ELLEN MACARTHUR FOUNDATION

Upstream Innovation

A guide to packaging solutions

This guide is not about the state of global plastic pollution

It's about solutions

Foreword

This book is intended as a practical guide to help organisations innovate towards achieving their circular economy goals for packaging. Packed with practical tips, decision support frameworks, and case studies, it is designed for marketers, product designers, and packaging engineers new to the idea of a circular economy for packaging, as well as for seasoned practitioners.

In January 2016, the Ellen MacArthur Foundation launched the landmark report *The New Plastics Economy – Rethinking the Future of Plastics*,[1] laying bare for the first time the enormous environmental and economic downsides associated with our current "take-make-waste" plastics economy. It gained global headlines with its estimate that, on current track, there could be more plastic than fish in the ocean, by weight, by 2050. Most importantly, the report presented a way forward, laying out a vision of a plastic system that can work in the long term — a vision of a circular economy for plastics (see p. 6).

The circular economy is a bigger idea that goes beyond treating the symptoms of the current economy to tackle the root causes of many global challenges, including climate change and biodiversity loss, while providing opportunities for better growth. It can scale fast across industries, providing the solutions that people are calling for.

It is now widely recognised that a circular economy approach is the only solution that can match the scale of the plastic pollution problem.[2] It allows us to redesign the entire plastics system to not only overcome this global challenge, but to do so in a way that allows us to build better growth, and create solutions at speed and scale. More than 1,000 organisations have united behind the Ellen MacArthur Foundation's vision of a circular economy for plastic, in which we eliminate the plastic we don't need, innovate towards new materials and business models, and circulate all the plastic we use. In addition, businesses accounting for more than 20% of global plastic packaging use have set ambitious 2025 targets in line with this vision.

With 2025 just around the corner, it is time to deliver solutions. This guide is here to help.

We hope you find this guide a useful resource during our collective journey towards a circular economy for plastic.

The Ellen MacArthur Foundation Plastics team
November 2020

Vision of a circular economy for plastics

1

Elimination of problematic or unnecessary plastic packaging through redesign, innovation, and new delivery models is a priority.

2

Reuse models are applied where relevant, reducing the need for single-use packaging.

3

All plastic packaging is 100% reusable, recyclable, or compostable.

4

All plastic packaging is reused, recycled, or composted in practice.

5

The use of plastic is fully decoupled from the consumption of finite resources.

6

All plastic packaging is free of hazardous chemicals, and the health, safety, and rights of all people involved are respected.

The vision in its entirety can be downloaded from New Plastics Economy website using this link: https://www.newplasticseconomy.org/assets/doc/npec-vision.pdf

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intro...

INTRODUCTION

Two types of innovation are needed to achieve a circular economy...

Upstream Innovation

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

Downstream Innovation

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

This book focuses upstream.

What is upstream innovation?

DEAL WITH A PILE OF WASTE

Treating the root cause of a problem, rather than the symptoms, is fundamental to finding a solution that truly tackles the issue.

If you leave a bath running and it starts overflowing, for example, the only real solution is to turn off the taps. Mopping up the mess with the water still flowing wouldn't solve the problem — you need to ensure no more mess is going to be made. This is the essence of tackling the root cause of a problem — moving upstream.

The same principle applies when we talk about waste. In a circular economy, upstream innovation means that rather than working out how to deal with a pile of waste, we work out how to prevent the waste from being created in the first place.

OR

PREVENT IT FROM BEING CREATED IN THE FIRST PLACE?

WHAT IS UPSTREAM INNOVATION?

Upstream innovation is about preventing **waste** from ever being created.

Why consider upstream innovation?

TACKLE PLASTIC POLLUTION

By redesigning products, materials and services, it is possible to prevent waste from being created in the first place. For example, Coca-Cola's reuse model for PET bottles, operating in Latin America, prevents the production of 1.8 billion single-use bottles per year.[3]

PROVIDE THE SOLUTIONS CUSTOMERS WANT

Plastic pollution has attracted widespread public attention, and customers increasingly reward brands that deliver real solutions on plastics and beyond. For example, in 2018, Unilever's Sustainable Living Brands* grew 69% faster than the rest of the business, delivering 75% of the company's growth.[4]

CAPTURE UNTAPPED BUSINESS OPPORTUNITIES

Finding new ways of delivering products while designing out waste can lead to business benefits, such as cost savings, brand loyalty and user convenience. For example, shifting just 20% of plastic packaging from single-use to reuse is an upstream innovation opportunity estimated to be worth USD 10 billion.[5]

REDUCE CARBON EMISSIONS

Many solutions that design out waste also design out carbon emissions. For example, SodaStream (acquired by PepsiCo in 2018), which enables customers to make sparkling water at home, reduces carbon emissions by up to 87% compared to sparkling water sold in single-use plastic bottles.[6]

GET AHEAD OF CHANGING REGULATION

Governments around the world are adopting legislation targeted at tackling plastic waste. By embracing the power of upstream innovation, companies can stay ahead of the curve.

JOIN THE NEW NORMAL

Through the Global Commitment and Plastics Pact network, more than 1,000 organisations, including companies responsible for over 20% of all plastic packaging globally, have united behind the Ellen MacArthur Foundation's common vision for a circular economy for plastic. This vision has a strong upstream innovation component.

**Brands that communicate a strong environmental or social purpose, with products that contribute to achieving the company's ambition of halving its environmental footprint and increasing its positive social impact.*

What you will find in this book

This guide is not here to tell you about the state of global plastic pollution — it is here to present practical solutions.

By providing tools, facts, and real world examples, it aims to inspire and empower you to take action on upstream innovation to achieve a circular economy for plastics.

1

PART ONE: THE MINDSET

This section introduces the upstream innovation mindset — rethinking not just the packaging itself, but also the product and the business model, to identify new ways of delivering value to users, while designing out waste.

2

PART TWO: THREE STRATEGIES

This section shows how to apply the upstream innovation mindset to achieve three key circular economy innovation strategies: elimination, reuse, and material circulation. Backed by more than 110 innovation case studies and references, this section shows what good looks like in practice.

3

PART THREE: MAKING IT HAPPEN

This section introduces five key elements that underpin successful implementation of upstream innovation efforts, and provides guidance on making upstream decisions.

FIND OUT MORE BY VISITING plastics.emf.org/upstream

- Download the Upstream Innovation **workshop asset packs** with actionable tools for you to use (including films, new circular economy sprint methodology, etc.)
- Explore the Upstream Innovation **case study database** profiling approximately 200 examples of upstream innovation
- Get **translations** of this book in Spanish, Portuguese, French, and Chinese.

1

PART ONE

MINDSET

Introducing the upstream innovation mindset — rethinking not just the packaging itself, but also the product and the business model, to identify new ways of delivering value to users, while designing out waste.

THE MINDSET

Rethink the packaging, product, and business model...

Upstream innovation requires a shift in mindset. To unlock the full opportunity, it is necessary to move beyond focusing on incremental packaging improvements, towards fundamentally rethinking how to best deliver products and services to a user.

It involves rethinking not just the packaging itself, but also the product and the broader business model, with the aim being to identify new ways of delivering value to users, while designing out waste.

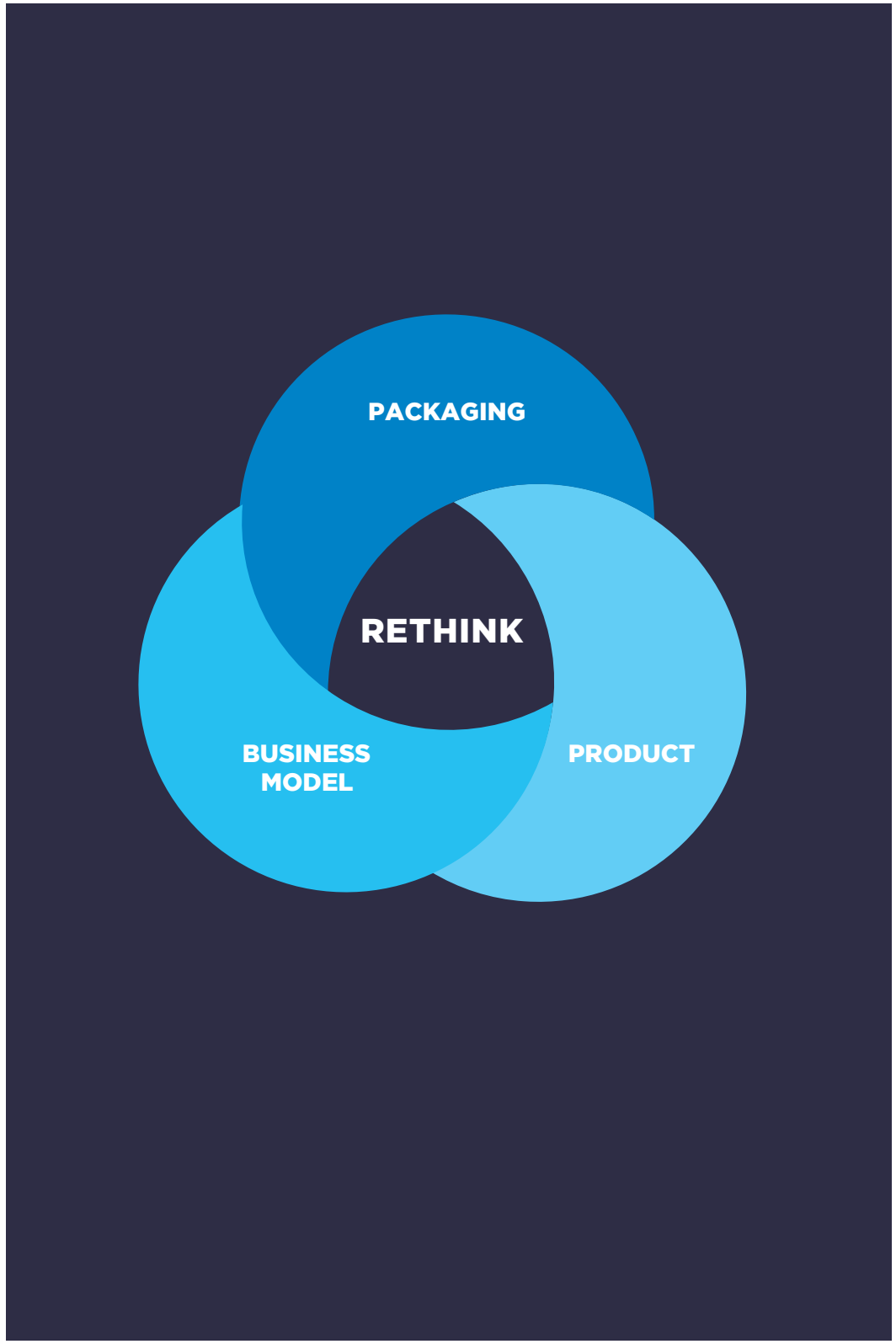
MODEL EXPLAINED

The mindset for upstream innovation

RETHINKING THE PACKAGING means innovating at the packaging design level (packaging concept, format, components, material choice) to provide the same essential packaging function, while designing out waste. For example, moving from non-recyclable to recyclable packaging formats or using a completely different type of material (such as an edible or dissolvable material).

RETHINKING THE PRODUCT means innovating at the product design level (product formulation, concept, shape, size) to change the packaging needs, while maintaining or improving the user experience. For example, changing from a physical product to a digital product, or from a liquid product to a solid product.

RETHINKING THE BUSINESS MODEL means innovating at the system design level (delivery model, supply chain, location of production, revenue streams) to change the packaging needs. For example, selling products in refillable or returnable packaging, rather than single-use packaging, or localising production, so freshness can be assured without relying on the complex, often less recyclable, packaging that is frequently required in global supply chains.



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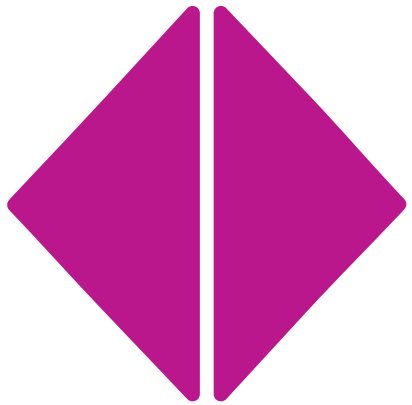
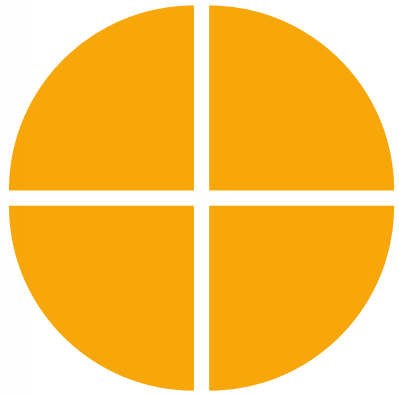
PART TWO

THE THREE STRATEGIES

This section shows how to apply the upstream innovation mindset to achieve three key circular economy innovation strategies: elimination, reuse, and material circulation. Including more than 110 innovation case studies and references, this section shows what good looks like in practice.

In the following chapters we introduce three upstream innovation strategies, and show how the upstream innovation mindset can be applied across them:





ELIMINATION

Packaging is eliminated while user experience is maintained or enhanced.

- Direct elimination
- Innovative eliminaton

REUSE

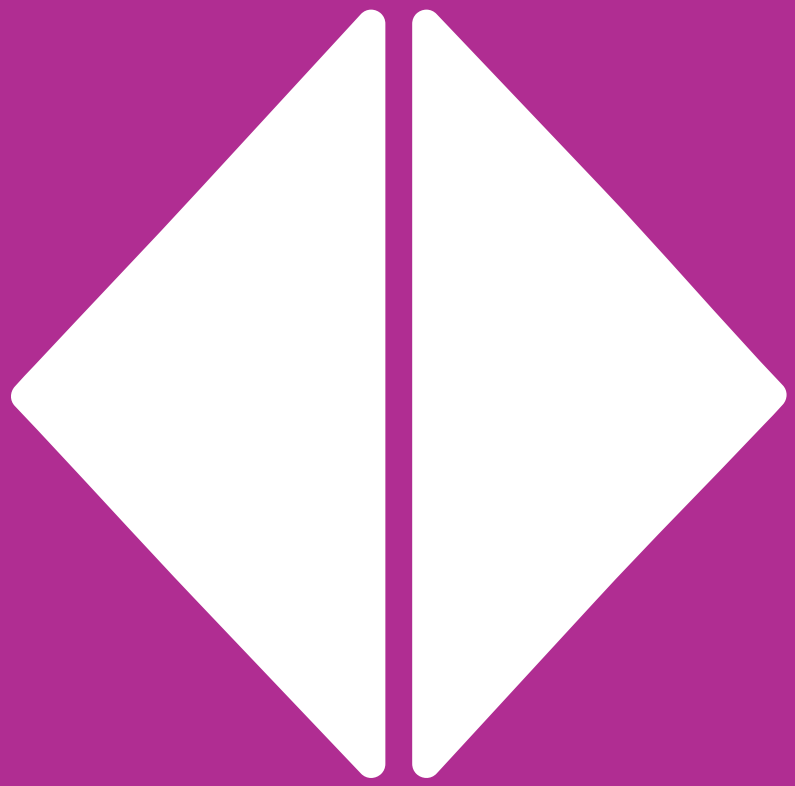
Packaging is reused, rather than discarded after one use, creating value for both users and businesses.

- Refill at home
- Return from home
- Return on the go
- Refill on the go
- Business to business

MATERIAL CIRCULATION

Packaging is designed so that the materials it is made from can be recycled or composted.

- Plastics recycling
- Plastics composting
- Substitution to a non-plastic material



THE THREE STRATEGIES

Elimination: The two approaches

By rethinking the packaging, the product and the business model, packaging can be eliminated while user experience is maintained or enhanced.

It is time to change our understanding of elimination to capitalise on its full potential.

Elimination: A hidden innovation opportunity

Elimination is more than bans on straws and plastic bags — it is a broad innovation opportunity.

Traditionally, elimination has mostly been seen as a relatively uninspiring strategy with limited impact, but this is changing, as:

1. The view on what constitutes 'necessary' packaging is changing. Many companies are starting to question their need for packaging in various applications, and the number of packaging items that can broadly be considered 'unnecessary', and therefore directly eliminated, is increasing.

2. Elimination is proving to be a hidden innovation opportunity. By rethinking the packaging, the product and the business model, packaging that is necessary in the current set-up can be eliminated through innovation, while maintaining or enhancing user experience.

"Why we need elimination"

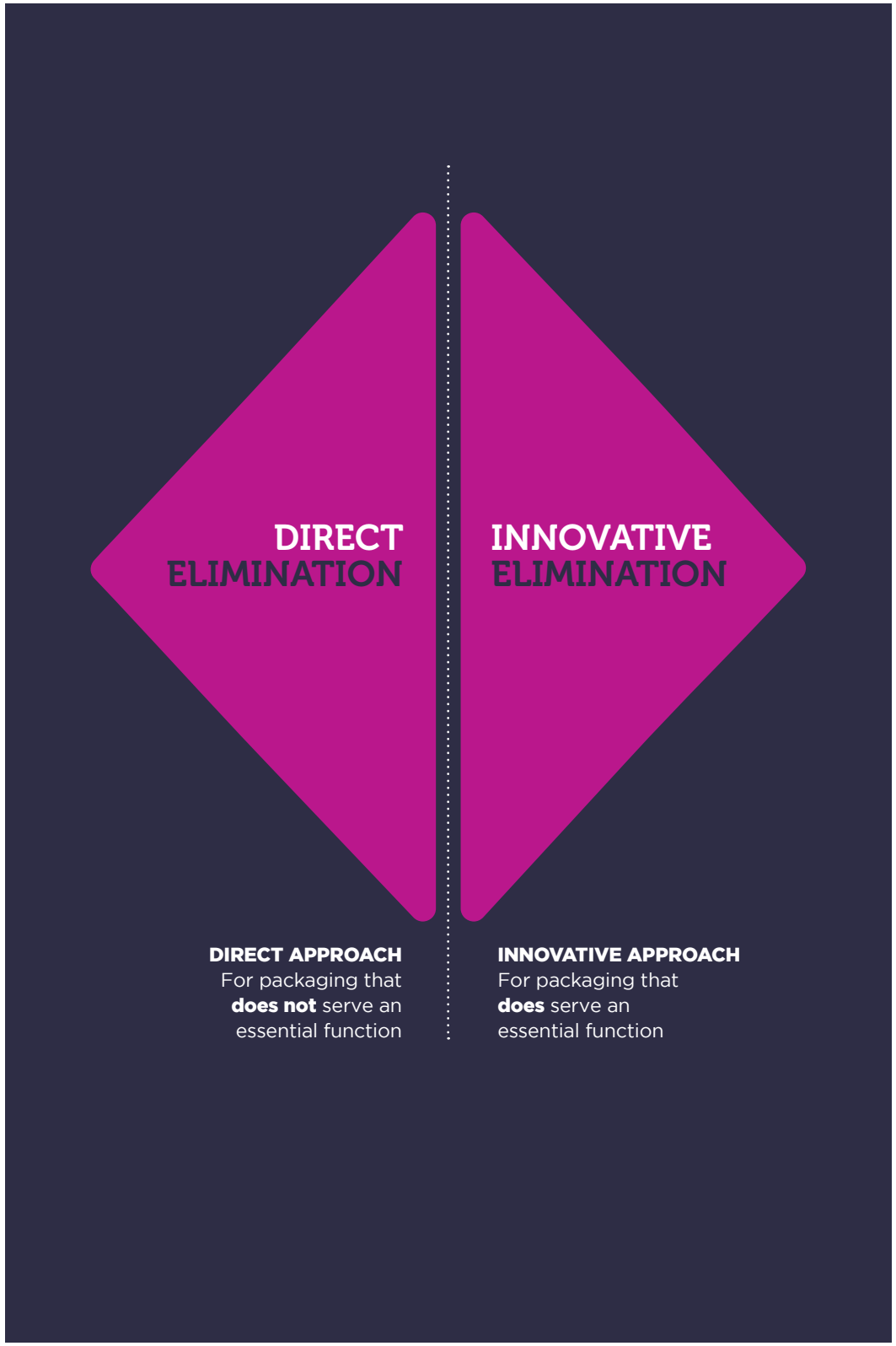
Without elimination, achieving a circular economy for plastics will not be possible. The demand for plastic packaging is set to double over the coming two decades making it impossible to keep this increased flow of plastics in the economy and out of the environment. To achieve a circular economy, we need to curb the growth in the amount of material that needs to be circulated.[7]

To note: Swapping from one type of plastic to another and substitution from plastic to another material (e.g. paper) are not discussed in this chapter. These approaches do not eliminate the need for a packaging or component and still require recycling/composting/reuse infrastructure and are therefore discussed in the Material Circulation section (p. 117). For the same reason, lightweighting is not covered here — a brief comment on this can be found on p. 127.[7]

"What we mean by elimination"

In this guide, 'elimination' means either eliminating the need for packaging or a packaging component, or making the packaging or component from an edible or dissolvable material (eliminating the need to treat the material after use).*

**Packaging refers to the entire item (e.g. a sachet, or a bottle including the cap and label). A packaging component refers to a part of packaging that can be separated by hand or by using simple physical means (e.g. a cap, a lid, or a tear-off).[8]*



The two approaches to elimination

There are two different approaches to elimination — a direct approach and an innovative approach. They differ depending on whether an item of packaging serves an essential function or not. Examples of functions that can be considered essential include necessary protection, containment, convenience, communication, and efficiency.

DIRECT ELIMINATION

Packaging that **does not** serve an essential function is directly removed. For example, film packaging on multi-buy tins.

INNOVATIVE ELIMINATION

Packaging that **does** serve an essential function is indirectly eliminated through innovation, with the function being achieved in a different way. For example, edible coatings for fresh produce that extend shelf-life, eliminating the need for packaging.

MODEL EXPLAINED

Direct Elimination

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

While straightforward in principle, an upstream innovation mindset can help rethink what is really needed and what is not.

TRENDS

Removing unnecessary multi-buy packaging: Secondary plastic wrapping is removed from multi-buy items such as canned foods, beverages, and snack packets *(e.g. Tesco's multi-buy cans p. 46, Waitrose's multi-buy cans p. 46).*

Removing unnecessary tear-offs: Tear-offs are removed from items such as water bottles, jars, and the openings of flexible packaging *(e.g. Nestlé's Pure Life (Egypt) p. 46, SonaeMC's jars p. 47).*

Removing unnecessary plastic film: Plastic film is removed from items such as fresh produce, clothing, perfume, cosmetics, and greeting cards *(e.g. ASDA's greeting cards p. 47, Walmart's loose fruit and vegetables p. 47).*

WHERE TO START

Many brands and retailers have already started to identify and eliminate unnecessary packaging[9,10] — the key categories of focus are captured in the trends above. Reviewing how these trends may apply across your portfolio is a good starting point.

WHAT GOOD LOOKS LIKE

Ambition level: Assessing opportunities for direct elimination of packaging should be done critically and on an ongoing basis.

Industry alignment: Brands, retailers, policy makers, etc. continue to refine the list of items that can be considered 'unnecessary' and hence directly eliminated.[11] Creating a common understanding and alignment on these items is an important way in which the industry can rapidly and collectively reduce the use of unnecessary plastic.

CASE STUDIES

RETHINK PACKAGING | SCALED | UK | TINNED/JARRED FOOD

Tesco: Eliminating multi-pack films

Plastic film wrapping has been removed from multi-buy tins (such as soups, beans, tuna, and tomatoes) across all UK stores. Multi-buy deals are still in place, and are automatically applied at the checkout for loose tins.

See p. 172 for the story behind Tesco's packaging strategy

ENVIRONMENTAL BENEFITS

Waste prevention: Eliminates 67 million pieces of film per year, equivalent to 350 tonnes.

Read more

RETHINK PACKAGING | SCALED | UK | TINNED/JARRED FOOD

Waitrose & Partners: Eliminating multi-pack films

Plastic film wrapping was removed from five multi-buy tin product lines as part of a trial in 17 stores. Multi-buy deals were still in place, and were automatically applied at the checkout for loose tins. The trial needed to be put on hold due to the resourcing impacts of Covid-19, but is planned to be reintroduced as soon as possible.

ENVIRONMENTAL BENEFITS

Waste prevention: Removing multi-pack films on the five product lines trialled would eliminate 18 tonnes of plastic film per year.

Read more

photo: Nestlé Waters Egypt

RETHINK PACKAGING | SCALED | EGYPT | BEVERAGES

Nestlé: Eliminating neck tear-offs

Plastic tear-offs that covered the bottle cap and neck (cap sleeves) have been removed from Nestlé Pure Life water bottles. Instead, the pack reads: 'if it clicks, it's safe', as an easy way for users to identify unopened bottles (i.e. listen for a click when the bottle cap is twisted).

ENVIRONMENTAL BENEFITS

Waste prevention: Nearly 240 tonnes of tear-offs were eliminated in the first 18 months (since January 2019).

RETHINK PACKAGING | SCALED | UK | HOME/OFFICE

ASDA: Eliminating greeting card packaging

Clear plastic wrapping has been removed from 92% of greeting cards. Envelopes are also distributed separately, so that they are only taken if required.

ENVIRONMENTAL BENEFITS

Waste prevention: 50 million individual cellophane bags are eliminated from cards per year, equivalent to over 86 tonnes of plastic. There has been no adverse rise in damage rates from eliminating the packaging.

Read more

RETHINK PACKAGING | SCALED | PORTUGAL | TINNED/JARRED FOOD

SonaeMC: Eliminating glass jar tear-offs

Plastic tear-offs (that covered the lip of the jar cap) have been removed from glass jars containing products such as olives and jams. The change is being explored for more items including honey and spices.

photo: SonaeMC

BUSINESS BENEFITS

Cost savings: Eliminating the tear-off saves EUR 0.0025 per jar, currently adding up to a saving of EUR 8,000 per year.

ENVIRONMENTAL BENEFITS

Waste prevention: Since 2012, 1.2 million tear-offs have been eliminated.

RETHINK PACKAGING | SCALED | CANADA | FRESH FOOD

Walmart: Eliminating fruit and vegetable packaging

Clear plastic film has been removed from individually sold peppers and organic bananas in stores across Canada.

ENVIRONMENTAL BENEFITS

Waste prevention: Approximately 87 tonnes of plastic film is eliminated per year for peppers, and approximately 6.3 tonnes for bananas.

Read more

CASE STUDIES

RETHINK PACKAGING | SCALED | PORTUGAL | PERSONAL CARE

SonaeMC: Eliminating toothpaste boxes

Secondary cardboard boxes have been removed from own-brand toothpaste. A shelf-ready tray is used instead.

ENVIRONMENTAL BENEFITS

Waste prevention: 725,000 boxes are eliminated per year. Total paper use is reduced by 8 tonnes per year.

Recyclability: The shelf-ready tray has an increased chance of recycling as it is now aggregated within the store versus in the user's bathroom, where recycling bins are rare.

photo: Colgate-Palmolive

RETHINK PACKAGING | SCALED | UK | FRESH FOOD

Tesco: Eliminating secondary lids

Clear secondary lids used on foil sealed 300mL cream pots (e.g. double cream and soured cream) have been removed.

ENVIRONMENTAL BENEFITS

Waste prevention: Removing secondary lids eliminates 34 million items of packaging per year, equivalent to approximately 100 tonnes.

Read more

RETHINK PACKAGING | ROLL-OUT | UK | HOME/OFFICE

ASDA: Eliminating bed linen packaging

Clear plastic covers made from PVC have been removed from own-brand duvet covers and pillow cases. There has been no notable increase in damage of products.

ENVIRONMENTAL BENEFITS

Waste prevention: 10.5 million duvet and pillow case covers, equivalent to 146 tonnes of plastic, were removed between Feb 2018 and Jan 2020 (with roll-out of the initiative still ongoing).

Read more

RETHINK PACKAGING | SCALED | USA | HOME/OFFICE

Walmart: Eliminating plastic windows

Plastic windows have been removed from the boxes used to package the 'My Life As' range of dolls, with the box instead left open at the front. This both improves the packaging's recyclability as well as helping to better showcase the product.

ENVIRONMENTAL BENEFITS

Waste prevention: Between June 2018 and June 2020 almost 2.5 million dolls were sold in the new packaging.

Recyclability: Eliminating the plastic window makes the remaining cardboard packaging recyclable.

photo: L'Occitane-En-Provence

RETHINK PACKAGING | ROLL-OUT | GLOBAL | PERSONAL CARE

L'Occitane en Provence: Eliminating plastic film around boxes

Clear plastic film around personal care products that are packaged in boxes (such as creams and lotions) will be removed (ongoing project, expected to be completed in 2022).

ENVIRONMENTAL BENEFITS

Waste prevention: Estimated to eliminate 8 tonnes of clear plastic film per year once changes have been fully rolled out.

Read more

MODEL EXPLAINED

Innovative Elimination

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

**Dissolvable packaging can be considered part of a circular system for packaging if it is proven that an entire biodegradation process takes place safely, within a reasonable timeframe, and in all environmental conditions where the packaging is likely to end up.*

TRENDS

Edible packaging: Packaging functionality is provided by a material that can be eaten with the product *(e.g. Apeel p. 52, Notpla's Ooho p. 58).*

Dissolvable packaging: Packaging functionality is provided by a material that can be dissolved in water *(e.g. MonoSol's laundry capsules p. 56, Aquapak's Hydropol™ , Smol).**

Solid products: Liquid products are redesigned as solid products, so packaging is no longer strictly required *(e.g. LUSH p. 60, a range of solid product-focused companies p. 61).*

Enhanced packaging functionality: Multiple packaging components and units are incorporated into one *(e.g. Amazon's Frustration Free Packaging p. 66, Charpak's Twist-Loc p. 62).*

Localised production and digitalisation: Goods are produced locally or digitally transferred, reducing packaging requirements for transport and protection *(e.g. Infarm p. 68, Opendesk Furniture p. 67).*

WHERE TO START

For innovative elimination, two categories stand out as good starting points: firstly, formats that pose significant challenges for a circular economy (for example, non-recyclable or high-leakage packaging formats); and secondly, packaging used in the fresh food, beverage, and personal care sectors where many innovative elimination examples already exist to take inspiration from.

WHAT GOOD LOOKS LIKE

Ambition level: If possible, eliminate the entire packaging, rather than just a packaging component. Also, be mindful that an innovative elimination effort does not unintentionally become a material substitution effort (see 'What is elimination' on p. 41).

Remaining packaging: In cases where auxiliary packaging might still be necessary (for example, to bring a solid soap home, or for home delivery of loose fruit and vegetables), make it optional rather than default when possible and design the packaging to be reusable, recyclable, or compostable *(e.g. LUSH p. 60, Kecipir p. 55).*

Unintended consequences: Make sure the innovative elimination strategy is implemented in a way that does not create unintended consequences (for example, a significantly higher level of product waste).

RETHINK PACKAGING | SCALE-UP | USA | FRESH FOOD

CASE STUDIES

Apeel: Edible coating

An edible coating made from plant material that extends the shelf-life of fresh fruit and vegetables. Designated FDA GRAS (Generally Recognised as Safe).

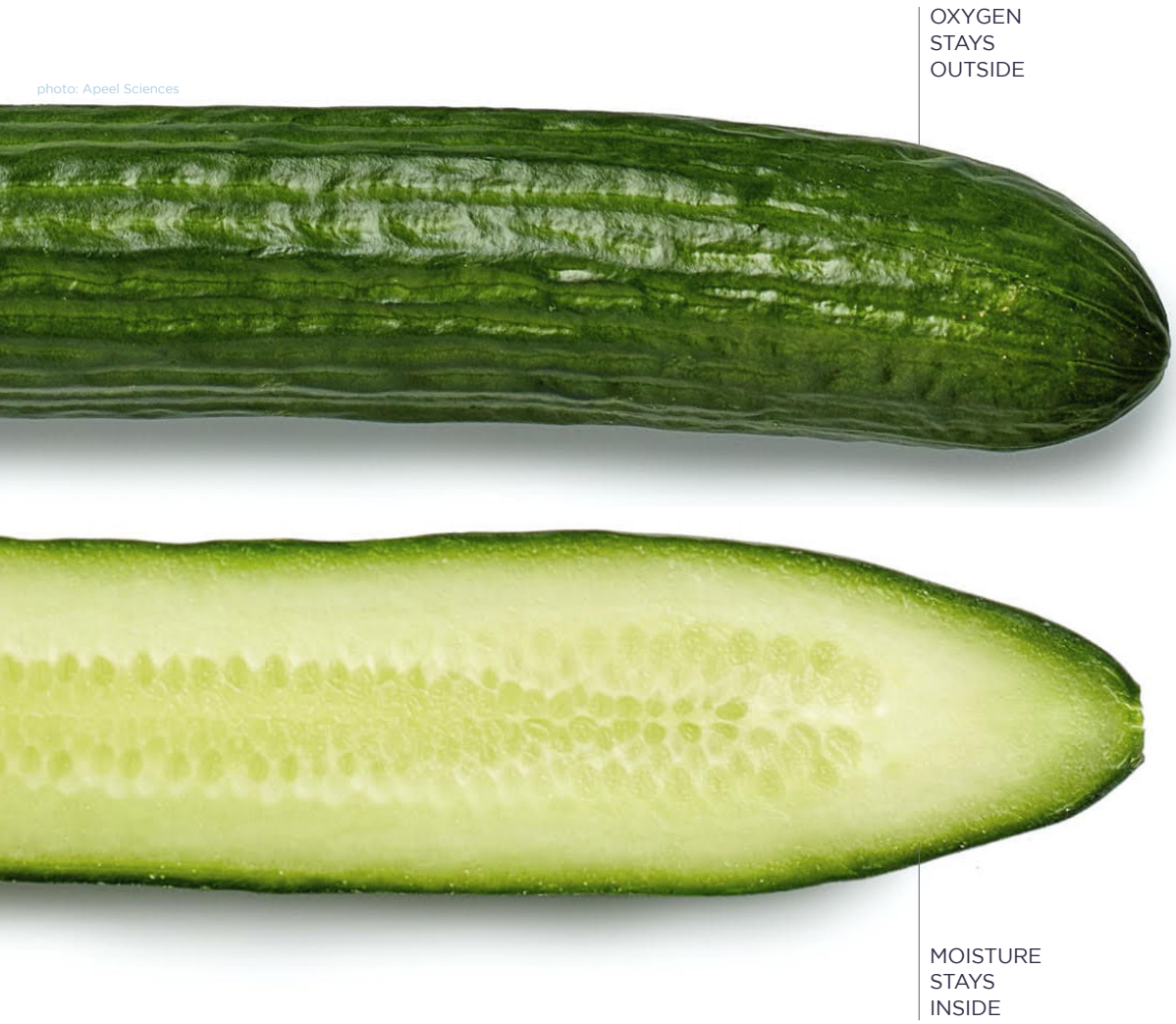


photo: Apeel Sciences

BUSINESS BENEFITS

Better products: Keeps products fresh for up to two to three times longer compared to non-coated produce by slowing water loss and oxidation.

Cost savings: Reduces the costs associated with food wastage and increases sales.

Competitive pricing: Return on investment is high enough that there is no need for retailers to charge more for Apeel-coated produce.

ENVIRONMENTAL BENEFITS

Waste prevention: Eliminates the need for plastic wrapping without increasing food wastage. For example, one cucumber supplier is expecting to eliminate >30 tonnes of shrink wrap annually by using Apeel.

Carbon emissions: A full life cycle assessment, including multiple indicators, has been conducted for Apeel-coated products.[12] Carbon savings range from 18% to 80%, depending on the product.

Compostability: Fully compatible with the compostable food.

INNOVATION STATUS

Investment: Secured USD 250 million to expand operations in 2020. Completed a USD 70 million Series C funding round in 2018.

Scale: USA retailer Kroger currently carries Apeel avocados, limes, and organic apples in their stores; German retailer Edeka carries Apeel avocados, oranges, and mandarins; and it was recently announced that ASDA stores in the UK would begin carrying Apeel produce. In addition, Apeel cucumbers are launching in the USA in late 2020.

Read more

DEEPDIVE

PROVIDING THE PRODUCT AND THE SERVICE

Apeel's product (the coating) is manufactured and distributed as a powder and mixed with water at the packaging centre. The product can then be applied by spray, dip, or brush-on methods.

Apeel provides both the product and the service of applying the product. They design and integrate the Apeel application system into the supply chain, monitor the application process over time, and study the produce quality in order to continually improve product performance.

With suppliers of fresh produce in the USA, Mexico, Peru, Spain and the Netherlands, and retail partners in the USA, Germany and Denmark, Apeel have brought avocados, limes, mandarins, oranges, and organic apples to market so far. Recent financing will allow the expansion of operations within Africa, South America, and Central America.

CASE STUDIES

RETHINK PACKAGING | SCALE-UP | USA | FRESH FOOD

Mori: Edible coating

An edible coating made from natural silk that slows down the spoiling process of fruits, vegetables, meats, and seafood. Self-designated as GRAS (Generally Recognised as Safe) in the United States. Approved for consumption in Japan.

BUSINESS BENEFITS

Better products: Improves the shelf-life and overall appearance of fresh foods by slowing down dehydration, oxidation, and microbial growth.

Cost savings: Mori can reduce costs associated with food wastage and deliver a two to three times return on investment compared to packaging that does not provide food spoilage protection.

ENVIRONMENTAL BENEFITS

Waste prevention: Eliminates the need for plastic wrapping, wax, and fungicides, and has the potential to reduce food wastage.

Compostability: Fully compatible with the compostable food waste stream.

INNOVATION STATUS

Investment: Raised USD 12 million in Series A funding in July 2020.

Partnerships: Mori has set up strategic partnerships across the food industry, specifically in the whole and cut produce, meat, and seafood sectors.

Read more

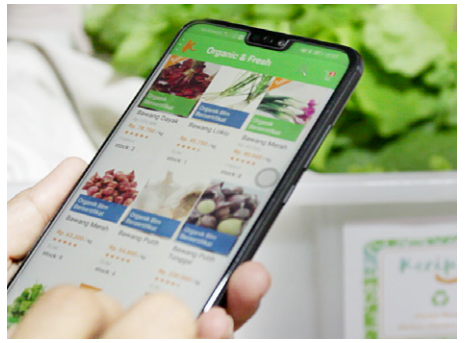
photo: Mori

Without Mori With Mori

RETHINK BUSINESS MODEL | START-UP | INDONESIA | FRESH FOOD

Kecipir from Enviu: Localised fresh food delivery

Online platform for fresh fruit and vegetables, connecting farmers directly with urban consumers through a fully reusable, circular delivery system.



photos: Kecipir

BUSINESS BENEFITS

Better products: Produce is harvested on demand ensuring freshness and best quality.

Convenience: An app-based platform enables users to shop online and save trips to the grocery store.

Cost savings: Reduced transport distances and a reduced number of parties involved in the process makes the model economically effective.

Competitive pricing: Produce is up to 50% cheaper than supermarket produce through the Kecipir platform.

ENVIRONMENTAL BENEFITS

Waste prevention: Since 2016, Kecipir operations have eliminated 6 tonnes of low quality, single-use plastics (like plastic bags and styrofoam trays). The model also reduces the amount of food normally wasted throughout the value chain as products are delivered locally, directly after being harvested. Food waste is currently reduced by 132 tonnes per year.

Carbon emissions: Products travel a maximum of 60 km, reducing transport emissions. Delivery time is less than 24 hours from farmer to consumer, so there is no need for refrigeration.

INNOVATION STATUS:

Scale: Since 2016, Kecipir has expanded to make 1,600 deliveries per month in the Greater Jakarta area and is actively exploring expansion into nearby cities. By 2022 the target is to expand to 15,000 deliveries per month across three cities.

Investment: Received EUR 30,000 in seed funding from the Enviu Foundation and a grant of USD 45,000 from National Geographic (in 2019).

Read more

CASE STUDIES

RETHINK PACKAGING | SCALED | GLOBAL | HOME CARE, PERSONAL CARE, DRY FOOD

MonoSol, LLC, a Kuraray division: Dissolvable films

Films that dissolve in water. The films have many applications ranging from home and personal care applications (e.g. detergent pouches, household and personal care refills) to food applications (e.g. single-serve packets of nutrition supplements, instant coffee, pre-measured spices for caterers and restaurants).

BUSINESS BENEFITS

Convenience: No need to unwrap or measure single-serve products saving time and mess. Easy for on-the-go use.

Better products: Can be used to reduce a user's contact with harsh chemicals, agricultural fertilisers, pesticides, or medically infectious materials.

Superior packaging: Films provide gas, odour, and oil barriers and the temperature they dissolve at can be controlled by design.

ENVIRONMENTAL BENEFITS

Waste prevention: Can eliminate single-use items such as sachets, bottles, bags, or protective films.

Renewable sourcing: Current formulations are available with up to 25% bio-based materials.

Recyclability: Does not contaminate plastics or paper recycling streams.

INNOVATION STATUS

Scale: Soluble pods for dishwashing detergent are used by the world's leading brands. MonoSol is expanding production in response to continued global demand with six facilities located in the US, UK, and Japan. A seventh facility is under construction in Poland.

Partnerships: MonoSol is best known for its partnership with P&G to develop Tide laundry detergent pods. Launched in 2012, these pods were one of the biggest breakthroughs for laundry products and MonoSol was recognised by P&G for accelerating innovation breakthroughs that drive business results. MonoSol today partners with almost every major consumer packaged goods and private label provider.

Read more

photo: MonoSol, LLC

CASE STUDIES

RETHINK PACKAGING & BUSINESS MODEL | START-UP | UK | TAKE-AWAY FOOD AND BEVERAGES

Ooho from NOTPLA: Edible 'blobs'

Edible and home compostable 'blobs' for beverages and condiments made from seaweed.

photo: Notpla

BUSINESS BENEFITS

Convenience: 91% of users find Ooho sachets for takeaway sauces and condiments 'easy to use' or 'easier to use than regular sachets'.

Brand reputation: 92% of users would like to see more of their takeaway sauces coming in Ooho sachets.

ENVIRONMENTAL BENEFITS

Waste prevention: Eliminates the need for single-use beverage bottles and cups as well as sachets. For example, approximately 36,000 cups/bottles were eliminated at a 2019 London Marathon trial and 46,000 sauce sachets were eliminated during an eight-week trial with ten London restaurants.

Renewable sourcing: Made from seaweed, which does not compete with food crops and is one of nature's most rapidly renewing resources (brown seaweed grows up to one metre per day!)

Compostability: Fully compatible with the compostable food waste stream and home compostable.

INNOVATION STATUS

Investment: Raised GBP 4 million in 'seedplus' funding in 2019.

Partnerships: A partnership between Notpla, Just Eat, Hellmann's, and Innovate UK has been established to scale up condiment sachets available on the Just Eat food delivery platform throughout the UK. Following a successful trial of Lucozade (sports drink) filled Oohos at the 2019 London Marathon, Ooho is being rolled out as the selected hydration solution for Lucozade at running events.

Read more

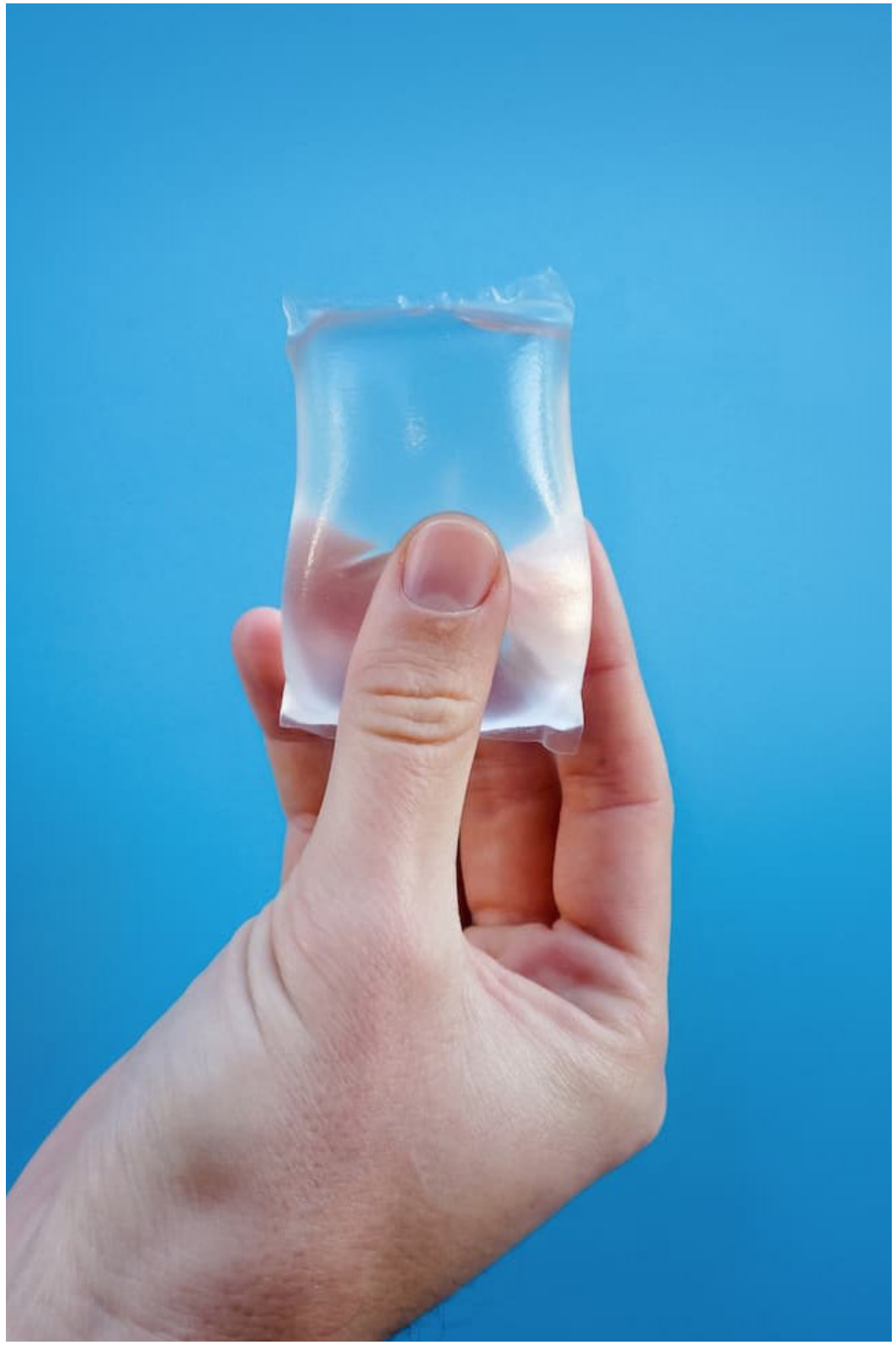


photo: Notpla

CASE STUDIES

RETHINK PRODUCT | SCALED | GLOBAL | PERSONAL CARE

Lush Cosmetics: Solid personal care products

Solid personal care products for the hair, body, fragrance, oral, and beauty care categories.

BUSINESS BENEFITS

Cost savings: Lush solid products reduce expenses associated with transport, storage space, and packaging material.

Convenience: Requires less cupboard space and eliminates the need to carry bulky, heavy bottles when travelling.

Brand reputation: Creates a new retail experience that has been embraced by customers.

INNOVATION STATUS

Scale: Founded in the UK in 1995, Lush now has over 928 stores in 48 different countries.

ENVIRONMENTAL BENEFITS

Waste prevention: Solid personal care products eliminate the need for bottles, containers, and tubes. For example, since 2007, Lush has sold over 38 million naked shampoo bars globally, saving over 90 million* plastic shampoo bottles. In the stores, products can be taken home with no packaging. When purchased online, products are placed 'naked' directly into mail order parcels.

Carbon emissions: Reduces emissions from transportation through reduction of product weight. For example, a shampoo bar can take up to 15 times less space than a liquid counterpart (based on the same number of uses).

Water use: Lush's yearly sales of shampoo bars save 450,000 litres of water compared to liquid counterparts.

Read more

DEEPDIVE

OVERCOMING THE CHALLENGE OF COMMUNICATING WITHOUT A LABEL

Although naked products present the opportunity to re-imagine what a cosmetics routine without any packaging could look like, they also present unique challenges — such as how to list ingredients without a label, and how to provide a customer with directions on how to use the product. Lush has leveraged the power of innovation and prevalence of technology to overcome these challenges. They developed the Lush Lens App, a product recognition tool that allows users to scan a product with their phone to get the typical information they would find on a physical label. The Lush Lens App also engages customers with the products through providing interactive content about the ingredients and the stories behind them.

*based on 1 x shampoo bar = 2.4 x bottles of liquid shampoo.

photo: Lush

Many companies, across a range of geographies, now offer personal care products as solid products.

photos left to right: Lamazuna, Beauty Kubes, Ethique, Amor Luminis, B.O.B Bars Over Bottles

Lamazuna, France

Beauty Kubes, UK

Ethique, USA

Amor Luminis, Australia

Bars over Bottles, Brazil

CASE STUDIES

RETHINK PACKAGING | SCALE-UP | UK | DRY FOOD, FRESH FOOD

Twist-Loc from Charpak: Tear-off free container

A plastic container with a locking mechanism between the container and the lid. Provides tamper evidence while eliminating the need for tear-off seals.

BUSINESS BENEFITS

Convenience: Simply twist to open, with no need to dispose of small format tear-offs that are unlikely to be recycled.

ENVIRONMENTAL BENEFITS

Waste prevention: Since launching in 2019, more than 3 million tear-off seals have been eliminated. This is predicted to increase to more than 10 million by the end of 2020.

Recycled content: The containers are made from a minimum of 75% recycled PET.

INNOVATION STATUS

Scale: Available in Waitrose grocery stores across the UK in the mini-bites aisle. Currently in discussions with a number of customers for expanding use across the UK and Europe.

Read more

photo: Charpak Ltd

RETHINK PACKAGING | PILOT | INDONESIA | BEVERAGES

Aqua Life from Danone: Label-free bottles

An embossed water bottle, eliminating the label and reducing the amount of packaging components. The barcode that was previously on the label has been integrated into the cap.

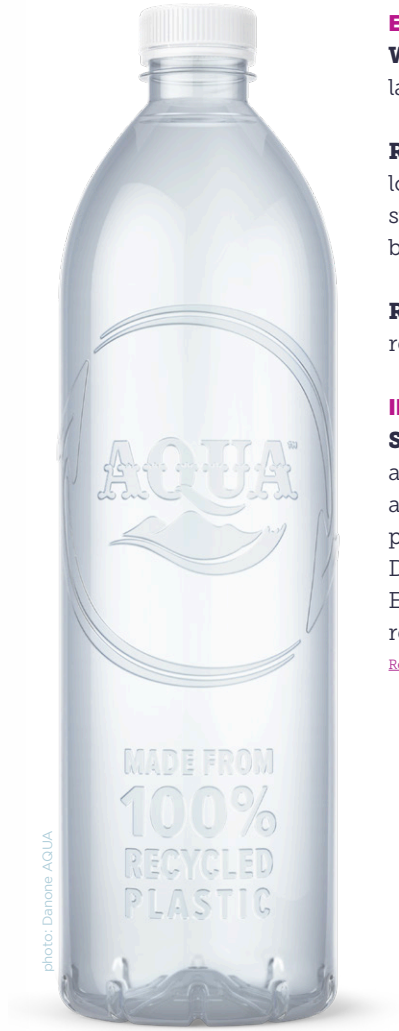


photo: Danone AQUA

ENVIRONMENTAL BENEFITS

Waste prevention: Eliminated 1.6 million labels in the launch year (2019).

Recycled content: Made from 100% locally sourced recycled PET, which stimulates local demand and drives bottle collection.

Recyclability: The bottle is 100% recyclable PET.

INNOVATION STATUS

Scale: The embossed bottle was launched as a pilot in Bali in early 2019, and is now available in Jakarta and Surabaya with plans to expand distribution. In July 2020, Danone's natural mineral water brand Evian also launched a label-free 100% recycled PET bottle in France.

Read more

CASE STUDIES

RETHINK PACKAGING | ROLL-OUT | GLOBAL | BEVERAGES

Snap Pack from Carlsberg: Innovative glue technology

Small glue dots that allow four, six, or eight aluminium cans to be glued together.

photo: Carlsberg Group

ENVIRONMENTAL BENEFITS

Waste prevention: Eliminates plastic rings and plastic film packaging.

Recyclability: Glue dots are compatible with the aluminium recycling stream.

INNOVATION STATUS

Scale: The product has been launched in several markets and is readily available at an industrial level.

Read more

RETHINK PRODUCT | ROLL-OUT | GLOBAL | ELECTRONICS

Phone chargers from Samsung: From glossy to matte surfaces

An altered phone charger design that eliminates the need for packaging. The glossy exterior is replaced with a matte finish, removing the requirement for a plastic protective film.

Read more

photo: Samsung

RETHINK PACKAGING | SCALED | SWEDEN | FRESH FOOD

ICA: Laser-engraved labels

Labels are etched directly onto fruit and vegetables using a laser, eliminating the need for plastic wrap and sticker labels. Only the pigment in the outer skin is changed, without affecting the produce itself. The laser label has been used on organic avocados, sweet potatoes, butternut squash, kiwifruit, ginger, and watermelons.

Read more

photo: ICA Sweden AB

RETHINK PACKAGING | SCALED | GLOBAL | B2B TRANSPORT

LOCK-n-POP from Signode: Adhesive spray

A food-grade cohesive that secures one layer of boxes or sacks on a pallet to the layer of boxes or sacks below. The cohesive has been designed so that it prevents packaged products from sliding off each other, but still allows them to be pulled apart relatively easily. The packaging surfaces are not sticky upon separation.

photo: Signode

ENVIRONMENTAL BENEFITS

Waste prevention: Eliminates or reduces plastic pallet wrap. For example, using LOCK-n-POP can reduce the total amount of solid waste produced by 10,000 pallets from five cubic metres down to 0.03 cubic metres.

Carbon emissions: According to LOCK-n-POP, greenhouse gas emissions can be reduced by seven to eight times compared to pallet wrap.

Read more

CASE STUDIES

RETHINK PACKAGING | SCALED | GLOBAL | E-COMMERCE TRANSPORT

Frustration-free packaging from Amazon: Easy-to-open e-commerce packaging

E-commerce packaging programme that challenges companies to redesign packaging that can provide protection during transport and a superior unboxing experience, but with the smallest number of packaging components.

photo: Amazon

Before

photo: Amazon

After

BUSINESS BENEFITS

Cost savings: Reduced shipping and packaging costs.

Convenience: Easier to open than regular transport packaging and reduces the amount of packaging a customer needs to store and dispose of.

Brand reputation: Improves brand reputation as overpackaging in e-commerce is negatively perceived by customers.

INNOVATION STATUS

Scale: Operating since 2008, the programme includes more than 2 million products.

ENVIRONMENTAL BENEFITS

Waste prevention: The programme eliminates secondary boxing and 'filler packaging', as well as hard plastic clamshell cases, plastic bindings, and wire ties. Since 2015, Amazon has reduced the weight of outbound packaging by 33% per shipment and eliminated over 910,000 tons of packaging material — equivalent to 1.6 billion shipping boxes.

Recyclability: To eliminate components that are not kerbside recyclable, Amazon has set clear guidelines on the types of materials and formats that can be used.

Read more

RETHINK PRODUCT & BUSINESS MODEL | SCALE-UP | GLOBAL | HOME/OFFICE

Opendesk Furniture: Localised furniture production

A new kind of furniture company that sells furniture designs, rather than physical furniture. Opendesk acts as a global platform for local making, and collaborates with independent designers all over the world to create shareable, downloadable designs. Through their online platform, Opendesk connects customers to a local professional maker to have furniture produced locally, on demand. This means no shipping, quicker lead times, and a short last-mile delivery.

BUSINESS BENEFITS

Cost savings: Opendesk reduces overheads by eliminating the need for shipping, display, and storage.

Customisation: On demand production means it is possible to tailor products to individual preferences.

Convenience: Shortened supply chains means a faster service. Opendesk has a 'desk-on-demand' service which can provide locally manufactured office furniture in 14 days (including order, delivery, and installation). This is designed to compete with the longer lead times of contract furniture brands.

INNOVATION STATUS

Scale: Opendesk has supplied office furniture for hundreds of companies, from start-ups to large organisations (such as Google, Greenpeace, and Nike).

Partnerships: Opendesk partners with more than 250 local makers worldwide.

ENVIRONMENTAL BENEFITS

Waste prevention: Localised production eliminates the need for transport packaging such as plastic film and cardboard. Reusable blanket wraps are used wherever possible during local transportation.

photo: Peter Guenzel

Carbon emissions: Localised production reduces transport emissions.

Renewable sourcing: Many workshops are social enterprises, which use FSC timber and help to retain proceeds in the local economy.

Other: The products are designed for local repair — prolonging their life and supporting a second-hand refurbished market.

Read more

CASE STUDIES

RETHINK BUSINESS MODEL | SCALE-UP | GLOBAL | FRESH FOOD

Infarm: In-store vegetable farms

Hyper-local production of produce, such as herbs and leafy greens, grown in-store in smart, modular 'farms'. Infarm installs the farms and then remotely controls and monitors each one through a cloud-based platform.

BUSINESS BENEFITS

Better products: Produce is fresher and looks and tastes better. Stores can offer a greater selection of products, including products that are not currently offered because they are too delicate to transport in existing supply chains.

Cost savings: Reduces touchpoints and logistics associated with the food supply chain.

Competitive pricing: Kroger in Seattle sells Infarm produce at the same price as the store's existing organic range.

INNOVATION STATUS

Scale: More than 900 farms in stores, restaurants and distribution centres across Japan, the USA, Canada, and Europe.

Investment: Completed a USD 100 million Series B funding round in early 2019 and a USD 170 million Series C funding round in 2020.

Partnerships: Established relationships with over 30 food retailers, including Kroger, Marks & Spencer, and Aldi.

ENVIRONMENTAL BENEFITS

Waste prevention: Infarm's hyper-local supply chain strategy allows customers to buy 'just-harvested' produce — meaning the produce stays fresh for a long time, which reduces food waste and means packaging is not strictly necessary.

Carbon emissions: A 90% reduction in transportation compared to traditional farming practices. On the other hand, energy consumption can be up to ten times higher than traditional farming — a factor that is the focus of continued innovation. The balance of emissions compared to traditional farming depends on the net difference between reduced transport emissions and increased energy use.

Water use: Uses 95% less water than soil-based agriculture.

Other: Uses 75% less fertiliser than soil-based agriculture and 99% less space.

Read more

photo: diephotodesigner.de

CASE STUDIES

RETHINK PRODUCT & BUSINESS MODEL | START-UP | EUROPE AND NORTH AMERICA | BEVERAGES

TAPP Water: Filtering water at home

Water filter that can be self-installed and attaches directly to the tap, providing instant filtering.

photo: TAPP Water

BUSINESS BENEFITS

Convenience: Eliminates the need to carry heavy water bottles or jugs.

Competitive pricing: Using a TAPP appliance is cheaper per litre of water than using single-use bottles. TAPP estimates that an average household can save more than EUR 200 a year through filtering water at home rather than buying bottled water.

Brand loyalty: Subscription service for filter refills keeps customers coming back.

ENVIRONMENTAL BENEFITS

Waste prevention: TAPP estimates it has eliminated close to 30 million bottles since 2016.

Carbon emissions: TAPP estimates their appliance can reduce CO_2 emissions by approximately 150 kg per user per year compared to transporting bottled water.

INNOVATION STATUS

Scale: Since 2016, TAPP Water has sold more than 85,000 units in 73 different countries around the world.

Read more

DEEPDIVE

WATER AT HOME

Access to safe and affordable drinking water is a human right (SDG 6). Sadly, for many people around the world, lack of access to drinking water is still a daily reality. Addressing this through water and sanitation infrastructure development is a priority, with huge societal and environmental benefits to be gained from the effort. Where this is not yet being addressed through infrastructure improvement, reuse and other delivery systems can sometimes present a viable option (for example, see I-Drop Water on p. 92 in this guide and Danone Water Jugs on p. 24 in the REUSE book). There are also cases where infrastructure exists, but consumers would still prefer not to drink water directly from the tap (due to bad taste, poor water quality, or presence of certain types of minerals, etc.). In this scenario localising the 'filtration' through offering 'on-tap' and 'in-house' solutions can provide an alternative to single-use bottles (see for example, TAPP Water pictured here).

RETHINK PACKAGING | SCALE-UP | GLOBAL | FRESH FOOD

Nebulization from ARECO: Advanced fog technology

Advanced fog technology (nebulization) for food (vegetable, fruits, fish, cheese, meat). Small micro-droplets of water maintain humidity to extend shelf-life and freshness without wetting the products, while reducing the need for packaging.

photo: ARECO

BUSINESS BENEFITS

Better products: Preserves look, taste, and nutrient value of fresh produce.

Cost savings: Increased profitability of the departments in which the technology is applied with a return on investment between 12 and 18 months. Nebulization reduces energy demand, and therefore lowers costs, compared to refrigeration systems. It also reduces product wastage and reduces product weight loss from dehydration (maintaining the price of products that are sold by weight).

ENVIRONMENTAL BENEFITS

Waste prevention: Reduces packaging and refrigeration requirements while extending product shelf-life and freshness.

INNOVATION STATUS

Scale: Used in over 4,500 stores globally, including recent entry to the North American market and Pacific region.

Read more

THE THREE STRATEGIES

Reuse: The four consumer-facing models – and a note on B2B

By rethinking the packaging, the product and the business model, packaging can be reused, rather than discarded after one use, creating value for both users and businesses.

Interest in reuse has been sparked. Now, it is time to use an upstream innovation mindset to implement and scale solutions.

Reuse: A revolution on the rise?

In the last few years, reuse models have gained significant momentum in the world of packaging.

Until recently, reuse models were broadly considered to be burdensome or a thing of the past, but not anymore. Interest in reuse is evidenced by the number of reuse-focused pilots, commitments, research initiatives, and start-ups that have been launched in the past two years.

This growing interest stems from the increasing recognition that reuse models offer not only a new range of solutions to plastic pollution, but also the potential to unlock significant business benefits.

For example, reuse can help to cut costs, adapt to individual needs, optimise operations, build brand loyalty, improve user experience, and gather intelligence.[13]

For further information on reuse, see the Ellen MacArthur Foundation's 2019 REUSE book, which presents a detailed assessment of the benefits of reuse, the four B2C reuse business models, and 69 examples of reuse solutions.

"What we mean by 'reuse'"

Reusable packaging is designed to be used multiple times, for its originally intended purpose, as part of a dedicated system for reuse. Reusable packaging is brought back into the economy through the washing of the entire intact packaging.*

"Covid-19 and reuse"

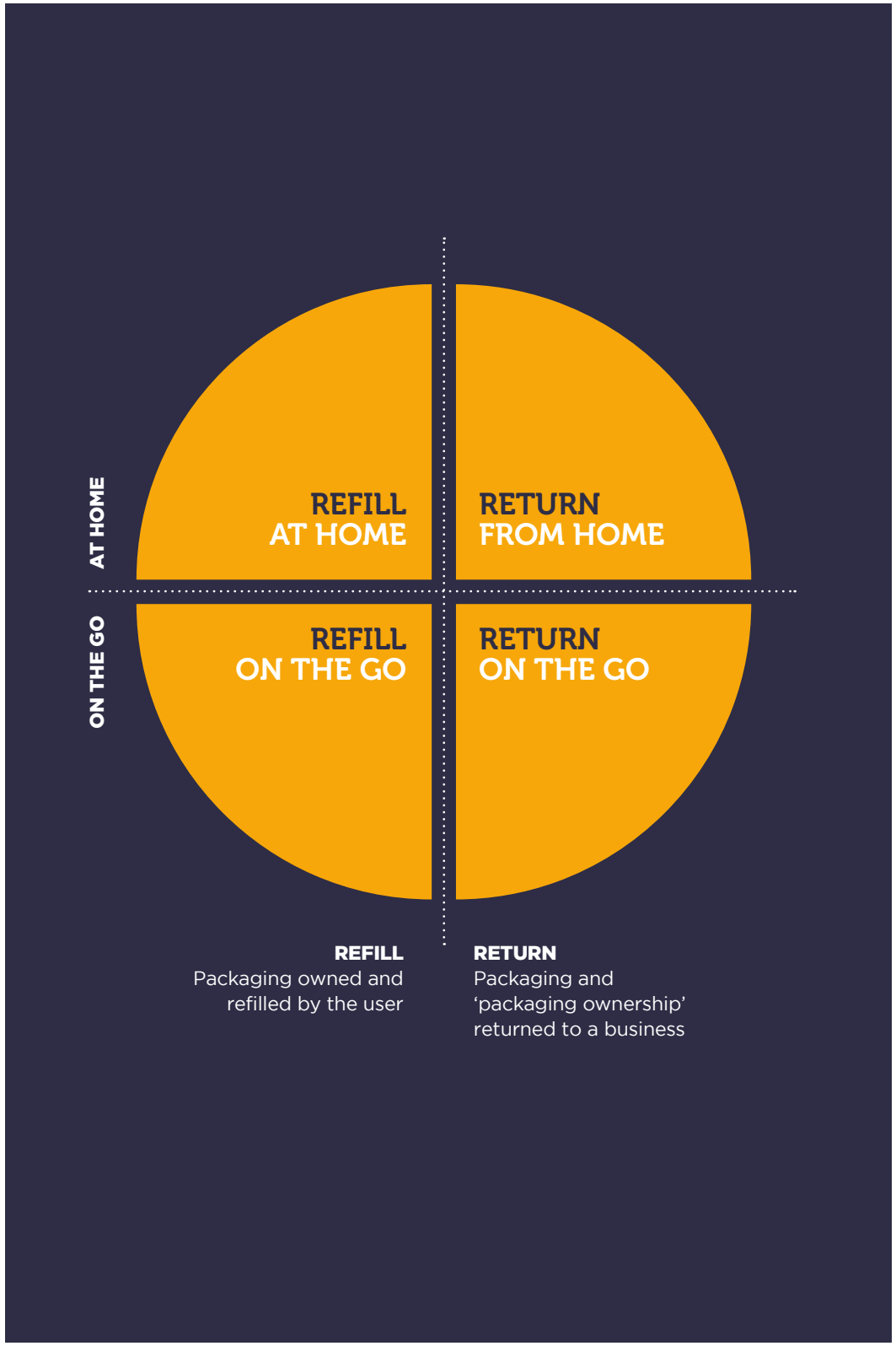
Safety and hygiene are critical for all packaging and are determined by how the packaging is managed and handled, not whether it is single-use or reusable. There are many examples of how reusable packaging can be used safely and hygienically.

Science and guidance from public health professionals — for example, 100 scientists from 18 countries,[14] and public bodies such as the European Commission[15] — suggest that it is safe to continue using reusable packaging systems while navigating the Covid-19 pandemic and beyond, through continuing to employ basic hygiene.

Most reuse systems, some active for decades, have withstood the pandemic without needing to make any changes. This is, for example, the case for reuse-return systems like reusable beverage bottle schemes, and Loop p. 100, which achieved record sales in April and May 2020.

For reuse systems based on user 'refill-on-the-go' (where some applications have been questioned from a hygiene perspective) there are also examples that have thrived during the pandemic. For example, sales from a 'refill-on-the-go' tricycle system by Algramo (p. 91) operating in Santiago, Chile increased by 356% between April and June while the city was in full lockdown. Other players like MIWA (p. 89), Uno, and SmartBins are showing how hygiene and safety of bulk dispensers can be retained, for example, by employing IoT to lower customer touchpoints, or by installing on-the-spot cleaning ports for the user-owned refillable packaging.

**This is a 'user-friendly' interpretation of the official New Plastics Economy definition of reuse. For the technical and exact definition, as based on ISO standards, see the Global Commitment definitions*



The four consumer-facing models for reuse

There are four different business-to-consumer (B2C) reuse models. They differ depending on the ownership of the packaging — i.e. whether the packaging is refilled or returned — and where the refill/return occurs.

REFILL AT HOME
Users refill their reusable container are home (for example, with refills delivered through a subscription service).

REFILL ON THE GO
Users refill their reusable container away from home (for example, at an instore dispensing system).

RETURN FROM HOME
Packaging is picked up from home by a collection service (for example, by a logistics company).

RETURN ON THE GO
Users return the packaging at a store or drop-off point (for example, in a deposit return machine or a mailbox).

B2B

B2B PACKAGING AND REUSE
In addition to the four B2C reuse models, a wide range of business-to-business (B2B) reuse models exist. These can range from individual companies reusing their own transport packaging to industry-wide reuse systems based on interconnected operators managing a shared set of standardised, reusable packaging.

MODEL EXPLAINED

Refill at home

Users refill a reusable container at home with refills either delivered to the door (for example, through a subscription service) or bought in a shop. Users retain ownership of the main packaging and are responsible for cleaning.

TRENDS

Solid or concentrated products: Liquid refills are redesigned as concentrates *(e.g. Unilever's Cif ecorefil, SC Johnson's concentrated refills)* or tablets *(e.g. Everdrop p. 82, by Humankind),* reducing transportation and packaging costs.

Customised products or packaging: Refill systems are designed so that the product or packaging can be customised — for example, a user can mix flavours *(e.g. PepsiCo's SodaStream p. 84)*, add a desired fragrance, or personalise the reusable packaging *(e.g. Replenish).*

Auto-refill services: Users are offered a refill subscription service, improving brand loyalty *(e.g. Bite Toothpaste Bits).*

WHERE TO START

Products that have a high water content (such as beverages, and some home care and personal care products) are good candidates for refill-at-home models as water can often be removed to produce a solid or concentrate that is then diluted by the user at home in a reusable bottle or dispenser.

Furthermore, exploring integration with e-commerce can bring many benefits as compact refills easily fit through letterboxes and save transportation costs for home delivery. An online outlet also removes the 'attention' advantage that standard large packaging may have when products are physically displayed on a shelf.

WHAT GOOD LOOKS LIKE

Product formulation: To maximise cost savings on transport and packaging materials, where applicable, remove as much water as possible from the product *(e.g. Everdrop p. 82).*

Refill packaging: To prevent the refill packaging from creating more waste than a single-use model, supply refills either without packaging or in packaging that is reusable, recyclable, or compostable *(e.g. PepsiCo's SodaStream p. 84, Blueland).*

Industry alignment: One way to avoid small concentrates having to compete for shelf space with full-size water-containing products, is to work toward making concentrated refills the industry standard for products where water can be removed. This would enable fair competition, reduce carbon emissions, and create material savings for the industry as a whole.

CASE STUDIES

RETHINK PRODUCT & BUSINESS MODEL | START-UP | GERMANY | HOME CARE

Everdrop: Dissolvable cleaning tablets

Cleaning tablets that are mixed with water in reusable bottles at home to make the final cleaning product.

photo: everdrop

BUSINESS BENEFITS

Cost saving: Reduces shipping and packaging costs, compared to diluted, heavy, water-containing products.

Competitive pricing: The refill tablets retail for EUR 1 per refill, meaning Everdrop is cost comparable to single-use products.

Convenience: Reduces cupboard space requirements and eliminates the need to carry bulky, heavy bottles from store to home. In addition, compact refills lend themselves well to e-commerce.

INNOVATION STATUS

Scale: Within the first few months of operation, Everdrop sold more than 1 million tablets.

Investment: Everdrop closed a seed funding round in July 2020.

ENVIRONMENTAL BENEFITS

Waste prevention: Every tablet avoids use of a single-use plastic bottle.

Carbon emissions: Transport volume is reduced by 80% to 90%, which cuts transport-related emissions.

Recycled content: The reusable bottles are made from 100% recycled PET.

Recyclability: The paper sachets for refills are compatible with the paper recycling stream.

Compostability: The paper sachets for refills are compostable.

Read more

RETHINK PACKAGING & BUSINESS MODEL | SCALED | GLOBAL | PERSONAL CARE

Pure Shots from Yves Saint Laurent (L'Oréal): Refill inserts

Refill inserts for skincare products. The plastic inserts are placed into a high-quality reusable glass 'shell' designed to be owned, and refilled, by a user.

ENVIRONMENTAL BENEFITS

Waste prevention: Having a refill insert means that for every purchase only the insert container needs to be recycled, rather than the entire packaging 'shell'.

INNOVATION STATUS

Scale: The product has been launched worldwide. It was the best performing Luxe Cream launch in Asia in Q1 2020.[16]

Read more

photo: L'Oréal

photo: L'Oréal

CASE STUDIES

RETHINK PRODUCT & BUSINESS MODEL | SCALED | GLOBAL | BEVERAGES

SodaStream from PepsiCo: Instant sparkling water

Appliance for making sparkling water at home in reusable bottles. The sparkling water is made using water from the tap and CO_2 supplied in returnable cylinders. Concentrated syrups for a variety of common drink flavours are also available.

BUSINESS BENEFITS

Brand loyalty: A device at home increases loyalty to the brand.

Convenience: Reduces space requirements and eliminates the need to travel to a store and then carry bulky, heavy bottles home (a single CO_2 cylinder can carbonate up to 60 litres of water).

Customisation: Accommodates users' preferences by offering a variety of flavours and control of level of carbonation.

ENVIRONMENTAL BENEFITS

Waste prevention: Prevents the use of single-use bottles. For example, in the year 2017 – 2018, users produced the equivalent of 6.3 billion single-use bottles worth of sparkling water in reusable bottles at home.

Carbon emissions: SodaStream reduces the carbon emissions of sparkling water by up to 87% compared to single-use, PET-bottled sparkling water.

INNOVATION STATUS

Scale: Distributes through more than 90,000 individual retail stores in 46 countries, and has 15 million household users.

Investment: SodaStream was acquired by PepsiCo in 2018 for USD 3.2 billion.

Read more

DEEPDIVE

HOW SODASTREAM IS MOVING BEYOND 'AT-HOME'

SodaStream has proven to be a successful example of an at-home refill solution. In June 2020, PepsiCo announced that following successful pilots with key customers, Sodastream will expand its brand to move beyond the at-home model into 'on-the-go' — introducing the SodaStream Professional Hydration Platform. The mobile-enabled SodaStream Professional Hydration Platform is set for roll-out in the USA in the second half of 2020 and allows users to customise and digitally track their beverage intake on-the-go while cutting back on plastic bottles. It has been developed for workplaces, college campuses and airports, expanding on the SodaStream brand.

photo: PepsiCo

MODEL EXPLAINED

Refill on the go

Users refill the reusable packaging at a dispensing point away from home, such as in a store. Users retain ownership of the reusable packaging and are responsible for cleaning.

TRENDS

Customised dispensing systems: Users can choose their desired refill quantity *(e.g. MIWA p. 88, I-Drop Water p. 92)* often at more affordable prices[17] and with personalised content, for example by adding or mixing flavours *(e.g. Coca-Cola's Dasani Purefill, PepsiCo's Pepsi Spire).*

Smart dispensers: Sensors are incorporated that recognise when a package is in place, automatically dispense the required quantity *(e.g. EcoCarga),* register product information, and facilitate cash-free payments *(e.g. Algramo p. 91, MIWA p. 88).*

Distributed sales points: Dispensers are moved outside of traditional stores, becoming mobile or being placed in public spaces, office buildings, etc. *(e.g. EcoCarga, PepsiCo's SodaStream Professional p. 84).*

WHERE TO START

A common starting point is dried products (such as beans, pasta, and grains). These products have minimal packaging requirements, making them ideal for very simple bulk dispensers, and can be purchased and transported home in foldable/flexible packaging (for example, reusable bags) that are easy to bring along to the store. It also gives customers the opportunity to purchase the exact amount they require.

Another place to look for opportunities is for beverages consumed on the go, allowing users to bring along their own reusable bottle or cup.

WHAT GOOD LOOKS LIKE

Dispensing equipment: To make dispensing systems staff friendly, user friendly and safe, design them to be quick to refill and quick to use, while minimising contamination and spillage. For example, use prefilled bulk units that fit directly onto the dispensing system to avoid staff having to refill bulk dispensers *(e.g. MIWA p. 88)* and/or design touchless and automated refill machines *(e.g. Algramo p. 91, Coca-Cola's Dasani Purefill).*

Product formulation: If the product has a high water content, think about supplying it as a concentrate to be mixed with water at the retail site *(e.g. Coca-Cola's Freestyle, PepsiCo's Pepsi Spire)*. This allows for increased customisation of flavour/fragrance and reduces transportation-related costs and emissions.

Packaging hygiene: To ensure proper hygiene around the refillable packaging, consider installing washing ports next to the dispensing units to clean and disinfect on the spot *(e.g. Uno)* or provide clear instructions on how to clean *(e.g. Unilever and Walmart Mexico's shampoo refill stations p. 90, KeepCup).*

Customer engagement: To engage customers and aid the transition to a new retail experience, employ proper signage and consider deploying extra floor staff in the initial phases of the roll-out *(e.g. Unilever and Walmart Mexico's shampoo refill stations, p. 90, Waitrose & Partners Unpacked).*
To ensure that users bring their reusable packaging, make it easy or create incentives for doing so. For example, make it foldable *(e.g. DiFOLD, Stojo Cup),* make it personal *(e.g. KeepCup)* or, where relevant, provide economic incentives *(e.g. Starbucks' cup charge trial[18]).*

CASE STUDIES

RETHINK BUSINESS MODEL | PILOT | SWITZERLAND | DRY FOOD

MIWA and Nestlé partnership: High-tech bulk dispensing

Partnership between Nestlé and the innovator MIWA on high-tech bulk dispensing solutions for instant coffee and pet food.

BUSINESS BENEFITS

Brand reputation: Customers reported that reduction of single-use packaging was the main incentive to buy in refill.

Customisation: Users can dispense the quantity they desire.

Data: RFID/NFC tags and readers, combined with an integrated information system, enable full control over the flow of packaging and products in the supply chain and provide the opportunity to gather insights on customer preferences.

ENVIRONMENTAL BENEFITS

Waste prevention: Products travel in airtight canisters throughout the supply chain, including during storage at retail sites, which reduces food waste. Packaging waste can be reduced by 90% if customers bring their own reusable container.

Carbon emissions: A specific Life Cycle Assessment (LCA) on the Nestlé pilot is still being completed. A general LCA performed by MIWA showed that the MIWA system can reduce carbon emissions by 46%.

INNOVATION STATUS

Scale: The dispensers were piloted in three Nestlé shops in Switzerland during a four-month period. Based on a successful pilot, Nestlé is now scaling the refill solution to all 16 Nestlé shops with its Purina One brand across Switzerland to test operational viability at larger scale.

MIWA Read more Nestlé Read More

photo: Nestlé

DEEPDIVE

WHAT NESTLÉ HAS LEARNED FROM PILOTING REFILL-ON-THE-GO

The initial pilot was designed to test user acceptance of the refill-on-the-go model. Overall, the pilot was successful as the majority of the customers said they were satisfied with the experience, and by the end of the pilot, 50% of customers brought their own reusable packaging for refill. Many of the customers were new customers in the Nestlé shops who came specifically for the refill offer, and Nestlé saw higher than expected sales from refill.

The pilot showed there is a need to guide the customers through the new shopping experience. Only one-third of new customers could use the dispensing unit and handle weighing without initial assistance. Improvements made during the pilot period included providing more signs and visual guidance to make the system more intuitive. Nestlé also decided to have the refill stations next to each other as 'a shop in a shop' to attract more attention.

The MIWA technology proved successful in overcoming concerns relating to health and safety of bulk dispensing. The products sit in airtight 11-litre canisters, which improves the shelf-life of products and eliminates the risk of contamination during refill and dispensing. Each canister is tagged throughout the supply chain to guarantee traceability. Also, the dispensing unit can only pour after being triggered by a user and when packaging is in place underneath, lowering spillage.

Nestlé is now assessing the feasibility of leveraging the dispenser technology for other product categories, in addition to testing the operational viability of the solution in larger supermarkets across the supply chain. MIWA is continuously reviewing the system to further develop the idea, including making the dosing unit work for liquids.

See p. 168 for the story behind upstream momentum in Nestlé.

CASE STUDIES

RETHINK BUSINESS MODEL | PILOT | MEXICO | PERSONAL CARE

Unilever and Walmart Mexico: Shampoo refill stations

Refill stations for Unilever shampoo brands in ten Walmart shops in Mexico. The stations were overseen by staff to help customers dispense shampoo in 1-litre reusable aluminium bottles. The reusable bottles were sold at a one-time price and were printed with guidance on how customers should clean the bottle at home before bringing it back to refill. As the solution expands, self-service refill machines will be tested to make the refilling independent from staff oversight and provide better dosing to avoid spillage.

BUSINESS BENEFITS

Customisation: Customers pay per weight and choose a desired quantity.

Competitive pricing: The refill shampoo is priced 16% lower than the equivalent in single-use packaging.

Brand reputation: 70% of customers said the reason they chose the refill station was to reduce single-use plastic and eight out of ten would recommend the experience. The initiative saw an organic reach through social media of over 197,000 users, with reactions and engagement by more than 31,700 users.

ENVIRONMENTAL BENEFITS

Waste prevention: Over the three-month pilot period, more than 3,000 single-use shampoo bottles, equivalent to 126 kg of plastic, were eliminated.

INNOVATION STATUS

Scale: After a successful three-month trial period, Walmart aim to scale the initiative to 500 Walmart shops in Mexico during 2021.

Read more

photo: Walmart de México y Centroamérica and Unilever

DEEPDIVE

HOW ALGRAMO IS TURNING PACKAGING INTO A WALLET

Algramo is a platform system that allows consumers to refill products at low prices by using smartpowered dispensing machines and packaging chipped with RFID. Customers charge their account through an app and bring their smart packaging to an Algramo dispenser — the machine will recognise the packaging and dispense the right product at a desired quantity without the need for login or payment as the packaging itself becomes a wallet. The Algramo system ensures product traceability, generates loyalty, and gathers business intelligence.

Algramo is currently piloting its smart system in partnership with Unilever in Santiago, Chile and since August 2020 in New York City with Clorox and Pinesol products.

photo: Algramo

CASE STUDIES

RETHINK BUSINESS MODEL | START-UP | AFRICA | BEVERAGES

I-Drop Water: Refill at the grocery store

I-Drop tackles two issues at once — access to affordable, safe drinking water and single-use plastic waste from pre-bottled water. I-Drop's 'Waterpods' are self-service, purified drinking water refill dispensers for grocery stores. A dispenser is connected to the store's main water supply and has an inbuilt filter allowing users to buy purified water in any size reusable bottles/containers. A bespoke 'Internet-of-things' technology platform improves market reach, reduces operating expenses, and improves system reliability by allowing remote oversight of all installed Waterpod systems in realtime.

BUSINESS BENEFITS

Cost savings: I-Drop installs the units at no capital cost to a store and monitors and replaces filters as required. Revenue is typically split 50/50 between I-Drop and the store. This business model removes capital outlay, meaning any store can afford to install a dispenser, and sales are almost directly store profit. Incentives are aligned with shop-owners only needing to focus on the sales side, and I-Drop focusing on ensuring that the Waterpods deliver safe water reliably and cost effectively.

Competitive pricing: With the I-Drop Water model, drinking water can be sold at prices that are 75–80% cheaper than bottled water, making access to clean drinking water widely affordable.

ENVIRONMENTAL BENEFITS

Waste prevention: At a single grocery store in the lowest-income province in South Africa, the equivalent of a 500ml bottle of water is sold through a Waterpod every 45 seconds of trade. This means that in the first six months of 2020, this store sold purified refills equivalent to over 200,000 500ml single-use bottles.

Carbon emissions: Transport emissions associated with transporting bottled water are reduced.

Water use: I-Drop's preferred purification technology produces no waste-water by-product.

INNOVATION STATUS

Scale: I-Drop has installed and piloted Waterpod systems and technology in over 100 locations in seven countries within Africa (South Africa, Botswana, Zimbabwe, Swaziland, Ghana, Senegal, and Namibia). An upgraded Waterpod system was launched in 2019 with the aim to start offering filtered water for refill in large retail chains throughout Africa.

Read more

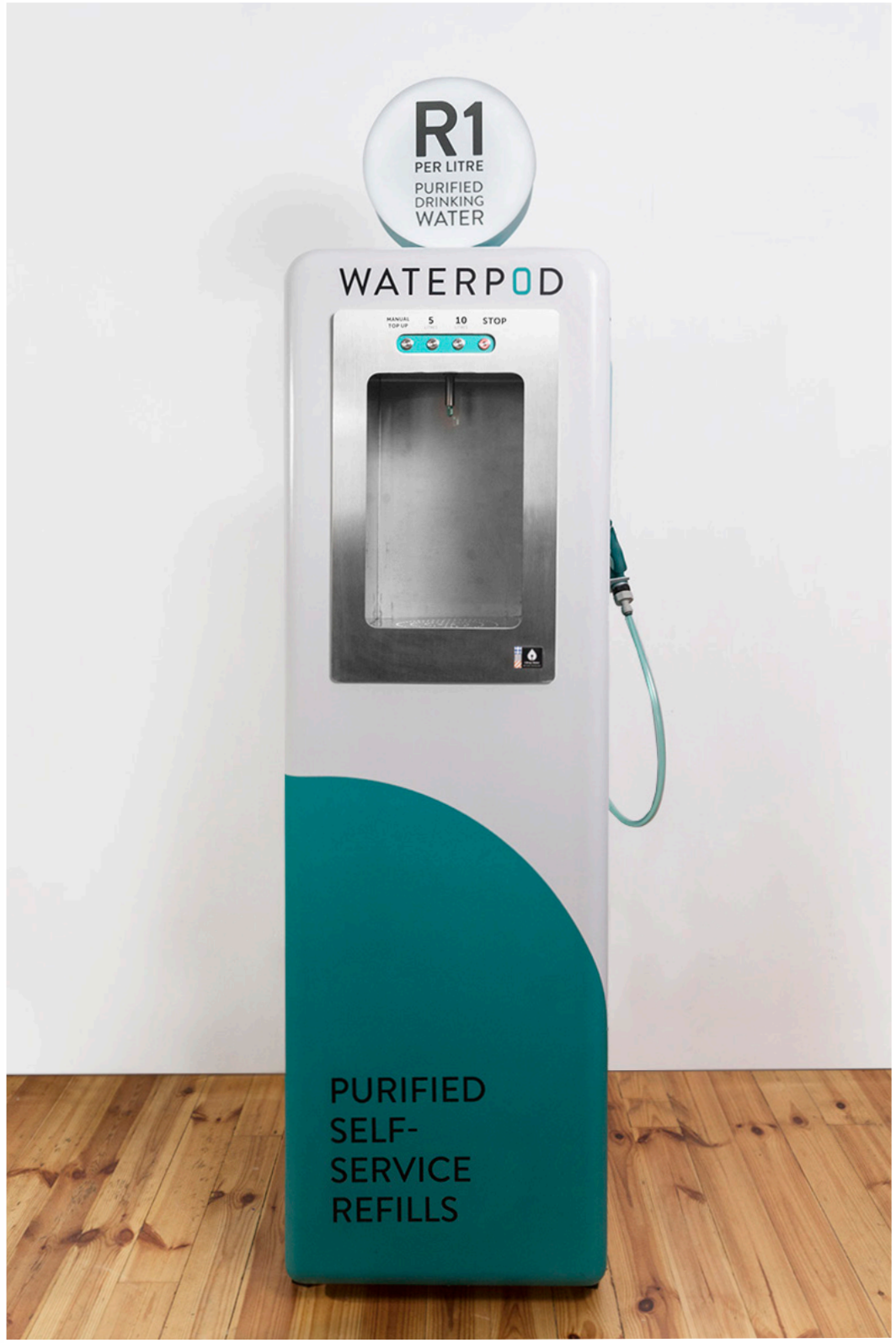


photo: I-Drop Water

MODEL EXPLAINED

Return from home

Users subscribe to a delivery and collection service that allows them to return empty packaging from home. A business or service provider then takes care of cleaning and redistributing the packaging.

TRENDS

Auto-replenishment services: Businesses offer a subscription service, where the empty packaging is collected upon the next delivery of goods, making it easy to return packaging. This also improves brand loyalty, and delivers user insights (*e.g. Abel & Cole's Club Zero p. 98, Danone's water jug service*).

Superior packaging design: Packaging is designed with improved functionality and/or aesthetics to provide a better user experience (*e.g. Loop p. 100, DabbaDrop, Liviri*). This is possible as the packaging remains an asset to the business and the initial packaging cost is divided over many uses.

Shared infrastructure: Businesses share logistics and cleaning facilities across brands, sectors or wider networks, potentially through a third-party service provider, in order to improve the economics of reverse logistics (*e.g. Loop p. 100*).

WHERE TO START

Focusing on e-commerce products that are delivered at relatively high frequency, ideally through a subscription model, can be a good place to start. It allows the collection of empty packaging to be combined with the delivery of new products and avoids users needing to store empty packaging for long periods of time.

The model is well suited to urban areas* where transport distances, both between deliveries and from delivery to cleaning/refilling sites, are shorter compared to areas with lower population densities.

WHAT GOOD LOOKS LIKE

Packaging hygiene: To lower the cost and resource use during cleaning, design packaging that is easy to clean (*e.g. reCIRCLE*). Many logistics or cleaning service providers charge brands according to how easy it is to wash their packaging (*e.g. Loop p. 100, Uzaje*).

Packaging design: Using universal designs for packaging formats across brands or products can improve the overall efficiency of operations (*e.g. The Wally Shop, MMP jars p. 104*). In addition, making the packaging plain, and designed to be decanted immediately, may help to boost return rates (*e.g. Abel & Cole's Club Zero p. 98*).

Customer engagement: Create incentives for users to return the packaging. One such way is through a deposit on the packaging — although it is important to find the right balance between being a strong enough incentive, while not scaring customers away with a very high initial deposit. Alternatively, rather than putting a deposit on the packaging, incentivise return by, for example, offering a free refill after a certain number of returns (*e.g. Abel & Cole's Club Zero p. 98*) or penalise users for not returning after a given period (*e.g. VYTAL p. 96*).

**Be mindful that areas with extremely dense populations might come with their own logistical challenges (for example, congestion and shortage of space).*

CASE STUDIES

RETHINK BUSINESS MODEL | START-UP | GERMANY | TAKEAWAY FOOD AND BEVERAGES

VYTAL: Reusables for home delivery and takeout

A platform for pre-order of home-delivery and takeaway food in reusable packaging introduced during the Covid-19 pandemic to support restaurants and local businesses. The new online platform and 'return-from-home' service is an extension of VYTAL's existing business as a provider of reusables to restaurants, canteens, and supermarkets for 'return-on-the-go'. With the new set-up, customers can order their food in VYTAL's reusable packaging for pickup in-store or to be delivered to their home on bikes. Users then drop off empty packaging at participating retail sites or have the packaging picked up upon a subsequent delivery.

photo: VYTAL Global GmbH

BUSINESS BENEFITS

Cost savings: Restaurants save 20–30% in packaging costs compared to single-use.

Brand loyalty: High share of repeat customers ordering again within the next week to return packaging.

Superior packaging: The reusable packaging keeps food warm for longer (on average only 3°C loss of temperature in ten minutes) and avoids spillage.

Data: A digital system enables cashless operations, smart inventory management, user incentives for quick returns, and clear tracking of saved packaging waste.

Brand reputation: Delivery without packaging waste was cited by customers as a key decision criterion when choosing between delivery platforms. Some restaurant owners have now decided to only offer takeaway with the reusable system.

ENVIRONMENTAL BENEFITS

Carbon emissions: Reduction of ~30kg CO_2 emissions over the life cycle of one bowl compared to single-use styrofoam packaging.[19]

INNOVATION STATUS

Scale: VYTAL supplies approximately 100 partner restaurants and canteens across Germany (Berlin, Munich, Cologne, and other cities) and has engaged more than 3,000 users in their 'return-on-the-go'–'return-from-home' hybrid business model. In the first two months of quarantine VYTAL saw about 400 first-time customers use their service.

Partnerships: The business has an established network of partners in the restaurant and canteen segment and is currently looking at developing partnerships with companies that want to offer convenient return options for their employees, or cities that are aiming to become waste-free.

Read more

photo: VYTAL Global GmbH

DEEPDIVE

WHY VYTAL HAS INTRODUCED PENALTIES INSTEAD OF REWARDS TO INCENTIVISE RETURN

VYTAL has replaced the classic deposit model with a digital system where customers sign-up, borrow the reusable packaging free of charge and are only charged a penalty if they do not return it back in time. The system overcomes several challenges of the deposit system, such as the administrative burden of handling deposit payments, the need for retailers to pre-finance the deposit, and the overall challenge of setting a deposit price that is low enough to maximise uptake of reuse at the point-of-sale, while high enough to incentivise quick return.

With VYTAL's system, users can borrow the reusable packaging free of charge for two weeks. Return is incentivised through an app that gives reminders, and employs gamification/ nudging elements (e.g. tracking the number of single-use packages saved). The penalty system has resulted in an average return time of four days and a return rate of 97.5% within the two-week period.

CASE STUDIES

RETHINK PACKAGING & BUSINESS MODEL | PILOT | UK | DRY FOOD

Club Zero from Abel & Cole: Decanting at home

A service delivering dried food (such as lentils, pasta, and oats) in low-cost, plain reusable transport containers, offered by Abel & Cole — a UK online retailer. The jars are designed to be functional, but not beautiful, so a user is not tempted to keep them. Upon delivery, users decant into their own reusable jars and at the next delivery, return the transport containers together with the reusable delivery box.

photo: Abel & Cole Ltd

BUSINESS BENEFITS

Optimised operations: Standardised packaging is used across different bulk products to optimise packaging operations.

Brand loyalty: Customer retention is aided by having an annual membership fee of GBP 10 to be a part of Club Zero, and offering the tenth refill of a given product free of charge.

Competitive pricing: Products are sold at the same price as products in single-use packaging.

Brand reputation: Abel & Cole started exploring reuse solutions in response to customer demand for reduced single-use packaging and market movement on refill solutions.

INNOVATION STATUS

Scale: A successful initial trial has been completed with 15 different products and three different reusable container sizes. A larger trial with 1,000 customers was started in early 2020 before needing to be put on hold due to Covid-19. The trial will be resumed when possible.

Read more

RETHINK BUSINESS MODEL | SCALE-UP | CHINA | E-COMMERCE TRANSPORT

ZerO Box from Huidu: Reusable e-commerce boxes

Reusable boxes for e-commerce deliveries rented out on a monthly, yearly, or one-time basis. The box is made from a light-weight plastic material, sealed without tape, and is fitted with an RFID tag to track its location. The box is either opened and directly returned when the product is delivered, returned at the time of a subsequent delivery, or returned to drop-off stations. Depending on the rental model, Huidu or the company renting the box take care of the washing.

BUSINESS BENEFITS

Competitive pricing:Although the production cost of a ZerO Box is about twice that of a standard cardboard box, Huidu is able to offer a box rental at a price below the single-use alternative, because each box is rented out multiple times. Using ZerO Box can save 30% on a cost-per-use basis compared to traditional shipping boxes. One of China's largest online retailers, JD.com, has partnered with ZerO Box after estimating that they could save approximately USD 4.5 million annually if just 10% of their orders came in a ZerO Box.

Convenience: The patented design can be flat-packed after use, making for easy storage and returns.

ENVIRONMENTAL BENEFITS

Waste prevention: A box can be reused up to 14 times and it is estimated that over 18 million single-use boxes have been eliminated since 2018. As a specific example, JD.com expects to have eliminated 7.2 million single-use boxes from its supply chain by the end of 2020 (having started using the boxes in 2018).

Carbon emissions: Companies using ZerO Box have collectively reduced carbon emissions by 50 tonnes since 2018.

INNOVATION STATUS

Scale: More than 2 million ZerO Boxes are currently in circulation. The company has more than 20 operation centres across China that manage the reuse logistics.

Investment: A USD 14 million Series A funding round was completed in 2019.

Partnerships: The company has cooperation partnerships with over 200 businesses, including JD Logistics, Cainiao, Suning Logistics, China Post, and Vipshop.

Read more

photo: Huidu Environmental

CASE STUDIES

RETHINK PACKAGING & BUSINESS MODEL | SCALE-UP | FRANCE, UK, NEW YORK CITY | DRY FOOD, FRESH FOOD, PERSONAL CARE, HOME CARE, BEVERAGES

Loop: Well-known brands in premium packaging

A global reuse platform, offered online and in store by major retailers, and offering more than 500 products in reusable packaging (including big brands like Tide detergent and Heinz Ketchup). When a container is empty, there is no need for the user to clean or sort it. It is either stored and then picked up from the user's home, or dropped off at a participating store. The containers are then professionally cleaned, refilled, and sold to another customer.

BUSINESS BENEFITS

Superior packaging: According to Loop analysis, the improved aesthetics and functionality of the packaging is the major driver of customer satisfaction.

Brand loyalty: Loop is seeing higher reorder rates than the industry average. 97% of reusable packaging is returned within 90 days.

Convenience: Loop's goal is to match the convenience of single-use packaging with customers purchasing products in reusable packaging from a range of retailers and then easily returning the packaging (by home collection or to any participating retailer) without needing to think about cleaning or sorting.

Brand reputation: An initial survey of Loop users purchasing home and personal care products showed that for 75–90%, the perception of the brand being purchased improved from an environmental perspective. 75–100% of respondents state they are more likely to purchase from the brand in the future.

ENVIRONMENTAL BENEFITS

Carbon emissions: Third-party verified LCAs show that packaging in Loop is typically 22% to 45% better than single-use.

photo: Loop and TerraCycle

INNOVATION STATUS

Scale: Initial pilots in Paris and New York served 10,000 customers with record sales in March and April 2020 during the Covid-19 pandemic. The platform is currently live via online pilot models, nationally in the UK (Tesco), and USA (Kroger and Walgreens), and regionally in France (Carrefour). Launches are planned for Canada, Japan, Germany, and Australia by mid-2021. Instore deployment of Loop (in partnership with leading retailers) begins in France in October 2020, the USA in February 2021, and Japan in March 2021.

Investments: In 2020 Loop closed USD 20 million in Series A funding.

Partnerships: Currently, Loop is working with over 400 major brands (including Nestlé, P&G, Unilever, Mars, PepsiCo, and Coca-Cola) and retailers (including Carrefour, Tesco, Loblaws, Kroger, Walgreens, Ulta, Woolworths, and Aeon). Seven other retailer partnerships are being announced in the coming months. Partnerships have also been announced with Ecolab for cleaning and DHL for sortation of inbound packaging.

Read more

DEEPDIVE

HOW RETAILER CARREFOUR IS PLANNING TO TAKE REUSE TO SCALE

Based on learnings from the initial Loop pilot, in June 2020, Carrefour launched an e-commerce model for reusable packaging that is totally embedded in the existing Carrefour e-commerce platform. The aim is to make the shopping experience seamless, avoiding the need for customers to visit a separate site to buy products in reusable packaging.

With the new integrated e-commerce model, Carrefour is expanding the reuse offering to the greater Paris area and Lyon, scaling capacity up from 5,000 to 125,000 customers. A major challenge in the scale-up phase has been figuring out how to adapt the existing distribution system for Carrefour and deciding what tasks should be outsourced to Loop and other subcontracted service-providers. In the initial set-up, Carrefour operates two distribution centres that handle the delivery of products in reusables and store empty packaging once it has been picked up from a customer. Loop is then responsible for picking up the empty packaging from the distribution centres, and ensuring packaging is sorted and scanned in order to refund deposits to customers. Ecolab is subcontracted by Loop to handle the cleaning of packaging, and DHL is responsible for the logistics. Currently, there is a small cleaning facility in France and supporting capacity in the UK. However, as volumes increase, it will be possible to invest in more localised infrastructure for sorting and cleaning to improve the environmental and economic efficiency of the operations.

In addition to the added costs of reverse logistics, Carrefour has invested in a new sophisticated IT system to be able to track all packaging individually and handle deposits. The retailer expects the investment to break-even in two to three years. The Loop pilot has proved that the reuse model with premium packaging can work well for products with higher margins, such as personal care products. It is, however, more tricky to make the model profitable for lower-cost, everyday products, where premium design is less important to users. For these products, Carrefour is now working with suppliers on developing more plain, standardised packaging, that will optimise operations and lower the costs throughout the supply chain. The offering would supplement the products in premium design that are currently available on the Loop platform.

The next step for Carrefour will be an in-store integration in ten shops in Paris, giving customers the opportunity to buy products in reusable containers off the shelves, and return to drop-off points in stores. The in-store integration is a key aspect of building an ecosystem of stores (retailers, food service providers, etc.) that all offer reusable packaging and drop-off points. If the expanded in-store model is successful in Paris, Carrefour will expand to several hundred city stores, nation-wide.

photo: Loop and TerraCycle

MODEL EXPLAINED

Return on the go

Users purchase a product in a reusable container and return the packaging at a store or drop-off point after use. The packaging is either cleaned where it is returned (e.g. at a retail site) or a business or service-provider takes care of the cleaning and redistribution of the packaging.

TRENDS

Smart systems: Packaging is tagged with individual IDs, allowing businesses to follow stock, control deposit payouts, and obtain user insights *(e.g. CupClub p. 107, Muuse, HELPFUL).*

Turn-key solutions: Reusable packaging and infrastructure is offered as a 'service', removing the need for a brand or retailer to be responsible for the reuse system. For example, a 'reuse as a service' business might handle the reuse system on behalf of a restaurant or café, offering the items required for food delivery *(cups, containers, etc.)* and then taking care of the washing, collection, and redistribution *(e.g. Globelet, Ozzi).*

Shared infrastructure: Return locations, collection, and cleaning infrastructure are shared between businesses, lowering the system cost while ensuring drop-off is convenient and seamless for a user *(e.g. MMP jars p. 104, Conscious Container).*

Low footprint reusable packaging: Packaging design and production are optimised to reduce upfront cost and resource use while maintaining utility and durability *(e.g. Bockatech, Circolution deepdive p. 105).*

WHERE TO START

Scaled examples of return-on-the-go for beverage packaging can be found across almost all continents, meaning beverages are a good place to start. There is also considerable precedence for return-on-the-go working for products consumed on-the-go, such as takeaway food.

WHAT GOOD LOOKS LIKE

Shared design: Standardising the packaging design and establishing a common reverse logistics process can help to make reuse affordable and feasible for the whole value chain. For example, if beverage bottles were interchangeable to some degree across brands and/or entire product categories (for example, water, soda, juice), system costs would likely be lower as storage, transport, sorting, and washing can be optimised *(e.g. MMP jars p. 104, Coca-Cola's Universal Bottle p. 106).*

Customer engagement: Brand loyalty along with higher return rates can be promoted in various ways. For example, by deploying deposit/reward schemes *(e.g. Coca-Cola's Universal Bottle p. 106, Fresh Bowl)* or penalising users for non-return *(e.g. VYTAL p. 96).* A high return rate can also be stimulated by making it as easy and seamless as possible to return empty packaging, for example, by ensuring there is a high density of easy-access return points *(e.g. Globelet, Vessel).*

CASE STUDIES

RETHINK PACKAGING & BUSINESS MODEL | SCALED | GERMANY | DRY FOOD, TINNED/JARRED

Bananeira, Unverpackt für Alle, Fairfood: Shared reuse system for jars

MMP glass jars are a historical reuse system, traditionally used for yoghurts by several major dairy companies in Germany. Today, innovators Bananeira, Unverpackt für Alle, and Fairfood are tapping into the existing infrastructure of glass reuse and using the MMP jars for dry and unchilled wet products. Products are primarily sold at organic stores and users can return the empty jars through a network of reverse vending machines at supermarkets. Wholesalers redistribute the jars to food producers, who are responsible for cleaning.

BUSINESS BENEFITS

Optimised operations: As jars and secondary crates are standardised, empty jars can be used by any participating food producer, which optimises operations for sorting and transportation.

Cost savings: Although brands need to pay a fee to use the infrastructure (for reverse logistics and for the cleaning of jars) they still experience cost savings compared to a single-use alternative.

ENVIRONMENTAL BENEFITS

Waste prevention: MMP glass jars are on average reused 15 times before they get recycled.

INNOVATION STATUS:

Scale: Bananeira sells products in the MMP jars in over 150 shops and Fairfood in over 200 shops across Germany. They are currently looking into expanding to more shops, offering other product categories and introducing additional standardised sizes.

photos: Bananeira, Unverpackt für alle, Fairfood Freiburg

DEEPDIVE

WHAT WOULD IT TAKE TO SCALE REUSE SYSTEMS IN GERMANY?

According to Circolution,* scaling reusable packaging to all food segments is possible if the industry works together to close key gaps. Circolution envisions a modular packaging system with various modules such as trays, cups, or boxes in many sizes. These could work for different product segments and would be optimised for transportation in crates/pallets, designed to minimise food waste and be easily washable.

To move towards this future system, Circolution has identified the following as key steps:

Co-creation of a standard for reusable packaging: A standard would allow environmental and economic efficiency, while also creating alignment on how brand differentiation can be achieved (for example, differentiation through labels, colours, material choice). The standard should regulate the relevant elements of the system, such as ensuring packaging is nestable and stackable, ensuring that secondary packaging is unified, and ensuring primary packaging has a unique identifier. Learnings from the German reuse system for glass bottles and MMP jars have shown that standardised packaging can be optimised to reduce purchase costs and reduce the effort required for sorting and reverse logistics.

Development of additional convenient return infrastructure: Interviews with retail reuse experts have shown that the higher weight of reusable packaging is a significant barrier to customers deciding to use it, and is one of the reasons why the nationwide share of reusable glass bottles has declined (according to the German Federal Environmental Agency (UBA), the share has declined from about 66% to 40% in the last 15 years). This is why Circolution envisions an innovation drive to develop new, convenient return options for on-the-go, return-from-home, and return-from-office scenarios.

Investment in regional, shared sorting and washing infrastructure: In the German system today, cleaning is done by producers at proprietary filling sites. However, to lower the entry barrier to reuse (especially for smaller producers), and optimise both economic and environmental efficiency, regional, shared infrastructure should be developed. As the cleaning requirements (for example, chemicals, temperature, time, and pressure) vary significantly from category to category, reusable packaging should be sorted prior to the washing process.

IT integration for automation and traceability: In the German system today, the reverse vending machines, as well as the processes for sorting and washing, are to some degree automated, but there are also extensive manual tasks associated with the reuse process. At the same time, there is little information about the loss rate of packaging, especially on MMP jars. If packaging were traced, and suppliers and retailers adhered to the same data standards, the packaging pool could be managed better, manual processes could be reduced and financial and environmental costs could be decreased throughout the value chain. Putting in place the required IT infrastructure would also support the development of additional services, such as automated deposit reimbursement, pick-up from home and/or office, and precise environmental footprint assessments.

*Circolution is a system development company that, together with industry partners, has co-created a vision for scaling reusable packaging to all product categories in Germany. The team has analysed barriers, enablers, and gaps that need to be closed for the new system to emerge and is currently building a collaborative ecosystem.

photo: Circolution

CASE STUDIES

RETHINK PACKAGING & BUSINESS MODEL | SCALED | LATIN AMERICA | BEVERAGES

Universal Bottle from The Coca Cola Company: A shared design for multiple brands

A reusable PET bottle which is standardised across multiple soda brands in Latin America, introduced by Coca-Cola in 2018. Users return empty bottles to retailers who store them and then give them back to Coca-Cola upon delivery of a new order. Coca-Cola takes the multi-branded mix of bottles back to a bottling facility where paper labels are washed off and bottles are cleaned, refilled, and rebranded with a fresh label.

photo: Latam Returnable Agile Project Team 2018 - Coca-Cola

BUSINESS BENEFITS

Brand loyalty: Customers pay indirect deposits on bottles by receiving a discount on their next purchase when they return an empty bottle to a store. The reward system ensures a high return rate of above 90% and has driven a 15% higher likelihood of repurchase compared to single-use formats.

Optimised operations: Creating a universal bottle design across all brands simplifies logistics and reduces stock space. This has allowed new retail channels to accept reuse models.

ENVIRONMENTAL BENEFITS

Waste prevention: Avoids the production of 1.8 billion single-use bottles in Latin America per year.

Carbon emissions: Greenhouse gas emissions can be reduced by up to 47% compared to single-use PET bottles, taking into account bottle production, increased transport, and water use during washing.[20]

Water use: Even with washing factored in, the reuse model reduces water use by 45% compared to single-use PET bottles, because the major water footprint comes from the production of new bottles.[21]

INNOVATION STATUS

Scale: The universal bottle initiative is part of a greater strategy for Coca-Cola Latin America to increase the share of reusable packaging (both glass and PET). As of 2020, reusable bottles (glass and PET) represent 27% of sales and were the fastest growing packaging format in 2018 and 2019. The universal PET bottle is being piloted in South Africa and in 2020 Coca-Cola will launch a universal design of the reusable glass bottle as well.

Investment: Coca-Cola Latin America has invested more than USD 500 million in expanding the reuse infrastructure (bottle cleaning, labelling, refilling) to accommodate the universal bottle.

Read more

See p. 170 for the story behind the universal bottle initiative.

RETHINK BUSINESS MODEL | START-UP | USA, UK | TAKEAWAY FOOD AND BEVERAGES

CupClub: Returnable packaging service for brands and retailers

A reuse system for on-the-go food and beverages. CupClub provides standardised, white-label food and beverage packaging with built in digital traceability to brands and retailers. CupClub then manages the system of collection (through a network of drop-off points), washing and redistribution, working with brands to make reuse a seamless experience for users.

BUSINESS BENEFITS

Convenience: No need for users to carry and wash their own reusable packaging and no need for brands and retailers to take care of washing, making it a convenient system for both. The integrated app system enables users to easily locate drop-off points.

Data: Each cup has an in-built digital ID which enables it to be tracked throughout the reuse system. This makes it easier to evaluate performance, gather return rates, manage stock inventory, and measure impact metrics, etc. CupClub reports a 95% return rate for retail brands and a 99% return rate for food service brands.

Optimised operations: The shape of the cups are standardised across all vendors, and the containers are not branded, increasing the efficiency of the system and making it a commercially attractive model for retailers and brands.

ENVIRONMENTAL BENEFITS

Waste prevention: As of March 2020, CupClub has completed a total of 400,000 orders using a stock of just 10,000 items, amounting to a total of approximately 7 tonnes of waste eliminated.

Carbon emissions: An independent life cycle assessment showed a 50% reduction in carbon emissions compared to single-use paper cups, even if assuming a 10% reusable cup loss rate.[22] As of March 2020, the CupClub system has saved 11 tonnes of CO_2 compared to a single-use system.

INNOVATION STATUS

Investment: CupClub have raised a total of USD 800,000 in pre-seed funding as of June 2020.

Scale: CupClub went from 45,000 completed orders in 2018 to 305,000 completed orders in 2019 with revenues seeing a 465% increase over that time period. CupClub is in the process of launching a to-go system for home delivery.

Partnerships: CupClub has established a consortium of international brands including Starbucks, McDonald's, Coca-Cola, Yum! Brands, Nestlé, Wendy's, Baxter Storey, John Lewis & Partners and Compass Group, with operations set to expand to a further 330 brands in 2021–2022.

Read more

photo: CupClub

MODEL EXPLAINED

Business-to-business B2B

B2B

Reusable packaging moves between businesses only. Different models exist and range from an individual company reusing their own transport packaging to industry-wide reuse systems (which are based on interconnected operators managing a shared set of standardised reusable packaging).

Often, moving towards the latter comes with system-wide benefits, for example, reducing material and fuel consumption. Many companies have already succeeded in innovating upstream to create viable B2B reuse models, demonstrating the scalability and benefits of reusable packaging in B2B operations.

TRENDS

Standardisation
Packaging format and infrastructure requirements are standardised across the system. Most B2B reuse systems currently working at scale have some level of standardisation *(e.g. Swedish Return System p. 113, IFCO crates).*

Turn-key solutions
Reusable B2B packaging and infrastructure is offered as a 'service', removing the need for businesses (such as brands and retailers) to be responsible for the reuse system. There are many scaled 'reuse-as-a-service' providers in the B2B space *(e.g. Swedish Return System p. 113, CHEP p. 114, SoluPlastic)* and the market is predicted to continue to grow (even with the impacts of Covid-19 considered).[23]

Smart systems
Packaging is individually tagged, enabling tracking of goods throughout the supply chain and optimisation of logistics *(MIWA p. 88, CHEP p. 114).*

WHERE TO START

To establish opportunities for B2B reuse, identify where single-use transport packaging is currently used in B2B applications (both internally and externally) and get an overview of transport and logistics patterns.

As reuse already exists at scale for B2B (for pallets, crates, foldable boxes, pails, drums, and various alternatives to flexible pallet wraps), it might not be necessary to start from scratch. Explore whether turn-key solutions exist for any of the identified opportunities.

WHAT GOOD LOOKS LIKE

Shared design: The vision of a global reuse system for B2B transport is based on standardised and modularised reusable containers, using an open network across industry, with pooled assets and protocols and real-time tracking of location and status.[24] This has the power to unlock considerable business and environmental value. As an example, the standardised, trackable shipping container has been credited as being the single-largest driver of globalisation. Before the use of the first shipping containers in 1956, it cost USD 5.86 and took almost an hour to load 1 tonne of cargo. Introducing the container instantly cut the cost to USD 0.16 per tonne and, by 1970, 30 tonnes of cargo could be loaded per hour.

CASE STUDIES

RETHINK PACKAGING | SCALED | USA | B2B TRANSPORT

REUSA-WRAPS: Reusable pallet wrap

Reusable pallet wrap made from sturdy, breathable mesh material secured with straps (solid material versions also available). The wrap is easily strapped around a loaded pallet and can be used both for delivery operations and storage at distribution centres.

BUSINESS BENEFITS

Cost savings: Estimated to cut pallet wrapping costs by up to 40% and typically pays for itself in less than a year. The cost savings are achieved through reductions in material usage (reusable wraps eliminate single-use pallet wrap), product damage (unlike single-use wrap, the reusable wraps can't be overtightened), and packing times (reusable wraps are easier to use and more ergonomic). For example, one beer distributor saves approximately USD 75,000 per year using REUSA-WRAPS cart covers.

Superior packaging: The reusable wraps are breathable and can be designed with a range of custom functionalities including document pockets, fire retardancy, insulation, RFID tags, and locks. Compared to single-use pallet wrap, the reusable solution makes it easier to remove one item from the pallet at a time and then re-secure.

ENVIRONMENTAL BENEFITS

Waste prevention: Each wrap lasts approximately three years with regular use and can eliminate an estimated 450 kg of single-use pallet wrap during its lifetime. For example, a small wholesale produce distributor reports preventing the use of 45 tonnes of single-use pallet wrap per year through using REUSA-WRAPS.

INNOVATION STATUS

Scale: Used by companies such as Toyota, MillerCoors, Anheuser-Busch, Ashley Furniture, and Martin Brower. The reusable wraps have been sold to businesses globally.

Read more

photo: REUSA-WRAPS-Reusable Logistics Solutions

RETHINK BUSINESS MODEL | START-UP | USA | B2B TRANSPORT

Return Bars from Returnity and Happy Returns: Drop-off points using reusable packaging

A reusable packaging system for returning items to e-commerce retailers. Happy Returns' Return Bar network (physical locations where items can be dropped-off) allows shoppers to exchange and return e-commerce items without printing, packaging, or person-to-person contact. All items are then bulk-shipped inside Returnity's reusable boxes to Happy Returns' regional Return Hubs, where they are sorted and returned to the original retailer. The reusable packaging is then returned to the Return Bars in bulk.

BUSINESS BENEFITS

Cost savings: Businesses who use Happy Returns' full solution of return software and reverse logistics with Returnity's reusable packaging save an average of 20% on shipping costs. Businesses save money by aggregating items in Returnity's reusable containers and shipping them in bulk (instead of one at a time) with the company's low carrier rates. Happy Returns guarantees 10% savings for a business in the first year compared to using single-use packaging.

Convenience A user is refunded immediately, and the box-free, label-free, and contact-free experience takes under 60 seconds to complete.

Optimised operations: Designed to stack on top of each other efficiently, the containers minimise space requirements during transportation.

ENVIRONMENTAL BENEFITS

Carbon emissions: By replacing individual cardboard box postage with reusable, stackable packaging, that is shipped in bulk, Happy Returns estimates that businesses using this system can, on average, reduce carbon emissions by 54 tonnes for every 1 million returns.[25] The calculation takes into account that in the standard model, some items would be returned in the box they were received in and some items would be posted in a new cardboard box.

photo: Happy Returns

INNOVATION STATUS

Scale: There are over 700 Return Bars within the USA, with approximately 15,000 Returnity boxes in use.

Happy Returns Read more Returnity Read More

CASE STUDIES

RETHINK BUSINESS MODEL | SCALED | SWEDEN | B2B TRANSPORT

Swedish Return System: Industry-wide shared B2B packaging

A shared system of reusable crates and pallets for B2B between wholesalers and retailers, powered by Swedish Return System, which manages take-back, quality control, washing, and redistribution. Customers pay a user fee and deposit for crates and half-sized pallets, and a daily rent and user fee for full-sized pallets. The system replaces single-use crates and pallets, which are otherwise commonplace.

photo: Svenska Retursystem AB

BUSINESS BENEFITS

Optimised operations: Standardised design means producers and retailers know the exact measurements of crates and can calibrate packing systems accordingly.

Cost saving: The pallets weigh 10 kg less than wooden pallets, lowering transport costs and increasing ease of handling. The filled crates are placed directly on the shelves, saving time by eliminating the need to unpack food products and then handle the waste — an average sized store with a reuse system saves 160 working hours per year compared to single-use systems.

Superior packaging: Crates are vented, do not attract moisture, and protect primary packaging — reducing product damage during transport. For example, broken eggs are reduced by up to 75% when using the reusable crates.

ENVIRONMENTAL BENEFITS

Waste prevention: The system prevents an estimated 50,000 tonnes of transport packaging waste annually.

Carbon emissions: Reusable crates reduce greenhouse gas emissions by 78% compared to disposable cardboard packaging.[26]

Recyclability: Crates have a lifetime of 15 years. When worn out, the crates are recycled and used in the production of new crates.

INNOVATION STATUS

Scale: In 2019, orders delivered in reusable crates and pallets exceeded 150 million and 8 million, respectively. There are more than 1,500 participating businesses.

Investment: The deposit on the units is placed in a sustainable fund which was launched in 2016 through a collaboration between Danske Bank and Swedish Return System. The fund has since grown in popularity among other investors.

Read more

photo: Svenska Retursystem AB

DEEPDIVE

DEVELOPING A COLLABORATIVE MODEL FOR B2B REUSE

Swedish Return System is a great example of how an industry-led collaboration can be a successful vehicle for driving the transition to a circular economy. Swedish Return System was established in 1997 and replaced a fragmented, inefficient model, which relied on single-use packaging and featured little or no collaboration between retailers. It came as a result of a project to implement a reusable packaging solution across the food and grocery supply chain, led by the Trade Association for Grocery of Sweden (SvDH) and the Swedish Food and Drinks Retailers Association (DLF).

Today, Swedish Return System operates as a business-driven Extended Producer Responsibility (EPR) model jointly owned by SvDH (50%) and DLF (50%). More than 1,500 businesses in Sweden are part of Swedish Return System, which means that in total 50% of all fresh produce is delivered in reusable crates in Sweden.

CASE STUDIES

RETHINK BUSINESS MODEL | SCALED | GLOBAL | B2B TRANSPORT

CHEP a Brambles company: Cross-industry B2B packaging platform

A global B2B supply chain logistics 'share-and-reuse' system of tertiary and secondary packaging.

BUSINESS BENEFITS

Optimised operations: CHEP's standard sizes for crates and pallets have set an industry standard and enable simplified and optimised logistics.

Cost savings: CHEP's network scale and visibility allows it to reduce transport distances and cut costs for businesses through facilitating efficient and collaborative solutions. Using the CHEP platform also reduces capital expenditure for businesses and makes it easier to meet seasonal peaks and troughs in packaging demand without needing to pay for storage and ownership of buffer stock. Overall cost savings compared to single-use alternatives can range from 10% to 70%.

Superior packaging: The reusable pallets and crates are of higher quality than single-use alternatives. This reduces product damage and improves production line efficiency.

Data: By using its end-to-end supply chain solutions and digital technology, CHEP can enhance customer's visibility of their supply chain so they can make more informed decisions.

ENVIRONMENTAL BENEFITS

Waste prevention: CHEP products have an extended product life to reduce waste. For example, a CHEP wooden pallet will last up to ten times longer than a standard wooden pallet equivalent, meaning CHEP uses three times less wood and generates one-quarter of the waste compared to non-reuse systems. In 2019, use of Bramble's platforms prevented the need to log 1.7 million trees.

Carbon emissions: The CHEP system minimises transport distances compared to systems that are not collaborative across industry. This can halve CO_2 emissions. In 2019, use of Bramble's platforms prevented 2 million tonnes of CO_2 from being generated.[27]

INNOVATION STATUS

Scale: For over 60 years, CHEP has operated share and reuse systems in practice, in various supply chains. CHEP now operates in 60 countries with 750 service centres and 510,000 delivery points. In Europe alone, CHEP issues more than 330 million pallets, containers, and crates.

Partnerships: Through launching the Zero Waste World collaboration programme, Brambles has committed to applying its proven know-how of running reusable packaging models to help prevent waste beyond its core activities.

Read more

photo: CHEP A Brambles Company

THE THREE STRATEGIES

Material circulation: The three routes for plastic

By rethinking the packaging, the product and the business model, packaging can be designed so that its material can be circulated at end-of-use.

When it comes to material circulation, such as recycling, upstream packaging design efforts have been estimated to be as important as downstream infrastructure efforts[28]

Material Circulation: It starts upstream

When packaging (both reusable and single-use) can no longer serve its function, the material should be circulated through recycling or composting.

While such processes involve numerous downstream elements, (such as collection, sorting, etc.), upstream innovation (such as material selection and packaging design) is key to ensuring the technical, practical, and economic viability of the system.

As a specific example, it is estimated that removing colour from the ~138,000 tonnes of coloured PET bottles sold in six Southeast Asian countries[29] could result in an extra ~18,000 tonnes of PET bottles collected every year, even without any changes to collection infrastructure.[30]

"What we mean by 'material circulation'"

Material circulation refers to keeping the material a packaging is made from (and, when relevant, the nutrients from leftover food it contains) in circulation in the economy via recycling or composting.[31]

To note: Material circulation differs from reuse. For reuse, the intact *packaging* is circulated through washing and refilling. For material circulation, the packaging is broken down through recycling or composting and the *material* is circulated.

"Maintaining material value"

In general, the more intact a material can stay while being circulated, the more desirable it is from a circular economy perspective as more embedded energy and labour is preserved. For example, as a rule of thumb, retaining the shape of the packaging (e.g. through reuse) is more desirable than grinding up the packaging (e.g. through mechanical recycling) which, in turn, is more desirable than breaking the packaging down into basic chemical components.

MATERIAL AND SYSTEM SELECTION
To select the option that will give the best overall outcome when choosing between the different material circulation routes, it is important to take a systems perspective. This includes considering a variety of factors relating to the performance of the packaging material — before-use, in-use, and after-use. Further guidance on approaching material selection (as well as strategy selection) is provided on p. 180.

The three routes for plastic material circulation

Materials can be circulated through a technical process 'recycling' or through a biological process 'composting' (and for some materials, anaerobic digestion).

Looking at material circulation through the lens of plastic packaging, this means there are three main routes to consider: (1) choosing a plastic type (e.g. PET) and packaging design that can be circulated through a recycling route; (2) choosing a plastic type (e.g. PHA) and packaging design that can be circulated through a composting route; or (3) choosing to substitute to a different, non-plastic material (e.g. paper) and designing that material for recycling or composting.

PLASTICS RECYCLING
Plastic packaging is broken down (mechanically or chemically) and the resulting materials are used to make new products (this excludes energy recovery and the use of the material as a fuel).*

PLASTICS COMPOSTING
Plastic packaging is decomposed in a home or industrial composting facility, producing biomass, water, and CO_2.*

SUBSTITUTION
Plastic packaging is replaced with non-plastic packaging (for example paper or aluminium), and designed for recycling or composting.

**These are 'user-friendly' interpretations of the official New Plastics Economy definitions for recycling and composting. For the technical and exact definitions, as based on ISO standards, see the Global Commitment definitions.*

MODEL EXPLAINED

Plastics recycling

Plastic packaging is broken down (mechanically or chemically) and the resulting materials are used to make new products (this excludes energy recovery and the use of the material as a fuel). Upstream innovation is crucial in facilitating recycling and goes hand-in-hand with developing downstream collection and recycling infrastructure.

TRENDS

Product or delivery model changes: Changes to the product *(e.g. JOI p. 130)* or delivery model *(e.g. reuse model, MIWA and Nestlé's refill partnership p. 88)* allow recyclable packaging to be used.

Reduced packaging complexity: Packaging portfolios are streamlined and packaging designs simplified to improve recyclability. For example, certain plastic types are eliminated *(e.g. L'Oréal's elimination of PVC p. 133; Danone's elimination of PS p. 133)*, colourants are removed *(e.g. Nestlé Professional's MAGGI® p. 132, Coca-Cola's clear Sprite bottle p. 134)* and material combinations are reduced *(e.g. Colgate's HDPE toothpaste tube p. 131, Amcor's AmLite).*

Recycled content:[32] Packaging is made from recycled content, helping to drive demand for recyclable packaging that can provide the recycled plastic *(e.g. Waitrose's Evolve range p. 135, Danone's Aqua Life p. 63)*

Supply chain involvement: Collection for recycling is shifted to an earlier point in the supply chain (e.g. shifted from B2C to B2B) to ensure a much higher collection rate and cleaner material stream for recycling *(e.g. Surfdome's Plastic Cutback initiative p. 136).*

WHERE TO START

Before delving into designing individual packaging items for recycling, it can be helpful to assess what broad changes can be implemented across an entire packaging portfolio that will rapidly improve recyclability — for example, moving away from plastic types or packaging formats that don't have a recycling stream towards those that do. Opportunities might also exist for eliminating certain formats completely (see the elimination section on p. 37).

"Recycling is recycling...

Broadly, recycling methods fall into two categories:

MECHANICAL RECYCLING
Operations that circulate plastics via mechanical processes (grinding, washing, separating, drying, re-granulating, compounding), without significantly changing the chemical structure of the material.

CHEMICAL RECYCLING
Operations that break down plastics into their chemical components, which are then used to produce a new material.

...as long as it is recycling"

Recycling explicitly excludes processes that do not reprocess materials back into materials but instead into fuels or energy (in accordance with ISO definitions).

"When can I consider my packaging recyclable?*"

Packaging or a packaging component can be considered recyclable if its successful post-consumer collection, sorting, and recycling is proven to work in practice and at scale.

The suggested test and threshold to assess if the recyclability of a packaging design is proven 'in practice and at scale' is: does that packaging achieve a 30% post-consumer recycling rate in multiple regions, collectively representing at least 400 million inhabitants? A possible alternative, especially relevant for more local players, is to check if a 30% post-consumer recycling rate is achieved in all the markets where the packaging is sold (this 'market' can be any size, for example, it could be a specific stadium or event, or a country).

** This is in the context of the New Plastics Economy Global Commitment. See Global Commitment definitions for further details.*

"When is light-weighting appropriate?"

A systems perspective should be taken when it comes to light-weighting packaging. The process of light-weighting has achieved considerable material savings in the past few decades and will continue to be a way to improve efficiency of individual packaging products (*e.g. Nestlé Professional's MAGGI® p. 132*).

However, the light-weighting trend (particularly the evolution towards more complex, multi-material formats to reduce the overall weight of the packaging) can have undesirable consequences at a systems level. If the cost and difficulty of collecting and recycling the packaging becomes too high compared to the revenues achieved from recycling the packing, it might not get recycled or even collected and overall system outcomes might be worse.

WHAT GOOD LOOKS LIKE

Identifying opportunities: When talking about design for recycling, people often immediately think about technical design guidelines and tools — all helpful for rethinking the packaging. But there are many more opportunities to design for recycling. Try to move beyond just rethinking the packaging design or materials, and also explore product and system redesign.

Rethink the system to facilitate packaging recyclability.
For example:

- Reduce the time between production and point-of-sale. This can ensure freshness without having to use complex (often less recyclable) packaging *(e.g. Kecipir p. 55, Infarm p. 68).*

- Remove and collect packaging before the product arrives at a user. This can help to ensure a much higher collection rate and cleaner material stream for recycling as the material is never mixed with other materials and the responsibility of collecting for recycling stays with the business, rather than the user *(e.g. Surfdome's Plastic Cutback initiative p. 136).*

- Change to a reuse-return model — the benefits of which are often overlooked when it comes to facilitating recycling. Firstly, return models can allow rigid, recyclable packaging to be used in place of hard-to-recycle packaging *(e.g. Enviu's Koinpack, Abel & Cole's Club Zero p. 98).* Secondly, once packaging that is part of a return model becomes unfit for reuse, it can easily be aggregated and sent as a clean material stream for recycling (rather than being mixed with other materials in a household recycling bin as a single-use item would) *(e.g. Swedish Return System p. 112, Bockatech in partnership with Borealis).*

Rethink the product to change packaging requirements and, in turn, packaging recyclability.
For example:

- Consider whether the specified shelf-life requirements might be longer than necessary (as this affects the complexity and hence recyclability of the packaging that needs to be used).

- Formulate hard-to-package products differently, for example, redesign toothpaste so that it comes in a tablet form *(e.g. Bite Toothpaste Bits)* and can be sold in a recyclable container, rather than a non-recyclable, multi-material tube.

Rethink the packaging, including material, additives, format, components, etc., to enable the packaging to be recycled in practice and at scale. Recycling associations — such as APR, PRE, EPBP, RECOUP, and others — provide technical, geographically relevant, guidance to help you do this. Retailers also often have their own design guidelines that are provided to suppliers. General guidance includes (see trends as well):

- Replace packaging materials commonly identified as problematic (e.g. PVC, PS, EPS) with packaging materials for which a dedicated recycling stream exists (in practice and at scale)
- Move away from multi-material packaging
- Use packaging features (for example, closures, labels, and zip seals) that are compatible with the target recycling stream
- As much as possible, limit the use of dyes, pigments, and inks
- Use additives that are compatible with the recycling system and are non-toxic

DEEPDIVE

INCLUDING THE KNOWLEDGE OF WASTE PICKERS IN THE PACKAGING DESIGN PROCESS

In many parts of the world, waste pickers play a crucial role in the recycling system. Despite this, their expertise and knowledge is rarely included in the packaging design process. Starting to do so is an important step towards understanding how to improve the environmental, economic, and social aspects of the system overall.

TriCiclos, a South American circular economy engineering consultancy, actively recognises the importance of including waste pickers in their consortium of experts. Using their Recyclability Index methodology, TriCiclos Brazil helps clients identify design changes that will improve the local recyclability of their packaging. A key aspect of the methodology is understanding the local recycling value chain through conversations with waste picker cooperatives (arguably the stakeholders with the most knowledge about collection on the ground in Brazil, with more than 800,000 waste pickers collectively moving 90% of the country's recyclable material). Waste picker cooperatives are also engaged as representatives at the workshops TriCiclos hosts to present the results of the Recyclability Index methodology to clients. Here, they are invited to share their perspectives on how upstream decisions directly impact their income generation.

The consultation of waste pickers by TriCiclos has helped numerous companies improve the environmental and social impact of their packaging — guiding them to design packaging that has a higher likelihood of being collected (both in the formal and the informal waste sector), which in turn has a positive social impact on the stakeholders that are dependent on selling the recyclable materials.

CASE STUDIES

RETHINK PRODUCT | START-UP | USA | BEVERAGES

JOI: Recyclable nut milk packaging

Concentrated nut paste for making nut milk and other products at home. Shifting from a liquid product to a solid product has changed the packaging requirements (e.g. barrier requirements) which now allows recyclable tubs to be used as well as allowing for more servings per container, reducing the overall amount of packaging needed.

BUSINESS BENEFITS

Convenience: JOI does not require refrigeration in concentrate form, which therefore reduces both cupboard and refrigerator space requirements. The JOI website also offers a subscription service for convenient nut milk replenishment and eliminates the need to carry bulky, heavy cartons from store to home (for both individuals and wholesale/business customers).

Competitive pricing: Prices are on par with mass-produced cartoned plant milk products.

Better products: By moving towards a concentrated format, all additives and preservatives can be avoided, leading to a higher quality, better product and hence the name JOI (Just One Ingredient). The natural oils and low moisture content in the single ingredient (almonds or cashews) give the concentrate a shelf life of up to 18 months, even after opening, which exceeds many other nut milk products.

Customisation: For nut milk, users can adjust the product to make their desired concentration and sweetness. JOI can also be used to make a much broader range of food items, such as sauces, soups, and ice cream.

ENVIRONMENTAL BENEFITS

Waste prevention: One JOI tub eliminates seven cartons; one pail eliminates 60 cartons. JOI also allows a user to make the desired quantity of nut milk on demand, avoiding food wastage.

Recyclability: JOI can use mono-material rigid packaging, which has a higher chance of being recycled than common multi-material alternatives used to package nut milks.

Carbon emissions: Reduces greenhouse gas emissions associated with transportation due to its reduction in weight and storage space. For example, one truckload of JOI is equivalent to five truckloads of plant-based milk in cartons.

INNOVATION STATUS

Scale: JOI was founded in 2015, launched its first product to wholesale in 2018, and its first e-commerce product in 2019. Multiple flavours have been introduced with plans to further expand product lines.

Read more

photo: JOI

DEEPDIVE

HOW TO MOVE AWAY FROM MULTI-MATERIAL FORMATS

Moving away from multi-material formats can be achieved in different ways. There are examples of:

Rethinking the packaging: Colgate-Palmolive have developed a new toothpaste tube production technology which allows toothpaste tubes to be made primarily from a single material (HDPE), replacing current multi-material tubes.

Rethinking the product: JOI (above) sells a concentrated paste for making nut milk, which can be packaged in a single-material container. Bite Toothpaste Bits has developed solid toothpaste tablets which can be sold in a single-material jar.

Rethinking the system: Reuse models, such as that offered by MIWA (p. 88), allow single-material, reusable packaging (recyclable at end-of-life) to be used for items that might otherwise be sold in multi-material packaging (e.g. coffee).

CASE STUDIES

RETHINK PACKAGING | SCALED | EUROPE | DRY FOOD, FRESH FOOD

MAGGI® from Nestlé: Elimination of colourants

Elimination of colourants for MAGGI® containers from Nestlé Professional (the out-of-home business of Nestlé) increases the value of the packaging for recycling. Resizing of the packaging also delivers a 33% weight reduction enabling supply chain optimisation.

ENVIRONMENTAL BENEFITS

Recyclability: The container is made from rigid white polypropylene (PP). Nestlé is currently performing a test in Germany with caterers to collect and recycle the containers into new packaging. All components of the container (tub, lid, label) are made from PP and the new design has an improved tamper function that stays on the pack after opening. Both of these changes make it easier for the whole container to be recycled as one and reduce the likelihood of small-format pieces ending up in the environment. Additionally, removal of colourants improves the economics of recycling with white and transparent recycled plastic normally fetching a higher price than mixed colour recyclate.

Other: A lighter container, i.e. 33% weight reduction, is equivalent to a reduction of more than 130 tonnes of plastic per year.

INNOVATION STATUS

Scale: Commercially rolled out in early 2020 in Europe with a total of approximately 3.5 million containers. Geographical expansion is underway.

Read more

photo: Nestlé

photo: Unilever

DEEPDIVE

USING RECYCLED POLYPROPYLENE

In 2019, the ice cream brand Magnum (from Unilever) became the first brand to use recycled polypropylene plastic in ice cream tubs. Over 7 million tubs made from recycled plastic will be rolled out across Europe in 2020 and by the end of 2020, Magnum will use an estimated 160,000 kg of certified recycled plastic material.

DEEPDIVE

MOVING OUT OF COMMONLY IDENTIFIED PROBLEMATIC PLASTIC PACKAGING MATERIALS

Elimination of the most commonly identified problematic plastic packaging materials is currently happening at scale and is being driven by businesses and governments.[33] Two of the materials in focus are polyvinyl chloride (PVC) and polystyrene (PS). 83% of Global Commitment signatories with PVC in their portfolio and 71% with PS in their portfolio report they have eliminated, or plan to eliminate, PVC and PS respectively.

For PVC, L'Oréal is among one of the signatories that has already successfully eliminated it. In 2011, when they started the effort, L'Oréal used approximately 2,260 tonnes annually. Through upstream innovation, L'Oréal managed to completely move away from PVC for all packaging by 2018, while ensuring technical and economic requirements could be met using other materials.

For PS, Danone is an example of a company that has set elimination targets, targeting zero PS in their dairy and plant-based brands in Europe by 2024 and worldwide by 2025. Achieving this will mean the removal of more than 100,000 tonnes of PS from packaging.

Other materials commonly eliminated include EPS and carbon black.[34]

RETHINK PACKAGING | ROLL-OUT | EUROPE, SOUTHEAST ASIA | BEVERAGES

Sprite bottle from The Coca-Cola Company: From green to clear

CASE STUDIES

Sprite — the soda brand — is transitioning away from their iconic green bottle to a clear bottle to improve its value during recycling.

photo: The Coca-Cola Company

ENVIRONMENTAL BENEFITS

Recyclability: Improves the economics of recycling. In Southeast Asia, clear PET bottles sell for an average of USD 84 per tonne more than coloured bottles (a 35% increase).[35]

Recycled content: Recycled content is incorporated into some Sprite bottles. As an example, the 500ml Sprite bottles in the Philippines and Sweden, are made from 100% recycled PET (through a separate initiative).

INNOVATION STATUS

Scale: The transition to clear PET is well underway in Western Europe, Asia–Pacific, and South Africa. In Asia, the transition started in the Philippines in 2019, and then expanded across Singapore, Malaysia, and Brunei in 2020; Thailand, Indonesia, and Vietnam are due to be completed in the first half of 2021.

Read more

RETHINK PACKAGING | SCALED | UK | FRESH FOOD

Evolve from Waitrose & Partners: Multi-coloured recycled trays

Ready meal trays made from recycled PET bottles and trays. The ready meal trays are a different colour each batch, depending on the colour of recycled material available. This is as opposed to using virgin material for the trays or colouring them black.

BUSINESS BENEFITS

Brand reputation: Part of a wider ambition to remove unrecyclable materials and reduce single-use plastic by 20% by the end of 2021, in line with the attitudes of Waitrose's customer base.

INNOVATION STATUS

Scale: Most of Waitrose's microwavable and ovenable ready meal range (excluding Italian at this time) has moved into the Evolve range.

ENVIRONMENTAL BENEFITS

Recyclability: Eliminates approximately 500 tonnes of hard-to-recycle black plastic material per year.

Recycled content: Creates a closed-loop end market for coloured PET recyclate. Using a variety of colours allows for greater material sourcing flexibility depending on availability of recycled content.

Read more

photo: Waitrose & Partners

CASE STUDIES

RETHINK BUSINESS MODEL | PILOT | UK | CLOTHING

Plastic Cutback initiative from Surfdome and Patagonia: Aggregating material for recycling

An e-commerce packaging model involving the removal of clear plastic bags from clothing items before they are shipped to the end user. This enables Patagonia and Surfdome to ensure the packaging film is recycled. The clear plastic bags are made from recycled material and used for protection during B2B transport of Patagonia items.

photo: Internet Fusion Group

BUSINESS BENEFITS

Brand reputation: Over packaging in e-commerce is poorly perceived by users. This operational solution takes the problem of disposing of plastic films out of the hands of a user.

ENVIRONMENTAL BENEFITS

Recyclability: Allows Surfdome to aggregate the film as a clean, single material stream that they can then ensure is recycled. This is not possible if the material ends up in the household, as films most often are not collected as a part of curbside recycling. Over a three-month trial period, 6,000 Patagonia items had their plastic packaging removed, resulting in an estimated 60 kg being collected for recycling. Although the material collected within this model enters the open recycling market, there is precedence for the material being recycled back into bags.

Recycled content: Patagonia's clear plastic bags are made from 100% recycled content, helping to close the material loop.

INNOVATION STATUS

Scale: A three-month pilot, aimed at establishing the processes and systems for roll-out, was successfully completed during the first half of 2020 and included 6,000 items. Off the back of this, Surfdome's parent group, Internet Fusion group, will look into how to offer the service to the 800 brands it carries. For Patagonia, the benefit was to learn how this might be applied within its owned and operated distribution.

Partnerships: The details of the trial will be shared with the European Outdoor Group, an association representing the European outdoor industry, who are coordinating a single-use plastic project and looking into a similar initiative with over 30 brands and retailers.

Read more

RETHINK PACKAGING | PILOT | EUROPE | ALL SECTORS

HolyGrail: Digital Watermarks Initiative

Incorporation of imperceptible watermarks into the artwork or surface of packaging effectively encoding the full surface of the package. The watermarks can be detected by standard high-resolution cameras, enabling higher efficiencies throughout the supply chain, including better sorting after-use (both at material recovery facilities (MRFs) and at recyclers). This can contribute to achieving higher-quality recycling.

BUSINESS BENEFITS

Convenience: Improves inventory management at retailers and warehouses and reduces checkout times in supermarkets.

Data: Enables data gathering as well as advanced communication and engagement with users through a digital product interface (e.g. the watermark can be used to provide digital anti-counterfeit, and how to use or how to recycle information when scanned).

Superior packaging: Presents a possible alternative to traditional linear barcodes or QR codes which take up printing space on a product.

ENVIRONMENTAL BENEFITS

Waste prevention: Enables advanced sorting of packaging such as food-grade vs non-food grade or reusable vs recyclable vs compostable. This not only has the potential to improve recycling economics, but also provide granular data on packaging material flows, e.g.sorting and recycling/reuse/composting rates.

INNOVATION STATUS

Scale: Proof-of-concept achieved in an R&D sorting facility (TRL 6-7). A semi-industrial trial, with numerous packaging formats, is set to take place in 2021, followed by industrial trials in test markets.

Partnerships: The HolyGrail consortium, established in 2017, has grown to 85+ partners under the Digital Watermarks Initiative HolyGrail 2.0, facilitated by AIM — the European Brands Association.

AIM Read more BBC Read more

What the customer sees

What the camera sees

photos: Procter & Gamble

MODEL EXPLAINED

Plastics composting

Plastic packaging is decomposed in a home or industrial composting facility, producing biomass, water, and CO_2.[36] While compostable plastics are not a blanket solution (see further details within the chapter), if well thought through, and used in the right applications, compostable plastic packaging can fit in a circular economy.

TRENDS

Using compostable packaging to improve the value of compost: Applications that commonly end up contaminating the organic waste stream are redesigned to be fully compostable *(e.g. Teabags and Fruit stickers p. 146)* and compostable packaging is used to facilitate the collection of food waste *(e.g. food waste collection bags).*

Dedicated systems to capture compostable materials: Compostable plastic packaging is introduced to the market as part of a dedicated (often closed) system within a specific region, which includes appropriate collection and processing infrastructure for compostable materials (this includes food and organics) *(e.g. BioPak's collection service p. 144, Vegware and Paper Round's collaboration p. 147).*

WHERE TO START

A good place to start when identifying opportunities for compostable plastics is to consider applications in which they can help to create a more effective system overall. Three broad categories that currently could make sense are:

- In applications that facilitate the collection and composting of organic materials thus helping to return nutrients to the soil (such as tea bags or organic waste collection bags).
- In a closed system (for example, an event or stadium) if reuse is not an option.
- In applications that are frequently found contaminating organic waste streams (such as stickers on fruit and vegetables).

WHAT GOOD LOOKS LIKE

To ensure a composting strategy is successful and supports a transition towards a circular economy, it is recommended to consider the following:

Sourcing: Aim to use renewable materials from responsibly managed sources so that the composting process returns carbon to the atmosphere that was captured during the material's production (and does not create a system dependent on the continuous input of finite resources as this is not a long-term solution).

Identification: To ensure that compostable plastics end up in the appropriate (organic) waste stream, use and support clear and standardised ways for users to easily identify packaging as compostable. Beyond certification logos, one example could be the adoption of a specific colour palette or marking pattern for compostable materials. To avoid confusion, it can also help to follow an 'all-or-nothing' approach:

- For closed systems (i.e. use is within a specific event/location), this would ideally mean using only compostable plastics or no compostable plastics in a given application. For example, all food packaging in a sports stadium would be compostable.

- For open systems (i.e. use is not within a specific event/location), this would ideally mean converting every item of the same packaging format/application to a compostable plastic, even across businesses. For example, if compostable plastic films are introduced to package 'on-the-go snacks' by one company in a specific geography, an 'all-or-nothing' approach would see the whole industry shift to packaging on-the-go snacks in compostable plastic film in that geography.

  Although this is not immediately achievable in practice, it can be useful to take this system perspective to make composting work in practice and at scale.

Collection: Support the establishment of dedicated collection systems for compostable plastics wherever their use is planned. Ideally, these collection systems are developed in a way that works together with, and promotes, the collection of food waste. Designing packaging to be industrially compostable in a geography where there are no options to have it composted in practice is not an effective approach.

Cross-industry alignment: Try to ensure the packaging format composts in a timeframe that is not only compliant with relevant composting standards, but aligns with the timeframes expected by the composting industry within your geography (which may otherwise still remove your packaging from the composting stream).

"Bioplastic, biodegradable, compostable, bio-based — confused?"

Use the term compostable rather than biodegradable when applicable:

'Compostable', in the context of plastic, is a precisely defined term. It means that an item can break down into carbon dioxide, water, and biomass within a specific time frame and under specific, controlled conditions. 'Industrially compostable' and 'home compostable' are subsets of the term, for which internationally recognised standards have been developed.

'Biodegradable', on the other hand, is not defined as such. It indicates that a material is able to be broken down into carbon dioxide, water, and biomass by the natural action of microorganisms — but the term by itself does not define how quickly this process will occur, or a specific set of conditions that are required.

Avoid using the term 'Bioplastic':
The term **bioplastic** should be avoided as it is a general term that can refer to materials that are either **bio-based** (related to how the material is sourced — wholly or partly from biomass), **biodegradable** (related to whether a material can be broken down into carbon dioxide, water, and biomass by the natural action of microorganisms), or both. Because not all bio-based plastics are biodegradable (for example, bio-based PE), and some biodegradable plastics are not bio-based (for example, PBAT), the term bioplastic can be confusing.

"Compostable plastics — not a blanket solution?"

Despite there being, for many people, an intuitive attractiveness in compostable plastics, they are not a blanket solution to plastic waste and pollution.

IMPACTS OF LEAKAGE

Using compostable packaging does not necessarily solve the environmental impacts of leakage.

Firstly, a packaging being certified as industrially compostable gives no information about the packaging's ability to biodegrade in the natural environment. For example, in one study, PLA and PCL (two industrially compostable plastics) did not show any significant breakdown in saltwater or freshwater conditions over the course of one year.[37]

Secondly, even for packaging classed as home compostable (meaning it will compost under milder conditions than those of an industrial composter) biodegradation in various natural environments can be slow and unpredictable.[38, 39] Therefore, even if expected to persist in the environment for a shorter period of time than conventional plastics, caution still needs to be taken when considering the potential impact of their leakage from collection systems.[40]

LOSS OF MATERIAL VALUE

A composting process breaks the packaging down into CO_2, water, and biomass — meaning the material then needs to be remade from scratch (i.e. virgin feedstock).

In general, the more intact a material can stay whilst being circulated, the more desirable it is from a circular economy perspective — as more embedded energy and labour is preserved. This means that, for many packaging applications, composting is not the most attractive material circulation route.

However, returning biological nutrients to the soil is also crucial in a circular economy and composting can play a vital role in capturing and circulating nutrients from food waste. Although compostable plastics themselves contain low amounts of valuable nutrients, one group of packaging applications for which composting could make sense are those that can help to return nutrients from organic materials to the soil (for example, in applications such as tea bags or organic waste collection bags).

INFRASTRUCTURE REQUIREMENTS

Simply introducing compostable packaging to the market, does not, by itself, prevent the packaging from becoming 'waste' after use — compostable packaging then needs to be composted in practice (in the same way that recyclable packaging still needs to be recycled in practice).

Firstly, for many items currently on the market, 'compostable packaging' often refers to 'industrially compostable packaging'. This means the packaging has been certified compostable under specific conditions and needs to be collected and composted in an industrial composting facility (see 'when can I consider my packaging compostable' below). In most countries, the required systems do not yet exist at scale. Although this is expected to change over time, as facilities are built to process food and organic waste, if/when appropriate facilities do exist, there are still certain issues that need to be addressed in order to develop a successful compostable plastics strategy (for details of these considerations, see 'what good looks like' p. 140).

Secondly, even for home compostable materials, collection and centralised composting can still be necessary as there are many areas, for example, urban areas, where composting at home may not be possible.

The above points do not mean compostable plastics should not be used at all. They mean that, like any material, the pros and cons of compostable plastics should be carefully evaluated before use. Currently, compostable packaging can typically provide most value in specific, targeted applications. Three broad categories that could currently make sense are listed under 'where to start' (p. 139). At the same time, a lot of innovation is ongoing that could open up new opportunities. The relevance of different categories may change as new materials and certifications are developed, and will also vary depending on geographical context and existing infrastructure.

"When can I consider my packaging compostable?*"

Packaging or a packaging component can be considered industrially compostable if it is compliant with relevant international compostability standards such ISO 18606, EN13432, ASTM D-6400 and AS4736 and if its successful post-consumer collection, sorting, and composting is proven to work in practice and at scale.**

For home compostability, these standards are adapted by national certification programmes (for example TÜV Austria).[41]

** This is in context of the New Plastics Economy Global Commitment. See Global Commitment definitions for further details.*

***The suggested test and threshold to assess if the compostability of a packaging is proven to work 'in practice and at scale' is: does that packaging achieve a 30% post-consumer composting rate in multiple regions, collectively representing at least 400 million inhabitants? A possible alternative, especially relevant for more local players, is to check if a 30% post-consumer composting rate is achieved in all the markets where the packaging is sold.*

CASE STUDIES

RETHINK PACKAGING & BUSINESS MODEL | SCALE-UP |AUSTRALIA | TAKEAWAY FOOD AND BEVERAGES

BioPak Compost Club: Creating a system for compostable plastics

A hyper-local collection and composting service established by BioPak (the provider of compostable serveware) to ensure that compostable packaging, food scraps, and organic material is collected (all in one organic waste bin) and then composted in practice.

BUSINESS BENEFITS

Brand reputation: To make sure its compostable serveware was designed to be part of a circular economy, BioPak created the system to ensure that packaging and, importantly, the food scraps it contains do end up being composted.

ENVIRONMENTAL BENEFITS

Compostability: Since launching in 2017, the service has diverted in excess of 1,500 tonnes of compostable packaging and food scraps from landfill and created 105,000 bags of compost.

INNOVATION STATUS

Scale: The collection service has been rolled out in Australia and New Zealand with broad accessibility. Over 200 businesses currently use the service to compost their food waste and packaging.

Read more

DEEPDIVE

BUILDING MOMENTUM FOR THE COLLECTION OF ORGANIC WASTE

BioPak's collection service is a welcome option for the many businesses located in areas where food organic (FO) collection is not currently facilitated by the local authority. In Australia, the food service industry sends 900,000 tonnes of organic waste to landfill every year. The compost service presents an opportunity to recover this material, along with the 14,000 tonnes of compostable packaging BioPak supplies nationally. BioPak has partnered with the Australian Organic Recycling Association (AORA) and is working collaboratively with waste management industries and local governments to increase access to composting infrastructure and scale the operations. As this initiative has gained momentum in the last 12 months, a number of councils have started offering FO collections that include certified compostable packaging.

photo: BioPak

CASE STUDIES

RETHINK PACKAGING | ROLL-OUT | UK | BEVERAGES

Yorkshire Tea from Bettys and Taylors Group: Using compostable tea bags

Replacement of non-compostable tea bags with paper/PLA tea bags for the entire Yorkshire Tea brand range (one of the most purchased tea brands in the UK). As of June 2020, the new material is used in 20% of UK Yorkshire Tea bags.

Read more

RETHINK PACKAGING | ROLL-OUT | UK | BEVERAGES

PG tips from Unilever: Using compostable tea bags

photo: Unilever

First major tea brand switching to a plant-based, compostable material derived from corn starch for their tea bags. The brand has also started the removal of the plastic overwrap from the box..

Read more

RETHINK PACKAGING | ROLL-OUT | NEW ZEALAND | FRESH FOOD

Bostock: Using compostable fruit labels

Compostable stickers used for apples by New Zealand's largest organic apple grower.

Read more

RETHINK PACKAGING & BUSINESS MODEL | SCALE-UP | UK | TAKEAWAY FOOD AND BEVERAGES

Vegware and Paper Round: Creating a system for compostable plastics

Vegware, a compostable packaging manufacturer, launched a partnership with Paper Round, a waste management company, in mid-2020 to ensure compostable materials are collected and composted. They offer a full service of both setting up and monitoring the implementation of compostable materials to ensure a best practice system, as well as handling the collection and hauling to an in-vessel composting facility, where it is transformed into compost in a seven-week cycle.

INNOVATION STATUS

Scale: Early stages of the service roll-out took place across London, Brighton, and Sussex in mid-2020, after a successful 12-month pilot across a dozen sites in London. The service complements Vegware's existing focus on producer responsibility with current services including a 'Close the Loop' composting collection in parts of the UK and a policy of encouraging sites to implement a bring-back scheme to capture used Vegware takeaways.

Read more

photo: Vegware

MODEL EXPLAINED

Substitution to a non-plastic material

A plastic packaging material is replaced with a non-plastic packaging material (for example, paper or aluminium), which is then designed for recycling or composting. Through upstream innovation, there is the opportunity to rethink what the most appropriate packaging material is for a given application in order to achieve a better systemic outcome.

TRENDS

- **Paper-based films:** Plastic films are substituted for paper films (sometimes combined with a polymer or wax that is compatible with the paper recycling stream) *(e.g. Mondi and Fiorini International's collaboration p. 151, Waitrose's plant and flower wrapping, Nestlé's Yes! bar).*

- **Paper-based transport packaging:** Plastic packaging used to provide protection during transport (such as EPS) is replaced by a paper-based alternative *(e.g. Flexi-Hex p. 153, TemperPack's ClimaCell p. 152).*

- **Paper-based versions of non-recyclable, small-format plastic items:** Small-format plastic packaging that is currently considered non-recyclable (such as six-pack rings or sachets) is replaced by paper alternatives *(e.g. Graphic Packaging International's KeelClip™ p. 156, Everdrop p. 82).*

WHERE TO START

A good place to start is to understand if substitution can help in addressing currently non-recyclable plastic packaging formats. One approach is to identify a list of plastic packaging formats that are currently not considered recyclable in practice and at scale and then assess for which ones substitution might be technically viable, not generate negative unintended consequences, and be an easier way to achieve recycling or composting in practice and at scale (compared to redesigning the plastic packaging). See the 'Trends' section (above) for formats and applications in which this may currently be the case.

Also, keep in mind that opportunities might exist for eliminating certain formats completely (see the elimination section on p. 37).

WHAT GOOD LOOKS LIKE

Structured approach: Approach substitution from a structured and systemic perspective. (See 'Asking the right questions' from p. 161 for initial guidance).

System infrastructure and packaging design: Before substituting from plastic to another material, consider whether systems are in place for the circulation of the alternative material (i.e. in practice and at scale recycling or composting) and ensure that the packaging is designed to fit within the targeted system (see p. 126 and p. 143 for more details).

Identification: To support appropriate disposal, ensure that packaging made from a material alternative to plastic is clearly distinguishable from its plastic counterpart (for example, plastic films and paper films can sometimes look similar).

"Should substitution be my only plastics strategy?"

No. It is not inherently more or less 'circular' to use one type of packaging material versus another. Rather than being a property of a packaging material, whether packaging is suitable for a circular economy is dictated by the wider system and is case-specific. For example, whether one packaging material is preferred over another can be influenced by transport distances, material availability, and the presence of collection systems in a specific geography or for a specific packaging format. So, in some cases, plastic might be the most appropriate material and, in some cases, it might not.

The decision to substitute away from plastics needs to take system, as well as case-specific, considerations into account. On p. 180, guidance is provided to help you do this.

"Can I call my non-plastic packaging recyclable/ compostable?"

When substituting from plastic to another material, it is still important to consider whether the new material is recyclable/compostable in practice and at scale, not just in theory. Similar guidance as for plastic packaging can be used (see p. 126 and p. 143).

RETHINK PACKAGING | SCALE-UP | ITALY | DRY FOOD

CASE STUDY

Mondi and Fiorini International collaboration: Paper-based pasta packaging

Paper-based packaging with a paper-based window for pasta. A joint collaboration between packaging producers Mondi and Fiorini International led to the development of the innovative packaging. The solution has enabled pasta producer Girolomoni to replace their non-recyclable flexible plastic packaging with paper packaging, while maintaining a view to the product.

BUSINESS BENEFITS

Superior packaging: Fiorini International was looking for a paper packaging to offer to its customers that would set it apart from the competition. The development of the paper window means customers get a view of the product — something that is normally not possible with all paper packaging.

ENVIRONMENTAL BENEFITS

Recyclability: 100% recyclable — which is currently not the case for the flexible plastic packaging often used for pasta — and compatible with waste paper recycling streams, even in countries with the highest recycling requirements.

Renewable sourcing: FSC certified.

INNOVATION STATUS

Scale: The paper-based pasta packaging is used by Girolomoni in three pasta lines. The packaging has also now been adapted for rice, and is used by Vignola, an Italian rice mill.

Read more

photo: Mondi

CASE STUDIES

RETHINK PACKAGING | SCALE-UP | USA | FRESH FOOD, HEALTHCARE

ClimaCell from TemperPack: Insulated packaging

Plant-based insulation for perishable shipments, with comparable temperature control performance to expanded polystyrene foam (EPS), as well as being made from a renewable material and fully compatible with paper recycling streams. Current use cases include meal-kit deliveries and pharmaceutical shipments, for which temperature controlled deliveries are a key requirement.

BUSINESS BENEFITS

Cost savings: ClimaCell packaging insulation comes as a two-piece flat-packed set, reducing transportation and storage logistics prior to use.

ENVIRONMENTAL BENEFITS

Waste prevention: Since 2018, TemperPack's customers have diverted 22 million plastic foam coolers from landfills by using ClimaCell, rather than EPS.

Carbon emissions: TemperPack estimates that ClimaCell reduces carbon emissions by an average of 65% compared to EPS.*

photo: TemperPack

Recyclability: Fully recyclable through kerbside cardboard recycling collection. ClimaCell liners comply with OCC-E repulpability standards and carry the "widely recyclable" Paper Insert designation from How2Recycle.

Renewable sourcing: 95% of the weight of the ClimaCell packaging solution, including the liners and corrugated shipping box, consists of plant-based, renewable paper and starch.

INNOVATION STATUS

Scale: TemperPack sells to over 100 customers from two manufacturing facilities. Existing clients include Hello Fresh, New England Biolabs, UPS Healthcare, and Illumina.

Investment: Raised USD 31 million in a Series C funding round in July 2020, bringing total funding raised to more than USD 75 million.

Partnerships: In early 2020, TemperPack entered into a partnership with DS Smith to market and sell jointly developed packaging solutions incorporating the ClimaCell technology, throughout Europe. TemperPack is backed by Closed Loop Fund and is a member of ISRI and the How2Recycle program.

Read more

** Methodology incorporates the relative weights and material inputs of ClimaCell and EPS, and is based on information from LCA databases, utility companies, and government agencies.*

RETHINK PACKAGING | SCALE-UP | GLOBAL | B2B TRANSPORT, E-COMMERCE TRANSPORT

Flexi-Hex: Protective transport packaging

Honeycomb-design, flexible cardboard packaging that provides protection to products during transport. It is an alternative to bubble packaging and foamed materials.

BUSINESS BENEFITS

Cost savings: High-performance design reduces breakages compared to traditional packaging and means the minimal amount of packaging can be used, for example, Tarquin's Gin only have a 0.22% breakage rate using Flexi-Hex (calculated on a postal test of 16,500 units) and Tinkture Rose Gin have reduced their breakage rate from 5% to 0% using Flexi-Hex. In its compressed form, it takes up very little storage space and the flexibility of the shape and structure allows it to fit and adapt to different sizes and shapes of products. This reduces time during the packaging process — for example, a surfboard company was able to reduce its packaging time from 20 minutes to 2 minutes per board.

Brand reputation: Flexi-Hex reduces the amount of non-recyclable protective packaging a user receives with e-commerce deliveries.

ENVIRONMENTAL BENEFITS

Recyclability: Fully recyclable with the paper recycling stream.

Compostability: Fully compostable.

Recycled content: Made from 100% recycled paper pulp.

INNOVATION STATUS

Scale: Used by Europe's largest action sports retailer, Surfdome, as well as drinks companies Bombay Sapphire, Mentzendorff, Atelier Nash, and Tarquins Gin.

Read more

photo: Flexi-Hex Ltd

CASE STUDIES

RETHINK PACKAGING | SCALED | GLOBAL | E-COMMERCE TRANSPORT

HexcelWrap from HexcelPack, LLC: Paper-based fragile wrap

Bubble packaging alternative made from 100% paper. Seals without tape, simplifying and optimising the wrapping process.

BUSINESS BENEFITS

Cost savings: HexcelWrap optimises operations, resulting in overall savings for the user. It is shipped and sold in a compact unexpanded roll which reduces storage space by up to 80% prior to use and its superior protection properties mean that less wrapping material can be used, reducing box size (and therefore shipment volume), while still delivering effective product protection.

ENVIRONMENTAL BENEFITS

Recyclability: HexcelWrap is fully compatible with the kerbside paper recycling stream.

INNOVATION STATUS

Scale: There are more than 12,000 HexcelWrap dispensers in over ten countries. The product is distributed by some of the world's largest packaging providers, including DS Smith, and is used by leading brands.

Read more

photo: HexcelPack, LLC.

RETHINK PACKAGING | ROLL-OUT | USA | E-COMMERCE TRANSPORT

Hexcel'ope from HexcelPack, LLC: Protective mailer

Padded mailer made from 100% paper. An alternative to traditional plastic bubble-lined mailers and can replace small boxes.

BUSINESS BENEFITS

Cost savings: While the mailer itself is more expensive than traditional mailers, the overall return for the customer in damage reductions, elimination of small boxes, and void fill is expected to net an overall return for companies using the Hexcel'ope.

ENVIRONMENTAL BENEFITS

Recyclability: Hexcel'ope is made using one material — paper — which makes it compatible with the paper recycling stream.

INNOVATION STATUS

Partnerships: HexcelPack, LLC has joined forces with Intertape Polymer Group as primary licensee to manufacture the Hexcel'ope under their Curby (curbside recyclable) line of products. The product is expected to be available on the market in Q3 2020.

Read more

photo: HexcelPack, LLC.

CASE STUDIES

RETHINK PACKAGING | SCALE-UP | EUROPE | BEVERAGES

KeelClip™ from Graphic Packaging International: Cardboard beverage packaging

Cardboard packaging solution that replaces shrink film and plastic rings used for multi-pack beverage cans. Works on all can diameters and heights, offering optimum scalability without the need for additional end-of-line packaging equipment.

BUSINESS BENEFITS

Superior packaging: KeelClip™ covers the top of the cans completely and keeps them clean while retaining the convenience and branding opportunities offered by shrink-wrap packaging. Also, KeelClip™ allows one can to be removed at a time, remaining portable until the very last can is removed.

INNOVATION STATUS

Scale: Between 2020 and 2021, Coca-Cola European Partners and Coca-Cola HBC will transition to KeelClip™ in selected markets across Europe for standard, sleek, and slim cans. AB InBev is leading the transition in the beer sector, with the product released to the market in September 2020.

Investment: Coca-Cola HBC will invest EUR 15 million in the roll-out of KeelClip™ across Europe. Coca-Cola European Partners have invested EUR 14 million to install a new can line and KeelClip™ packaging machine in The Netherlands.

ENVIRONMENTAL BENEFITS

Waste prevention: Through the introduction of the KeelClip™, Coca-Cola HBC forecast that 250 tonnes of plastic will be saved in Ireland alone and Coca-Cola European Partners forecasts that 350 tonnes of plastic will be saved in The Netherlands. By the end of 2021, Coca-Cola HBC will have removed shrink wrap from all its can multi-packs in the EU and Coca-Cola European Partners will do the same by the end of 2022. The tops of the cans also being covered allows for direct palletisation, reducing the need for secondary packaging and maintaining hygiene standards from factory to household.

Carbon emissions: Reduces carbon emissions compared to the plastic alternatives. As an example, roll-out of the KeelClip™ by Coca-Cola HBC across Europe will save 3,000 tonnes of CO_2 annually.

Recyclability: Fully kerbside recyclable.

Compostability: Fully compostable.

Other: An 'Eco+' version using less material is also in development and will run over the same packaging machine.

Read more

photo: Graphic Packaging International

RETHINK PACKAGING | PILOT | USA | BEVERAGES

Moulded pulp rings from PepsiCo

photo: PepsiCo

RETHINK PACKAGING | PILOT | MEXICO | BEVERAGES

Moulded pulp rings from Corona (AB InBev)

photo: ABI

RETHINK PACKAGING | PROTOTYPE | GLOBAL | BEVERAGES

GreenClip and TopClip from Smurfit Kappa: Cardboard beverage packaging

photo: Smurfit Kappa

Cardboard packaging solution for bundling canned and bottled beverages.

BUSINESS BENEFITS

Superior packaging: The GreenClip uses a corrugated alternative to bundle cans but also easily facilitates the sale of single units. The TopClip replaces shrink-wrap packaging, fully covering the top of the cans to keep them clean and provide branding opportunities.

ENVIRONMENTAL BENEFITS

Carbon emissions: Smurfit Kappa reports that greenhouse gas emissions for TopClip are 30% lower than a plastic stretch-wrap equivalent.

Recyclability: Fully recyclable.
Compostability: Fully compostable.

INNOVATION STATUS

Partnerships: Smurfit Kappa is co-operating with KHS, a large automation supplier, to offer a full turn-key solution to customers.

Read more

3

PART THREE

MAKING IT HAPPEN

This section introduces five key ingredients that underpin successful upstream innovation efforts, and provides guidance on making upstream decisions.

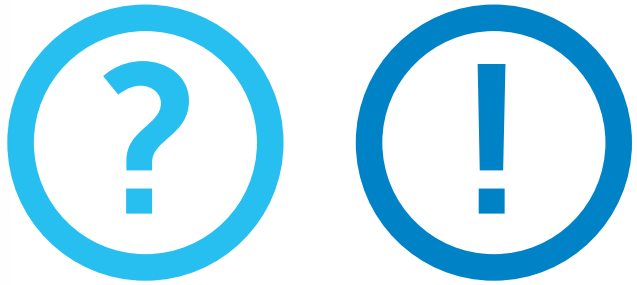
With the upstream innovation mindset and circular economy strategies established, and a wide range of examples to take inspiration from...

...it's time to take action.

In this part of the book, guidance is provided to support your implementation journey.

Setting up for success:
None of the upstream innovation examples presented in this book will have followed exactly the same process of ideation, development, and implementation. Yet across the many cases, common traits can be identified that contributed to the successful innovation process. In this section, a perspective on these five key ingredients for success is presented and then exemplified through the stories of different companies that are taking action.

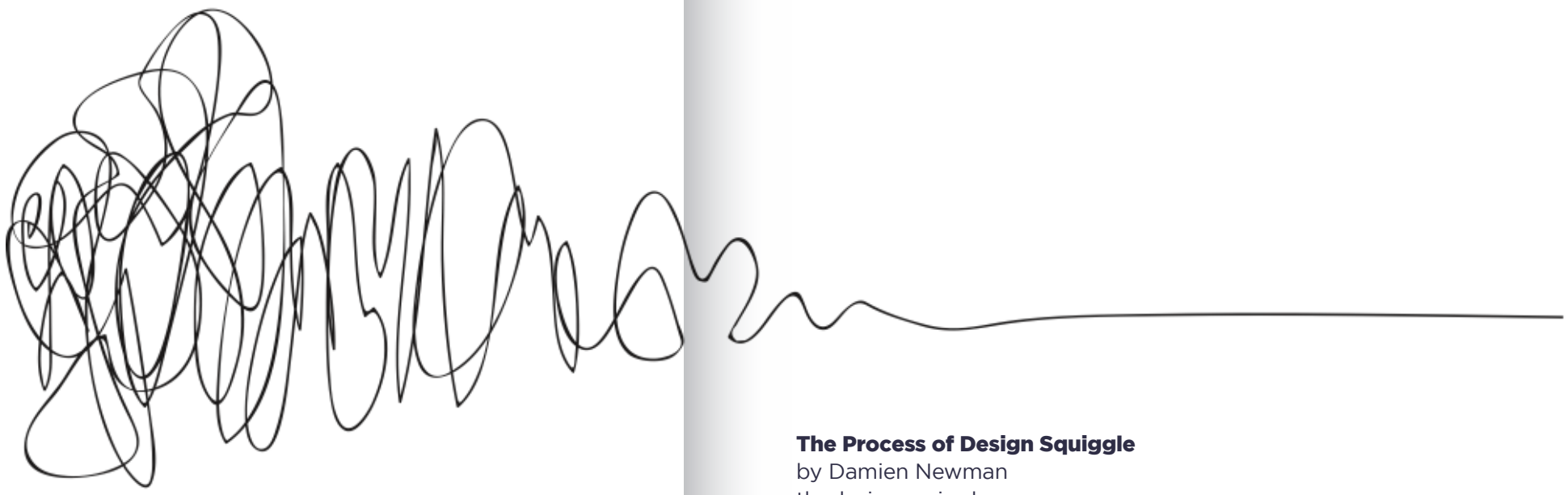
Asking the right questions:
Going through the upstream innovation process requires a structured approach to decide on a strategy, and then design the solution appropriately. In this section, guidance is provided to help you identify the right questions to ask during your decision making phase.



Setting up for success

SETTING UP FOR SUCCESS

Innovation processes are often messy, unpredictable, and full of detours — sufficient and sustained support is crucial for success.



Each company, innovator, innovation lab, and innovation consultancy will have their own unique way of pursuing innovation, but in many cases it will — by nature — resemble a funnel.

This is because — through research, testing, iteration, and refinement — a successful innovation process needs to transition from broad vision, high uncertainty, and many loose ideas into clarity, focus, and one single solution.

Many great frameworks already exist to help visualise and structure this innovation process (for example, the Double Diamond Framework and the Agile Innovation Framework), so here we do not aim to recreate what these frameworks already do very well. Instead, we focus on the five key ingredients that are required to both set the process up for success and support the innovation process along the way.

The Process of Design Squiggle
by Damien Newman
thedesignsquiggle.com

Five key ingredients

Through in-depth interviews and extensive engagement with businesses, we have identified five key ingredients that support a successful upstream innovation process in the corporate setting. It is not necessary for all key ingredients to be present all the time, but the presence of at least a few does appear to mean the innovation process is more likely to be successful.

1 COMPANY-WIDE VISION AND TARGETS

Publicly communicating a long-term vision (such as by signing the Global Commitment or joining a Plastic Pact) and communicating the senior leadership buy-in that follows from that, plays a vital role in creating the enabling conditions for upstream innovation within an organisation. In addition, targets set at CEO level need to trickle down and become core objectives for individuals and departments. One way businesses can achieve this is through internal communication and education about a company's long-term vision and by translating the high-level targets into tangible key performance indicators for each department.

2 INTRAPRENEURIAL CULTURE

To succeed with upstream innovation, organisations need internal change agents — intrapreneurs — with ideas that push the boundaries, and who see ways to create better products or reach new markets, even when it conflicts with existing business priorities. Companies pioneering upstream innovation support a culture of intrapreneurship by, for example, allocating time for employees to work on projects of personal interest, or hosting development programmes and competitions to support and accelerate idea generation.

3 EXTERNAL INPUT

Some aspects of upstream innovation can fall outside the comfort zone of even very large companies. A key ingredient to success for many companies has been to bring in complementary assets, resources, skills, and expertise when required. Companies can bring in such expertise by establishing partnerships with start-ups, hiring consultancies to fill internal knowledge gaps, or getting feedback from NGOs.

4 BREAKING SILOS

An effective team is a key ingredient for making any innovation process successful. For upstream action in particular, a cross-functional team is essential as rethinking the packaging, product, and business model often involves many different teams or business units in an organisation. Businesses who are successful in upstream innovation actively seek to break organisational silos, for example, by setting up a core team of internal champions who are responsible for securing business-wide buy-in, as well as capturing and sharing learnings.

5 PATIENT CAPITAL

Upstream innovation can involve the development of fundamentally new materials, processes, technologies, business models, and more. These types of innovation take time and immediate success is rare. A well-funded innovation process with room to fail, and patience for return on investment, is therefore crucial to be successful. Patient capital can come in many forms — including the allocation of internal funding, external investment into impact funds, research and development grants, or human resources — but common to all, is patience and the understanding that truly transformative innovation takes time.

CASE STUDIES

THE STORY BEHIND

Upstream momentum in Nestlé

The development of innovative alternative delivery systems, such as bulk reuse and refill options, are a key focus area for Nestlé across several product categories. For example, the company was one of the first joiners on the Loop platform (p. 100) with a double-walled Häagen-Dazs ice cream container (see photo right) that has now become an iconic example of reusable packaging with increased functionality. Also, Nestlé is actively exploring what next generation refill systems could look like, among others, through a partnership with the start-up MIWA to pilot tech-powered refill systems for Néscafe and pet food (p. 88).

COMPANY-WIDE VISION AND TARGETS

Continuously raising the organisation's ambition level to guide upstream innovation efforts

In 2018, Nestlé joined the Global Commitment and with that set quantitative targets, such as making 100% of its packaging recyclable or reusable by 2025. The announcement helped build an internal vision for packaging and created a demand for innovation across all Nestlé product categories. In January 2020, Nestlé raised the ambition level by setting a target to reduce the use of virgin plastic by one-third by 2025. Nestlé has also explicitly included reference to the company's commitment to developing a circular economy in its Corporate Business Principles (mandatory principles for all employees).

PATIENT CAPITAL

Earmarked funding for upstream innovation to shorten timelines

Nestlé has established a CHF 250 million sustainable packaging venture fund to invest in companies that focus on this area. Additionally, Nestlé has invested in in-house research with the creation of the Nestlé Institute of Packaging Sciences (an institute dedicated to packaging innovation) and an R&D Accelerator (a mix of internal and external teams working on innovation under the mindset of 'learning fast and failing smartly') — both based in Lausanne, Switzerland. These initiatives, in addition to others, have made it easier and quicker for internal champions and external start-ups to get funding or expertise behind upstream innovation initiatives — for example, joining Loop (p. 100) and developing bulk dispensing models with MIWA (p. 88).

INTRAPRENEURIAL CULTURE

An employee innovation culture supported by crowdsourcing

Through various initiatives, Nestlé has been encouraging and directly investing in creating an intrapreneurial culture across the organisation. One of these initiatives is InGenius, Nestlé's Global Employee Innovation Accelerator. InGenius consists of a crowdsourcing platform, that helps employees collaborate and grow ideas into tangible business opportunities (see innovation process tool to right). More than 62,000 Nestlé employees from 108 countries have generated 6,400 new ideas and submitted over 92,000 votes. Today, many of Nestlé's upstream innovation efforts have their roots in internal pitching events where one or several internal champions have presented their vision, demonstrated a consumer-validated prototype, and gained support to deliver their innovation.

EXTERNAL INPUT

Creating several access points for externals

Partnerships with start-ups such as MIWA and Loop are examples of Nestlé's efforts to welcome good ideas from outside the organisation. Several access points have been created for external stakeholders to engage in the development and implementation of breakthrough packaging ideas. For example, the Nestlé Institute of Packaging Sciences collaborates with suppliers, research institutes, and start-ups to discover and develop 'environmentally friendly packaging solutions', while the Nestlé R&D Accelerator provides access to Nestlé's R&D expertise and infrastructure (including access to shared labs, kitchens, bench-scale and pilot-scale equipment) for external as well as internal teams.

INNOVATION PROCESS TOOL: AN IN-HOUSE INNOVATION PLATFORM

Nestlé's InGenius platform drives an employee innovation process that takes crowdsourced winning ideas from concept to pilot within six months. The team uses design thinking techniques, user research, and rapid prototyping to validate the idea and test the solution with real users. The employee who pitched the idea is positioned as the start-up CEO and an agile team is created around them to advance the concept via sprints, all in under eight weeks. An investor round with Nestlé's senior executives engages the start-up CEO in a live pitch and Q&A session where seed funding is available to develop viable prototypes, as well as embark on full-scale pilot tests.

Learn more on ingenius.nestle.com.

photo: Loop

CASE STUDIES

THE STORY BEHIND

Coca-Cola's universal bottle

Coca-Cola is currently expanding delivery of soft drinks in refillable PET bottles with a universal design (p. 106). The initiative evolved from an intensive, ten-month innovation process undertaken by a dedicated cross-functional team in Latin America. The team had one task: Come up with a solution that can make refill packaging formats more efficient. In less than a year, the universal bottle was in operation in many markets in Latin America — it is Coca-Cola's fastest growing packaging format and is being scaled to other continents.

COMPANY-WIDE VISION AND TARGETS

Setting a growth expectation for upstream innovation

The launch of a company-wide vision of a 'World Without Waste', along with targets set out by the Global Commitment, acted as an impetus for Coca-Cola Latin America to invest USD 400 million in updating and scaling up infrastructure for refillable bottles. In the past, refillable bottles represented the majority of sales in Latin America, as they offer an affordable, alternative to single-use packaging, and bring significant environmental benefits, but they had been declining in most markets due to operational complexity. The president for Coca-Cola Latin America, Alfredo Rivera, saw an opportunity in launching an innovation challenge and with the investment set a long-term growth expectation for refill formats, which helped to ground it in the core business strategy.

PATIENT CAPITAL

A sponsored and empowered team

In addition to large investments in updating and scaling up infrastructure to enable refill across Latin America, a team of ten people from across the Latin American markets were selected by the leadership team to drive an innovation process on the packaging design for returnable refillable bottles and deliver a complete business plan. The innovation process was triggered by a USD 25 million investment and the team members were taken off normal duties for almost ten months to focus on this project only. The capital and sponsorship from senior management left the team empowered and able to meet in person for several months to focus on the intensive innovation process.

BREAKING SILOS

Blending ideas and experiences from many markets

Many of the Latin American markets had already been experimenting with different solutions to overcome the operational complexity of refill glass bottles. For example, Chile had achieved a 75% market share of returnables and had seen very positive results from repeat sales due to a built-in reward for return. However, they were struggling operationally as the sorting of bottles was problematic and they had therefore already started to think about a universal design. At the same time in Brazil, they had seen a breakthrough in paper-based labelling technology and the upgraded lightweight refillable PET bottle. By mixing competencies from different business units and countries, the core team got the opportunity to learn from each other and blend different ideas to ultimately optimise the solution of a refillable PET bottle with a universal design.

The agile team had senior representatives from marketing, finance, commercial, quality and technical areas, which helped to get a fast buy-in from the wider organisation during the innovation process.

Also, a key to success for the speedy innovation process was involving the bottlers from the outset. In fact, the CEO of Coca-Cola FEMSA, Coca-Cola's largest independent bottler, sponsored this innovation challenge on refill together with the Latin America Coca-Cola president. Having FEMSA representing all Latin American regional bottlers throughout the process made it possible to understand and integrate their needs and was key to ultimately getting the bottlers to invest in the new infrastructure for the universal bottle.

After the launch of the universal bottle in Latin America, a global workstream was formed to apply the learnings to other markets. For example, Coca-Cola has created a website where bottlers can get information about the opportunity in the universal bottle and read about the experiences and learnings from Latin America. Recently, South Africa has been identified as the next market for roll-out and the customer response to the new design is currently being tested.

INTRAPRENEURIAL CULTURE

Backbone of structures and procedures to encourage innovation

For more than ten years, Coca-Cola has been implementing a venture capital culture, inspired by the tech giants in Silicon Valley. Different tools and initiatives have been tested, such as introducing a Common Innovation Framework (CIF) to guide innovation processes in all markets (initiated in 2006), and recently evaluating employees on skills such as daring to take risks and being inclusive of other perspectives and new ideas. Especially in the last two years, the employees in Latin American markets have been expected and supported to adopt intrapreneurship, which helped to create the right environment for implementing the universal bottle.

EXTERNAL INPUT

Investing in consultants to support the process

One of the key ingredients to succeeding in the innovation process of the universal bottle was the investment in external consultants who were specialised in agile methodology (see innovation process tool below) and could help guide and facilitate the core team in the process.

Also, Coca-Cola benefitted from partnering with NGOs at the final stage of the innovation process to get an external point of view and a validation of the solution. In Brazil, for example, the NGO TriCiclos carried out an independent LCA and has been giving input and feedback on how to further optimise returnable packaging systems.

INNOVATION PROCESS TOOL: AGILE TECHNOLOGY

The Common Innovation Framework (CIF) has guided innovation processes in Coca-Cola for almost 15 years. The goal is to build ideas into screened concepts through a process of five stages and gates: 1) Source concepts and ideas, 2) Assess strategic fit and potential value, 3) Build concept statements, 4) Screen with customers and shoppers, 5) Submit 'winners' at stages and gates. The screening is an especially important part of the process and Coca-Cola uses a variety of methodologies to recruit and develop panels to obtain input from them. In the case of the universal bottle, the team drew on the agile methodology to further guide the innovation process. It relies on breaking a big problem into small problems and incrementally building a solution through two- to four-week sprints on each problem statement. Each sprint's goal is to build the most important features first and come out with a minimal viable product that can go to market. Key to success for the agile methodology is having a small multi-functional team that doesn't work on a fixed project plan, but is dedicated full time during the necessary sprint periods.

CASE STUDIES

THE STORY BEHIND

Tesco's packaging strategy

Since the start of 2018, Tesco, the UK's largest retailer, has been on a journey to transform their approach to plastic packaging. The retailer has now established a successful process for continuous packaging innovation and has dedicated a store to trialling new ideas.

COMPANY-WIDE VISION AND TARGETS

Communicating intentions, both internally and externally

The first phase in Tesco's upstream innovation journey involved setting a company-wide packaging vision. This was explicitly supported by the Tesco Group CEO, Dave Lewis, and clearly communicated throughout the supply chain. For example, in 2018, Tesco communicated to all of their suppliers that they intended to ban the hardest-to-recycle plastics from their products. All packaging materials in the business were then audited, and a preferred materials list was provided (the materials list is now updated as required). Removal of the hardest-to-recycle plastics has now been achieved for all own-brand products with work ongoing with branded products. The second phase was launched in mid-2019, with a 4R strategy developed to govern all packaging design — remove, reduce, reuse, and recycle. At this time, Tesco also communicated that, starting in 2020, they would assess the size and suitability of all packaging as part of their ranging decisions and category reviews — reserving the right not to list a product if they find the packaging to be excessive or inappropriate. This vision was set out by the Tesco Group CEO at four meetings with over 1,500 suppliers along with a target to remove 1 billion pieces of packaging by the end of 2020 (See p. 46 and p. 48 of this guide for two of the items — multi-pack films and secondary lids — removed as part of this process).

BREAKING SILOS

Cross-functional teams to identify opportunities for change

From the moment the packaging strategy was laid out, a cross-functional team (consisting of technical experts, product developers, and commercial teams working with branded and own-brand suppliers) has existed to assess every single piece of packaging in Tesco's business and identify opportunities for change. The 4R programme is also guided by a steering group of managers from across the business and governed by a cross-functional group of directors who meet once a month.

Ideas that are developed by these cross-functional teams are either directly rolled out across Tesco's operations, or, if they require testing, are trialled in a dedicated store (see the innovation process tool).

EXTERNAL INPUT

Engaging with a broad range of actors to deliver on the packaging strategy

Tesco works with a broad range of actors, including experts from industry, NGOs and charities, to achieve its packaging programme. For example, a partnership with WWF supports the 4R work on packaging, Tesco's Head of Packaging engages with a number of organisations through the UK's Plastics Pact, and Tesco has recently teamed up with Loop (p. 100) to pilot reuse–return in the UK.

INNOVATION PROCESS TOOL:
REAL-LIFE TRIAL AND ERROR OF FRESH IDEAS

Tesco has turned one of their stores near Cambridge into a dedicated store for trialling ideas to reduce waste — Tesco Bar Hill. Here, ideas can be rapidly tested and customer response understood in order to develop ideas that can be scaled to support the 4R strategy. Once Tesco identifies/understands how an idea will work best, the idea is rolled out from Bar Hill to all 2,658 UK stores. This said, it is accepted that some of the ideas tested in Bar Hill will not be rolled out — the point is to quickly establish what works and only roll out the best innovations. To feed fresh ideas into the Bar Hill shop in 2019, Tesco gathered 24 graduates from different areas of Tesco's business. The graduates participated in a ten-day workshop and generated more than 50 initial ideas which were developed into 23 defined deliverables that could support the 4R strategy, based on volume and scalability. The idea to remove multi-pack films (p. 36) was one of the ideas generated in this workshop and was first tested in the Bar Hill store before being rolled out across the UK.

photos: Tesco

CASE STUDIES

THE STORY BEHIND

X, the Moonshot Factory

One of the most iconic contemporary examples of disruptive innovation is 'X, The Moonshot Factory' — the radical innovation engine behind Alphabet (parent company of Google). While the innovation scope of X is much broader and quite different from this book, their approach can serve as inspiration on how to invent groundbreaking technologies and solutions.

Inspired by iconic innovation laboratories such as Bell labs and Thomas Edison's Menlo Park laboratory, X focuses on inventing and developing groundbreaking technologies and solutions. Since its creation in 2010, X has created all-electric delivery drones to reduce carbon emissions and air pollution, drills to bring geothermal power to homes, and storage for renewable energy in giant vats of molten salt. Ongoing projects include computational agriculture to explore opportunities to reduce emissions and waste through the food system and the ocean health project to explore new ways to protect our oceans while feeding humanity.

PATIENT CAPITAL

Merging risky project profiles with 5–10 year project timelines to achieve truly transformative outcomes

X does not focus on quick, easy, and certain wins. X explicitly focuses on inventing and launching 'moonshot' projects with the potential to solve problems that affect millions or billions of people. Consequently, X works with project timelines of astronomical proportions (up to a decade) compared to conventional corporate innovation projects. In order to be truly innovative, the projects pursued usually have the highest risk profiles, high degrees of research, and long-term time horizons.

BREAKING SILOS

A diverse pool of 'T-shaped' entrepreneurs

Rather than establishing large project teams around each effort, X has small project teams that draw on a large pool of highly skilled people who lend their expertise to many different projects. To ensure maximum innovative capacity, X focuses on hiring a diverse group of innovative and entrepreneurial individuals with deep expertise in a given field but who also have the ability to look at the broader picture and work across many different domains — 'T-shaped' candidates.

INTRAPRENEURIAL CULTURE

Engaging with a broad range of actors to deliver on the packaging strategy

To avoid having to give up on ideas at very late stages, with millions of innovation dollars down the drain, X focuses on actively killing ideas — ideally as early as possible. Creating a culture around this process and celebrating failure is key (see innovation process tool to the right).

EXTERNAL INPUT

Making contact with the real world — early and often

Rather than hiding away in a lab and hoping that the world will like what comes out of the X-labs, X actively seeks external input from the beginning in order to build something truly useful and learn as fast as possible.

photo: X, the moonshot factory

INNOVATION PROCESS TOOL: PERFECTING THE ART OF KILLING IDEAS

X's innovation process is organised around a funnelling process that aims to continuously eliminate ideas that, for technical or economic reasons, will not be able to succeed.

The first stage is about understanding a project's biggest risks. Here innovators usually get a few weeks and funding in the order of a few thousands USD. Most ideas do not move forward from this stage.

The second stage involves prototype building and modelling (both technical and economic) to understand the biggest obstacles that need to be overcome for an idea to succeed and whether overcoming these is possible at all. This stage usually takes a couple of months and only a handful of ideas survive this stage.

The third stage usually takes a year and involves further drilling into the risks and key preliminary barriers that need to be overcome. Only after this stage, which roughly half of the ideas pass through, is a full multi-year X project launched.

Once an X project reaches the point equivalent to the 'growth stage' of start-ups, when the next stage is to scale operations, the project 'graduates' from X and leaves the Moonshot Factory. Either the project becomes an independent Alphabet company (e.g. the autonomous vehicle company Waymo created as a result of X's Self-Driving Car project) or it gets embedded into existing Alphabet operations (e.g. the X project Brain, which pioneers deep learning, now works at the core of many Google services).

Asking the right questions

ASKING THE RIGHT QUESTIONS

Going through the upstream innovation process requires a structured approach to decide on a strategy, and then design the solution appropriately.

Unfortunately, no single-metric exists that can answer the question "which packaging solution should I choose to achieve the best systemic outcome?" When considering the entire system in which the packaging will participate, most solutions come with pros and cons, and there will inevitably be trade-offs.

Here we present three steps to help structure the upstream design process as well as provide commentary on how Life Cycle Assessment (LCA) can be effectively used to guide upstream decisions.

Three steps for upstream decision making

The steps presented here are designed to help structure and evaluate various upstream innovations or solutions from a broad systems perspective.

These steps can be used to assess a single solution, compare solutions that only differ slightly (such as one material versus another), or compare radically different solutions (such as reuse versus single-use).

The steps follow this simple logic...

DEFINE

WHAT ARE YOU TRYING TO ACHIEVE?

IDENTIFY

WHAT ARE THE POSSIBLE SOLUTIONS?

EVALUATE

WHAT ARE THE PROS AND CONS AT A SYSTEMS-LEVEL?

1 DEFINE

WHAT ARE YOU TRYING TO ACHIEVE?

What are you trying to achieve with a particular packaging item? What function would the alternative solution need to provide? Be as specific as possible when it comes to limiting factors such as geographical location, customer segments, timeframe, etc.

BROADER EXPLORATORY QUESTIONS

How can we maintain the freshness of fruits and vegetables in Europe?

How can we best deliver small quantities of personal care products in Southeast Asia?

NARROW DEFINED QUESTIONS

Which material should we make our salad packaging from in the USA?

Which material should we use for delivering home care refill tablets in Brazil (now and in ten years time)?

2 IDENTIFY

WHAT ARE THE POSSIBLE SOLUTIONS?

Identify a set of 'solutions' that can provide the defined functions (i.e. identify all of the solutions you would be happy to explore in response to the question. This may be two solutions, it may be five).

POSSIBLE SOLUTIONS

1. Edible coating (e.g. Apeel, p. 52)
2. Shortened supply chain (e.g. Kecipir, p. 55)
3. In-store misting system (e.g. ARECO, p. 71)
4. Plastic film packaging

---

1. Mono-material plastic sachets
2. Soluble sachets (e.g. MonoSol, p. 56)
3. Solid tablets in refillable containers (e.g. Bite Toothpaste Bits)
4. Compostable sachets
5. Return system (e.g. Koinpack)

POSSIBLE SOLUTIONS

1. Clear film (e.g. clear PE)
2. Coloured mono-material plastic film (e.g. coloured PE)
3. Compostable plastic film (e.g. PLA)
4. Paper-based film

---

1. Compostable plastic sachet (e.g. PHA)
2. Paper sachet (e.g Everdrop, p. 82)
3. Multi-material plastic film (e.g PE/PP)
4. Rigid plastic container (e.g. PP)

3 EVALUATE

WHAT ARE THE PROS AND CONS AT A SYSTEMS-LEVEL?

Consider the identified solutions as part of a bigger system in order to evaluate pros, cons, and trade-offs during the 'upstream' design stage. This includes looking at the solution throughout its entire life — 'before-use', 'in-use', and 'after-use'. The table below provides an initial list of systems-level questions you could consider. While not comprehensive, this list is provided to act as a guide on how to consider the technical, economic, environmental, and social factors of a solution during before-use, in-use, and after-use phases.

BEFORE-USE

Production emissions: To what extent can production processes for the solution be designed so they do not emit pollutants such as greenhouse gases and substances that are harmful to air quality, water quality, and human health?

Recycled or renewable materials: Are the primary feedstocks of the materials used in the solution recycled or renewable (i.e. not from virgin finite resources)? If not, is there a feasible pathway to transition from virgin finite to recycled or renewable primary feedstock within a reasonable timeline?

Systemic issues from sourcing: Can the materials used in the solution be sourced in a way that does not damage ecosystems, cause losses to biodiversity, reduce ecosystem service provisions, or impede human health or worker rights?

Systemic impact of scaling: What would be the implications (beneficial and/or negative) if the use of this solution was significantly scaled up by the industry in general? Are there, for example, positive economies of scale or potential risks of resource depletion / land degradation?

IN-USE

Performance: How well does the solution perform in achieving the objective defined in step 1?

Business benefits: What benefits (e.g. cost savings, brand loyalty, better products, brand reputation) does the solution provide to your business, based on its set-up and design?

Resource demand while in use: What is the resource demand during the use-phase of the solution? This could include forward and reverse logistics, filling/refilling, refrigeration, other resources consumed by the user in using the packaging and product, etc.

Toxicity: Are the materials used for the solution (including additives and left-over chemicals from production) free of substances of concern that could pose a danger to either human health or the environment?

AFTER-USE

After-use infrastructure: Is the solution designed to fit into existing systems for collecting and reprocessing of the material after it has been used (this includes both the formal and informal sectors)? If yes, how robust are these systems? If not, how feasible and realistic is it to create a new infrastructure or system or add to existing infrastructure? Within what timeline?

Feasibility, yield, and resource demand: Is it technically, economically, and environmentally feasible to keep the material or package in the economy via the intended circular route? Will the material reenter the economy in a reasonably valuable application (not fuel or energy — see p. 126 for further details). What are the associated process losses for the given material circulation route?

Likelihood and consequences of leakage: What is the likelihood of the material or packaging escaping out of human-made systems and into the natural environment? What would be the impacts of this occurring (including consideration of topics such as ecosystem health, biodiversity, and climate change)?

The role of Life Cycle Assessment in upstream innovation

"What is Life Cycle Assessment?"

Life Cycle Assessment (LCA) is a tool for the evaluation of the environmental aspects of a product or service through all defined stages of its life. As such, if implemented well, it can be a valuable tool to determine, as an individual company or for an individual product, what the solution with the lowest environmental impact is for defined metrics (for example, carbon emissions), and at a specific point in time.

"One tool in a set of tools"

Like any tool, however, it has its limitations, which are important to bear in mind when using it:

1. Although LCA is well suited to optimising individual choices in today's system, the solutions it points to will not always lead to the best collective outcomes over time.[42] This means LCA can sometimes lead us to seek short-term benefits at the expense of long-term ones. Take electric vehicles (EVs) as an example. Many would agree that a mobility system supported by EVs and renewable electricity is a more attractive target state to work towards than one perpetually reliant on combustion engines and fossil fuels. However, not all LCAs would support this conclusion. Some would point towards the immediate benefit of improving the efficiencies of petrol cars (minimising impacts in today's system), while not pointing towards the need to innovate to improve EVs for the future (build a system that will work by design).[43]

2. LCA only measures what you can measure and, as such, can ignore the impacts of certain factors that can not yet be measured. LCA can therefore weigh decisions more heavily towards the certain metrics or parts of the system that we can quantify better (for example, carbon emissions) at the expense of other metrics that are harder to measure or impacts that are less well understood (for example, the effect of plastic leakage, or the long-term effects of leachate from landfills).

3. LCA only looks at the part of the system that is defined within the LCA boundaries. As such, it can be tricky to identify systemic impacts, knock-on effects, or capture trends, unless they are accounted for in the set-up of the LCA.

"How LCA can be effectively used to design for the circular economy"

4. LCA is highly dependent on input data and assumptions. There are many known cases where different studies looking at exactly the same question, but with different data sources and assumptions, arrived at entirely different conclusions.

Given these points, it becomes clear that while LCA is a valuable tool to quantify the environmental impact of a solution, it should be viewed as one tool in an integrated set of tools, not as a 'single source of truth'. Rather than simply optimising individually in today's system, we need to envisage the target state we want to achieve — a circular economy, where packaging never becomes waste — and start innovating towards it. The last thing we'd want is to stay stuck in a wasteful, fossil fuel dependent, linear model forever. LCA can be used to support and inform the developments towards the circular economy.

Below are a few examples of how LCA can be used as an effective tool to support your upstream innovation efforts.

1. Use LCA to highlight areas of improvement for a solution. LCA can help identify impact 'hotspots' within a selected strategy and then be used to provide an indication of how effective different strategies are at minimising the impact (for example, use LCA to identify areas within a solution where resource use is particularly high and then use scenario testing to identify ways to address this).

2. Use LCA to investigate the impact of changing external factors. By changing the input parameters of an LCA, you can investigate the impact of external factors that might vary between geographies or with time (for example, changes in the energy mix, development of recycling infrastructure, or deployment of a new technology). This can be a useful way to investigate under which conditions an upstream innovation will perform on par with, or better than, the status quo.

3. Use LCA to compare solutions that are fairly similar. When most parts of the system remain unchanged, LCA is more likely to be able to give a clear answer for the indicator of interest (for example, use LCA to compare the carbon emissions associated with delivering ten individually wrapped, small portions versus one large portion in an otherwise unchanged packaging application).

4. Take extra care when using LCA early in the innovation process. An LCA is most useful once there is reliable input data and clarity on how exactly materials and resources will flow through the system. Hence, it is challenging to use LCA effectively in the very early stages of an innovation process, when there are many unknowns and it is difficult to get proper data. An LCA may provide most insight if used during the later stages of an innovation process (such as during scale-up or when seeking to improve an existing model).

End content...

Abbreviations

PLASTIC (POLYMER) TYPES

EPS Expanded polystyrene
HDPE High-density polyethylene
PBAT Polybutylene adipate terephthalate
PE Polyethylene
PET Polyethylene terephthalate
PHA Polyhydroxyalkanoate
PLA Polylactic acid
PP Polypropylene
PS Polystyrene
PVC Polyvinyl chloride

OTHER

B2B Business-to-business
B2C Business-to-consumer
GHG Greenhouse gas
LCA Life cycle assessment
NGO Non-governmental organisation

RECYCLING ASSOCIATIONS

APR The Association of Plastic Recyclers
EPBP The European PET Bottle Platform
PRE Plastics Recyclers Europe

Case study tags

BUSINESS BENEFITS

Better products
Brand loyalty
Brand reputation
Competitive pricing
Convenience
Cost savings
Customisation
Data
Optimised operations
Superior packaging

ENVIRONMENTAL BENEFITS

Carbon emissions
Compostability
Recyclability
Recycled content
Renewable sourcing
Waste prevention
Other

INNOVATION STATUS

Investment
Partnerships
Scale

Innovations profiled - in order of appearance

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Waitrose & Partners: Eliminating multi-pack films p. 46

Nestlé: Eliminating neck tear-offs p. 46

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About the Ellen MacArthur Foundation

The Ellen MacArthur Foundation, a UK-based charity, develops and promotes the idea of a circular economy in order to tackle some of the biggest challenges of our time, such as plastic pollution, climate change, and the loss of biodiversity. In a circular economy, business models, products, and materials are designed to increase use and reuse, creating an economic system in which nothing becomes waste and everything has value. Increasingly built on renewable energy and materials, a circular economy is distributed, diverse, and inclusive. The Ellen MacArthur Foundation collaborates with, and inspires, businesses, organisations and other key actors to accelerate the transition to a circular economy.

Further information:
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About the Plastics Initiative

Since 2016, the Ellen MacArthur Foundation's New Plastics Economy initiative has rallied businesses and governments behind a positive vision of a circular economy for plastics. Its 2016 and 2017 New Plastics Economy reports captured worldwide headlines, revealing the financial and environmental costs of waste plastic and pollution.

The initiative is supported by Wendy Schmidt as Lead Philanthropic Partner, and the Oak Foundation as a Philanthropic Partner. Amcor, Borealis, The Coca-Cola Company, Danone, L'Oréal, MARS, Nestlé, PepsiCo, Unilever, Veolia, and Walmart are the initiative's Partners.

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