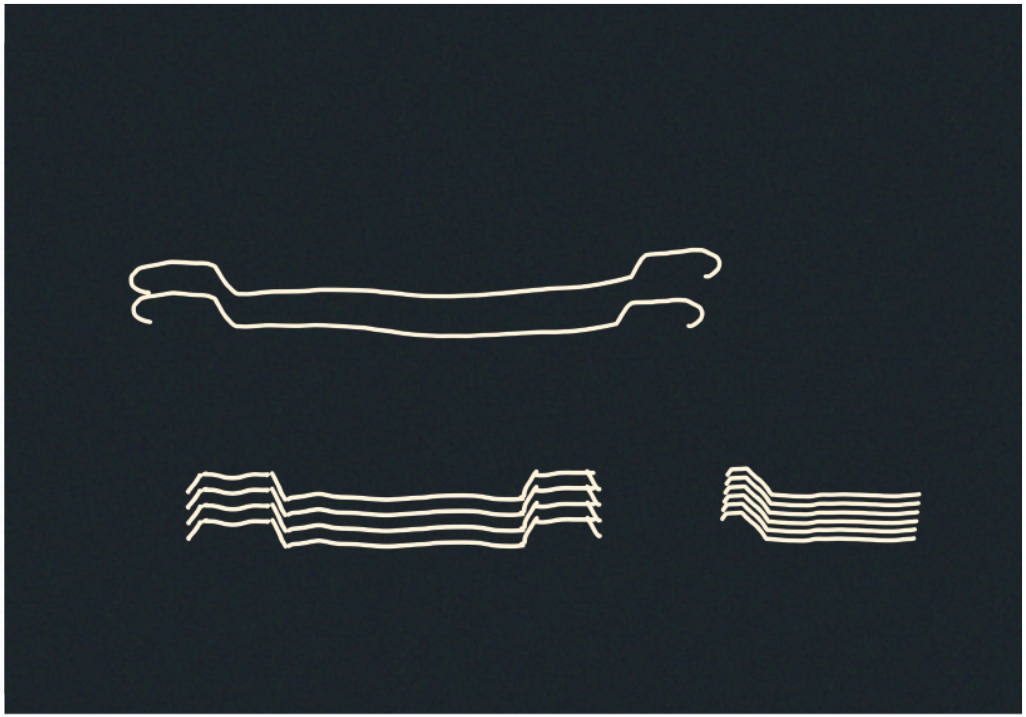


How can box sachets become more stable in Jake's store and as Jake purchases them?

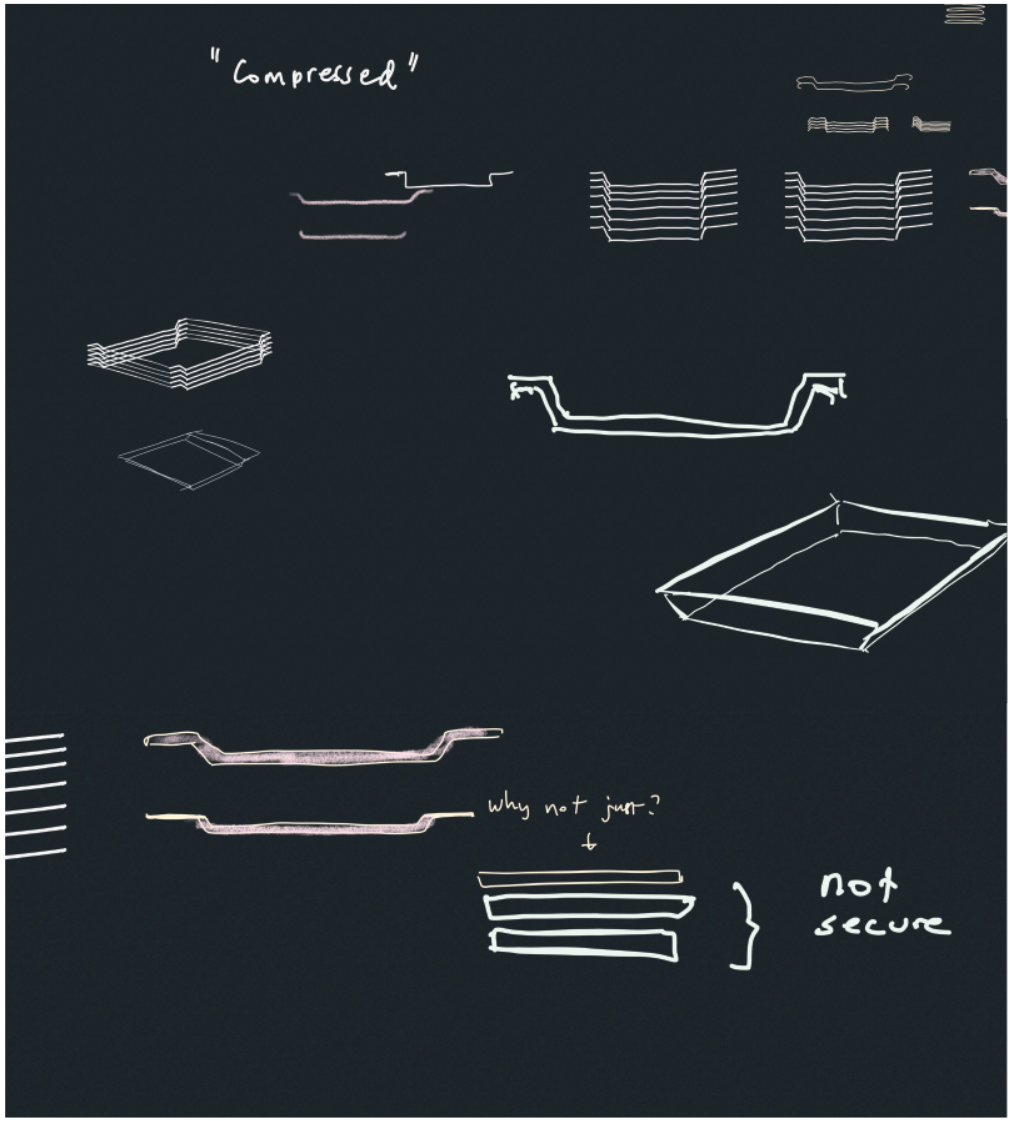
Stackability is a feature added based on the example of stackable takeaway boxes



Simply putting sachets in boxes have downsides such as stability when stacked, possibly result to crushing and product spillage

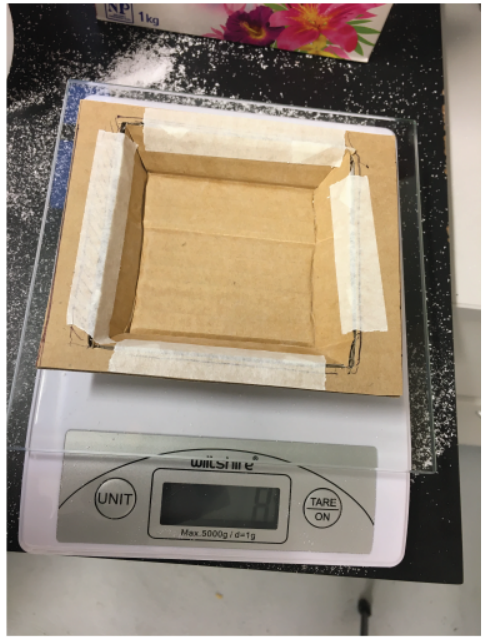


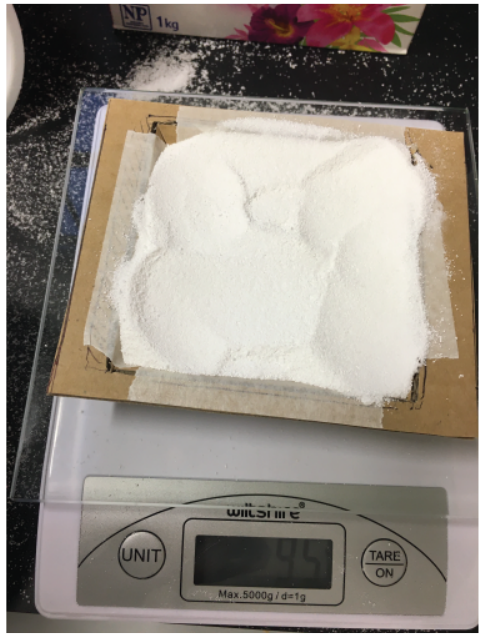
Ideating stacking forms using lines



Key Decision

After sketching ideal forms for stacking, it was decided that the gaps between the stacked lines will be used as the space for the laundry detergent. The idea was a result of the line drawings and stacking takeaway boxes with laundry detergent in them.



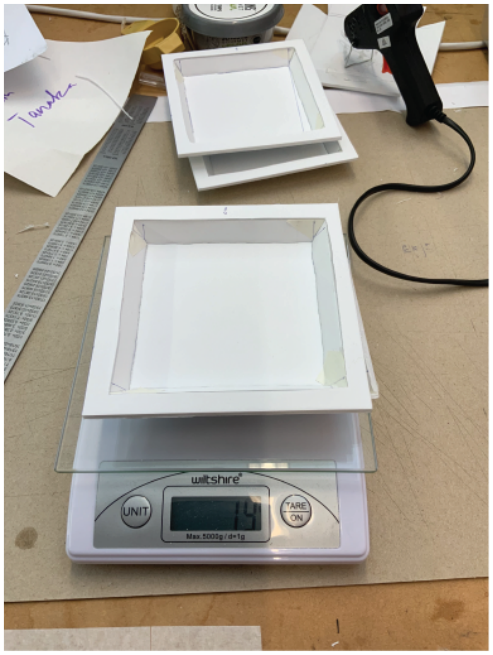


Initial prototypes weighed without and with laundry detergent to determine capacity.

This information was insightful for size adjustments.

Prototypes are in 1:1 scale

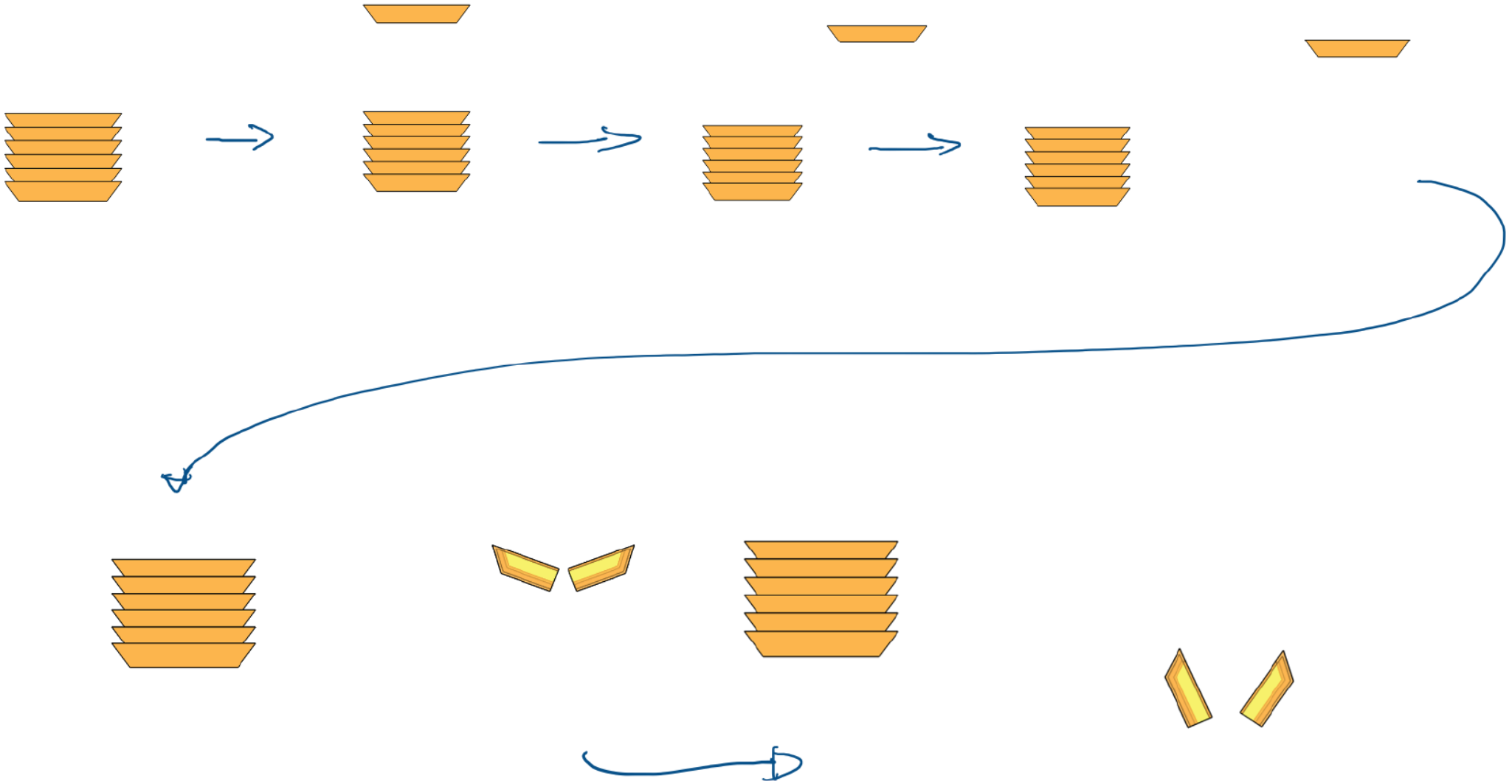
Early foam core prototypes

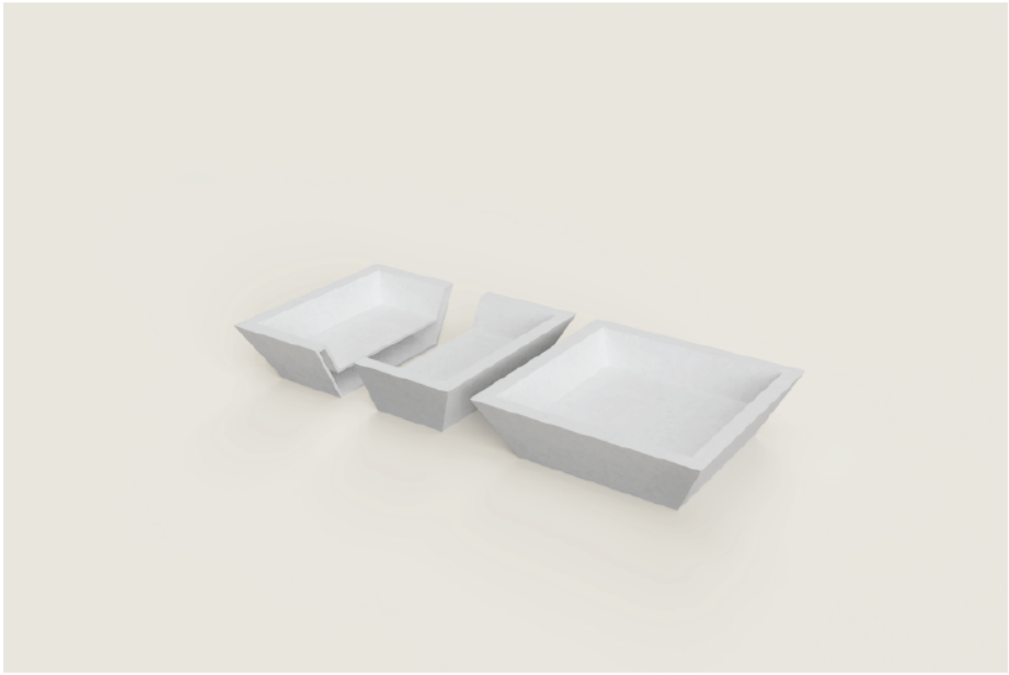


19 grams without contents

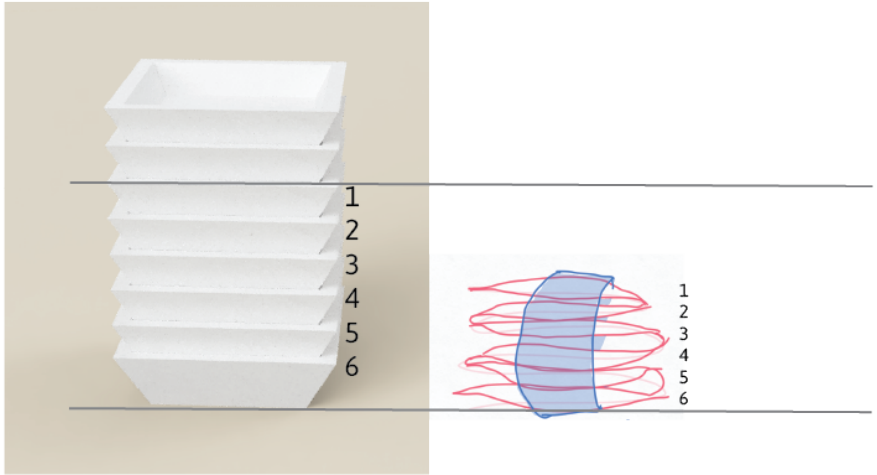
Refined foam core prototypes

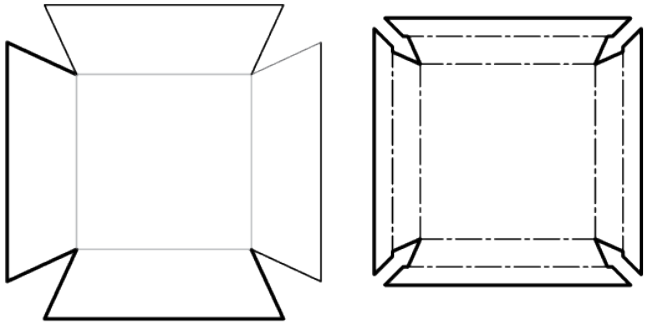
98 grams when filled to capacity, making net capacity 79 grams



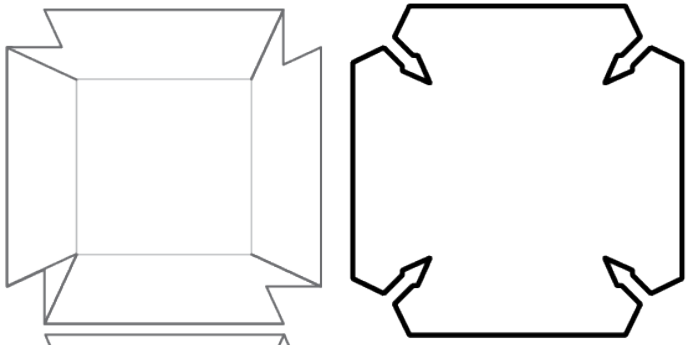


The Gap Snaps have potential for further refinement. With more iterations, it can eventually become closer to the size of plastic sachets.

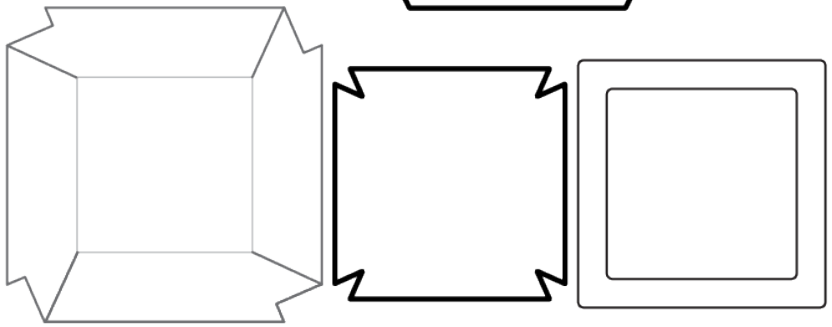




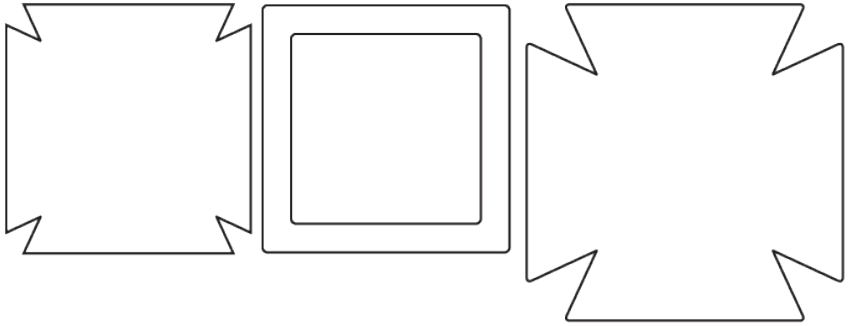
Sheet metal tool generated pattern



Revised pattern with tabs

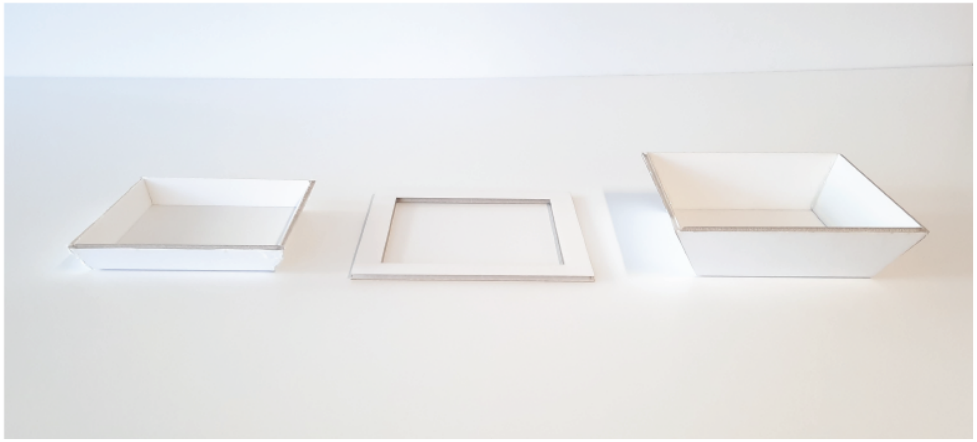


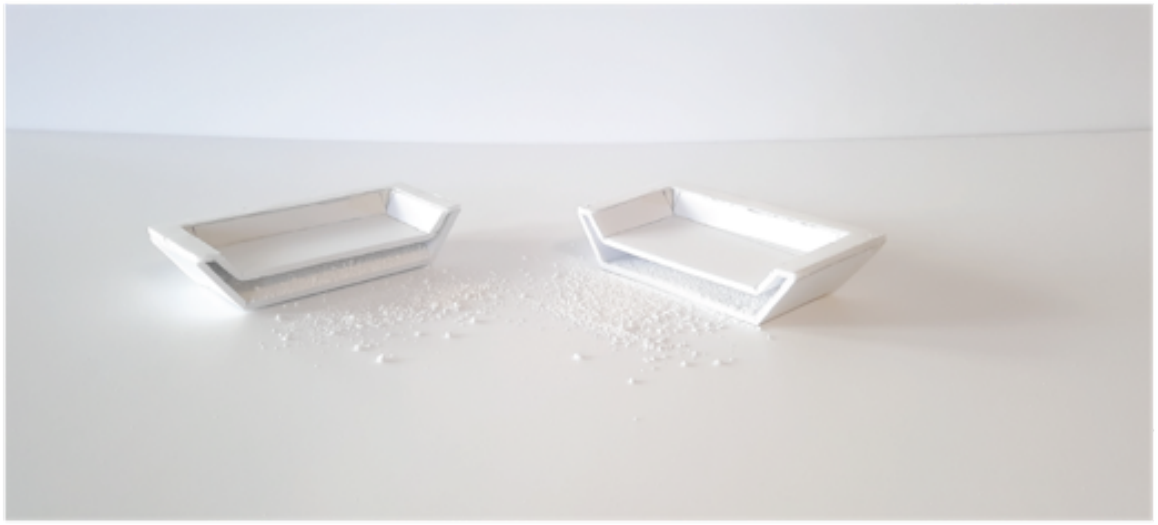
Revised pattern with adjusted tabs and third component



Final pattern for prototype

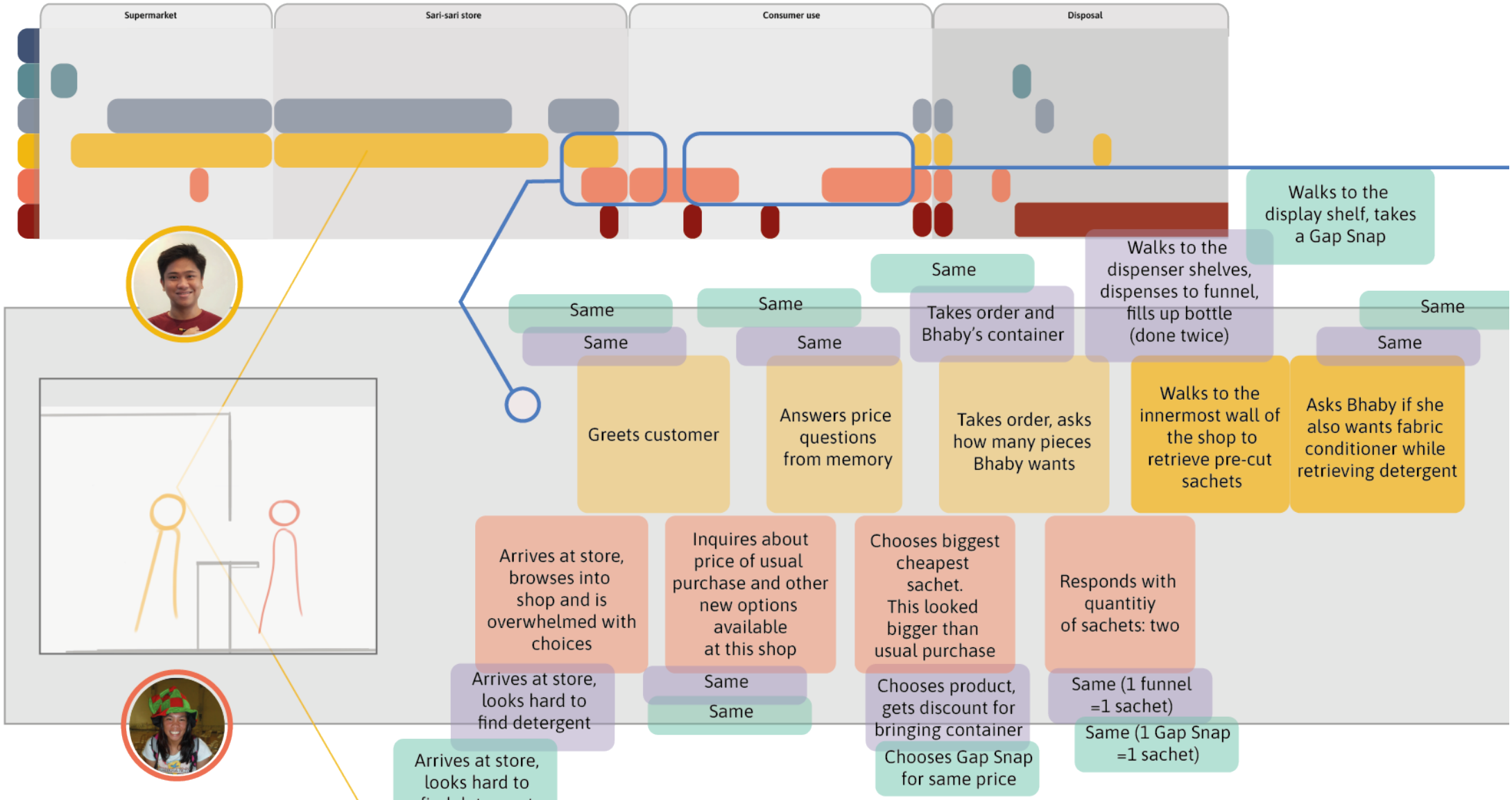
Using Fusion 360's Sheet Metal tool, Flat patterns were created for laser cutting. However, there were failure points in the flat pattern design, which resulted to multiple trial and error of the patterns until I eventually circled back into the simple three-part construction as seen in pattern and photo below.





Evaluation of Design

Evaluating proposed strategy outputs on Journey Map



Plastic Sachets

Unpack, inventory, price check, prepare, display, store

Jake makes an inventory of his purchases, double checks pricing, displays new sachets, cuts up old sachets, and stores the rest of supplies in storage room

Dock Dispensary

Unload, inventory, price check, prepare, dock

Jake makes an inventory of his purchases, double checks pricing, docks new container and stores the rest of containers in storage room

Gap Snaps

Unpack, inventory, price check, prepare, display, store

Jake makes an inventory of his purchases, double checks pricing, displays new Gap Snaps, and stores the rest of supplies in storage room

Same

Same

Same

Same

Same

Same

Same

Same

Same

Same

Tells how much total is without and with fabric conditioner

Retrieves fabric conditioner

Walks back to front with items, writes order in notebook and hands over items to Bhaby through window

Receives payment, calculates change, walks to cash box and returns with change

Takes coin and retrieves cigarette on front table

Asks how much she owes so far and how much fabric conditioner is, considering additional purchase

Decides to add 1 fabric conditioner

Takes sachets and Hands over 50-peso blil

Receives change, gives back PHP 5 coin and asks for a cigarette stick

Thanks Jake, lights up cigarette with lighter attached to store front and walks home

Same

Same

Takes refilled bottle and hands over payment

Same

Same (takes Gap Snaps)

Bhaby handwashes clothes in dormitory bathroom

Same

Same

Main Findings

Both solutions from both strategies are a good start in laying groundwork for future work to reflect on and iterate further. Majority of the journey for both strategies remained the same compared to the journey with plastic sachets. They will be useful starting points for future work that want to take the designs forward.

Both designs have so far only touched the surface of a highly complex, large-scale issue, as expected. However, they both relied on the data collected and analysed throughout the research project.

The dock refillery strategy met 10 out of 12 of the design criteria.

- Minimal changes in shopping logistics,

- minimal changes to selling logistics,

- does not have folds that hides/wastes products,

- can be grouped into around 30-40 sachet equivalents,

- does not exceed 3.5kgs,

- has enough flat surface for brand placement,

- can serve as a display at the store,

- does not require new construction at the store,

- eliminates plastic sachet waste; and

- has sizing relatable to sachets.

Without further testing, criterion on containing odour cannot be determined, while the remaining criteria of not taking up too much space at the store was also not met.

Overall, the dock refillery strategy offers valuable insight towards a solution that answers the aim of impactfully reducing plastic sachet waste. In many ways, the design is already familiar to the society it's targeted towards since it was deeply reflected to fit in among system precedents identified in the beginning of chapter 3. To become a zero-waste laundry detergent source, Jake only needs to keep doing what he does, and the BOP's positive contribution to the environment could follow.

The dock refillery will still potentially use high grade plastics as its materials. Although it is reusable, recyclable and hence valuable to waste pickers, that plastic will still end up somewhere in our environment and will stay around forever. Any further research is recommended to look into the specifics of materials potentially used for this design strategy.

The disposable Gap Snap strategy met 11 of 12 items in the design criteria:

- Minimal changes in shopping logistics,

- minimal changes to selling logistics,

- does not have folds that hides/wastes products,

- can be grouped into around 30-40 sachet equivalents,

- does not exceed 3.5kgs,

- has enough flat surface for brand placement,

- can serve as a display at the store,

- does not require new construction at the store,

- does not take up too much space in store,

- eliminates plastic sachet waste; and

- has sizing relatable to sachets.

Similar to the dock refillery, it cannot be determined if this design will contain the detergent's odour until it is tested with an identified material. However, it relatively contains the odour with its representational material (foam core).

The gap snap prototypes are still significantly bulkier than a string of sachet piled on top of each other. However, it is interesting how a small change in packaging construction can make all the difference in speculatively removing plastic sachet waste in the laundry of an entire country.

The disposable approach's potential pay-off to removing plastic sachet is the demand it will make on paper supplies. In addition, wrapping plastic film over the paper as typically done for many newly-cardboard packaged products could cancel out the waste reduction it aims to do.

Every day, Filipinos use 164 million sachets every single day, up to 27.88 million sachets (17%) of which are household cleaning products. If tomorrow all laundry detergent sachets were replaced with the dock refillery, that could reduce the Philippines' plastic sachet waste by roughly up to 10.1 billion sachets after a year of implementation.

Further Work

For further research and design on this topic, it is highly recommended that field work to verify the data and analysis in this

research is conducted. This research's field work was limited due to the COVID-19 pandemic.

It's also recommended that further prototyping is executed and tested in small pilots at supermarkets and sari-sari stores and existing zero-waste stores in the Philippines and compare observation data to journey map testing data provided in this research.

Conclusion

The global plastic waste problem is a problem created by the whole world, and directly affected BOP communities around the world especially the BOP in the Philippines and other Southeast Asian BOP communities. With sachets currently being their default means of access to branded products, the BOP market does not have a choice but to contribute to the plastic waste problem to survive. The aim of this research was to propose alternative packaging systems based on specific design strategies to eliminate plastic sachets in the context of the Philippine BOP market. The research wanted to challenge multi-national corporations by proposing a way to continue to profit from the BOP market while minimising their contribution to the destruction of the environment.

The research wanted to focus on this context because the BOP market is a significant contributor of single-use plastics, most negatively affected by the problem it causes, yet are left out of solutions created towards sustainability. The research also wanted to challenge the questionable notion of needing to pay more to help save the environment by targeting low-income consumers first.

The outcome of this research are two design approaches: a (1) Dock Refillery System and (2) Disposable Gap Snaps. These approaches and represented by two designs, one for each approach. Both were designed primarily for the identified main persona Jake (the urban sari-sari store owner) with other personas considered secondarily in latter iterations. Both design approaches also accommodates the personas' behaviour and fits well within the current distribution systems that plastic sachets currently operate within. These design approaches are modelled in an abstracted 3D form in plain colour to emphasize that the research does not claim these designs as the ultimate solution vs plastic sachets. These are representations of approaches that will provide key information for further creative research work towards designing a viable system solution.

References:

Alegado, Jed. 'Year's Worth of Sachet Use in the Philippines Can Cover Entire Metro Manila 1 Foot Deep in Plastic Waste'. *Break Free From Plastic*, 7 Mar. 2019, https://www.breakfreefromplastic.org/2019/03/07/gaia-waba-report-2019/.

Anderson, Jamie, and Niels Billou. 'Serving the World's Poor: Innovation at the Base of the Economic Pyramid'. *Journal of Business Strategy*, vol. 28, no. 2, Emerald Group Publishing Limited, Jan. 2007, pp. 14–21. *Emerald Insight*, doi:10.1108/02756660710732611.

Bor, W. H. *Releasing the Reuse Revolution in the Global South: The Transition of Businesses from Single-Use Plastic Packaging to Reuse Models at the Base of the Pyramid in Indonesia*. 2020, http://localhost/handle/1874/394898.

Cooper, Alan. *The Inmates Are Running the Asylum*. [New ed.], SAMS, 2004. Wellington 004.019 Coo.

Current Real Minimum Wage Rates | National Wages Productivity Commission. https://nwpc.dole.gov.ph/stats/current-real-minimum-wage-rates/. Accessed 16 Feb. 2021.

Funahashi, Toyoko. 'Distribution and Consumption in the Base of the Pyramid (BOP) Market : The Case of Sari-Sari Stores in the Philippines'. 経営論集, vol. 60, no. 4, 明治大学経営学研究所, Mar. 2013, pp. 211–23. *CiNii*, https://ci.nii.ac.jp/naid/120005347530/.

GAIA. 'Plastics Exposed: How Waste Assessments and Brand Audits Are Helping Philippine Cities Fight Plastic Pollution'. *Plastics Exposed*, 7 Mar. 2019, https://www.no-burn.org/plastics-exposed/.

Gonzaga, Diego. 'Every Single Piece of Plastic Ever Made Still Exists. Here's the Story.' *Greenpeace*, https://www.greenpeace.org/international/story/7281/every-single-piece-of-plastic-ever-made-still-exists-heres-the-story. Accessed 29 Oct. 2019.

Hammond, Allen L., et al., editors. *The next 4 Billion: Market Size and Business Strategy at the Base of the Pyramid*. World Resources Institute, International Finance Corporation, 2007.

Jambeck, Jenna R., et al. 'Plastic Waste Inputs from Land into the Ocean'. *Science*, vol. 347, no. 6223, Feb. 2015, pp. 768–71. *science-sciencemag-org.ezproxy.massey.ac.nz*, doi:10.1126/science.1260352.

Keating, Christine, and Tara Schmidt. 'Opportunities and Challenges for Multinational Corporations at the Base of the Pyramid'. *Sustainability Challenges and Solutions at the Base of the Pyramid*, Routledge, 2017, pp. 387–409. *www-taylorfrancis-com.ezproxy.massey.ac.nz*, doi:10.4324/9781351279888-23.

Kolk, Ans, et al. 'Reviewing a Decade of Research on the "Base/Bottom of the Pyramid" (BOP) Concept'. *Business & Society*, vol. 53, no. 3, May 2014, pp. 338–77. *DOI.org (Crossref)*, doi:10.1177/0007650312474928.

Malasig, Jeline. 'Anti-Poor or Expression of Respect? Looking into Catholic Churches' Dress Code'. *Interaksyon*, 3 Jan. 2020, https://interaksyon.philstar.com/politics-issues/2020/01/03/159709/anti-poor-respect-catholic-church-dress-code-philippines/.

Martelino, Ashley. 'This Is Not a Drill: Unilever's Refilling Stations Open This Month'. *SPOT.PH*, 22 Mar. 2019, https://www.spot.ph/shopping/the-latest-shopping/77313/all-things-hair-refillery-a3440-20190320.

Matejowsky, Ty. 'CONVENIENCE STORE PINOY: SARI-SARI, 7-ELEVEN, AND RETAIL LOCALIZATION IN THE CONTEMPORARY PHILIPPINES'. *Philippine Quarterly of Culture and Society*, vol. 35, no. 4, University of San Carlos Publications, 2007, pp. 247–77. JSTOR, *JSTOR*, https://www.jstor.org/stable/29792624.

'MetroMart - Online Grocery Delivery'. *Metromart*, https://www.metromart.com. Accessed 16 Feb. 2021.

Nielsen, Christine, and Patricia M. Samia. 'Understanding Key Factors in Social Enterprise Development of the BOP: A Systems Approach Applied to Case Studies in the

Philippines'. *Journal of Consumer Marketing*, edited by Dennis Pitta, vol. 25, no. 7, Emerald Group Publishing Limited, Jan. 2008, pp. 446–54. *Emerald Insight*, doi:10.1108/07363760810915662.

Oxales, Orlando. *'Sari-Sari' Stores Are Closing - Manila Standard Mobile*. https://manilastandard.net/mobile/article/277373. Accessed 18 Apr. 2021.

Parker, Laura. 'We Depend On Plastic. Now, We're Drowning in It.' *Magazine*, 16 May 2018, https://www.nationalgeographic.com/magazine/2018/06/plastic-planet-waste-pollution-trash-crisis/.

PR Newswire. 'Sachet Packaging Market Global Industry Analysis 2012 - 2016 and Opportunity Assessment 2017 - 2027'. *Reportlinker*, Y, Sept. 2017. *EBSCOhost*, http://ezproxy.massey.ac.nz/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bwh&AN=201709071935PR.NEWS.USPR.SP83372&site=eds-live&scope=site.

Rana, Preetika. 'L'Oreal Tries On Smaller Packets for Size in India - WSJ'. *The Wall Street Journal*, https://www.wsj.com/articles/loreal-tries-on-smaller-packets-for-size-in-india-1465405814. Accessed 18 Apr. 2021.

Ritchie, Hannah, and Max Roser. 'Plastic Pollution'. *Our World in Data*, Sept. 2018. *ourworldindata.org*, https://ourworldindata.org/plastic-pollution.

Ritschel, Chelsea. *Why Is Plastic Bad for the Environment and How Much Is in the Ocean? | The Independent*. 18 Apr. 2018, https://www.independent.co.uk/life-style/plastic-bad-environment-why-ocean-pollution-how-much-single-use-facts-recycling-a8309311.html.

Rundh, B. *The Multi-Faceted Dimension of Packaging - Marketing Logistic or Marketing ...: Discover*. http://eds.b.ebscohost.com/eds/detail/detail?vid=1&sid=ca408e9e-841a-496f-8067-a8c27d7cad0f%40pdc-v-sessmgr02&bdata=JnNpdGU9ZWRzLWxpdmUmc2NvcGU9c2

l0ZQ%3d%3d#AN=000234107100003&db=edswsc. Accessed 15 Feb. 2021.

Simanis, Erik. 'Reality Check at the Bottom of the Pyramid'. *Harvard Business Review*, June 2012. *hbr.org*, https://hbr.org/2012/06/reality-check-at-the-bottom-of-the-pyramid.

Singh, Ramendra, et al. 'Buying Less, More Often: An Evaluation of Sachet Marketing Strategy in an Emerging Market'. *The Marketing Review*, vol. 9, Mar. 2009, pp. 3–17. *ResearchGate*, doi:10.1362/146934709X414297.

Sy-Changco, Joseph A., et al. 'Managerial Insights into Sachet Marketing Strategies and Popularity in the Philippines'. *Asia Pacific Journal of Marketing and Logistics*, Nov. 2011. world, *www-emerald-com.ezproxy.massey.ac.nz*, doi:10.1108/13555851111183129.

van Kote, Gilles. 'Manila's Waste Scavengers Are Integrated into the Recycling Chain'. *The Guardian*, 29 Jan. 2013, http://www.theguardian.com/world/2013/jan/29/manila-philippines-recycling-payatas.

Villanueva, Rhodina. '"Estero Rangers" given 6 Weeks to Clean up Metro Manila Creeks'. *Philstar.Com*, https://www.philstar.com/nation/2019/11/17/1969370/estero-rangers-given-6-weeks-clean-metro-manila-creeks. Accessed 18 Apr. 2021.

Visconti, Katherine. 'Products in Bulk Packages Cost More than in Sachets?' *Rappler*, 8 Apr. 2012, https://www.rappler.com/business/products-in-bulk-packages-cost-more-than-in-sachets.

Appendix

Alternative Packaging System for Single-Serve Products for Bottom of Pyramid Market in the Philippines: A Master of Design Research Topic Proposal

By Julian Tanaka
20000884

Submitted April 2020

Keywords: packaging design, single-serve sachet, sachet economy, plastic waste, bottom of pyramid, FMCG, sachet marketing, sustainable packaging, eco-friendly packaging

Table of Contents

Introduction

Research context

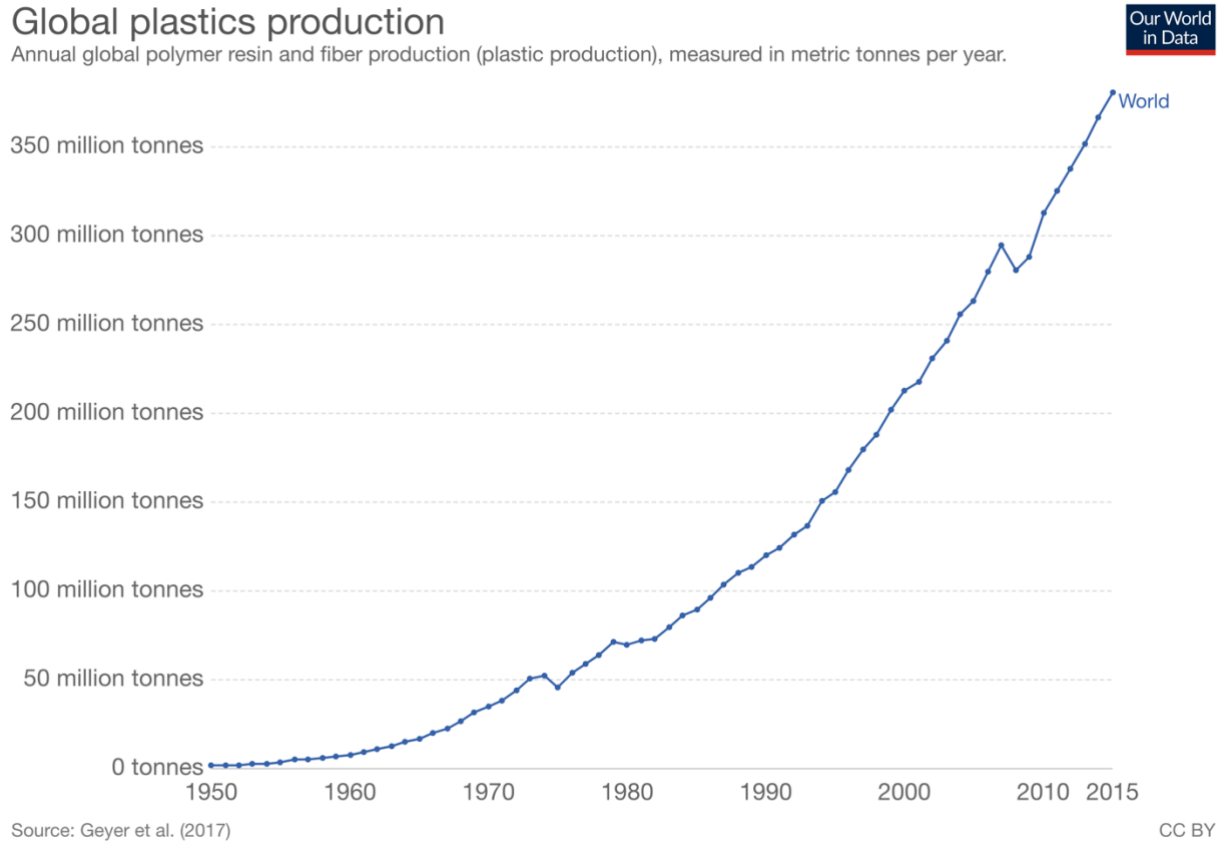
There is a plastic waste problem that continues to grow despite global efforts towards sustainable living. This waste issue is taking over our eco systems. Efforts towards sustainable living are unsustainable for many consumers especially in developing counties where single-serve sachets are the more viable channel of consumption for low-income families.

Global plastic waste problem

We produce and consume too much plastic in the world. Plastic started out as a "miracle material" born out of war, that benefitted our environment for a while (Parker). It made vehicles lighter, making fuel consumption efficient. It became an alternative to paper bags that required cutting down trees. Plastics gave rise to a more convenient and accessible form of consumerism (Parker). Today, plastic has become an unavoidable material to use and is congesting and threatening our ecosystems.

The use of plastic boomed when mass production began in the 1950's when two million tonnes of plastic was produced per year (Ritchie and Roser). Years later, production continues to grow despite the world's current understanding of its negative impacts on the environment (Ritschel). Figure 1 shows how plastic production has trended upward.

Figure 1: Global plastics production since 1950 (Jambeck et al.)

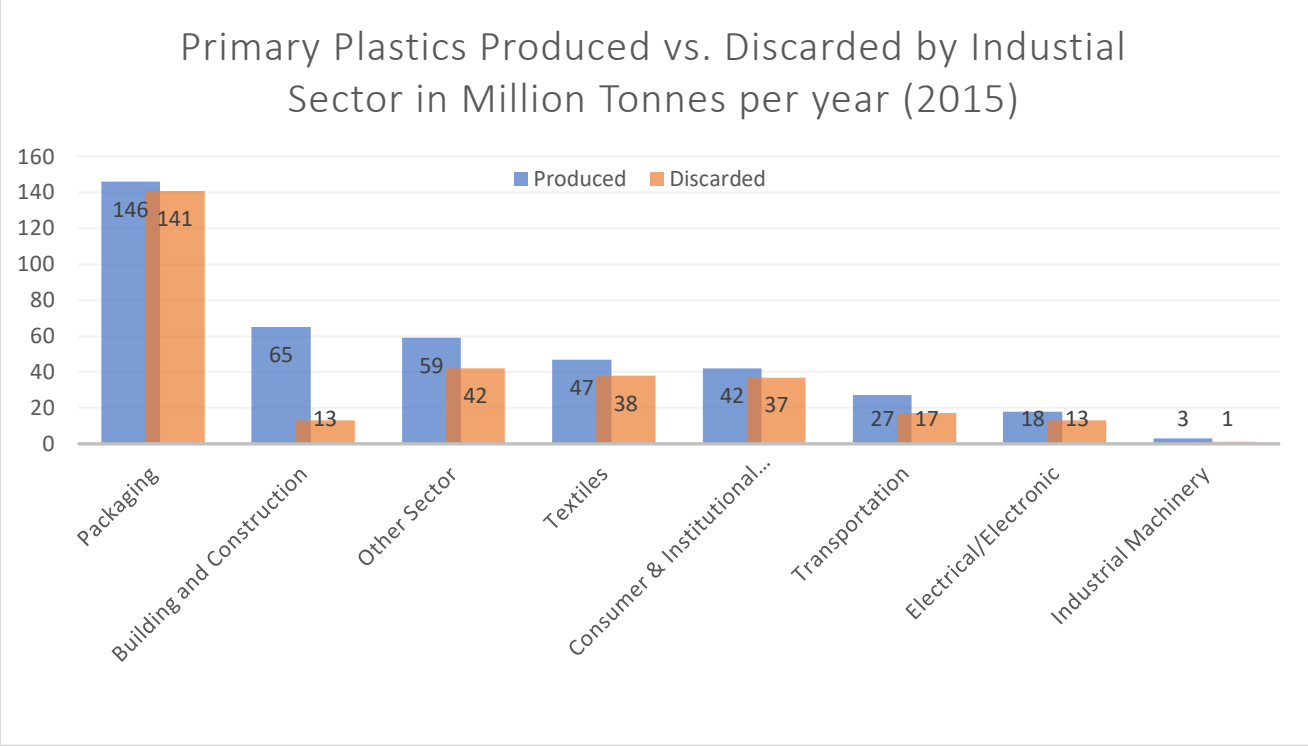


The rise of plastic production is problematic because, according to Gonzaga, "Every single piece of plastic ever made still exists, and will continue existing for at least 500 years" (Gonzaga, para.9). This is how we ended up in a situation where countries are overfilling landfills, running out of places to sell their recycling, and allowing oceans to be filled with plastic waste. China, which used to be the largest plastic recycling importer implemented the National Sword policy, rejecting most of the plastic waste imported to them by countries like the USA (Regan). Southeast Asian countries like Indonesia are also beginning to reject and send back plastic waste imported by countries like Canada and New Zealand (McCullogh). Many scientists and researchers believe that there are about eight million metric tonnes of plastic that enter the ocean per year on top of what the approximately 150 million tonnes of plastic already in the ocean (Ritchie and Roser). Some experts predict that by 2050, there will be more plastic in the ocean than fish (Ritschel).

The plastic packaging problem

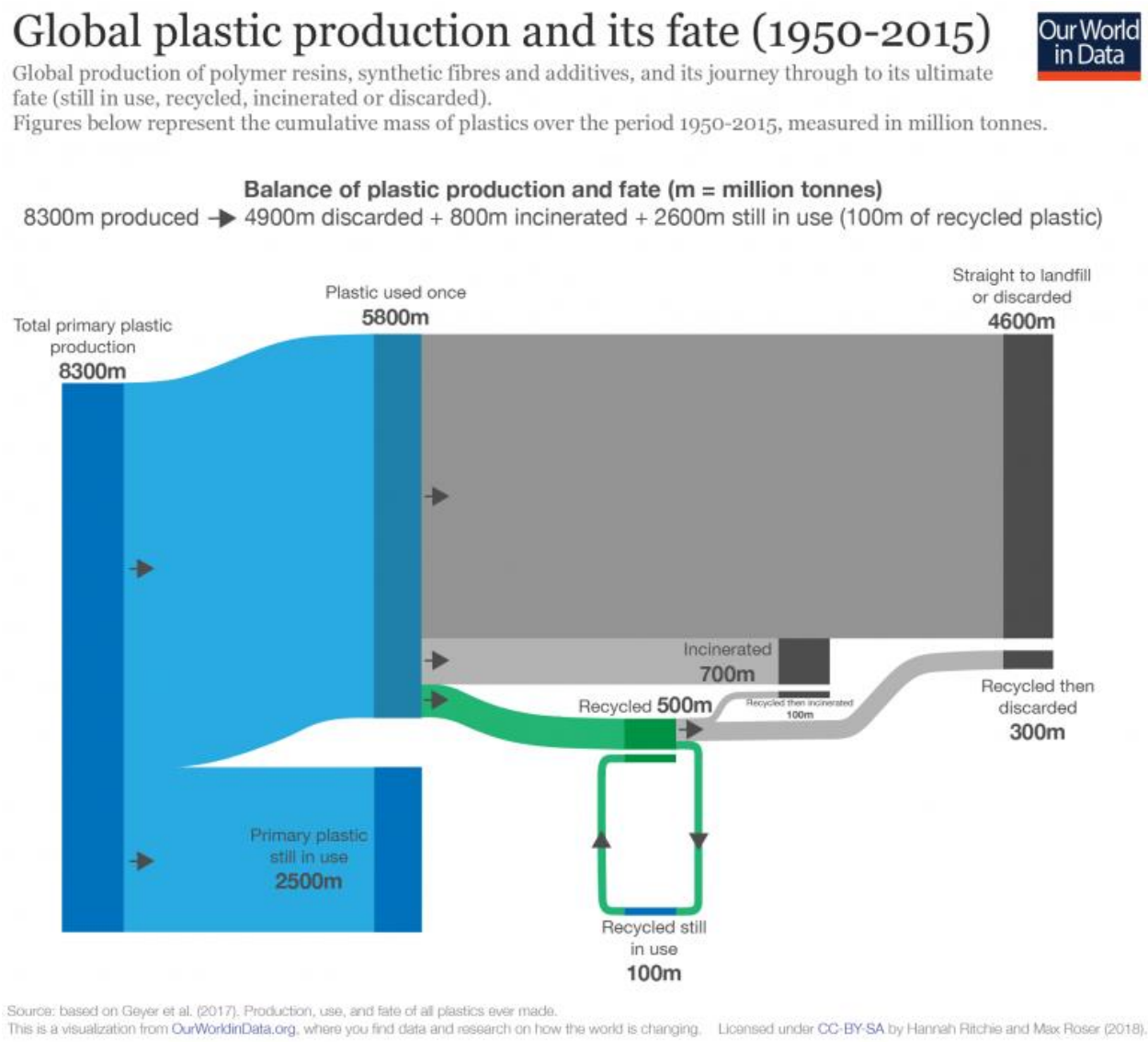
Plastic packaging is the biggest contributor to the global plastic waste problem. It accounted for about 42% of the world's total plastic production in 2015. In 2015, 146 million tonnes of plastic packaging were produced, and 141 million tonnes of the 146 was discarded within the year (see figure 2). Not only is plastic packaging the most produced plastic, it is also the plastic with the shortest lifespan. The life of plastic packaging, from production to disposal averaging a product lifetime of 6 months of less (Ritchie and Roser).

Figure 2: Primary plastics produced per year vs. discarded plastics by industrial sector per year (2015) (Ritchie and Roser)



The management of plastic waste has changed very little since the global plastic waste problem was discovered. Figure 3 below shows how of the 380 million tonnes of plastic waste, only 19.50% is recycled (delayed from discarding), 22.50% is incinerated, and 55% or around 209 million tonnes is discarded in landfills and into oceans (Ritchie and Roser).

Figure 3: Where all the plastics have gone (Ritchie and Roser)



Global mismanagement of waste

Ritchie and Roser pointed out that mismanagement of waste is a key element that increases the risk of our plastic waste ending up in landfills and/or spilling into the ocean. Waste is considered mismanaged when waste is disposed of "in dumps or open, uncontrollable landfills, where it is not fully contained" (Ritchie and Roser). When waste is mismanaged, recyclable plastics are difficult to find, and difficult to decontaminate and therefore, cannot be recycled. The amount of work being put into waste management systems and recycling facilities in developed countries only amounts to the green (recycled) area of Figure 3 above.

Importantly, experts like Narayan claim that even if we recycled 100% of the plastic waste in some developed countries, it still would not make much of a difference unless the mismanagement waste issues were also resolved in developing countries (Parker).

Data in Jambeck's research reflects how inadequate waste management commonly occurs in developing countries or Lower-Middle Income (LMI) countries, with the exception of the USA and some Upper-Middle Income (UMI) countries like China and Malaysia (see Figure 4). It was also pointed out in her research that the top 5 countries, all Asian countries, generated half of the globe's mismanaged plastics. (China, Indonesia, Philippines, Vietnam, Sri Lanka). (Jambeck et al.)

Figure 4: Top 20 countries with mismanaged waste (Jambeck et al.)

Table 1. Waste estimates for 2010 for the top 20 countries ranked by mass of mismanaged plastic waste (in units of millions of metric tons per year). Econ classif., economic classification; HIC, high income; UMI, upper middle income; LMI, lower middle income; LI, low income (World Bank definitions based on 2010 Gross National Income). Mismanaged waste is the sum of inadequately managed waste plus 2% littering. Total mismanaged plastic waste is calculated for populations within 50 km of the coast in the 192 countries considered. pop., population; gen., generation; ppd, person per day; MMT, million metric tons.

Rank	Country	Econ. classif.	Coastal pop. [millions]	Waste gen. rate [kg/ppd]	% plastic waste	% mismanaged waste	Mismanaged plastic waste [MMT/year]	% of total mismanaged plastic waste	Plastic marine debris [MMT/year]
1	China	UMI	262.9	1.10	11	76	8.82	27.7	1.32–3.53
2	Indonesia	LMI	187.2	0.52	11	83	3.22	10.1	0.48–1.29
3	Philippines	LMI	83.4	0.5	15	83	1.88	5.9	0.28–0.75
4	Vietnam	LMI	55.9	0.79	13	88	1.83	5.8	0.28–0.73
5	Sri Lanka	LMI	14.6	5.1	7	84	1.59	5.0	0.24–0.64
6	Thailand	UMI	26.0	1.2	12	75	1.03	3.2	0.15–0.41
7	Egypt	LMI	21.8	1.37	13	69	0.97	3.0	0.15–0.39
8	Malaysia	UMI	22.9	1.52	13	57	0.94	2.9	0.14–0.37
9	Nigeria	LMI	27.5	0.79	13	83	0.85	2.7	0.13–0.34
10	Bangladesh	LI	70.9	0.43	8	89	0.79	2.5	0.12–0.31
11	South Africa	UMI	12.9	2.0	12	56	0.63	2.0	0.09–0.25
12	India	LMI	187.5	0.34	3	87	0.60	1.9	0.09–0.24
13	Algeria	UMI	16.6	1.2	12	60	0.52	1.6	0.08–0.21
14	Turkey	UMI	34.0	1.77	12	18	0.49	1.5	0.07–0.19
15	Pakistan	LMI	14.6	0.79	13	88	0.48	1.5	0.07–0.19
16	Brazil	UMI	74.7	1.03	16	11	0.47	1.5	0.07–0.19
17	Burma	LI	19.0	0.44	17	89	0.46	1.4	0.07–0.18
18*	Morocco	LMI	17.3	1.46	5	68	0.31	1.0	0.05–0.12
19	North Korea	LI	17.3	0.6	9	90	0.30	1.0	0.05–0.12
20	United States	HIC	112.9	2.58	13	2	0.28	0.9	0.04–0.11

*If considered collectively, coastal European Union countries (23 total) would rank eighteenth on the list

It is of note though, that there is economic potential in waste. Within the imperfect waste management system, there are some people who try to "pick up the slack" so to speak (Parker). They recover and clean as much valuable material as they can find. Some of the most valuable plastics are plastic bottles (PET) and HDPE. They then sell them to companies who recycle plastic, some of which are the multi-national companies that recycle plastic and turn them into products that are marketed as high value for being made out of recycled material

(Parker). In this way, bottles may become less of a problem in the future because of the incentive embedded in recycling them. Further, they are slowly being replaced with slightly more expensive bioplastics which bottled products' current target market is able to afford. By contrast, sachets do not have much economic value attached to them as a recyclable or valuable material, and research is still ongoing to replace them with more sustainable alternatives.

Sachet packaging and the economy it thrives in

A sachet is a small, flexible packaging that is often layered with different materials, designed to deliver products in single servings. Sachets have been widely used as a business strategy to deliver goods to what used to be an untapped market at the Bottom of (the economic) Pyramid or BOP (Nulkar). It thrives as a primary consumer good for families who can only afford to buy products in these sizes due to poverty and inconsistent source of income. Families at the BOP earn an average of 2 USD per day (Funahashi).

Sachets have become so successful in these economies that they have reached the status of a default purchase. In Hammond's research, he mentioned that in India, 95% of the shampoo industry's profit comes from sachet-packaged products (Singh et al.). Figures 5-7 below exhibits visual examples and sizes of these products alongside their larger counterparts.This is problematic as sachets are arguably the most difficult plastics to recycle, yet almost all fast-moving consumer product (FMCG) like shampoo, laundry soap, facial wash, cooking oil, salt, sugar, soy sauce, etc are packaged in sachets and sold in LMIs.

Figure 5: Shampoo bottle vs shampoo sachet. Source: Wall Street Journal

Figure 6: Soy Sauce sold in the Philippines. Source: NutriAsia

Figure 7: 1 Tide laundry powder detergent carton(2.72kg) is equal to 36.7 sachets (74g each)

Sachet use is unavoidable even in developed countries like New Zealand, where everyday goods such as coffee and cosmetic products are still packaged in sachets. In high-income countries, individuals and businesses have the purchasing power to buy in bottles/cans/bulk. A decision to allocate more investment into being environmentally-friendly enables the availability of products packaged in biodegradable packaging. Take it a little further, and you find sustainable products that were specifically designed and specifically priced for consumers who are willing or prefer to pay a premium. Unfortunately, sustainable living as we know it today is still financially unsustainable and inaccessible for many at the bottom of the pyramid in developing countries.

Sachets may have benefitted many consumers by safely giving them access to goods that keep them clean, healthy, and enable them to enjoy a variety of goods they did not have complete access to. However, because sachets are single-use and have almost no value post-use, its effects on the environment have been big. In the Philippines alone, it was reported that Filipinos throw away 163 million plastic sachets every single day (Gascon).

Figure 8: Branded plastic sachets collected for a brand audit © GAIA/SHERMA BENOSA ('GAIA Report | Plastics Exposed')

Figure 9: GAIA's Volunteers sorting household waste samples ('GAIA Report | Plastics Exposed')

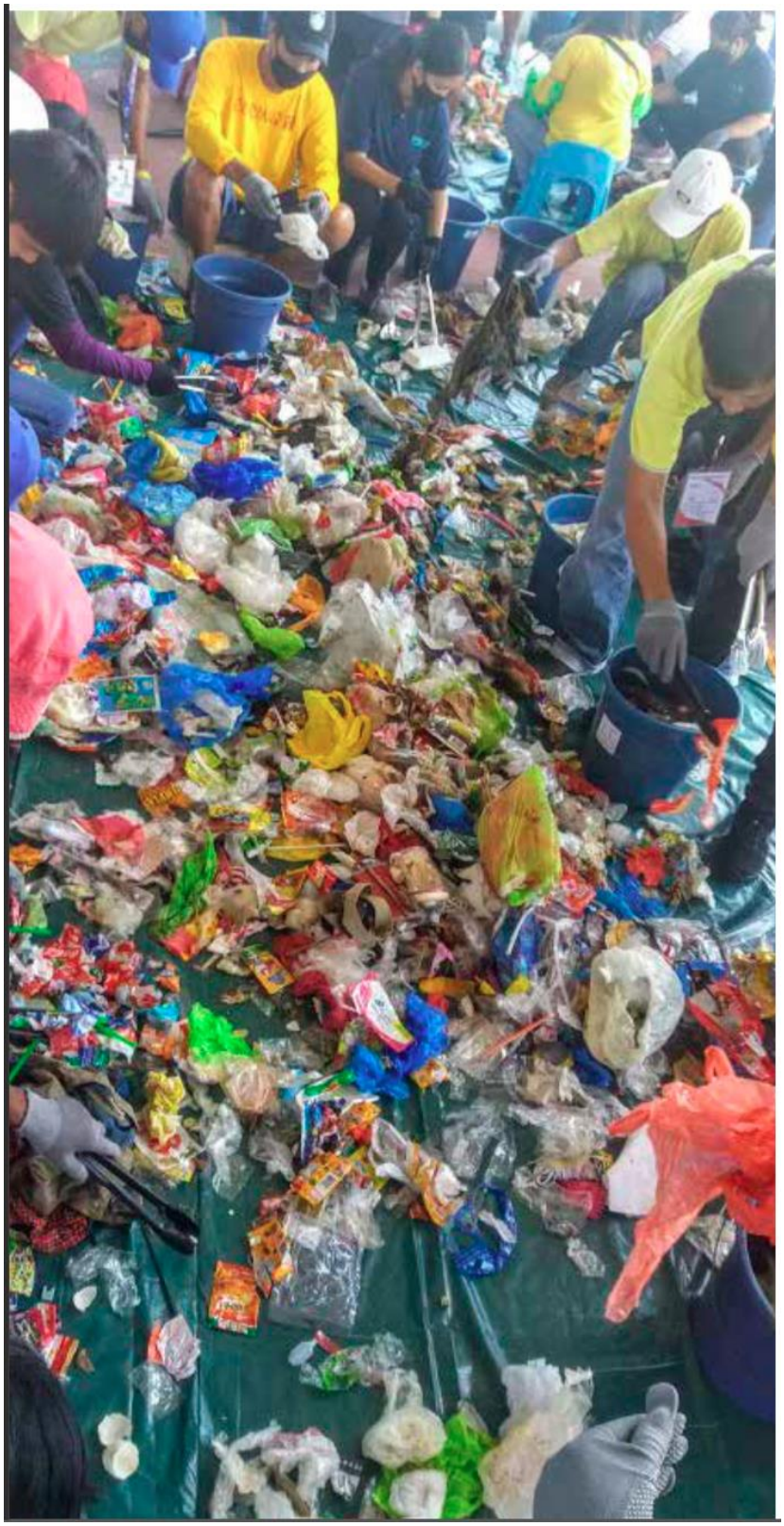


Figure 10: Freedom Island in Manila, Philippines plagued by sachet waste and others ('Plastic Trash from the ''Sachet Economy'' Chokes the Philippines' Seas')

The sachet waste issue is a little more complicated than the problem of plastic bottles, and plastic bags because it is difficult to encourage the BOP to buy more sustainably or take a stand against plastics if the things that they need, in quantities they can afford only comes wrapped in plastic sachets. Preventive measures must be placed to make plastic sachets obsolete in delivering goods efficiently to the BOP market. To do this, we must also understand the distribution channels of sachets. In the Philippines, it is the sari-sari store (sundry store).

Sari-sari stores

A sari-sari store (variety store) is a small retail store located in almost every corner of each street in the Philippines. The success of small retail stores in the Philippines is rooted in the pre-colonial piecemeal transaction habits of the Filipinos (Sy-Changco et al.). In the Philippines, and especially for the BOP, the sari-sari store is considered as the "primary source of consumer items in exactly the needed amounts" (Kuang-Jung). Before the rise of sachets, low-income families purchased products in small stores, like sari-sari stores, that dispense the

products to them in smaller amounts (Sy-Changco et al.). Most importantly, I believe that sachet marketing although coined by business experts, rose from the already existing and informal retailing as practiced by sari-sari stores and stores alike in countries like India and Indonesia. Figures 11 to 15 show what a sari-sari store typically looks like in the Philippines.

Figure 11: A Sari-sari store primarily displaying confectionaries in small packs

Figure 12: A sari-sari store that primarily displays beauty products and sundries

Figure 13: A sari-sari store that primarily displays cooking ingredients

Figure 14: A sari-sari store's view from the inside

Figure 15: Larona in her sari-sari store ('It's a Small World')

Research Aims

The aim of this research is to explore alternative packaging systems that will continue to deliver quality products to the BOPs while minimising environmental effects.

This project aims to explore alternatives to current single use, single serve sachet packaging systems. These alternatives may include:

- Packaging alternatives
- Material alternatives
- Dispensing method alternatives
- Refillable alternatives

Research Objectives

To accomplish the aims of this research, the objectives are to:

1.) Identify which specific product classification would be best to design an alternative for, and classify the sachet packaging methods used on it. Because there are only 52-weeks for this research, main choices for product classification will be limited to non-food products.

a. Choices:

i. Powdered, Non-food

1. E.g. Detergent

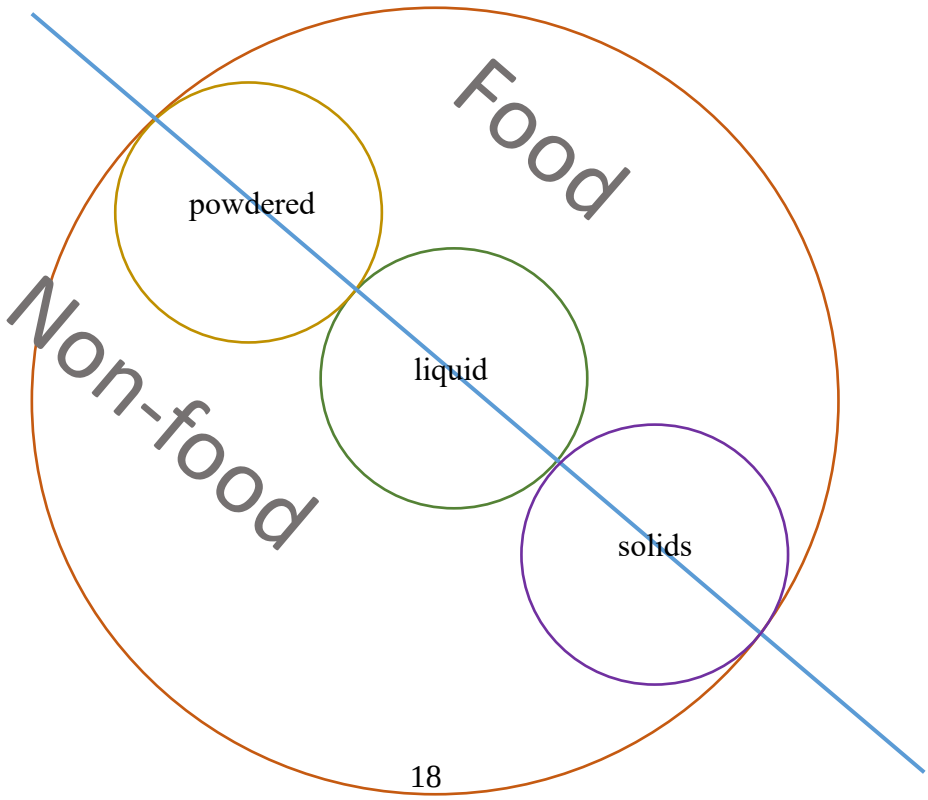
ii. Liquid, Non-food

1. Liquid detergent
2. Shampoo
3. Face Cream
4. Deodorant
5. Lotion

iii. Solid, Non-food

1. Bar of soap
2. Sheet face mask
3. Condom
4. Tissue

Figure 16: Diagram of product classification based on state



b. In doing this, I will be able to gain a comprehensive understanding of what types of materials and plastic type are layered together and why for the selected classification of product. I will be able to identify how unique or common methods are used based on the types of products packaged in sachet.

2.) Understand the history of Sachets
    a. How and why sachet packaging became so successful in allowing big companies like Unilever and Proctor & Gamble penetrate and dominate the Bottom Of economic Pyramid (BOP) market.
    b. What systems were in place for BOP markets before the invention of sachet packaging?

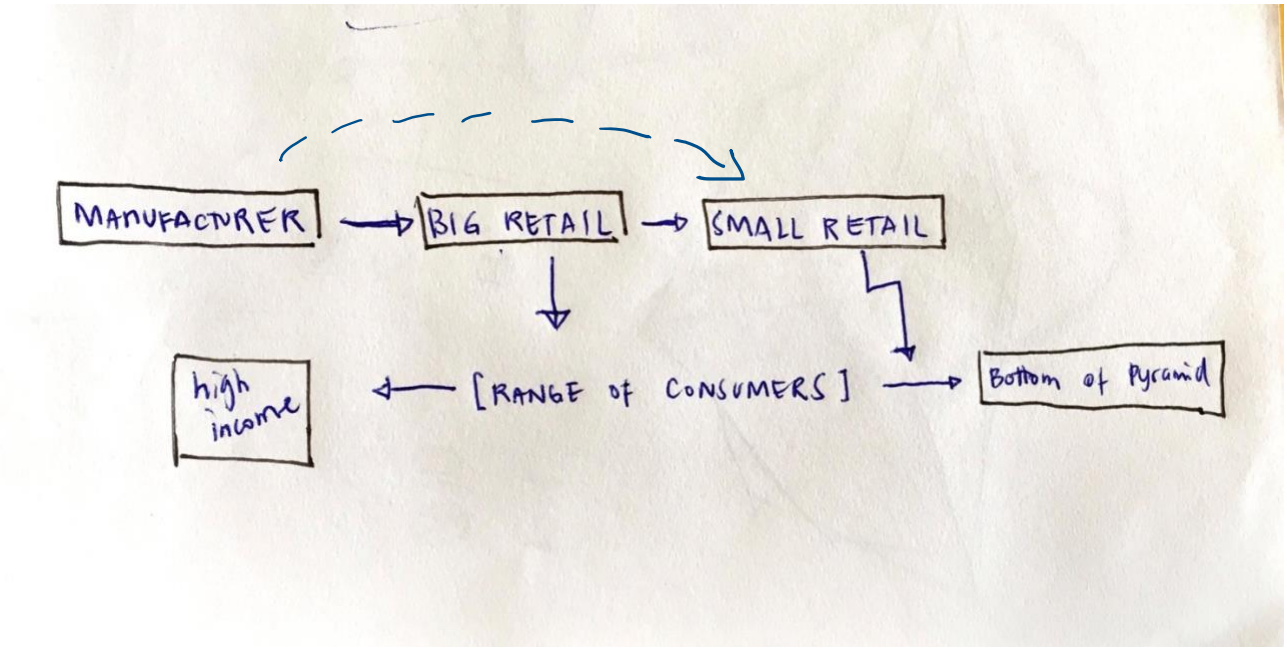
3.) Profile the target market using Design Personas

All 3 user groups must be well represented by the personas in the cast

a.) Product Owner (Unilever, P&G, etc)
b.) Manufacturer
c.) Big Retail (Supermarkets)
d.) Small Retail (Sari-sari store)
e.) Bottom of Pyramid
    a. Buyer
    b. End user

4.) Analyse different models and systems of distribution chain (see Figure 17)
    a. In understanding the journey of products from packaging to consumer purchase, I will be able to respond to prioritise and incorporate stakeholders' needs into the design of the alternative packaging system. Some examples of considerations may be:
        i. Packaging process
        ii. Boxing/Storage
        iii. Stacking
        iv. Delivery
        v. Display
        vi. Sales and Inventory

Figure 17: Common-knowledge journey of a sachet-packaged product



5.) Understand consumer behaviour in sachet usage; and
    a. It is crucial to incorporate behavioural concepts into the design of the alternative system because it could greatly affect reception to change
    b. Resources such as Don Norman's Design of Everyday Things, formerly known as The Psychology of Everyday Things, and concepts such as the status quo bias are worth exploring as guiding principles to this area of the research
6.) Understand sachet marketing strategies
    a. It is also important to understand the main merchandisers of the product. Considering their needs could help in creating positive impact as they are the decision-makers, and their products contribute the most to the environmental costs of sachets.
7.) Investigate and analyse precedents that have suggested alternatives to single-serve, single-use sachets
    a. This will hopefully lead me to clues on what types of materials, shapes, and sizes I should use in Objectives 3 and 4

8.) Investigate interactions of chosen product category to alternative materials

a. What if product A-Z was packaged in material A-Z?
    i. E.g. Shampoo in orange peels, shampoo in egg carton, detergent in orange peels, detergent in egg carton, etc

Research Questions

How can an alternative packaging systems design for sacheted Fast Moving Consumer Goods result in a decrease in plastic waste?

- What kind of strategies might encourage demand for a sustainable single-serve packaging design?
- How can an alternative design continue to serve the Bottom of the Pyramid?
- How can packaging systems design optimise cost-effectiveness in product delivery without plastic sachets?

Literature

Review of related literature

There has not been a lot of studies specifically on inclusive and environmentally sustainable plastic packaging, though I have been able to find related literature on environmentally sustainable plastic packaging, the sachet economy, and sachet marketing.

The review of related literature will be organised in these categories:

1.) Context
2.) Theory
3.) Methodology
4.) Precedents

1.) Context

Bottom of the economic Pyramid Market (BOP)

According to Anderson and Billou, there are around 1 billion people all over the world (1/6 of the global population) have a per capita income of less than $1 per day. Out of the billion, 700 million households come from the 20 biggest emerging economies alone. Their income put together is around $1.7 trillion. This huge market is often described as untapped or young because businesses are still struggling to penetrate this market due to constraints such as " corruption, poor infrastructure, non-existent distribution channels," etc. However, India, China, and the Philippines were cited as countries where Multi-National Corporations (MNCs) have taken action in penetrating the BOP market, and have significantly profited from these attempts. The success was credited to the use of the 4A's approach: Availability, Affordability, Acceptability, and Awareness (Anderson and Billou). In the Philippines, a major player in this success through this approach are sundry stores called *sari-sari* stores, representing around 90% of the country's total number of entrepreneurial enterprises (FUNAHASHI). This information validates the intention of the research to make environmental sustainability inclusive to the poorest communities by focusing design intervention on sachets with high consideration of sari-sari stores.

Sari-sari stores: An origin of modern sachet marketing

Sy-Changco and Pornpitakpan's study lays out some history of sachet marketing that gives significance credit to the early practices of sari-sari stores of piecemeal transactions as its origin or insipiration. Sari-sari stores or sundry stores are local neighbourhood shops who even before the modern sachets, repacked consumer goods (now known as Fast-Moving Consumer Goods or FMCG) into smaller packs and marked them up by a fraction.

Their study further explains the success of sacheted FMCG in the Philippines by putting together case studies from interviews conducted with highly positioned corporate managers of MNCs who had significant involvement in their respective companies' sachet marketing. One of the resounding reasons behind sachets' success in the country is that it "addresses the financial liquidity problems of consumers," and that the MNCs are able to distribute these goods through the existing large number of sari-sari stores (known as mom-and-pop stores/corner stores in the developed world) (Sy-Changco et al.).

2.) Theory

The Ciruclar Economy

Under the umbrella of the Circular Economy model, there have been a lot of material technology developments such as bioplastics in the past few years. There are also already existing systems that also falls under the circular economy umbrella such as the milkman system, that are often seen as an example from the past we should go back to.

The circular economy is about "ensuring we can unmake everything we can make" (*Circular Economy – Ōhanga Āmiomio | Ministry for the Environment*). It is about using our current waste as a resource, and/or making sure we design what we use to degrade back into the earth as a nutrient to the earth. (McDonough and Braungart). I chose to include in this review of related literature precedents that I found to be most relevant to the context of the research topic. For instance, Evoware was chosen because it is set in Indonesia, another sachet economy and neighbouring country of the Philippines where sari-sari stores are located. Tide pods were also identified as a related precedent because detergent is one of the most common examples of sachet-packaged products, and has become a very popular product in America because of its design flaw.

In the models that are simple and have long existed, I chose the water refill services because this is a perfect example of an almost-zero waste system that has been working for decades even without having to market it as a sustainable product. It is a remarkable example because drinking water is a staple need and has a high requirement of perception of cleanliness, yet the refill model thrives despite knowing that the refilled bottle they're getting in exchange of the empty one was previously used by another customer (a stranger).

Lastly, I also included Unilever's CreaSolv sachet recycling solution which is still being tested for market viability ('Rethinking Plastic Packaging – towards a Circular Economy'). Albeit the approach being different, it directly responds to the sachet waste issue, making it worth noting.

3.) Methodology

Design Persona

Literature by Alan Cooper and Kim Goodwin on Design personas are also being reviewed for this research. Design personas are fictional people meant to represent the different users designers are meant to design for. These characters mean to help designers in a goal-oriented design process (Cooper). Design personas will be described as accurately as possible

in traits, roles, characteristics, etc. which will eventually help me identify their individual goals and common goals. This will keep a focused design goal, avoiding common issues faced by designers, one of which is what Cooper called “features debates”.

I believe that given the constraints of this research such as time, funding, and the nature of it being conducted by an individual, the usage of design personas is a highly appropriate methodology in designing the end output of this project.

Precedents

Bioplastics

Bioplastics are plastics made out of natural materials which are degradable—some biodegradable (home compostable), and some just degradable (requires industrial composting). Some of the commonly used bioplastics today are derived from soy, seaweed, corn, egg whites and shrimp shells (Ungvarsky). Some bioplastics are also edible packaging.

There is still a lot of argument on whether or not bioplastics are truly friendly to the environment due to the gases they release when degraded and/or its ability to degrade being limited to industrial composting. Nonetheless, it is one of the approaches commonly used in some of the precedents like Evoware and Tide Pods:

Evoware

Evoware is an Indonesian company that manufactures packaging alternatives from seaweed. As of 2019, they are still only selling in small quantities “for product testing” (*Evoware*)

According to the Evoware website, Indonesia is also a sachet economy and is second to China as the top plastic waste-producing country in the world. Some of their products are edible grade, some biodegradable grade.

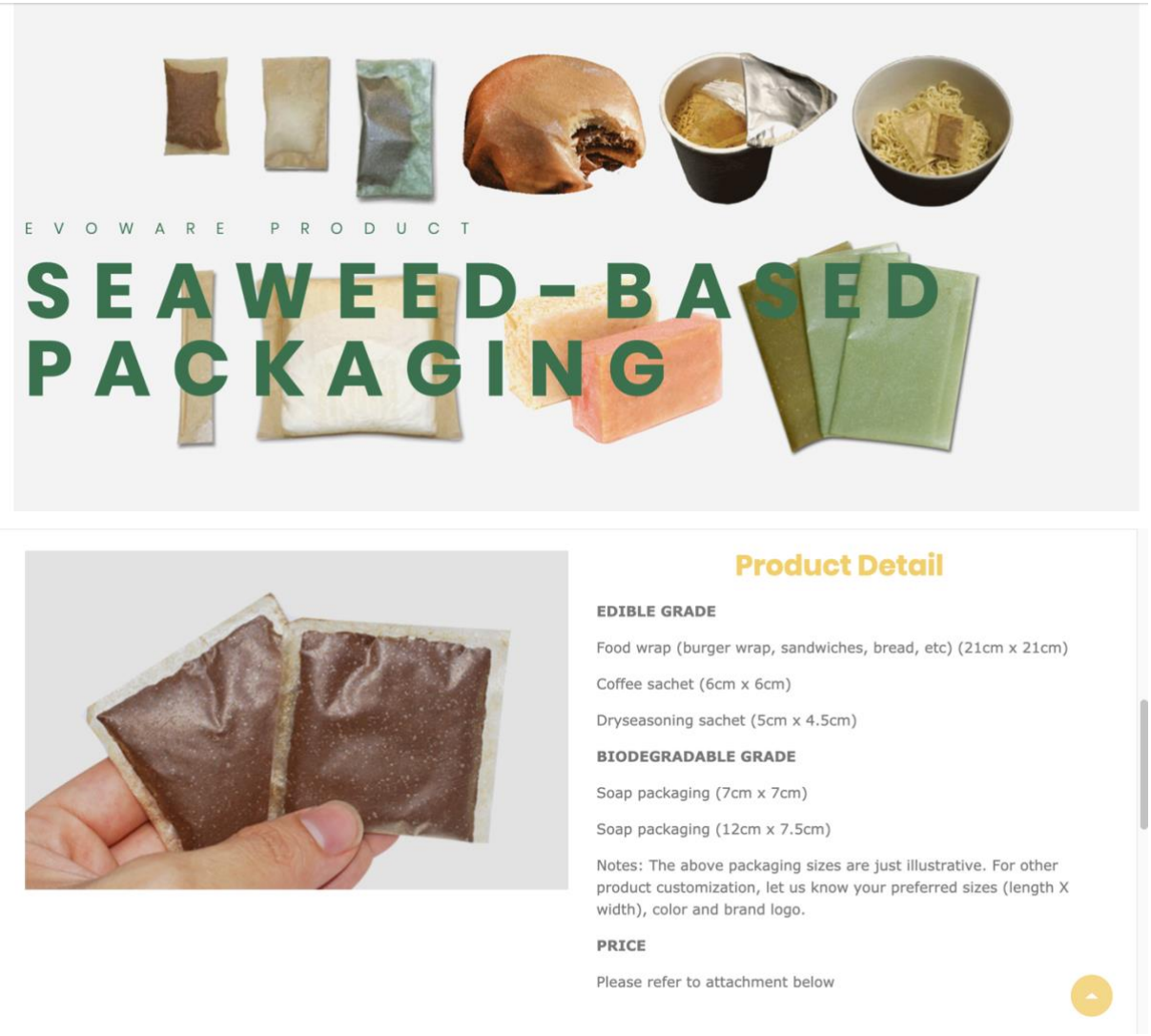
The edible grade has been applied by the company on products falling under a zero-waste bioplastics solution—without needing to compost the plastic post-use. The packaging melts or is eaten with what it is packaging.

There are other companies in the edible packaging market cited as prominent players by the Edible Packaging Market Research Report (2019) such as WikiCell Designs Inc (USA), Tate & Lyle Plc. (UK) Safetraces Inc. (USA), JRF Technology LLC (USA), Tipa Corp (Israel), MonoSol LLC (USA), Watson Inc. (USA), Devro plc (UK), Interpack (USA), Coveris Holdings (USA), Dupont de

Nemours and Co (USA), Ingredion Inc (USA), Nagase & Co. Ltd. (Japan), Pace International LLC (USA) (*Edible Packaging Market Global Analysis, Size, Share and Forecast to 2023 | MRFR*)

I decided to use Evoware as a precedent because it is the only company founded and based in a low-middle income country (LMI).

Figure18: Evoware



Tide Pods

The Disappearing Package : Tide Pods, designed by Aaron Mickelson in his Master of Design thesis is another form of dissolving flexible packaging, this time made out of polyvinyl alcohol (PVOH) (Dent and Sherr). This material also accepts ink,

allowing branding to be placed onto the packaging rather than the sticker type seen in Evoware. They almost completely disappear when popped into the washing machine, dissolving to release the detergent. Aaron Mickelson has since expanded this method to dissolving body soap boxes for Nivea, tea bag packaging for Twinnings (*The Disappearing Package: Tide PODs*). Mickelson's MDES was an experimental progression of the existing Tide Pods (see Figures 19-20) redesigned to produce zero-packaging waste.

Figure 19: Tide Pods

Figure 20: Tide Pods as available in the US Market

It is important to point out that the Tide Pods as seen in Figure 20 sparked controversy in America, where infants have been reportedly mistaking these pods as candy and ingesting them. Following these incidents is the "Tide Pod Challenge" where teenagers record videos of themselves taking the challenge of ingesting these pods and posting them on social media. There have been campaigns to ban these pods since (Meth).

There are many other examples of bioplastics that are continuously being developed in different parts of the world. Dezeen recently featured a number of projects and products that use this method in designing alternative packaging materials. Some examples of these are a water bottle made out of algae by Ari Jonsson of the Iceland Academy of the Arts (Pawnall), also algae based single-use packaging developed by Margarita Talep from Chile (Hitti), and Emma Sicher's food packaging made out of fermented bacteria and yeast (Hitti).

Refillery

Water and Gas Refill Stations

In the Philippines, there are a few refill systems in place for large products that are ordered on the phone and delivered at home such as drinking water and gas.

Since tap water is not safe to drink in the Philippines, almost all households buy drinking water in 5 gallon or 5 litre containers. To invest in this system, one must purchase containers and have those exchanged for refilled, plastic shrink-sealed containers, only paying for the water and delivery thereafter. The same system is applied to refilled gas tank home deliveries.

Figure 21: Water Refill stations


Happy Fiesta
St. Anthony De Padua
June 4-13

Dispensary

Rice dispensary

Rice dispensing businesses are also common in the Philippines. Small retailer buy goods in bulk and dispense them into smaller plastic bags priced by weight.


SINANDOMENG
ANGELICA
LONG GRAIN
MAHARLIKA
DENORADO
NO FAKE RICE

The Refillery

The Refillery is refill system attempted by Unilever in multiple countries. It received a lot of criticism after it declined to refill bottles from other brands. It also sold refillery-branded bottles to customers who brought bottles from different brands.

Its success has not been reported on since the controversy in early 2018.

Soap Dispensary

It is worth noting that recently, a soap dispensary in a city in the Philippines became viral on social media site Facebook recently. News on its success and reception have not been reported.

*Figure 28: One Stop Soap Franchising Advert (*One Stop Soap - Home*)*

*Figure 29: One stop soap stall (*One Stop Soap - Home*)*

Others

Creasolv: Unilever's Pilot sachet recycling plant

In line with Unilever's goal to cut their virgin plastic production in half by 2025, they launched a pilot plant in Indonesia called Creasolv in 2018 which can recycle sachets into new polymer plastics. According to Unliever, it has the ability to "process three tonnes of material in a day" which includes sachets produced by competitors ('Rethinking Plastic Packaging – towards a Circular Economy').

Unilever also committed to make all their plastic packaging 100% recyclable/reusable/compostable by 2025.

Discussion of the gap and opportunity

With everything considered, I believe that the gap between the problem and the precedents is the inclusivity of all the contributions presented towards solving the global plastic waste problem. Solutions that are new will always need time to scale to gain funding that will avoid costs being passed onto consumers who cannot afford another rise in prices.

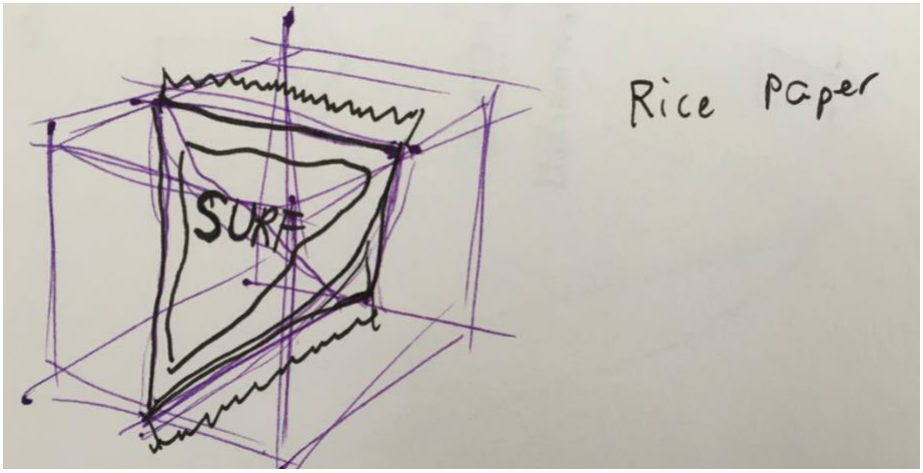
I believe that there is an opportunity to design specifically to include the bottom of the pyramid in sustainable living. Many of them understand the effects of the sachet plastic waste but feel that they do not have a choice.

Research Methods

Initial Design Experiments

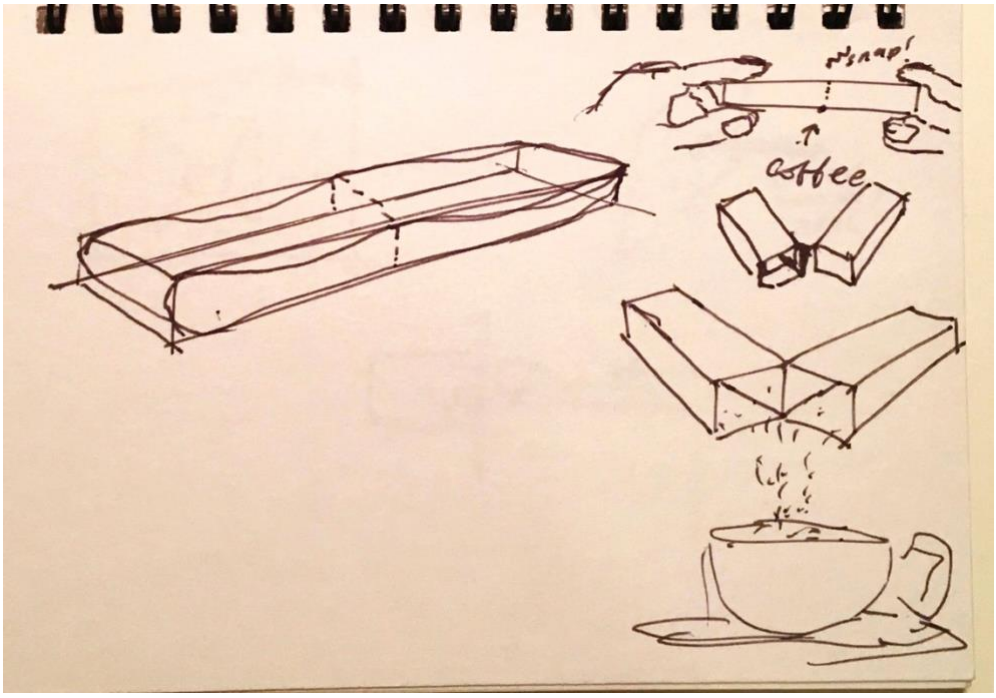
Rice Paper Sachet

I imagined a sachet world without plastic, and wondered if everything else remained the same except the material, would manufacturers have used something like Rice paper sachets?



Snap Cartons

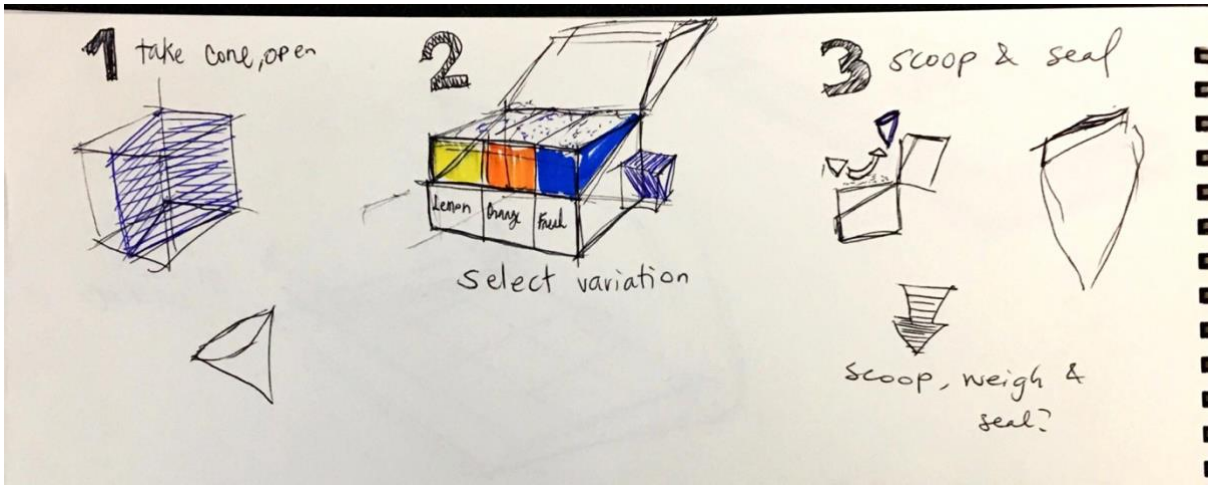
In this design experiment, I thought about instant coffee, changing its packaging to carton, and applying a movement like egg cracking into the usage of the sachet.

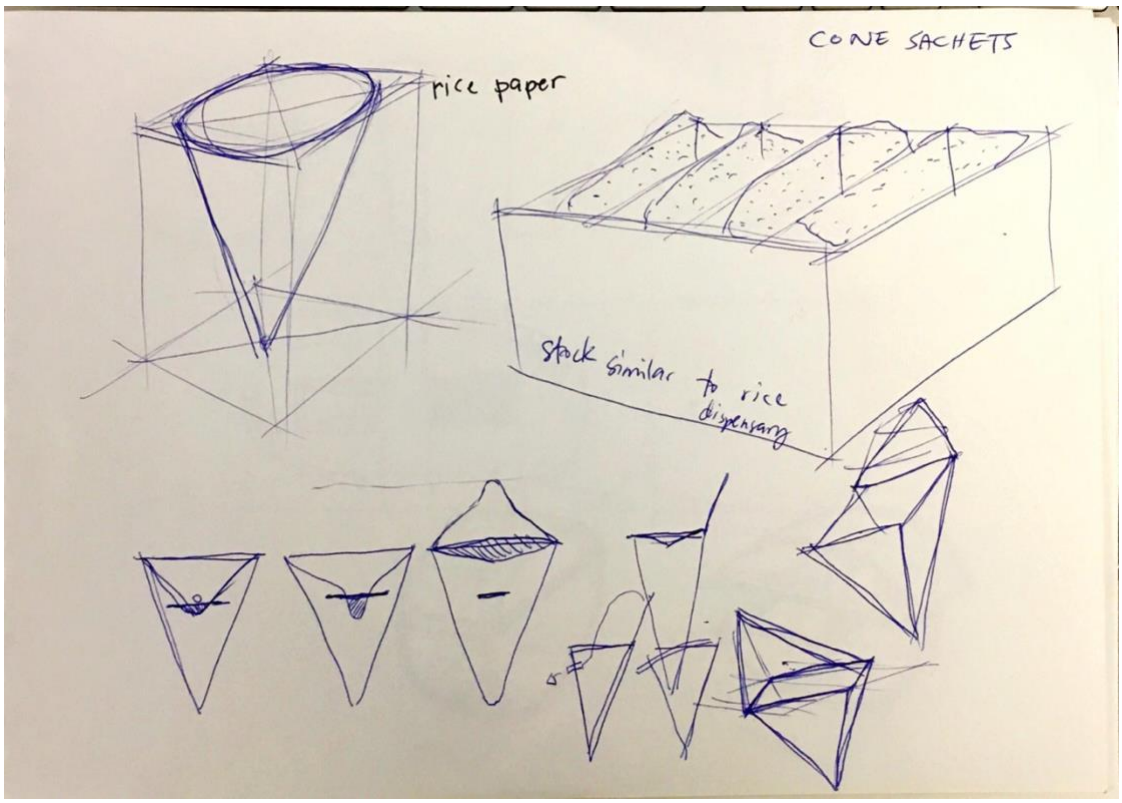


Detergent Dispensary

This design experiment responds to the question: “what if we distributed detergent the way we distributed rice?”

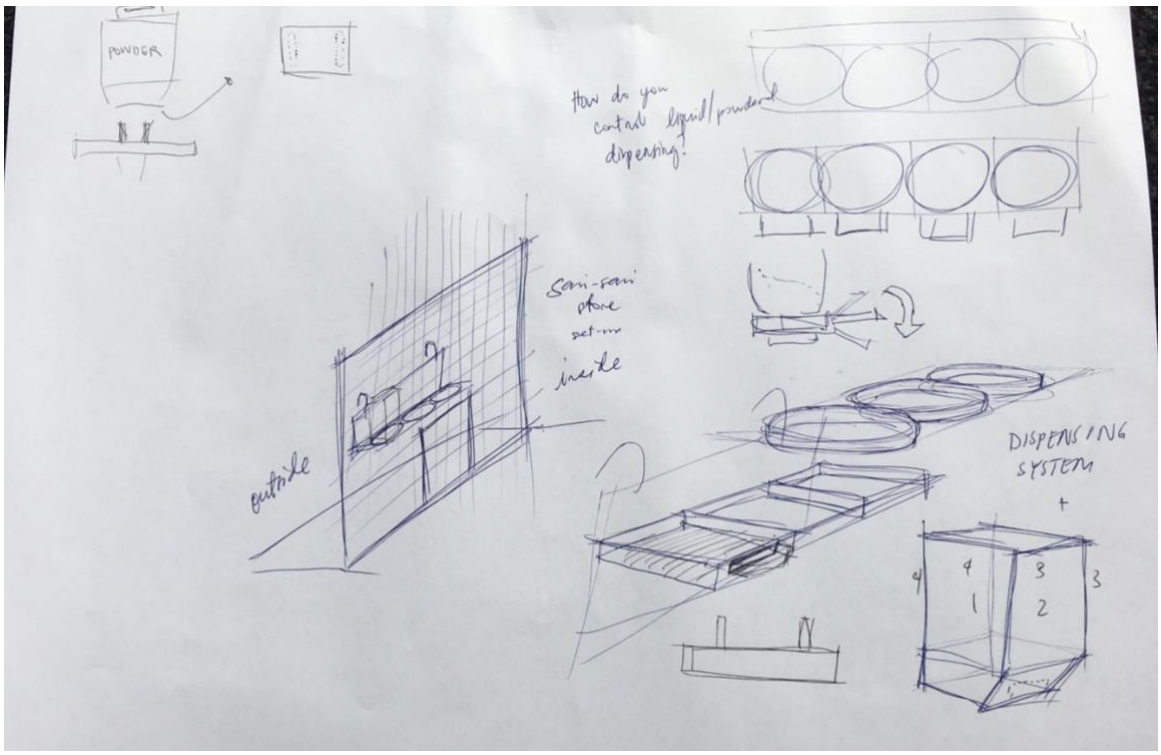
I imagined ways that detergent could be dispensed by sari-sari stores the way they do with rice products. Incorporating the scoop-fill-seal method used in dispensing rice into paper cones made out of paper. This was also thought of in the context of BOP consumers’ disposing behaviour being difficult to change. Paper is safer if littering could not be controlled. It will also decompose if dumped in a landfill.

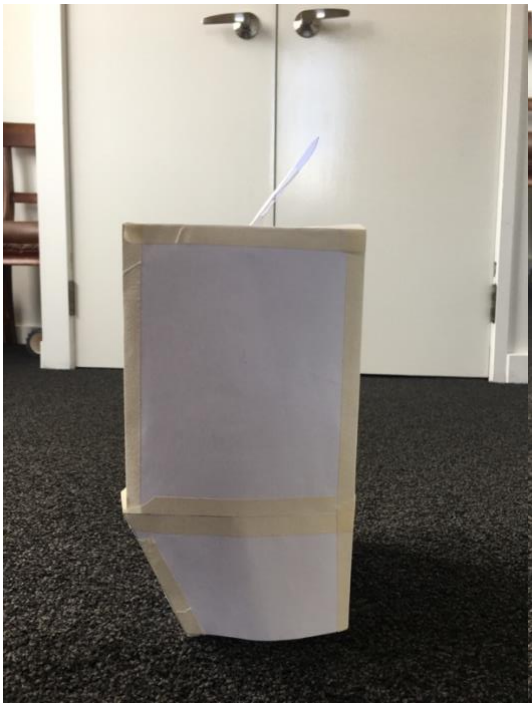


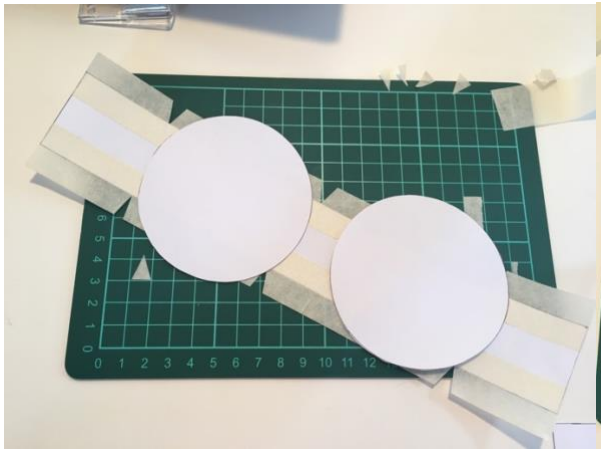


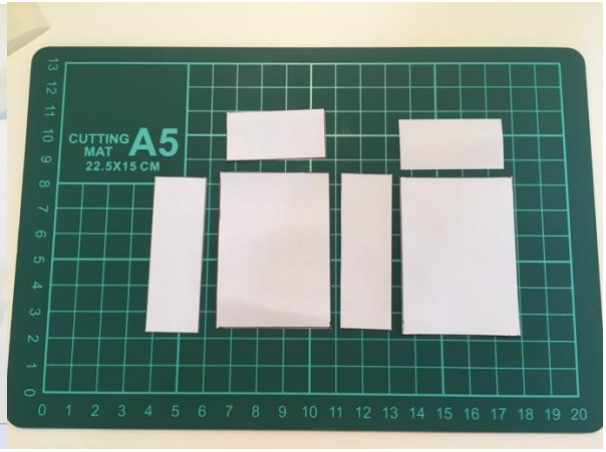
Exploring this idea further, I experimented and used structural packaging techniques from Paul Jackson's "Structural Packaging."

The sketches below show an approach that involves the sari-sari store owner purchasing cartons of detergent from the grocery rather than having it delivered to her store. A carton that is capable of dispensing or can be attached to a dispensing system would be more apt for this scenario.





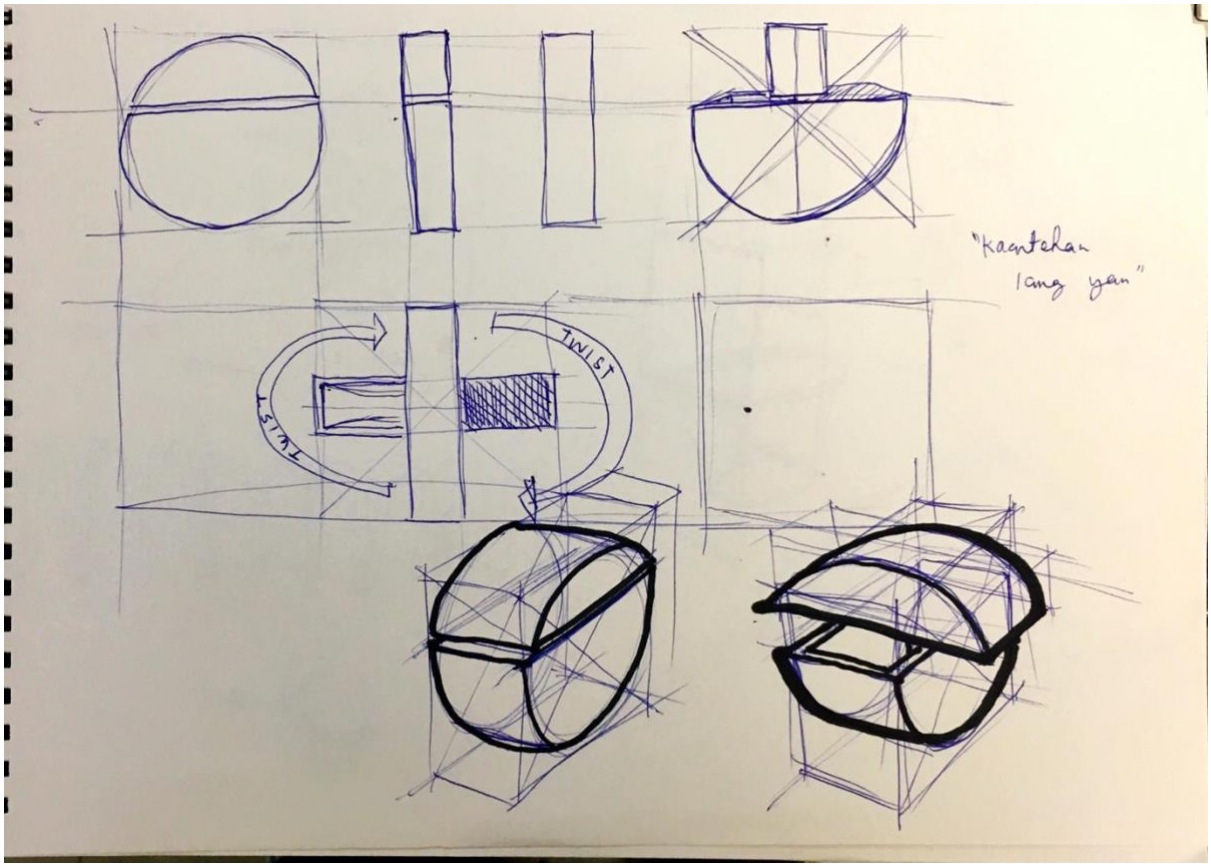



CUTTING
MAT
A5
22.5X15 CM

Shampoo/Soap Beetle Experiment

Lastly, I imagined a refill system for shampoo or other liquid detergents by sketching out a system consisting of a bottle that could become part of the homeware system (the way a plate is). I imagined that these bottles would be brought to the sari-sari store and have them match a retail dispenser to create a seamless and sealed refill transaction.

The bottle I imaged also evolved into a bottle that is flexible and can mimic the movement of pinching or squeezing a sachet.



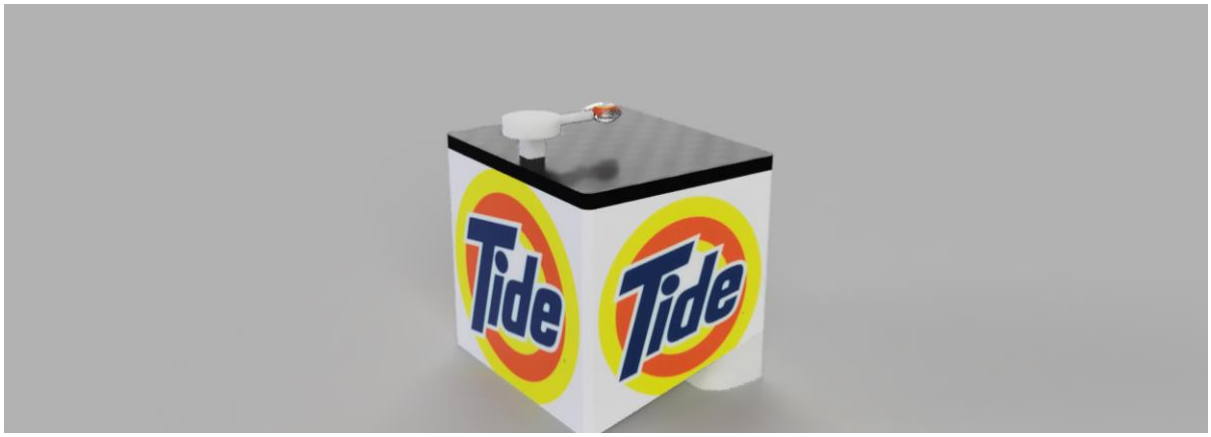

Tide
Tide
Surf


Tide
Tide
Tide

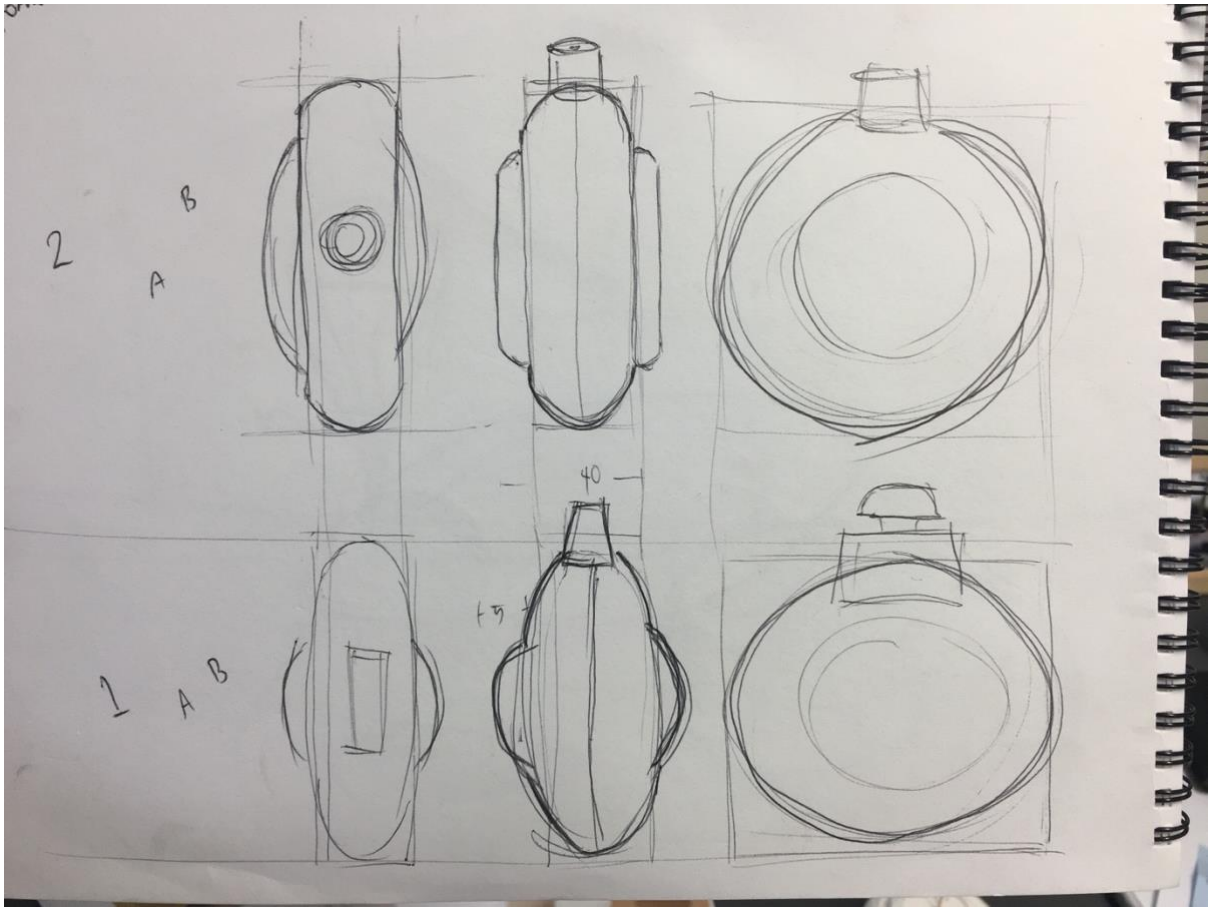

Tide
Tide
Tide

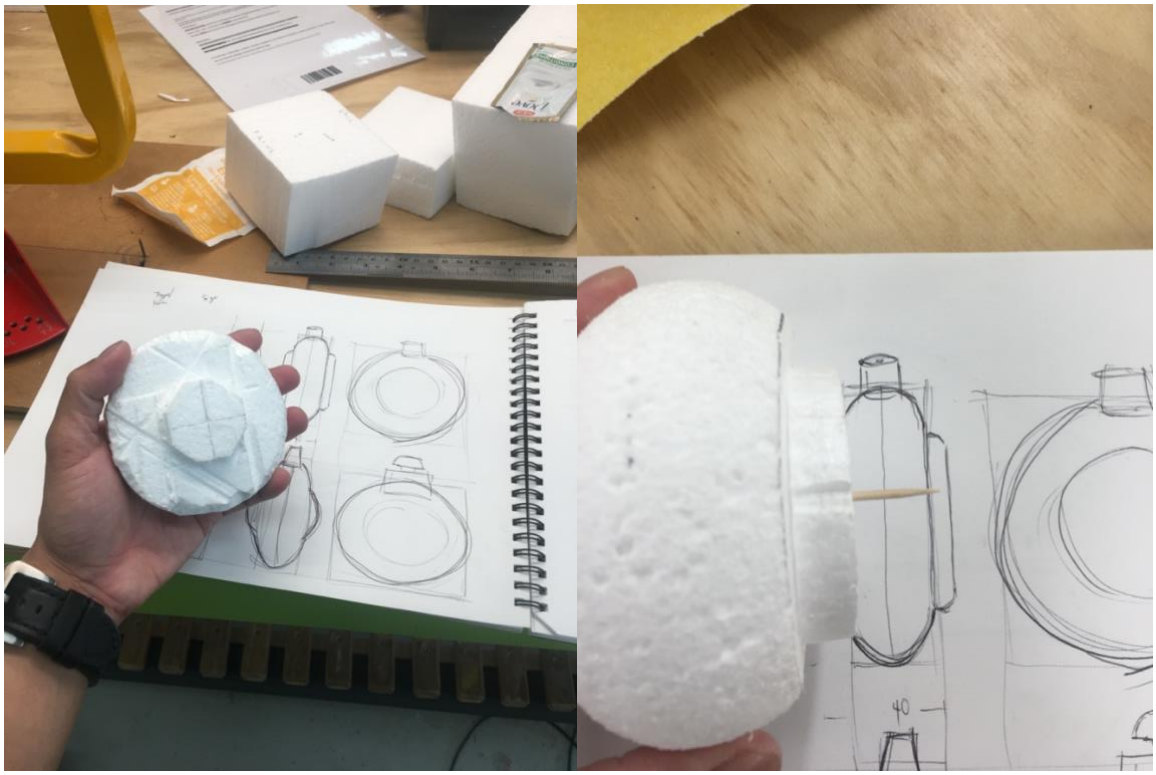

Tide


Tide

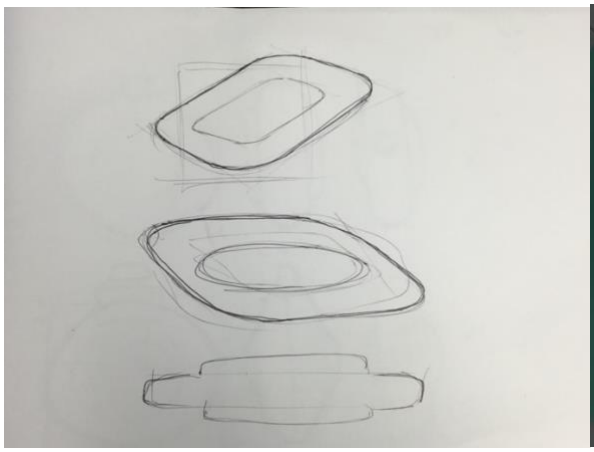

Tide
Tide


Tide

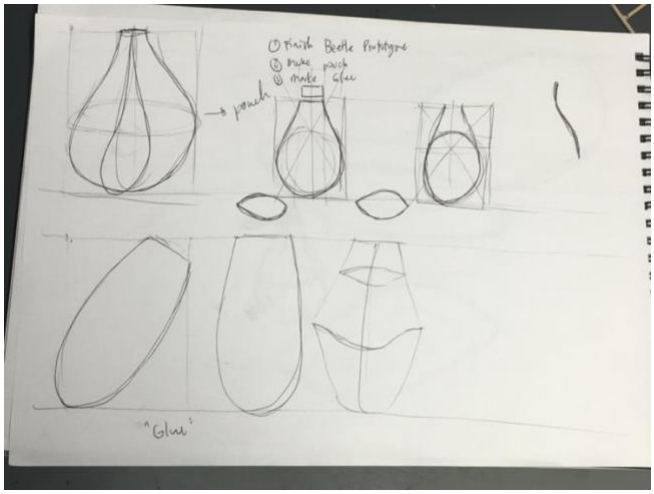

2
B
A
40
1
A
B

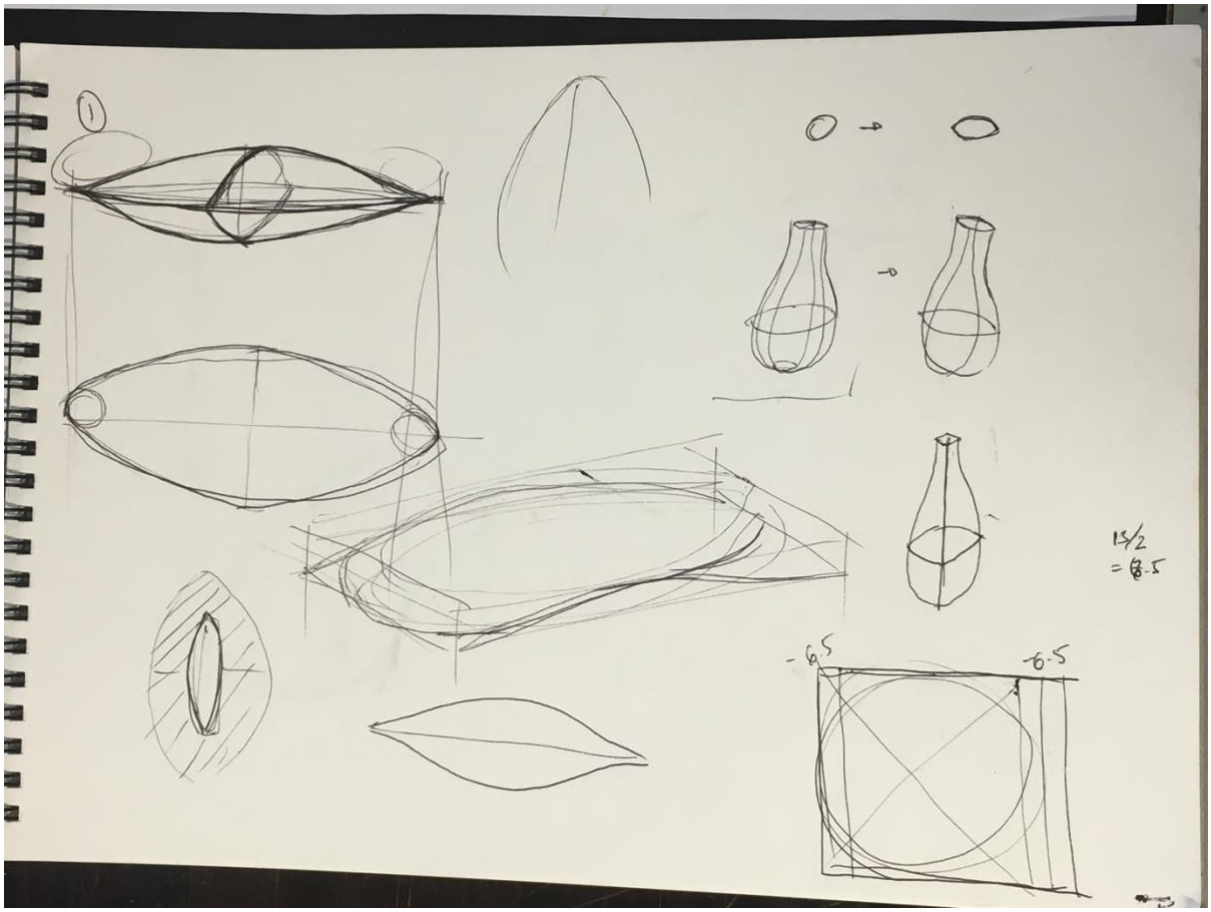

40

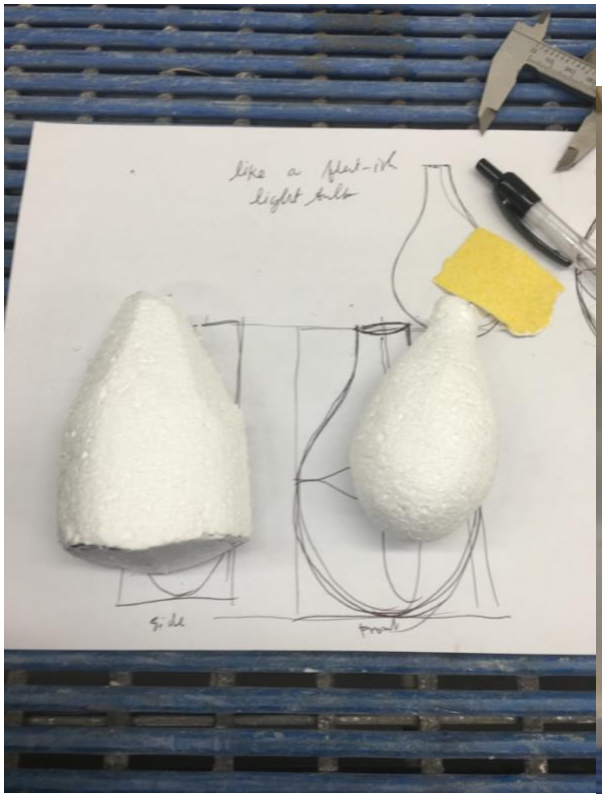

Dove
CONDITIONER

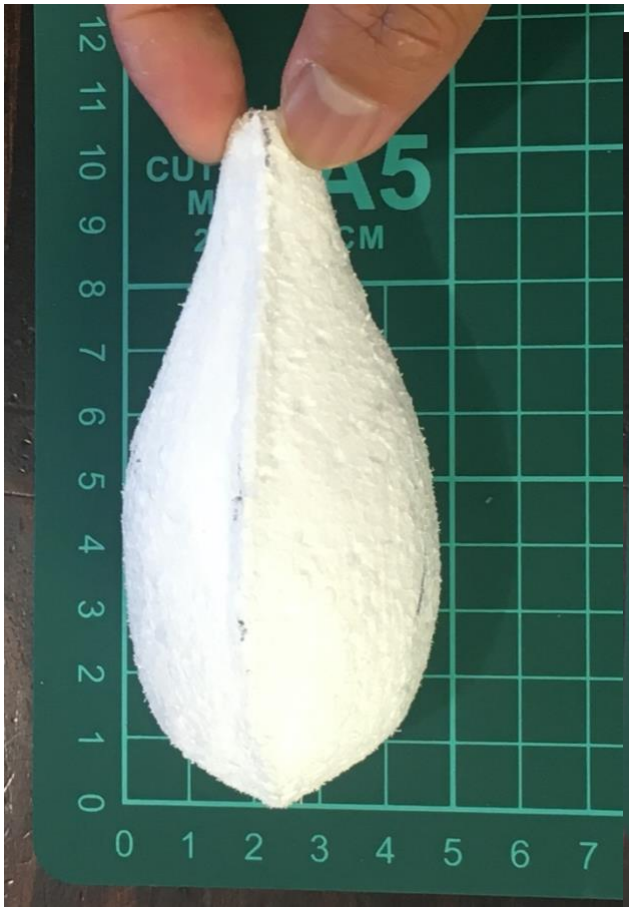



CUTTING MAT A5
22.5X15 CM


① finish Beetle Prototype
② make pouch
③ make Glue
→ pouch
"Glue"


15/2
= 7.5
-6.5
-6.5


like a flat-ish
light bulb
side
front


A5
0 1 2 3 4 5 6 7
12 11 10 9 8 7 6 5 4 3 2 1 0


A5
0 1 2 3 4 5 6 7
12 11 10 9 8 7 6 5 4 3 2 1 0

Material Exploration: Orange Peels Plastic with Fablab WLG

Conclusion

The global plastic waste problem continues today. Efforts towards sustainable living cannot truly succeed without the inclusion of developing countries who contribute significantly to the global mismanagement of waste. Current efforts towards sustainable living remain inaccessible and unsustainable for many consumers in developing counties like the Philippines where single-serve sachets are the only choice of purchase people have at the BOP. Additionally, because BOPs are still viewed as untapped and an unmined territory for a trillion-dollar profit. This means that the single-serve sachet packaging method used in the Philippines and India is something MNCs could potentially bring to the rest of the estimated 4 billion BOPs in the rest of the world, resulting to more disastrous effects on the environment. This research project hopes to address that gap by designing sustainable, eco-friendly packaging systems that are inclusive of consumers at the BOP.

Bibliography

Anderson, Jamie, and Niels Billou. ‘Serving the World’s Poor: Innovation at the Base of the Economic Pyramid’. *Journal of Business Strategy*, vol. 28, no. 2, Emerald Group Publishing Limited, Jan. 2007, pp. 14–21. *Emerald Insight*, doi:10.1108/02756660710732611.

Circular Economy – Ōhanga Āmiomio | Ministry for the Environment. https://www.mfe.govt.nz/waste/circular-economy. Accessed 4 Nov. 2019.

Cooper, Alan. *The Inmates Are Running the Asylum*. [New ed.], SAMS, 2004. Wellington 004.019 Coo.

Dent, Andrew, and Leslie H. Sherr. *Packaging Design*. Thames & Hudson Ltd, 2015. Wellington 688.8 Den.

Edible Packaging Market Global Analysis, Size, Share and Forecast to 2023 | MRFR. https://www.marketresearchfuture.com/reports/edible-packaging-market-5435. Accessed 1 Nov. 2019.

Evoware. http://www.evoware.id. Accessed 1 Nov. 2019.

FUNAHASHI, Toyoko. ‘Distribution and Consumption in the Base of the Pyramid (BOP) Market : The Case of Sari-Sari Stores in the Philippines’. **経営論集**, vol. 60, no. 4, **明治大学経営学研究所**, Mar. 2013, pp. 211–23. *CiNii*, https://ci.nii.ac.jp/naid/120005347530/.

Funahashi, Toyoko. *Pyramid（BOP）market：The Case of Sari－Sari*. https://scholar.googleusercontent.com/scholar?q=cache:7a1O9KC1HGYJ:scholar.google.com/+sari-sari+store+AND+sachet&hl=en&as_sdt=0,5. Accessed 1 Nov. 2019.

‘GAIA Report | Plastics Exposed: How Waste Assessments and Brand Audits Are Helping Philippine Cities Fight Plastic Pollution’. *Global Alliance for Incinerator Alternatives*, 7 Mar. 2019, https://www.no-burn.org/plastics-exposed/.

Gascon, Melvin. *Filipinos' Daily Plastic Waste: 163 Million Sachets, 3 Million Diapers*. https://newsinfo.inquirer.net/1093401/pinoys-daily-plastic-waste-163-million-sachets-3-million-diapers. Accessed 6 Oct. 2019.

Gonzaga, Diego. 'Every Single Piece of Plastic Ever Made Still Exists. Here's the Story.' *Greenpeace*, https://www.greenpeace.org/international/story/7281/every-single-piece-of-plastic-ever-made-still-exists-heres-the-story. Accessed 29 Oct. 2019.

Hitti, Natashah. 'Emma Sicher Makes Eco-Friendly Food Packaging from Fermented Bacteria and Yeast'. *Dezeen*, 13 Nov. 2018, https://www.dezeen.com/2018/11/13/sustainable-food-packaging-emma-sicher-peel/.

'It's a Small World: Living Sustainably in the Philippines' Sachet Economy | Coconuts Manila'. *Coconuts*, 10 Oct. 2018, https://coconuts.co/manila/features/small-world-living-sustainably-philippines-sachet-economy/.

Jambeck, Jenna R., et al. 'Plastic Waste Inputs from Land into the Ocean'. *Science*, vol. 347, no. 6223, Feb. 2015, pp. 768–71. *science-sciencemag-org.ezproxy.massey.ac.nz*, doi:10.1126/science.1260352.

Kuang-Jung, Chen. 'The Sari-Sari Store: Informal Retailing in the Philippines'. *Journal of Small Business Management*, vol. 35, no. 4, Oct. 1997, pp. 88–91. *EBSCOhost*, http://ezproxy.massey.ac.nz/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=9712116747&site=eds-live&scope=site.

McCullogh, Yvette. 'Indonesia to Send Contaminated Recycling Back to NZ'. *RNZ*, 20 Sept. 2019, https://www.rnz.co.nz/news/environment/399221/indonesia-to-send-contaminated-recycling-back-to-nz.

McDonough, William, and Michael Braungart. *The Upcycle : Beyond Sustainability - Designing for Abundance*. 1st ed, North Point Press, 2013. Wellington 363.7 McD.

Meth, Jake. 'The Tragic Side of Tide Pods'. *Fortune.Com*, 3/1/2019 2019, p. N.PAG-N.PAG.

Nulkar, G. ‘The Environmental Costs of Serving the Bottom of the Pyramid’. *Sustainability (United States)*, vol. 9, no. 1, 01 2016, pp. 31–38. *EBSCOhost*, doi:10.1089/SUS.2016.29042.

One Stop Soap - Home. https://www.facebook.com/OneStopSoapOfficial/?rf=108044800617230. Accessed 4 Nov. 2019.

Parker, Laura. ‘We Depend On Plastic. Now, We’re Drowning in It.’ *Magazine*, 16 May 2018, https://www.nationalgeographic.com/magazine/2018/06/plastic-planet-waste-pollution-trash-crisis/.

Pawnall, Augusta. ‘10 Bioplastic Projects Made from Algae, Corn Starch and Other Natural Products’. *Dezeen*, 9 Oct. 2018, https://www.dezeen.com/2018/10/09/bioplastic-projects-algae-corn-starch-beetle-shells/.

‘Plastic Trash from the “Sachet Economy” Chokes the Philippines’ Seas’. *Mongabay Environmental News*, 9 Oct. 2018, https://news.mongabay.com/2018/10/plastic-trash-from-the-sachet-economy-chokes-the-philippines-seas/.

Regan, Rick. ‘National Sword’. *99% Invisible*, https://99percentinvisible.org/episode/national-sword/. Accessed 30 Oct. 2019.

‘Rethinking Plastic Packaging – towards a Circular Economy’. *Unilever Global Company Website*, https://www.unilever.com/sustainable-living/reducing-environmental-impact/waste-and-packaging/rethinking-plastic-packaging/. Accessed 3 Nov. 2019.

Ritchie, Hannah, and Max Roser. ‘Plastic Pollution’. *Our World in Data*, Sept. 2018. *ourworldindata.org*, https://ourworldindata.org/plastic-pollution.

Ritschel, Chelsea. *Why Is Plastic Bad for the Environment and How Much Is in the Ocean? | The Independent*. 18 Apr. 2018, https://www.independent.co.uk/life-style/plastic-bad-

environment-why-ocean-pollution-how-much-single-use-facts-recycling-a8309311.html.

Singh, Ramendra, et al. ‘Buying Less, More Often: An Evaluation of Sachet Marketing Strategy in an Emerging Market’. *The Marketing Review*, vol. 9, Mar. 2009, pp. 3–17. *ResearchGate*, doi:10.1362/146934709X414297.

Sy-Changco, Joseph A., et al. ‘Managerial Insights into Sachet Marketing Strategies and Popularity in the Philippines’. *Asia Pacific Journal of Marketing and Logistics*, Nov. 2011. world, *www-emerald-com.ezproxy.massey.ac.nz*, doi:10.1108/13555851111183129.

The Disappearing Package: Tide PODs. https://disappearingpackage.com/solutions/tide/. Accessed 1 Nov. 2019.

Ungvarsky, Janine. ‘Bioplastic’. *Salem Press Encyclopedia of Science*, Salem Press, 2018.

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email: legaspipanjie@gmail.com

Organisation: n/a

City: Quezon City, Philippines

Virtual store observation and interview

Alternative environmentally sustainable sachet packaging systems for bottom of the pyramid consumers in developing countries
by Julian Tanaka

INFORMATION SHEET

This information is valid for a period of five (5) years

Researcher(s) Introduction

- Discussed what the project is about

- Discussed that one of the objectives of the research is to design the alternative that works best for sari-sari store owners as what I perceive to currently be the most important of personas
- Discussed Consent Form, Privacy Act, and Ethics Code, specifically Justice

Participant Recruitment

- The participant was recruited via personal messaging platform. Researcher reached out to former teammate whose family owns and manages a sari-sari store in Quezon City, Philippines

Project Procedures

- Researcher explained to participant that the data I will be gathering in this activity will enrich Personas and Journey Mapping used to guide Design Process.

Participant involvement

- Researcher explained that participant will be treated as a group, lead by researcher's main contact and signatory of this information sheet

Participant's Rights

You are under no obligation to accept this invitation. If you decide to participate, you have the right to:

- Decline to answer any particular question;

- Withdraw from the study (no specific timeframe);
- Ask any questions about the study at any time during participation;
- Provide information on the understanding that your name will not be used unless you give permission to the researcher;
- Be given access to a summary of the project findings when it is concluded.
- Ask for the audio/video tape to be turned off at any time during the research.

Project Contacts
Please feel free to contact me at any stage if have any questions about the project.

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND

PARTICIPANT CONSENT FORM

Name: Panjie Angela D. Legaspi

Email: legaspipanjie@gmail.com

Organisation: n/a

City: Quezon City, Philippines

Virtual Store Observation and Interview

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This consent form will be held for a period of five (5) years

I have had the details of the [project title] project explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.
Please circle one option for each clause…

- I **agree/do not agree** to the documentation of my participation in this research.
- I **agree/do not agree** that my participation in this research can be attributed to me.
- I **agree/do not agree** to the audio recording of my participation in this research. **(N/A)**
- I **agree/do not agree** to the photography of my participation in this research. **(N/A)**
- I **wish/do not wish** to have audio tapes or photographs sent to me. **(N/A)**
- I **would like/would not like** a copy of this document
- I am **willing/not willing** to be contacted

I agree to participate in Alternative environmentally sustainable sachet packaging system for bottom of the pyramid consumers in developing countries under the conditions I have outlined above.

Signature: Panjie.		**Date: August 3, 2020**
Full Name – printed **Panjie Angela D. Legaspi**		

We take your privacy seriously. Your contact information will never be used for any other purpose other than to contact you about your participation in this production or design research.