



Bloom Bums

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Sustainable Design Engineering

Defining the Problem

DISPOSABLE NAPPIES



Disposable nappies are **single use** items with no requirement for folding/preparation and no need for washing. Once used, the nappies containing excreta are generally **thrown away** with other household waste. Classified as **municipal waste**, they end up in **landfills**. These nappies are made from **non-biodegradable** material.

Our Future Scenario

It is important to quickly define what setting we are designing this for. Generally, we are designing about 5-10 years in the future. We will hopefully see changes in:

Environmental Policy: Greater emphasis and incentivisation to use biodegradable packaging and synthetic fertilisers

Economic policy: High tax on plastics

Political Policy: Complete ban on single-use plastics

Social Policy: Economic support for parents due to population dip

Technical: Developments in AI and crypto-anchors for greater tracking of materials



SYSTEM ISSUES

3 billion disposable nappies are thrown away each year [3], which all end up in landfill. Disposables take over **300 years** to decompose [4].

Majority of disposable diapers on the market are made from **non-biodegradable** materials that are complicated or **near-impossible** to clean and reuse. Further, laws prohibit nappy materials from being reused.

Nappies are not getting filtered/sorted out of other **municipal waste**.

Currently there is **no large scale** reuse system for **any part** of the nappy.

Takeback service for nappies to be implemented. Uniform design of nappies allows for efficient recycling system to be put in place.

100% compostable nappies to be made. This would be used for fertiliser, as opposed to being used for reuse. Market could be created for compost product from used baby nappies

Separate sorting and cleaning facilities for nappies to be implemented. Auditing processes to ensure nappies are being cleaned properly.

Sufficient cleaning processes of used nappy material to be implemented. Adequate systems for material separations (via mechanical and chemical processing) to extract useful material for reuse. A look at strict government regulations regarding the prohibition of selling used nappy material. This would incentivise producers to invest more into nappy material recovery.

WHAT'S NEEDED: BASED ON INSIGHTS

1 COMPOSTABLE NAPPIES

We must eliminate plastic and all non compostable materials from nappy production for any circular solution. This includes all plastic layers of the nappy: top and back sheets, acquisition layers, and fastening tabs. 100% of the material must definitively prove to return back into nature in a neutral or beneficial way. This means zero nappy waste will end in landfills, and be used in part of a closed loop system.

2 COLLECTION

Offering parents compostable nappy options is only part of the solution. In order to ensure the used product is actually composted, collection and regeneration are critical steps. This can be facilitated through us establishing extensive collection services for consumers.

3 IMPROVED TECHNOLOGY

Funding into research and development for improved sustainable nappy material is essential in order for nappies to be 100% biodegradable. Further, improved mechanical and chemical processes are required to break down nappy components into its constituent material, in order to be composted. Currently, all research is in its pilot stages.

4 SUPPORTIVE STAKEHOLDERS

Currently there are stringent laws on reselling nappy material. This makes it extremely complex to spearhead nappy reuse initiatives. Cities and local governments are motivated to find solutions but must be convinced that sufficient nappy waste treatment facilities exist and appropriate auditing is being expedited.

References

[1] <https://bambonature.co.uk/apps/frequently-asked-questions?faq-section-id=77465&faq-article-id=349293>

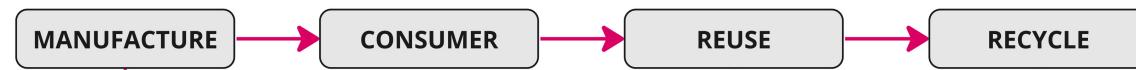
[2] <https://www.charliebanana.com/blog/cloth-diapers-vs-disposable-pros-and-cons/>

[3] <https://www.nappicycle.co.uk/>

[4] <https://www.guplanet.com/en/12-baby-diapers-and-wipes>

Solution Implementation

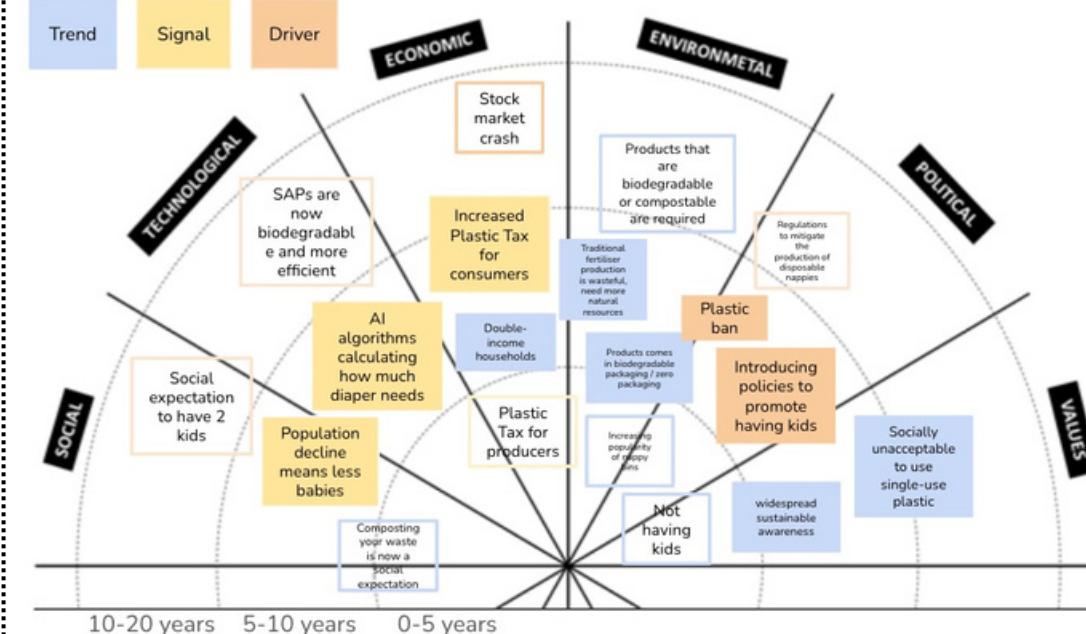
CIRCULARITY ANALYSIS



- loop is closed entirely - 100% of virgin materials are taken from within the circle
- A mixture of bamboo fibre, hemp blends and plant-based bio-plastic coating produces a fully recyclable outer shell. Shell is designed for longevity and can withstand consistent machine wash
- QR code at the bottom of liner packaging and on outer shell help users to quickly restock when needed
 - shell can be easily identified and sorted for recycling
- discounted price to encourage shell returns
- all components are compostable with a dedicated composting plant

FUTURE SCENARIO

TIME HORIZON: 5-10 years



Influenced by:

- significant increase in the biodegradable market
- implementation of a plastic ban
- consumers' raising sustainability awareness

Key elements:

- Social:** worsening of the aging population leads to decreasing birth rate
- Technical:** advanced AI tech to predict diaper needs
- Economic:** large increase in plastic tax
- Environmental:** widespread biodegradable packaging; synthetic fertiliser production is becoming obsolete
- Political:** single-use plastic ban

FEASIBILITY

Key factors that affect overall feasibility:

- CONSUMER LOYALTY**
 - subscription service relies heavily on a loyal consumer base. By making our product available in-store, users can try a pack first with no pressure of committing to the brand. Incentivising long-term purchases can be done gradually
- INITIAL DEMAND**
 - It is expected that BloomBums will have high initial interest, as the current market lacks an advanced reusable nappy solution
- COMPOST AVAILABILITY**
 - a large part of our closed-loop system relies on consistent sources of compost from consumers. This can be achieved by implementing widespread compost bin collection; used liners can be thrown in the same bag as food waste to be collected the same as normal trash collections.

INNOVATION



Integrating features from existing disposable nappies as well as reusable nappies, we identified the **market gap** and created a product that merges the convenience of disposable nappies with the demand for sustainability



Tackles the 2 main issues users have with using existing reusable nappies: time and effort



Product is available physically and online, reducing the necessity of brand loyalty from the beginning. Users can try a pack first and loyalty can be built over time



Biodegradable material incorporates the use of hemp blend, replaces traditional nappy adhesives that are non-recyclable



Adjustable waistband and liner reduce the number of shell sizes needed. Reduces repurchasing needs related to outgrowing the shell

System Diagram

Our Proposal

We intend for the proposed intervention to be implemented in 5-10 years.

Firstly, the consumer goes on the BloomBums app and subscribes to the nappy linen weekly package.

An initial two nappy shells are provided on the first delivery. A top-up of shells is provided if user requests for one on the app.

In the weekly delivery, a box of 100 linens is delivered to the mother with 4 linen bags.

Dirty linens are collected in their compostable bags in this same delivery.

Stakeholder: Bio Plant



Trucks initially get supply from distribution service, and simultaneously distribute clean nappies and receive dirty ones. Trucks deliver dirty nappies to cleaning facility before being parked back at distribution service.

BloomBums greatly cut costs and save energy by doing delivery and collection at the same time

Stakeholder: Transport

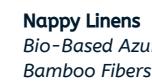


SOURCE



Tree Farms

MATERIAL SYNTHESIS



Nappy Linens
Bio-Based AzuraGel SAP, Wood Pulp, Bamboo Fibers

Linen Bags
Bamboo Fibers
Nappy Shell
Bamboo Fibers, Hemp Fibers

MANUFACTURING

Nappy Shell
Traditional blending, spinning, and weaving techniques of fibres is adopted to construct the textile, followed by the material being cut and sewn to form the nappy.

Linen Bags
Extruded then cut

Nappy Linens
Fabric production, Trimmed to length

PACKAGE

SUPPLIABLE

- Linens are packaged in boxes of 100
- Recycling guidelines clearly stated
- Each linen box comes with 4 linen bags

STORAGE

DISTRIBUTION READY

Stakeholder: Transport

DISTRIBUTION SERVICE

Users have already paid via subscription service

Packaging: The nappy parts are delivered to users in biodegradable cardboard boxes and are easily transported. Truck network is split by borough.

OPERATIVE DELIVERY

The delivery and collection system occur at the same time

Location of users dictates distribution flow
2 nappy shells are provided on initial delivery
Subsequent nappy shells are only provided if consumer purchases on website
100 linens + 4 linen bags provided to each user per delivery

Trucks used

RECEIVE COLLECTION

Consumer receives collection every week

STORAGE

Mother stores nappy packaging in cabinet

TRANSPORTATION

Trucks used

BloomBums greatly cut costs and save energy by doing delivery and collection at the same time

Stakeholder: Transport

KEY



Principles



Values



Infrastructure



Data

Resource State



Stakeholders:

Supplier & Manufacturer

User

Transport

Cleaning and Sorting Facility

Bio Plant

CLEANING

SEPERATION

COMPOST

TRANSPORTATION

COLLECTION SERVICE

Stakeholder: Transport

OBSOLETE

OBSOLETE

DIRECT LINENS IN BAG

Stakeholder: Mother and Baby (User)

OBSOLETE

REUSABLE

REMOVE AND REPLACE DIRTY LINEN

Stakeholder: Mother and Baby (User)

REUSABLE

WASH DIRTY SHELL

CHECK FOR DIRTY SHELL

Stakeholder: Mother and Baby (User)

CHECK FOR DIRTY NAPPY

STORAGE

Stakeholder: Mother and Baby (User)

Infrastructure

Zain Ahmad

A look into the functionality of BloomBum's infrastructure system. Each bullet point in each section is ordered chronologically in the system.

LOCATION

sites at different geographical locations

- Nappy shells, waste bins and bin liners are distributed from distribution centres.
- They are brought home, to be used at home or in public handicap toilets .
- Nappy shells are brought to a centralised composting centre (Yara) for the city.
- Nappy linens are dropped off at participating vendors (grocery stores such as Tescos) or given directly to the collection service.

- A washing and sorting facility sorts and chemically processes the used material to separate it into its constituent properties for reuse.
- Tree farms (AzuraGel, Eco Planet Bamboo, New Forests) use our fertiliser to grow trees.

POSITION

particular places found at certain locations

- Our nappies can be bought from our application, whereby the customer signs up for the weekly subscription, in the "signup" section.
- Replacement shells can be bought in the "buy shells" section of the application

- At home, they tend to be changed on a changing mat for sanitary purposes. In public they are changed on the foldable platforms in handicap bathrooms.
- Nappy linens are left in compostable bags and can be placed outside the door or remain in the bin until pickup.
- Drop-off points for nappy shells are inside participating vendors.

CONSUMABLES

subsequent resource flows that are input or output to the system

- Rain water is collected and purified at the washing facility to reduce water consumption.
- AzuraGel, Eco Planet Bamboo, and New Forests harvest trees (input) for the production of nappies, however use our fertiliser as part of the resource flow.

- Phosphorus is extracted from the excreta to be used outside the flow (output)
- Compostable linen bins (input) are provided to the customer to increase ease of use for the user to store used nappy linens.

MEANS OF CAPACITY

Objects (movable and fixed) that are defined by the number or volume of resources they can hold

- Nappy shells in the initial delivery comes in a pack of 2.
- A box of 100 linens come with each delivery
- 4 compostable linen bags come with each delivery
- Each linen bag holds 25 linens.

- A baby uses 1 nappy linen to nappy shell at a time. Approximately use 8-10 linens in a day

MEANS OF TRANSPORTATION

Vehicles used by actors to relocate resources between different locations

- The nappy pickup and collection driver will use a lorry to transport the linens from the distribution centre and to the sorting facility.

- The raw materials are distributed via a rail system, which is more energy efficient than trucks, in an optimised route system to minimise distances travelled.

MEANS OF COMMUNICATION

Media to communicate with or share data between actors

- Nappy linens undergo a thorough washing process before being composted. Nappy linen bags are thoroughly washed before reuse.
- The excreta is not thrown out, but sent to a bio-plant facility where Phosphorus extraction occurs (output from cycle). This process involves algae and is sustainable due to algae's property of respiration.

- Biodegradable nappy shells are thoroughly washed before being chemically processed to remove the bamboo and hemp from each other. Each of these 3 materials are restored for reuse.
- Tree farms development is aided with the use of the compost.
- Traditional blending, spinning, and weaving techniques of fibres is adopted to construct the textile, followed by the material being cut and sewn to form the nappy.

MEANS OF PROCESSING

Equipments and facilities to process resources

- Customers can subscribe to weekly nappy linen purchases on the app.
- The app is used to navigate and track purchases
- Media on the packaging of the nappy shells clearly indicate that they can be returned to drop-off points once user intends to stop using it (if a pickup delivery is in too long of a time).

- Packaging also clearly indicates a tutorial of how to use the linen bag and linens. It would also stipulate the pickup-dirty-liners process. The liners pickup process schedule would be clearly indicated on the company website, and it would be based on area code.
- Advertisements will emphasise sustainability aspects of the product, including the compostability features of the materials.

Infrastructure

Zain Ahmad

A look into BloomBum's major interventions in the infrastructure system

COMPOSTABLE LINEN BAG



The compostable linen bags come in 4 and are provided for free with each delivery of the linens. Each bag has a capacity of 25 linens. The bag, including the seal are made from bamboo fibres.

BLOOMBUM'S APP

HOME PAGE

The application allows the customer to navigate their purchases and organise their incoming deliveries.

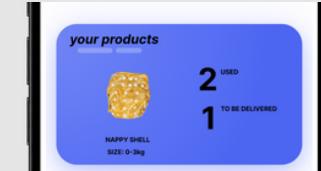
The product is selected, alongside a tracker indicating how many linens have been used. There is also clear indication for how many incoming linens are to be delivered

Importantly, there is a panel for notifications reminding the user when the next delivery will commence.

There is also a sustainability panel, informing the user how many days they have been using BloomBums.



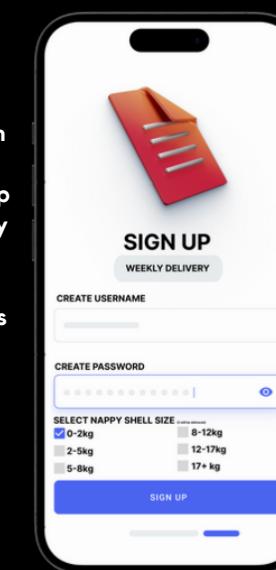
Alternatively, the nappy shell can be selected. The current nappy shell size is tracked, alongside how many are used and to be delivered.



There is a panel giving clear accessibility to the user to prompt another purchase. "Payment" prompts the user to do so, while "History" tracks all the previous purchases, and "Refund" allows the user to return damaged products.

SIGN UP PAGE

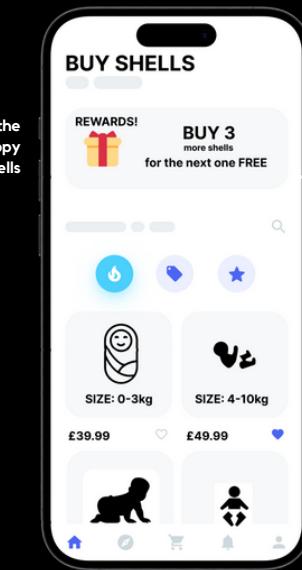
The signup page is the initial page the user is presented with. It allows the user to sign up for the weekly linen delivery package



Crucially, the user can only use the application if signed up to the weekly delivery service. As all consumption of BloomBums products is based on this.

TOP-UP SHELLS PAGE

If the user requires a top-up of nappy shells, due to the baby outgrowing its size, this page allows the user to buy a new nappy shell.



The nappy shells bought are categorised by size. There are 6 sizes available.

User Journey

Sarah Gu

Key

Macro behaviour

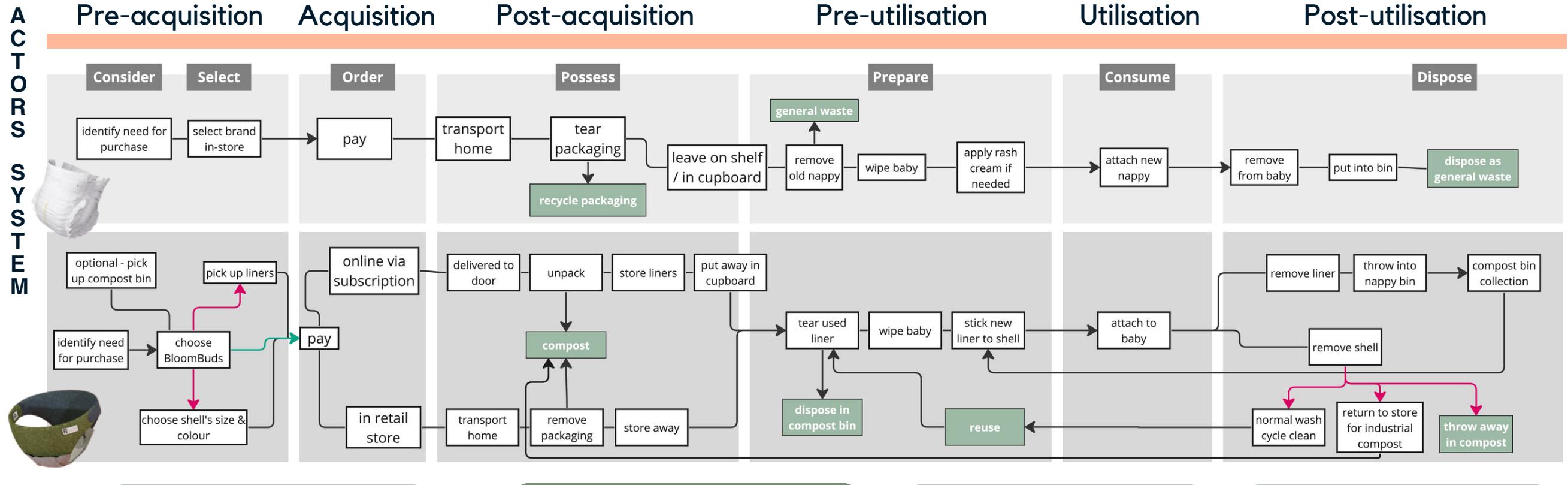
Meso behaviour

Ultimate behaviour

Forward path
Return path

Forking path

Actors and stakeholders involved in the product flow, from material sourcing to waste disposal

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Motivation

to explore convenient, cost-effective brands with natural materials

availability in major stores

promote product's convenience on packaging

- anticipation to try new product
- increased environmental awareness
- clear instructions and responsive customer support
- encourage users to promote on social media

parents appreciate convenience and practicality of adjustable design

- make compost properties clear on packaging
- no change to disposable diaper habits

motivated to return shells for future discounts

- all physical stores will allow return added return envelope with subscription packs
- encourage proper waste disposal

Ability

availability in major stores

promote product's convenience on packaging

Prompts



Anxious



Satisfied



Relieved

INTENTS

- create informative marketing content; chose a coral and green colour scheme to display clear sustainable strategies

- simple subscription website interface; reduce subscription pricing

- minimalistic packaging instructions, obvious unpacking signs (perforations, big, coloured text size).

- create informative marketing content; chose coral and green colour scheme to display clear sustainable strategies

- adjustable design to reduce number of sizes. Separation of liner and shell means the shell can be washed in combination with normal clothes

- obvious QR code on nappy to promote subscription service. Designed liner with strip underneath to be so that it can be removed with minimal effort

Stakeholder flow

Raw material suppliers

Effort: source sustainable materials, ensure material longevity
Incentives: increasing market demand for eco-friendly materials

Manufacturer & Distribution

Effort: quality control, implement green production, efficient transportation
Incentives: eco-efficient practices and streamlined logistics reduce production cost, presents positive brand image

Consumers

Effort: engage feedback and responsibility dispose waste
Incentives: contribute to brand sustainability

Government / Policy makers

Effort: ensure safety compliance
Incentives: protect public health, further strategy plan

Investors

Effort: cost-conscious ethical practices
Incentives: long-term profitability

Data

Sarah Gu

DATA SYSTEMS COMPARISON

	Pampers / M&S	BloomBums
CLAIMS	<p>promotes its FSC-certified materials, however new wood pulp is needed for all nappies due to legislation and hygiene concerns</p>	<p>part of compost is repurposed as tree fertiliser, creating a closed resource loop for long-term material growth</p>
RESOURCE INFO	<p>4000-6000 nappies needed until baby is potty trained. All virgin materials (except polyester used for outer layer); recycled PE can only be used up to 5 times</p>	<p>shell is designed to last 2-3 months on average; a maximum of 40 shell is needed until baby becomes potty trained. Zero plastic material used in materials</p>
CUSTOMER DATA	<p>97% of parents do not recycle nappies 85% have had concerns about the volume of their nappies waste only 7.1% have a separate nappies bin</p>	<p>By implementing widespread compost waste collection and easy liner bin usage, landfill waste is minimised with no negative impact on user experience. Incentivising used shell returns promotes material circularity. Returned shells help track usage patterns</p>
INSTRUCTIONS	<p>standard usage instructions, no emphasis on environmental or disposal considerations. Focus on physical considerations (e.g. hypo-allergic properties)</p>	<p>large font size and minimal words to make instructions easy to read. Clear step-by-step manual. Designed to look similar to disposal nappies - familiar usage methods. QR code on shell/liner box for easier repurchase</p>
IMPACT DATA	<ul style="list-style-type: none"> target of 50% less emissions by 2030 Accusation of failing to act upon a 2020 shareholder rebellion, calling to end its supply chain deforestation 	<ul style="list-style-type: none"> 87 billion USD global market share ranked top 25 most common plastic items found - reduced to 0 as plastic is no longer needed

FRONT END | BACK END

IT & App Development	Back stage employee action	Backstage worker action	Logistics system
Touch Points			
Physical evidence & marketing			
Physical evidence / user action			
Front stage employee action			

INSIGHTS

- From analysing the ecological impacts of traditional diapers in comparison to BloomBums, it is noticed that by closing the supply chain loop, **user-product interaction time** is greatly extended, and the overall **carbon footprint** associated with frequent repurchasing is minimised
- BloomBums' approach encourages users to naturally develop a **composting habit**, which aligns with household food waste practices and ultimately reduces the long-term nappies **cost**
- Incentivising shell returns encourages users to participate in **green practices**
- User experience with the actual nappy utilisation remains consistent, and **minimal extra effort** is required from the parent

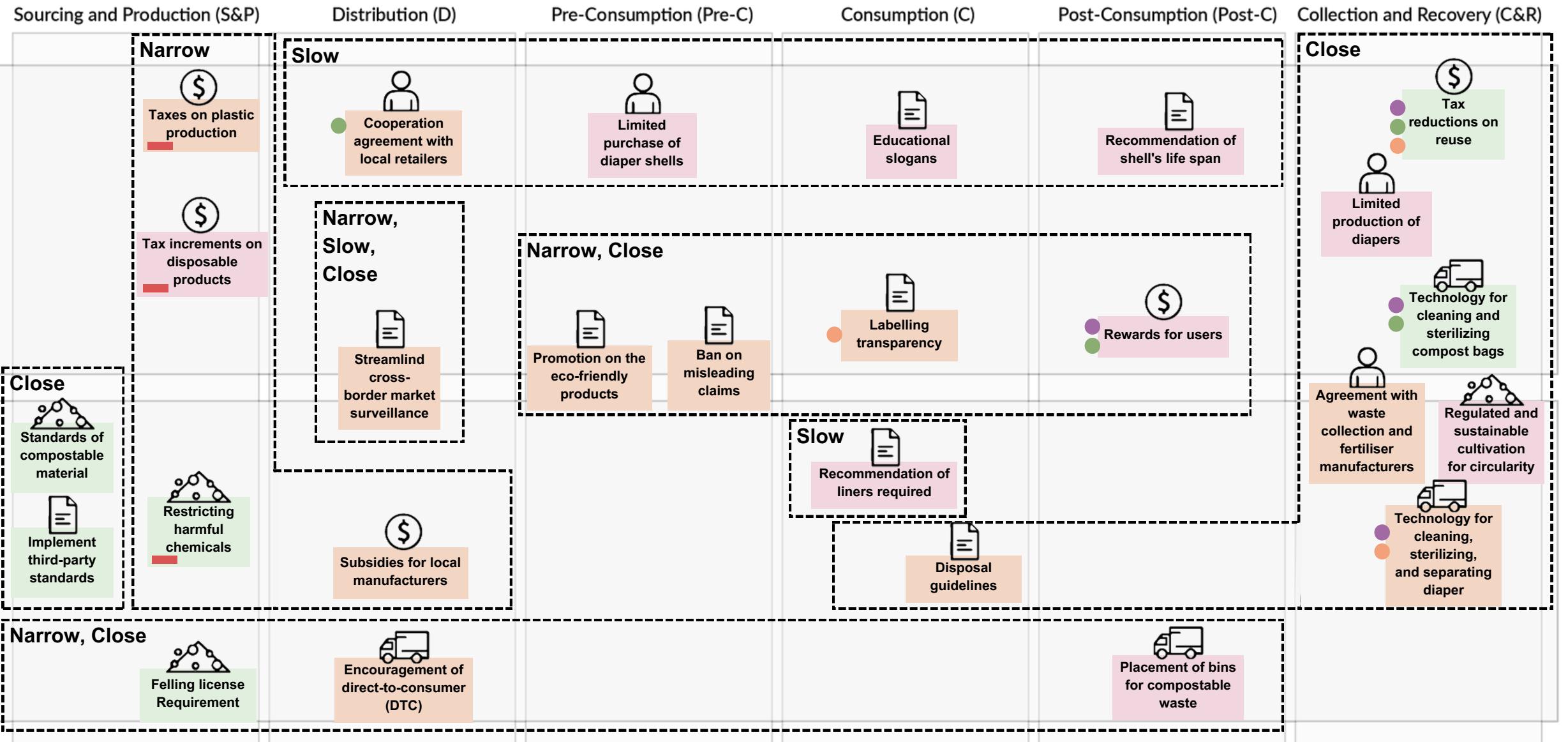
Principles

Warren Tie

Conditions

1. Climate change accelerates "**BloomBums** diaper system"
2. Severe weather events can disrupt collection & supply, affecting sourcing and production of diapers.
3. After COVID-19, parents are now more concerned about quality of children's hygiene products.

Legislation



Standards

1. Standards of compostable & biodegradable materials
EU: EN 14995, EN 13432 and EN 16640. US: ASTM D6400. Worldwide: ISO 18606 and ISO 14855.
2. Standards of third parties
Examples: EU Ecolabel, FSC Certification, Cradle to Cradle Certified™, PEFC, etc.
3. Standards of reused materials (In developing): Global Recycled Standard (GRS), ISO 14021, etc.
4. Standards of reused compost bags (Idea): Reused bag must pass durability performance & hygiene tests.

Agreements

With local retailers

Collaborate with local retailers to stock **BloomBums** products in pharmacies, supermarkets, and grocery stores. Sellers should implement the following measures and policies:

1. Prominently display and advertise **BloomBums** nappies on shelves.
2. Implement a limit on the number of shells per transaction.
3. Collect and store compost bags returned by customers, offering discounts on liners.
4. Provide trade-ins for shells.

With subscription platforms

Collaborate with platforms like Amazon to introduce an exclusive **BloomBums** subscription plan featuring:

1. Delivered through limited DTC delivery, at a more affordable rate than offline purchases.
2. The plan is entirely flexible, allowing easy cancellation with a refund option at any time.
3. Subscribers enjoy free delivery, with support for paid next-day delivery during emergencies.

With fertiliser manufacturer

Establish a long-term partnership with fertilizer manufacturing companies, such as Yara. In this collaboration, **BloomBums** sells the collected compostable and biodegradable waste to these companies at an economical rate. **BloomBums** earns a profit from the diaper waste, while the fertilizer company sells the converted commercial fertilizer to plantations, creating a mutually beneficial and sustainable circular process.

Principles

Warren Tie

Policy	Descriptor	Mat.	Cat.
Implement third-party standards	Incorporation of established and recognized guidelines or criteria such as FSC and PEFC into the sourcing and production processes of diapers. (EU, GPP; GOV.UK, DEFRA)	E*	VI
Felling license Requirement	Adhering to regulations related to the sourcing of raw materials, particularly wood pulp and bamboo, and ensuring that manufacturing facilities comply with local land use planning regulations. (GOV.UK, FC)	E	DR
Restricting harmful chemicals	Restriction on the presence of chemicals in hygiene products to improve its environmental performance along its life cycle. (EU, REACH)	E	DR
Tax reductions on reuse	Reduction on taxes, e.g. VAT on reuse activities that keep products in use. (Sweden, Further reduced VAT; EU, Right to Repair Briefing)	E*	EI
Standards of compostable material	Clarify compostable and biodegradable materials standards, and sustainable companies must manufacture products under the standards, such as EN 13432 and ISO 18606. (CEN; ISO)	E	DR, EII
Technology for cleaning and sterilizing compost bags	Reusing compost bags is vital for cutting single-use plastic waste. Technological advances and a strong sustainability commitment are making these practices more prevalent and feasible.	E	DR
Taxes on plastic production	The EU and the UK established some tax policies aimed primarily at plastic packaging, but there should be a growing number of plastic products that should be taxed. (EU; GOV.UK, HMRC)	D	EI
Subsidies for local manufacturers	Some EU countries have implemented broader environmental initiatives and incentives, while there should be subsidies exclusively designed for local manufacturing to reduce pollution from cross-border transportation.	D	EI
Streamline cross-border market surveillance	Coordination and support for cross-border market surveillance practices in the EU & assurance of cross-sectoral coordination between different Administrative Cooperation Groups. (EU, SSCT)	D	EII, DR
Encouragement of direct-to-consumer (DTC)	Diapers are delivered directly from suppliers to consumers, which can save consumers' time and reduce traffic pollution that may be generated by consumers traveling to the shop.	D	EII
Ban on misleading claims	The CMA is investigating descriptions and labels used to promote products and services claiming to be 'eco-friendly', and whether they could mislead consumers. (GOV.UK, CMA)	D	DR
Promotion on the eco-friendly products	Many companies recognize the importance of sustainability, and the promotion of eco-friendly diapers has become increasingly common in pharmacies and shops.	D	EII, VI
Labelling transparency	Consumers must be provided with information at the point of sale about reused materials as well as information relevant to health, including hygiene standards. (EU, ESPR; EU, SSCT)	D	EII, DR
Disposal guidelines	Many diapers already have labels such as 'Don't flush it' and 'Dispose of with household waste' on their packaging, but new labels such as 'dispose of in a compost bins' need to be widely used.	D	EII
Cooperation agreement with local retailers	Diapers should be available not just in pharmacies but also in grocery stores such as Tesco for broader accessibility. And policies such as purchase restrictions should be adhered to and enforced by retailers.	D	EI
Agreement with waste collection and fertiliser manufacturers	Contracting with fertiliser manufacturers for the supply of compostable diapers for long-term profitability, and partnering with and learning from waste collections. (e.g. P&G with Veolia)	D	EI
Technology for cleaning, sterilizing, and separating diaper	There are technologies designed to address this for sustainable disposal methods, but challenges remain in terms of cost-effectiveness and ensuring that the recovered materials meet quality standards for reuse.	D	DR
Digital product passport	Introduction of digital product passports enabling products to be tagged, identified and linked to data relevant to their circularity & sustainability. (EU, ESPR; EU, SSCT)	D	DR, EII

Policy	Descriptor	Mat.	Cat.
Tax increments on disposable products	The goal of implementing taxes is to discourage the production, purchase and use of disposable products that are unfriendly to the environment.	I	EI
Limited purchase of diaper shells	The limitation on shell purchase is intended to encourage reuse of shells to a certain extent and to avoid over-purchasing by consumers.	I	DR, EII
Recommendation of liners required	The maximum number of liners to be used by a baby per week is calculated for the parents according to the different ages, body types, sizes and habits of the babies.	I	VI, EII
Educational slogans	Educational slogans about the positive environmental impact of compostable diapers and the environmental problems should appear more often on packaging.	I	EII
Recommendation of shell's life span	Labelling the recommended number of times the diaper shell should be used on the packaging can reduce the amount of shell used and also avoids hygiene issues that may arise from using a shell for too long.	I	VI, EII
Placement of bins for compostable waste	The government and the waste organizations place bins for the exclusive storage of compostable waste outside houses more widely, thus reducing part of the sorting process and increasing efficiency in the circularity.	I	DR
Rewards for users	Provides discounts on liners for customers returning compost bags and offers reduced prices on shells through trade-ins.	I	EI
Limited production of diapers	Align diaper production with tree and bamboo planting to prevent excessive cutting. Restricting production limits market availability, promoting reuse of diaper shells.	I	DR
Regulated and sustainable cultivation for circularity	Sustainably manage tree and bamboo plantations for diaper production by harmonizing harvesting with natural growth cycles to maintain circularity.	I	DR

Maturity (Mat.):

E:Established

(E*:Established in one or more EU country only); D: Development; I: Idea.

Policy mechanism category (Cat.):

DR: Direct regulation; EI: Economic instrument;

VI: Voluntary instrument; EII: Education and

information initiative.

Limitations

In the established and developing legislation, there are still some areas that are not sufficiently refined and fail to align with the circular system of **BloomBums**.

Some of these include:

- 1.The government has yet to provide tax reduction for a broader range of reused products, and there is a lack of explicit definitions for such products.
- 2.Currently, plastic taxes are primarily imposed on packaging (such as GOV.UK). This means the government's resistance to the plastic products is not sufficiently robust and effective.
- 3.Most households still only have two bins outside—general waste and recyclable waste—with no specific bin for compostable waste.
- 4.There is currently no taxation on the production and use of disposable items, and their convenience continues to attract significant consumer use.
- 5.Some countries, such as Brazil, have inadequate laws regarding the cutting down of trees. The misuse of natural resources contradicts the principles of sustainable development.

How idea legislation helps BloomBums system

- 1.By restructuring taxation, funds collected from disposable products can be redirected towards tax reductions for reusable items. This not only promotes the use of reusable products and reduces disposable consumption but also alleviates government financial pressures.
- 2.Placing compost bins outside houses helps provide compostable waste directly to fertilizer manufacturers, reducing the time and effort expended in the sorting process.
- 3.Achieving **BloomBums** circular system involves precise and strict regulations on the logging cycles in plantations and the production quantities of diapers.
- 4.Transparent labeling fosters trust among customers. Through labels, customers can access information about diaper composition, adherence to hygiene standards, and environmental impact, thereby enhancing customer loyalty and environmental awareness.

Values

Alex Li

Our Business Model

As discussed before, the **main issues** for our users are **time constraints** to remove waste, and also **incapability of using reusable diapers due to those constraints**. The *BloomBums* business model's main **value proposition** is to collect waste directly from our customers, simultaneously capturing the value from this waste as **compost** to create fertiliser.

Value Proposition

BloomBums focuses on bringing a **stress-free experience** for our users. By offering a **compostable material collection service** and a **delivery service**, we can **remove waste** for our users and **deliver straight to their doorstep**. By also selling in store, this **allows access** to our products at all times. By removing compost waste, we also can also sell the waste to create **fertiliser to grow more materials for production**.

Value Creation

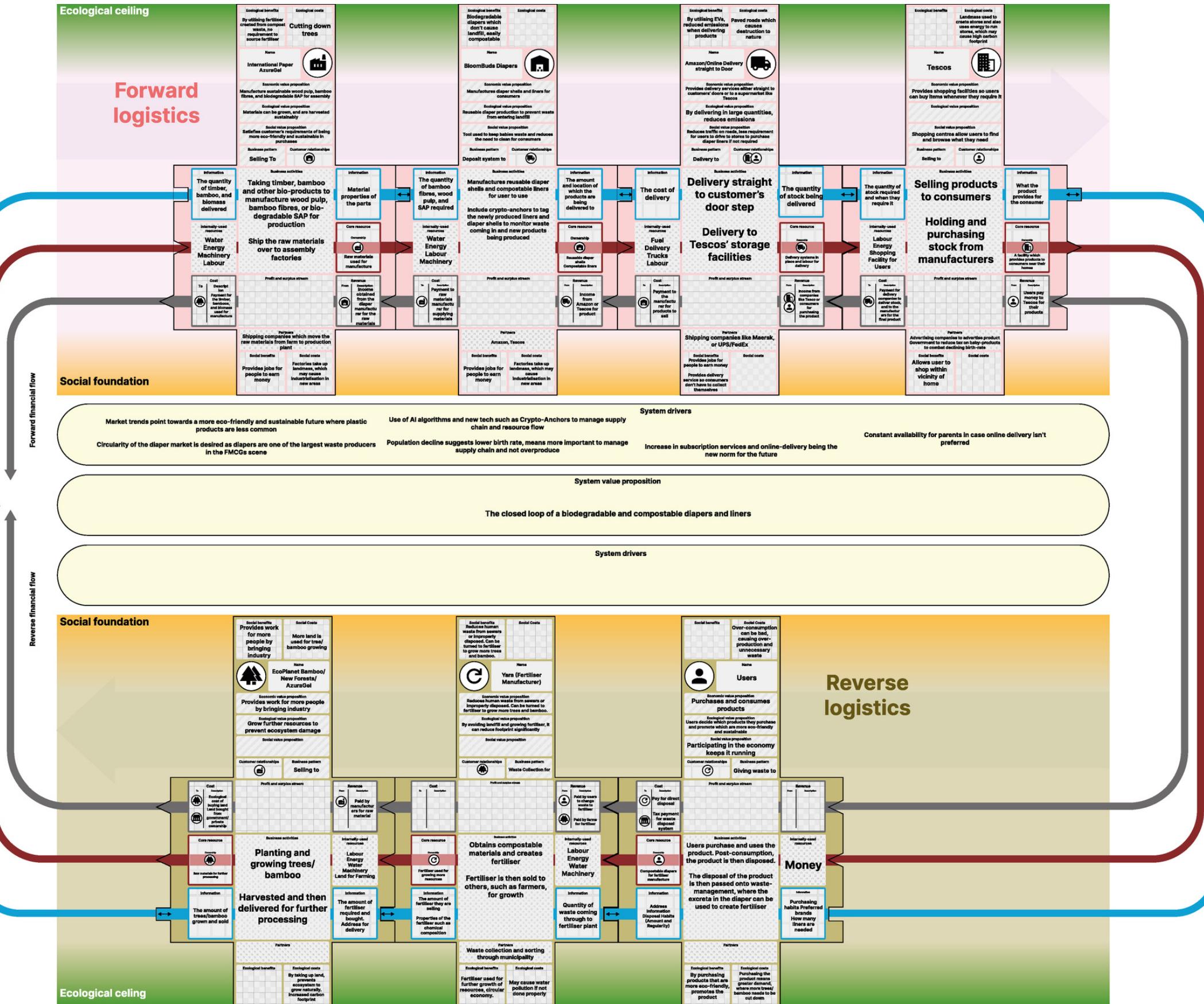
To **create value**, we utilise **various biodegradable versions** of materials **used in diaper lining** now to **create single-use liner** for a **reusable diaper**. Our **modular diaper** can reduce the waste produced, and the **shell can be reused and traded in** when it **gets old or worn out**, to be **composted too**. The **waste collected** can also generate **revenue** for *BloomBums* when sold to fertiliser manufacturers.

Value Delivery

BloomBums ensure to keep **customer relationships positive** and **constant** through **multiple touchpoints**, from regular deliveries to trade-ins in store for old and worn shells, **it is important to keep a loyal customer base**. It is also important to keep a constant relationship with the fertiliser manufacturers.

Value Capture

The largest cost inherent of this business model **is the manpower costs and manufacturing costs** for our product, specifically **cost of delivering and collecting the waste**. The current revenue streams are a **subscription service** to collect compostable waste or liner/shell purchases in store.



Values

Alex Li

	Revenue/Benefits: What are the positive impacts of the system?	Costs: What are the negative impacts of the system?	Cost Mitigation: How can the negative effects be mitigated?
Finances	<ul style="list-style-type: none"> Captures and delivers value at each step of the product life-cycle Reduces cost for manufacturers to source the fertiliser Reduced costs for users if providing compostable material 	<ul style="list-style-type: none"> Majority of costs are paid by our partners, as opposed to the user, may cause dissatisfaction amongst producers and manufacturers Need to pay external waste treatment facilities to create fertiliser 	<ul style="list-style-type: none"> Government support can help mitigate costs to our partners We can either create our own composting scheme or generate a long-term deal for reduced costs
Ecology	<ul style="list-style-type: none"> Prevents single-use diapers from reaching landfill Long-term circularity, as diapers and other composted waste are all collected for production Continues growing the amount of material harvested, doesn't disrupt habitats 	<ul style="list-style-type: none"> Initial short-term investment of materials, as it takes a long time for trees and other materials to grow Land use to grow our material Fertiliser production can cause water pollution if done incorrectly Dependency on user habits to dispose waste correctly, may cause landfill waste 	<ul style="list-style-type: none"> Grow a surplus of material to offset the initial investment Use existing tree growers rather than finding new plots of land Ensure policies and constant prevention measures are in place to stop pollution Introduce incentivisation for users to dispose waste correctly
Society	<ul style="list-style-type: none"> Reduces the stress on parents to remove compost waste Helps society by responsibly sourcing material through our fertiliser, preventing high carbon emissions Ease of mind providing trade-ins for users and reduced prices as incentivisation for responsibly disposal of waste. 	<ul style="list-style-type: none"> Creates another subscription model for users to adopt, which can cause stress 	<ul style="list-style-type: none"> Allow anytime cancellations and monthly reminders about subscription

Assessment

To assess the **business model critically**, it is a very **ambitious model** which have **lots of uncertain variables**. Collecting compost waste **expands our revenue streams** to **manufacture fertiliser**, which will **reduce costs for us in the long-term** when being sold to farms and **creating a B2B relationship there**. At the same time, theres a **lot of dependency** on a **constant demand for fertiliser** from our partners. Moreover, the **largest dependency is our users disposing their waste correctly**. If the reusable **compost bags are not returned**, the bags can **contribute to landfill further** and not biodegrade properly.

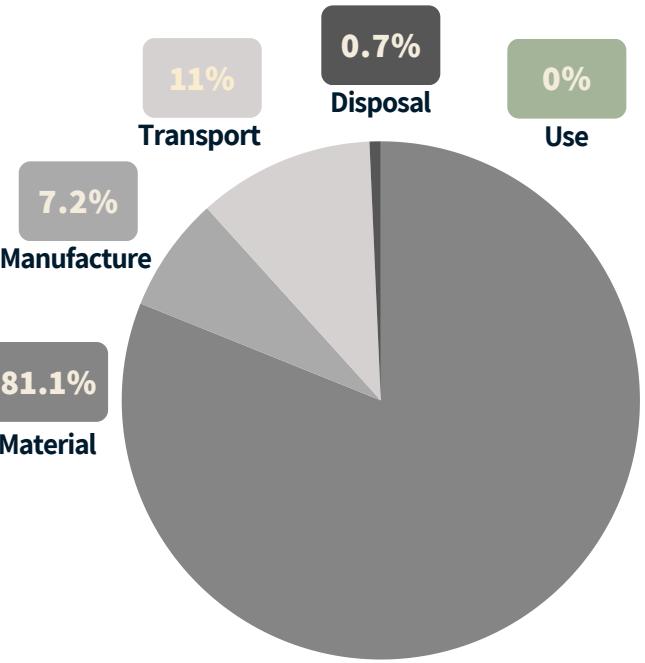
Insights

After considering the costs and mitigation methods, the **business model brings many insights** to creating one. The **biggest disadvantage** of this business model is the **increased chance of failures** between deliveries and dependency on our customers. As our goal is to **completely remove diaper waste from landfill**, our users may dispose the compost bags to landfill instead, which destroys our goal. To ensure success, the **business model should have a lesser reliance on the users' habits**. This can be **mitigated through introducing incentivisation** for correct disposal, such as discounts.

Environmental Impact

Eco Audit tool within Granta Edupack was used to analyse the environmental impact of the products and system.

BloomBums Embodied Energy



Assumption

- After conducting an Eco Audit analysis on a single **BloomBums** diaper, it is evident that the **material, manufacture, and transport** phases collectively account for over **99%** of the system's energy consumption. Since diaper usage does not consume energy, and the proportion of disposal is too minimal, these two aspects will not be considered.
- Granta Edupack does not provide specific methods regarding compost-related end-of-life, and therefore, **all uniformly treated as landfill** in the analysis.

Materials

Traditional disposable diaper



Shell: Polyethylene(PE) -- 10g
Fluff pulp: Wood pulp -- 16g
SAP: Sodium polyacrylate* -- 3g
Liner: Polypropylene(PP) -- 5g

BloomBums

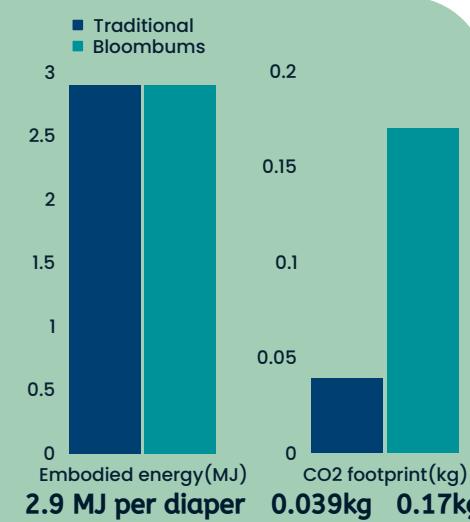


Shell: Hemp & Bamboo fibre -- 100g
Fluff pulp: Wood pulp -- 16g
SAP: AzuraGel™ -- 3g
Liner: Bamboo fibre -- 5g

Intervention:

Utilizing a blend of hemp and bamboo fibers to manufacture reusable shells instead of PE, as both hemp and bamboo are natural and compostable materials. Hemp fiber enhances shell durability, while bamboo fiber improves softness. Substituting AzuraGel™ Superabsorbent Biopolymers for sodium polyacrylate, as AzuraGel™ is 100% biobased, non-toxic, and biodegradable. Replacing the PP film in liner with bamboo fiber enables direct composting after use. Due to the reusability of **BloomBums'** shell, higher standards and more filling are needed to ensure its durability. Despite increasing the mass of the shell to 100g, the energy consumption remains unchanged; the CO₂ footprint increases undoubtedly. In the long run, by reusing our products, the energy consumed and CO₂ released will be significantly lower than that of traditional disposable diapers, alleviating environmental impact.

*no SAPs material in Granta Edupack



Why We Choose Bamboo?
According to BBC Science Focus, bamboo is the fastest growing plant on the planet*. Because of this, growing bamboo is incredibly low maintenance and bamboo has developed a reputation as one of the most eco-friendly and sustainable materials in the world.

*<https://www.sciencefocus.com/nature/speed-bamboo-grow>

Manufacture

Traditional disposable diaper

Shell: Polymer extrusion

Fluff pulp: Kraft pulping*

SAP: Polymerization*

Liner: Polymer extrusion

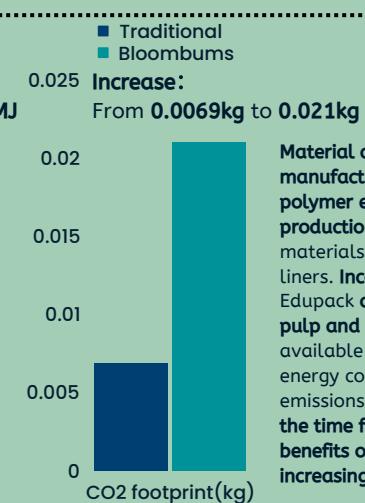
BloomBums

Shell: Fabric production

Fluff pulp: Kraft pulping*

SAP: Fermentation-based bioprocess*

Liner: Fabric production



Material changes alter the manufacturing process, shifting from polymer extrusion to fabric production by replacing polymer materials with fibers in shells and liners. Incomplete methods in Granta Edupack complicates quantifying fluff pulp and SAP production. Notably, available data shows increased energy consumption and carbon emissions per diaper. But if we extend the time frame, the environmental benefits of BloomBums will become increasingly evident.

*no kraft pulping, polymerization and fermentation processes in Granta Edupack

Transport

Traditional disposable diaper

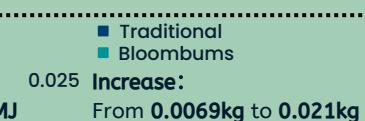
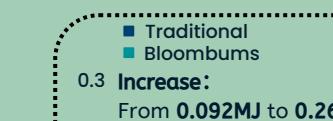


Made in UK

BloomBums



Made in China



The increased transport pollution can be gradually offset through the continuous operation of our circular system

Analysis & Intervention:

In order to use the Eco Audit, we need some assumptions: 1. Users are in London. 2. The distance from Manchester to London is 263 km and diapers are transported by 14-ton trucks. 3. The distance from Shenzhen to London is 18,210 km by cargo ship. As per the GOV.UK Environment Agency report, most UK disposable nappies are made locally, like at the Pampers factory in Manchester, ensuring economic viability. Since transportation contributes only 11% to total energy consumption, producing in China and shipping to the UK cuts costs. This approach allocates more funds for enhanced trade-in programs, high-quality diapers, and circularity expenses, favoring environmental protection. Local bamboo sourcing in Asia reduces transport pollution, and introducing BloomBums in China, the largest consumer of diapers, significantly supports global environmental efforts.

Estimated energy savings

Time Frame: 1 year

Traditional disposable diaper used in UK: 3 billion

BloomBums Shell can be reused for at least 1 month

So Max number of BloomBums Shell used in UK:

18 million

Min number of BloomBums Shell saved in UK:

2.982 billion

Combined with the data obtained from the Eco Audit, the calculation results indicate:

2.63 billion MJ Energy Saved per year
which can power the entire UK for one day*

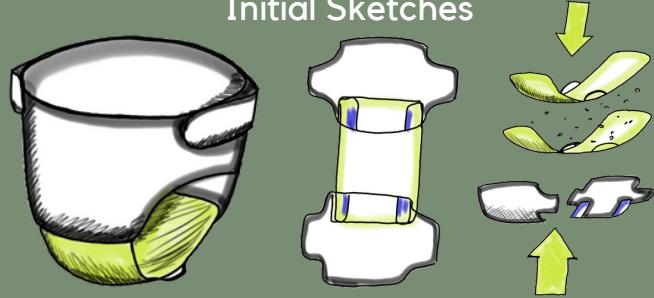
*<https://www.statista.com/statistics/322874/electricity-consumption-from-all-electricity-suppliers-in-the-united-kingdom/>

Our Product

THE PRODUCT

As shown, our **BloomBums** diaper have undertaken a huge developmental change from the original diaper. Featuring a modular design, the **shells** are separated between front and back, with the **liners** attaching to the shell via an adhesive.

Initial Sketches



THE LINER LAYER

Function: Liner layer acts as the comfortable padded layer, allowing Liquids to pass through and absorbed by the absorbent core

Assembly and Manufacture: Similar manner to the diaper shells, but with less thickness as there are two layers

Process: Fabric production, cut at specific lengths

ABSORBENT CORE

Function: Absorbs the liquids from the baby's waste, preventing any leakage.

Assembly and Manufacture: Fabric extruded from a machine, and cut at lengths. Super Absorbent Polymers (SAP) is then sprinkled throughout. The absorbent core is then layered and sealed between two liners.

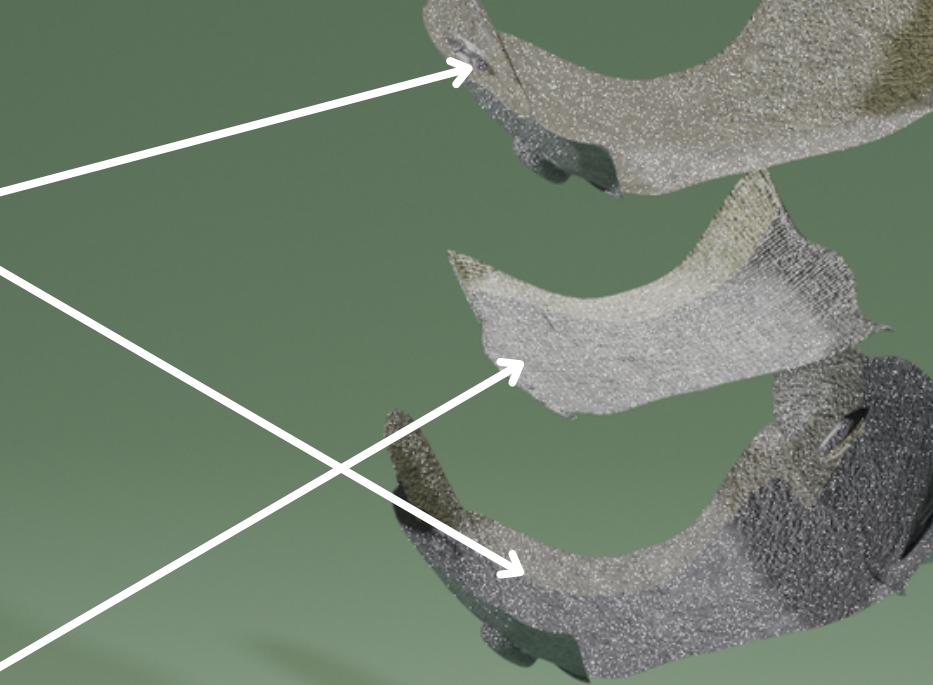
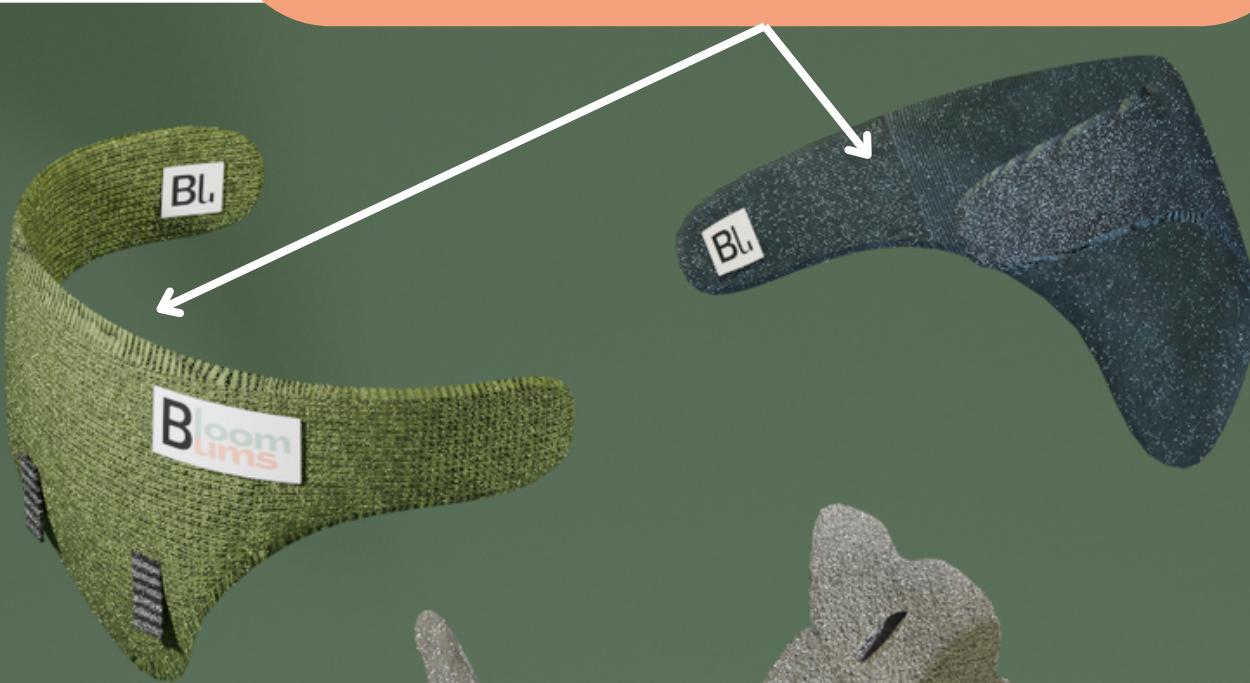
Disposal: The entire liner is disposed together, straight into the dedicated compost bag

THE SHELL

Function: Separated by two parts, attached to each other by interlocking straps on the bands.

Assembly and Manufacture: Parts are manufactured using our compostable materials. The two can then be traded in when worn

Process: Fabric cutting, cutting shapes out of the material



PACKAGING DESIGN

BloomBums packaging design for the liners features a small perforation across the compostable cardboard box to open and access the liners. At the perforation, it also reminds the users to dispose the liners into the given compost bags. On the side, it shows the quantity of liners, our logo, and some policy related signs, like the FSC logo. QR Code is available to quickly scan to order more liners



EASY USE

The general design of the product allows the user to quickly take off dirty liners and replace new ones. The variable size allows the diaper to fit on the baby no matter the size. Along with reducing stress for parents, all parts can be compostable. The shells are also available to trade in store for a discount on their next purchase of shells.