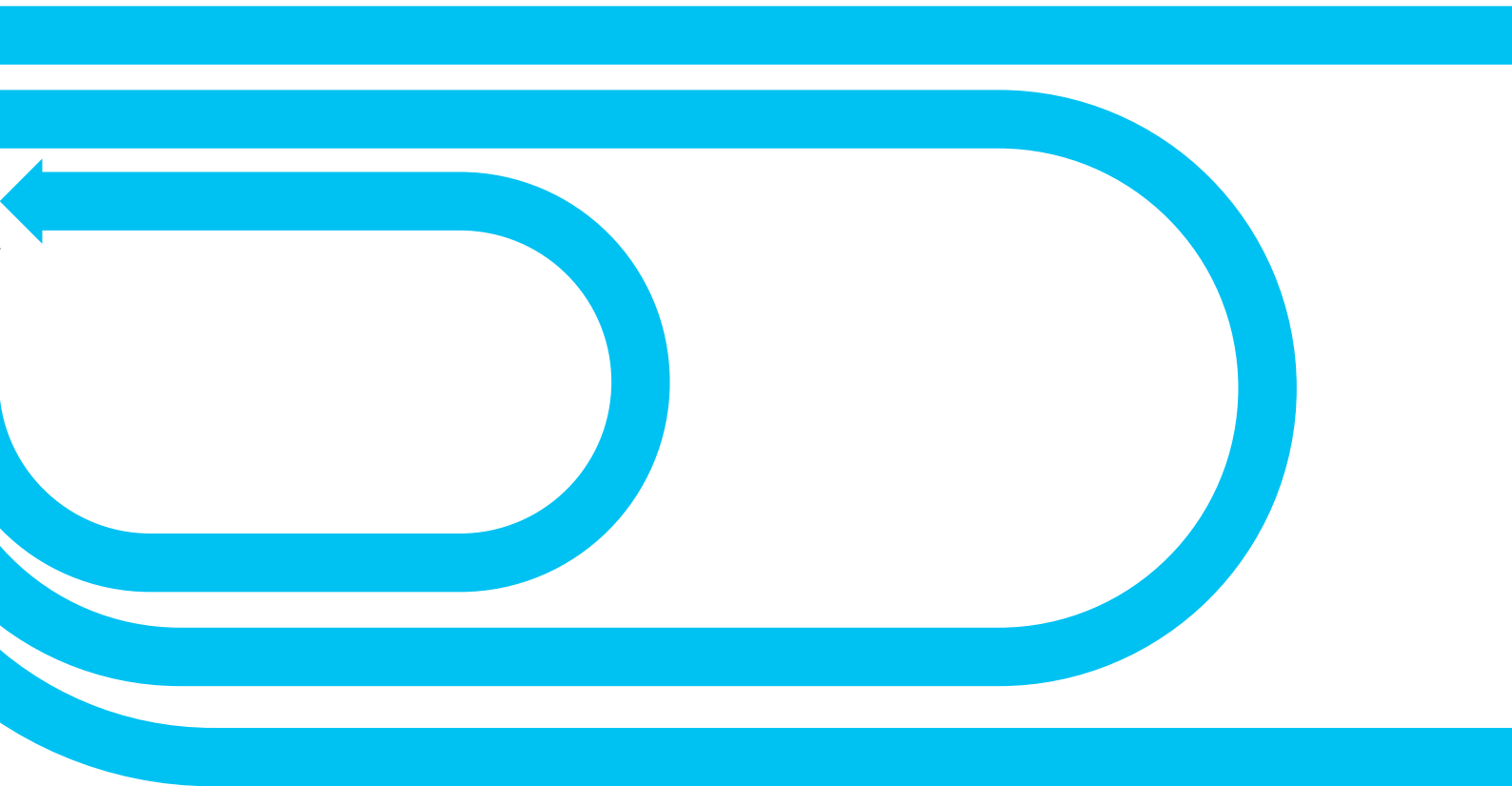




CREATE A FINANCEABLE CIRCULAR BUSINESS IN 10 STEPS



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INTRODUCTION

In this paper we propose 10 steps that business managers need to take into account when developing a financeable circular business model. These steps can support businesses that wish to establish a sound circular business model and to overcome the financing barriers that such models face.

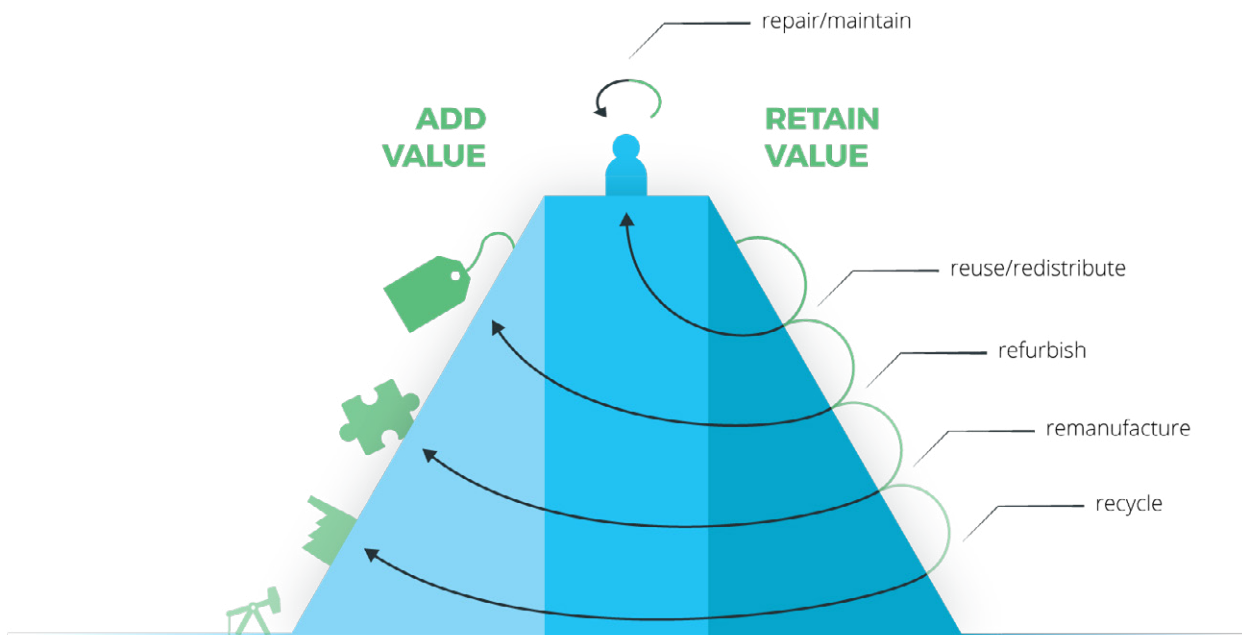
During our work with business managers and financiers we found ourselves in need of a framework that outlines circular business activities and pinpoints where and why financing problems occurred. This led to the development of the *Value Hill*, a tool to plot business activities in different phases of a circular product's lifecycle. ↗

The aspect that differentiates a circular supply chain from its linear equivalent is the return of products into the supply chain after they have reached the end-of-use stage. A linear supply chain ends with the sale of a product whereas a circular supply chain leads products back into the supply chain after they are done being used. In order to enable returns to the supply chain, increased control over the product is necessary. Therefore businesses operating in the circular economy are becoming increasingly interested in product-service combinations in order to maintain this control.

Circular product-service (also called product-as-a-service or product service systems, henceforth PSS) business models provide control over the products while at the same time incentivizing optimal use and circular design. Circular PSS models provide products in the form of services while retaining ownership instead of transferring ownership to users¹. Additionally, from an economic perspective, PSS models have a potential for long-term customer relationships and recurring cash flows. Because of the importance of PSS models for a circular economy and the great specific financing challenges (FinanCE working group 2016), this paper primarily focuses on PSS business models.

PSS

PSS is 'a mix of tangible products and intangible services designed and combined so that they are jointly capable of fulfilling final customer needs' (Tukker and Tischner 2006).



CIRCULAR DESIGN	OPTIMAL USE	VALUE RECOVERY
<p>Design products and materials with the aim of long term value retention:</p> <p>Product Design, Circular Materials, Classic Long Life, Encourage Sufficiency</p>	<p>Support better usage and product productivity:</p> <p>Product as a Service, Life Extension, Sharing Platforms, Sell and buy back, Repair & Maintenance Service</p>	<p>Capture value after user life:</p> <p>2nd hand seller, Refurbisher, Recycler, Recaptured material supplier</p>
NETWORK ORGANISATION		
<p>Manage information, materials, money flows:</p> <p>Value management, Process design, Tracing facility, Recovery provider</p>		

Fig. 1 Illustration of circular business models on the Value Hill (Achterberg et al., 2016)

In accordance with the *Value Hill* a **circular business model** is defined as a business model that is focussed on either circular design (developing products and materials with the aim of long term value retention), optimal use (supporting prolonged usage and product productivity), value recovery (capturing value after the product reaches the end-of-life stage), or network organisation (organising and coordinating a community that enables circular business models) or a combination of these categories (Achterberg, Hinfelaar, and Bocken 2016).

Businesses operating in the circular economy rarely do so in isolation. Their aim is to **keep products functioning at their highest value for as long as possible** and to **fully close material loops** with re-use, re-furbish, re-manufacture and re-cycling activities. To do this increased collaboration within a product's supply chain is essential. Therefore, the first 3 steps towards a financeable circular business model are about *involving your supply chain when choosing a circular strategy*.

Although circular PSS business models are promising, they are still quite new. While offering a range of additional advantages

when compared to outright selling a product, it takes time to educate the larger public on these benefits. Introducing circular business models will not happen over night, it takes time. This is addressed in the subsequent 3 steps *about smartly shifting the the business strategy*.

Moreover, circular PSS business models encounter financing issues due to the changing nature of cash flows, increasing working capital needs and a mismatch with current financial decision-making processes. Therefore, the final 4 steps towards a financeable circular business are about how to *attract financiers to invest*.



A **Circular Finance Problem** is defined here as a well structured circular business case encountering problems obtaining finance (equity and/or debt) required from a third party.

This definition of a circular finance problem isolates circular characteristics as the problem for obtaining funding. If a circular business fails to obtain funding due to other reasons (for instance high investment costs for unproven technology without underlying patents) this is not seen as a circular finance problem. By this definition we want to exclude regular financing problems that are often encountered by start-up businesses.

CREATE A FINANCEABLE PSS BUSINESS MODEL IN 10 STEPS

INVOLVE YOUR SUPPLY CHAIN WHEN CHOOSING YOUR CIRCULAR STRATEGY

1 Decide on a logical starting point

The starting point for developing a circular business model depends on your core activities.

2 Generate profit through multiple use cycles

The profitability of a circular PSS model is dependent on the ability to keep products in use through multiple use-cycles. Profits can increase significantly when circular activities enable a second and third product use phase.

3 Align incentives throughout the supply chain

Altering processes in one company may lead to increased revenue for an upstream or downstream partner. Collaborate and find ways to share risks and returns.

SMARTLY SHIFT YOUR BUSINESS STRATEGY

4 Be transparent about the value proposition

Educate your customer: specify the difference and rationale for favouring your proposition to a traditional one. As long as the (financial) costs and benefits are not clear to the end user, financier or your staff, the majority will not embrace it.

5 Redefine the role of retail

To reduce costs, re-think the role of retail. Circular PSS models reduce the need for retail because of new routes to the user (e.g. digital platforms) and changing responsibilities of manufacturers, service providers and users.

6 Gradually transition to a PSS by combining value propositions

Reduce the gap between pre-financing and the break-even point by cross-funding PSS models with regular sales and buyback constructions until it is fully "self-sustaining".

ATTRACT FINANCIERS TO INVEST

7 Secure stable cash flows through a robust contract

Making contracts simple and understandable for the customer will increase their understanding of what shared responsibility for the product means. Contracts should balance flexibility and robustness.

8 Mitigate debtor risk

Decrease the chance that customers will not pay their bills by rewarding those with a good track record and collaborate with a financial institution when necessary.

9 Match asset value, payback period and contract duration

If the product that is offered as a service has a low collateral value the risk for a financier can be reduced by a short payback period.

10 Measure the impact of environmental activities on financial performance

Measuring and reporting the environmental impact of circular activities enables financial institutions to make decisions based on other values in addition to their financial goals.

10 STEPS - IN DETAIL

INVOLVE YOUR SUPPLY CHAIN WHEN CHOOSING YOUR CIRCULAR STRATEGY

1. Decide on a logical starting point

Choose a circular strategy that is viable, smart and fits the core activities of your business. An easy and practical way to do this is to use the Value Hill business strategy tool (Achterberg, Hinfelaar, and Bocken 2016). This tool provides a way to position your current business activities in a circular context and identify gaps and opportunities on which you can base your future circular strategy on. It also provides insight into your supply chain partners that are essential for creating a circular network.

We experience an emerging trend towards circular PSS business models with frontrunners in construction, consumer appliances and fashion. In addition, PwC experts found an increased customer demand for service instead of ownership, a so-called 4th industrial revolution that addresses climate change (Financieel Dagblad 2016). When developing a strategy for PSS, business managers should take into account that working capital demand is a barrier which must be overcome (also see step 6). Starting a PSS model by recovering used products, as in the example of Recover-E and Green Mobile, can smoothen the start-up phase.



Recover-E & Green Mobile: Selecting a smart starting point

Recover-E and Green Mobile make smart use of used electronics. Plotting their position on the Value Hill shows that their starting point is value recovery. Due to the fact that used electronics and e-waste are highly accessible, initial investment costs are low and value that exists in the products can be easily obtained. Note however, that when this market (circularity) matures, e-waste prices will increase. Besides recovering value through repair and refurbishment activities, they lease the used electronic devices to give them a second life. These businesses have combined a value recovery strategy with an optimal use strategy, by generating revenue from refurbishing electronics and marketing them in lease contracts.

FAIRPHONE

Fairphone: modular design

Fairphone has a reputation for innovative product design, and has developed the first modular smartphone – Fairphone 2. Their strategy started with circular design due to that fact that their device is designed in a durable and modular way. However, Fairphone wants to increase their circularity by optimizing the use of the device and include value recovery in their future strategy. The possibilities for them to establish a PSS model are currently being evaluated, meaning Fairphone is now moving to an optimal use strategy and extending their value recovery strategies.

2. Generate profit through multiple use cycles

Creating multiple use cycles is the most effective way of generating profit using a PSS model since it enables optimal use of the product². Every additional use-cycle of a product minimises additional costs and increases profit margins. Therefore, it is the most important concept to grasp when creating a PSS model.

A business that generates profit from multiple use cycles in a PSS model has to be closely connected to its supply chain, in order to collaborate on product design, (re-)manufacturing, repair, (reverse) logistics and other activities required to increase or maintain the product's value throughout multiple use-cycles.

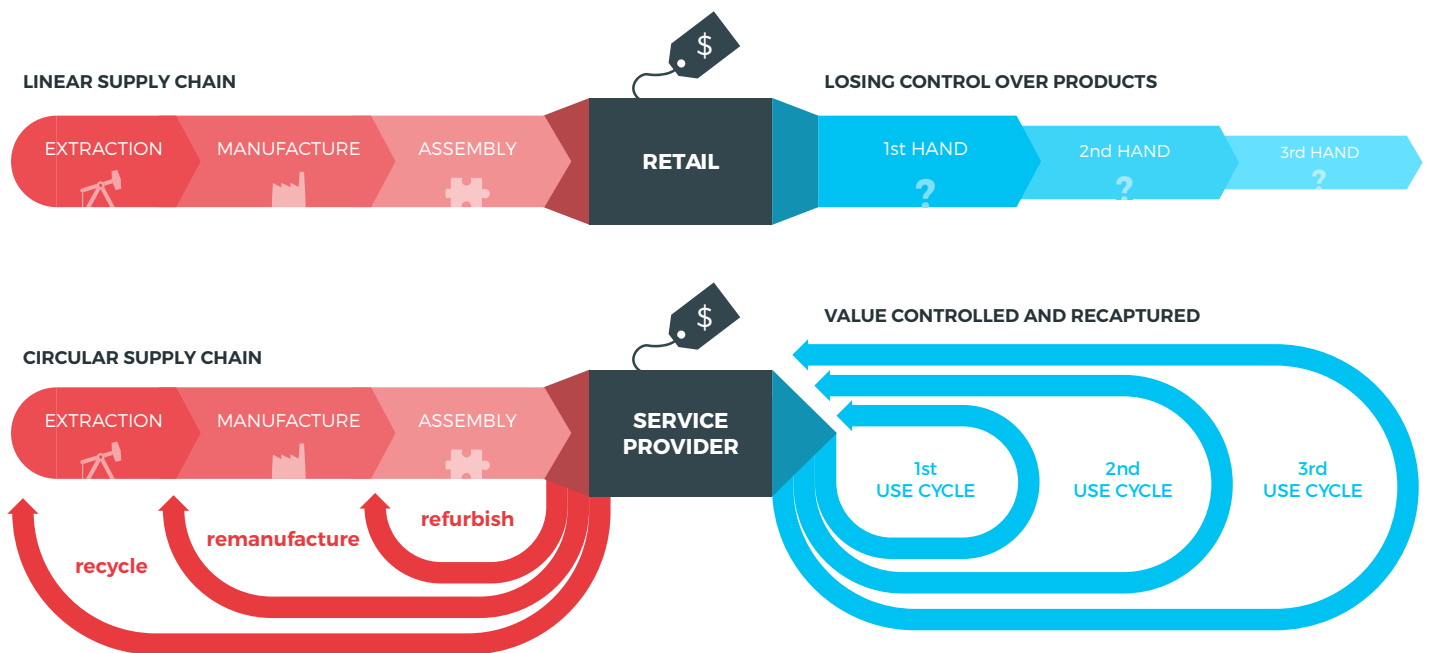


Fig. 2 Controlling & recapturing value in multiple use cycles vs losing control over products



Recover-E: Multiple use cycles

Recover-E recovers used ICT equipment from companies, refurbishes it and leases the refurbished equipment in use contracts. When used ICT equipment arrives, the life of the equipment is prolonged through refurbishing, data wiping and remarketing the equipment in a web shop. The Recover-E foundation then leases the equipment to the second user. After this second use-cycle the equipment is again recovered, data-wiped and finally recycled. Throughout the product's entire lifecycle the assets are managed and monitored.



Copier industry : mixing new and used equipment

By mixing new and re-circulated equipment, a more competitive 'product' can be offered and a wider range of customers can be served. Additional revenue is earned by providing equipment through multiple use-cycles, and contributes to resource conservation (Ellen MacArthur Foundation 2012).

It is important to communicate the economic advantages of multiple use-cycles to financiers. Circular PSS models are often confused with traditional lease structures but in reality they differ substantially. The economic advantages of multiple use cycles are manifold. The control over and knowledge of a product benefits the PSS business model. Monitoring the product's performance and use enables improving the product in the long run and continue offering it at a competitive price. Moreover, adding or maintaining value after every use-cycle allows for a substantial shift in costs for the provider. Per unit costs for such resources as materials and energy can substantially decrease, where increased costs of monitoring, reverse logistics, maintenance, repair and refurbishment can be offset by the increased income from additional product use-cycles. Additionally, PSS models can increase engagement with users, opening up opportunities for direct marketing and increased efficiency in regards to the role of retail (see step 5). Finally, service contracts can lead to an increase in customer retention. This benefit has the ability to generate stable, long-term cash flows, compared to the traditional sales business model through which little to no long term relationship are established with customers.

3. Align incentives throughout the supply chain

Aligning incentives with your supply chain partners increases collaboration and will benefit the tuning process. Incentives throughout the chain can be aligned in several ways.

Monitoring systems and the internet of things can be used to generate information on product use and performance during multiple use-cycles but information can also be valuable for other aspects of the supply chain, including logistic processes and other support activities. This information can facilitate transparency throughout the supply chain and establishes trust and collaboration. Additionally it can result in more accurate pricing of the product and services at a specific stage in the product's lifecycle. Moreover, shared information can provide a quantification of the product's value at various points throughout its lifecycle and enables agreement throughout the supply chain on residual value of the product after each use-cycle.

Another way of aligning incentives is mutual factoring, or providing mutual credit throughout the supply chain. This can reduce working capital needs and improve financial conditions for SME's. SME's are often pressured to make



Ricoh: machine performance monitoring

Ricoh adopted a service, @Remote, which is used to remotely monitor their copy machines performance, energy use, and number of copies it produces and when the cartridges need to be replaced. Through this remote monitoring, high-quality and efficient maintenance services can be provided, malfunctions can be prevented and downtime can be shortened or eliminated (Eccles et al. 2011).

payments quickly while large companies receive substantially more time. This results in SME's being cash strapped, due to the fact that they have to pay their bills while also waiting for their larger customers to pay. This financing gap forces them to borrow cash at unpredictable conditions. For mutual credit distribution, invoices or other payment claims can be used as liquid payment instruments throughout supply chains (for a detailed explanation of a commercial credit circuit please refer to Lietaer and Social Trade Organisation, 2016). This solution decreases liquidity risk for SMEs and creates a level playing field throughout the supply chain.

A more rigorous incentive alignment strategy is to create a formal collaboration in the form of a joint venture, strategic alliance, cooperation or other structure (depending on the desired level of flexibility, commercial goals, etc.). These types of formal collaborations can be used to share ownership of assets, creating interdependence around the assets and incentivising optimal asset management throughout use-cycles. The interdependence that is created can also be perceived as a risk in the sense that one of the partners' setbacks can affect the others. However, this risk can be mitigated by creating solidarity

through a collaboration structure that spreads the risk throughout the supply chain. Moreover, such collaboration enables revenue sharing. In circular supply chains investments made to improve a product in company A can result in a revenue increase for company B or C, allowing all parties to benefit from the collaboration. This not only strengthens the supply chain but can also generate a competitive advantage over other, less well-integrated supply chains.

SMARTLY SHIFT YOUR BUSINESS STRATEGY

4. Be transparent about the value proposition

If the financial benefits are not made clear to the end user, circular business models will only be embraced by a minority group of early adopters. In order to convince the larger public about the value of a circular PSS value proposition consumer education is essential. Consumers must be made aware of the value proposition of a PSS relieving the burden of having to maintain and repair a product as those responsibilities and costs are included in the fee they pay.

When comparing the price of a PSS product to a for sale product proposition, the former can seem more expensive. What

consumers do not take into account are the additional costs for product maintenance, repair, logistics, and the time it takes to make arrangements (e.g. call the factory, explain the issue, decide on whether to repair or to replace, investigate the options, et cetera) for these additional services. Moreover, making these arrangements can be a hassle, as the factory is not always incentivised to solve the problem. When we look at the two business models again, while taking these additional costs into account, it becomes clear that the value proposition of a PSS model can exceed the value of the for sale model thanks to the additional unburdening services.

Therefore, an important aspect of a circular PSS model is a transparent price build up. Besides for communicating the added value, it is also important for gaining consumers' trust. The necessity of transparency can be illustrated by the example of the mobile phone market. A few years ago it was common to buy a mobile phone in combination with a one- or two-year network subscription. The phone was 'free' and the customer would pay a monthly fee during the contract period. In this

proposition no additional services were included and when compared to simply buying a phone and a pre-paid SIM card, proved to be significantly more expensive. Moreover, after the contract term was finished the customer had to actively end the contract although the phone was paid by then. Many customers lost trust in these phone-contract combinations, resulting in a shift towards purchasing phones with separate pre-paid SIM cards. This example illustrates how the opportunist behaviour of the industry can backfire. Customer trust and an honest reputation are of vital importance for PSS value propositions.

5. Redefine the role of retail

In a sales model, the sale of the product is a one-time transaction after which the customer owns the product and the additional responsibilities that come with maintaining and repairing it. For consumer markets (B2C), this transaction has traditionally taken place in a store, i.e. in the retail industry. However, the role of the retail industry is shifting due to the rise of the internet and PSS models can take this shift one step further. In a PSS model,

FAIRPHONE

Fairphone: retail channels become redundant

The mobile phone market is becoming a satiated market, illustrated by a decreasing number of people buying the latest model and changes in new smartphone designs becoming marginal. Fairphone has a modest market share thanks to its extraordinary value proposition: a phone largely made from conflict-free minerals that are built for long lasting use. The price build-up is clearly stated on their website, showing what it costs to source fair materials and the specifications of the phone attract a conscious and loyal customer base. Fairphone has an effective website for selling the device and devices are also sold in combination with network contracts via other websites. This way of direct marketing and customer support makes retail channels redundant. To further improve their product offering, Fairphone is currently looking into possibilities for a PSS model for their Fairphone 2.



LENA
THE FASHION LIBRARY

Lena: 'Library in Shop'

Lena Fashion Library lends high quality garments to subscribed customers. Using a points system, customers can borrow as many garments as they please. Most of the garments are in conciliation; meaning Lena only pays the brands when garments are sold. In order to expand, Lena plans to develop a 'library in shop' concept, collaborating with several shops to create 'library' sections of their stores. Lena is developing a software system for tracing garments when they are circulated between Lena, swapping points and library sections at other shops. Their current challenge is to convince shops of the benefits of having a library section.



MUD JEANS

Mud Jeans: Create margin for retail stores

Mud Jeans' 'Lease a jeans' is popular, but can only be ordered via the Mud Jeans website. Revenues from leased jeans alone have not yet been profitable, which is currently compensated with revenues from sales. Since the lease concept does not include an earning model for retail stores, Mud Jeans is looking into possibilities for making their lease jeans more appealing to them.

a contractual relationship is established between the service provider and the customer. Since this service, based on the product's performance, is the focal aspect of the contract, the point of purchase, i.e. the retail store, becomes less important. This could shift the role of retail towards the service provider or an intermediary providing choice between services.

An advantage of a direct relationship between the manufacturer and the customer is that circularity is increased. This relationship allows for more direct feedback, which stimulates improved customer relations and product design. In the case of a PSS model, service contracts enable product tracking and can improve the efforts of reverse logistics. Moreover, the improved relationship between the manufacturer and the customer can also increase trust and reciprocity between both parties.

The extent to which the role of retail shifts also depends on the nature of the product. For the fashion industry, retail is more essential to the customer experience. However, businesses are starting to experiment with PSS models in a retail dominated sector. For example, Mud Jeans invented the concept 'Lease a Jeans' and Lena Fashion Library is a library for garments.

6. Gradually transition to PSS by combining revenue models

Bridging the period of transition from a sales model to a PSS model is a challenge. PSS models create the possibility to generate long-term cash flows, capture a premium for performing maintenance activities and capitalise on the information asymmetry between the supply chain and users. Financiers often

PSS ≠ LEASE

In the context of PSS business models people often talk about lease. Although lease is a financial product that can be used for PSS, it is not necessarily the same thing. Leasing as a lending technology uses the value of underlying assets to provide credit (where in most cases the ownership of the asset moves to the financier). The innovations in circular PSS models especially concern a change in underlying assets: low capital products such as textiles and consumables instead of high capital products such as cars. Therefore ideally, leasing is combined with other methods (steering on other securities) to finance circular PSS models.

Moreover, differences between financial-, operating-, and full service lease should be considered when using lease for a PSS. In financial lease the ownership of the asset is transferred to the user after the end of the leasing contract. In operating lease the lessor retains ownership of the asset. A full service lease combines operating lease with maintenance and repair services. And lastly, pay-per-use combines full service lease with flexible periodical fees that depend on the use (performance) of the asset. We only consider operational lease constructions fit for circular PSS models³.

agree that these prospects are appealing and worthwhile to invest in. However, the gap between working capital needs for acquiring assets and generating profit from incoming cash flows is much wider than in a for sale model. Substantial investments must be made while return on investment can take many years.

This financing barrier is illustrated in figure 3. As a company gains more additional customers, additional pre-financing is needed and the break-even point is only reached after a considerable amount of time. However, after reaching the break-even point revenues increase substantially.

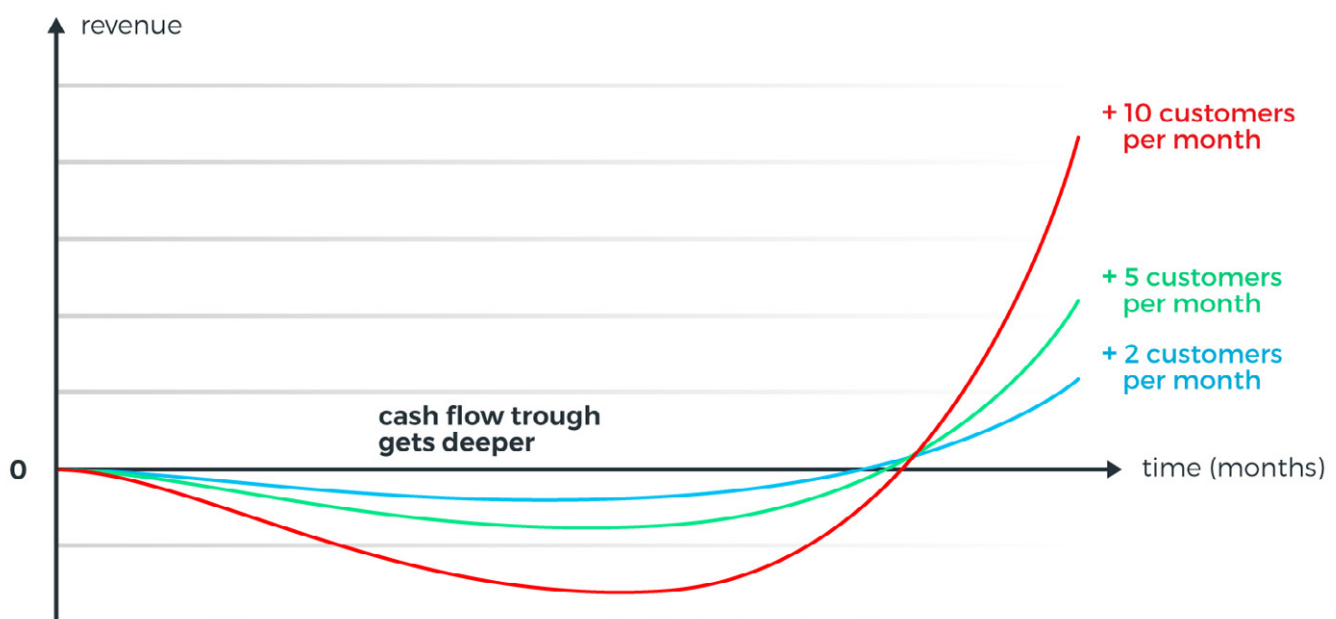


Fig. 3 Scenarios of pre-financing and (delayed) profitability of PSS business models



Textiles: combining sales and PSS models

Both Lena and Mud jeans run sales and PSS models simultaneously. Both companies have to tweak their business model if they want to run on PSS alone.

Mud Jeans sells and leases its jeans because revenues from 'Lease-a-jeans' are not yet profitable on their own. Mud Jeans does regular sales – in store and via the website – and buyback contracts to bridge the delayed revenue of their lease jeans.

A way to bridge this gap is to cross finance the PSS model with profits from for sale models that are already in place. By reinvesting the profits from the for sale model (instead of extracting dividends) a company can pre-finance assets from their own cash flows. It is important to communicate the potential gains from PSS to shareholders since PSS investing will generate profits but with significant delay. Debt can also be attracted more easily with a diversified value proposition (providing cash flows from the for sale model) combined with a sufficient equity position. For start-ups and SME's it will be more difficult to fund PSS through for sale profits due to the smaller amount of available resources they can reinvest. Attracting external funding for the PSS model would therefore be more imperative for start-ups and SME's. Collaboration with wealthy businesses can provide a solution, although this decreases their independence.

ATTRACT FINANCIERS TO INVEST

7. Secure stable cash flows through a robust contract

It is important to structure a robust contract that clearly states the responsibilities of both the service provider

and the customer. PSS models can propose different services, from basic services added to a for sale product to full service of the performance of a product. Circular PSS models are generally structured as performance contracts since this provides maximum control over the assets while creating opportunities for increased sustainability. The contract can be an important tool to stabilize and guarantee high quality earnings.

It is key to provide multiple incentives so that the customer will continue the contract, as opposed to terminating it, in order to continue to receive steady cash flow. This can be achieved in multiple ways. To secure a stable cash flow a company must make sure that the periodic fees charged to the customer at least cover the basic costs associated with the product and that the customer commits to a minimum use of the product.

The contract should reflect all costs that are made during the product's use-cycle. Clearly stating the service providers' responsibilities like installation, maintenance, repair, reverse logistics and disassembly will create a mutual understanding of what the user pays for and what the service provider delivers.



Bundles

Bundles: Good behaviour results in lower periodic fee

Bundles developed a device that, when attached to washing machines, is able to monitor their usage. Statistics gathered from the machine are displayed on the Wash-App, which provides the customer with insights into the overall cost of doing their laundry, including energy, water and detergent consumption. Additionally, the Wash-App provides the customer with tips to optimize the use of the machine. Not only are the costs for the customer (and the environment) reduced, but it also extends the lifetime of the machines. Bundles is exploring the possibility of adding a gaming element to the app that reduces customer's monthly fees when the machine is used responsibly.

In order to entice customers into long-term contracts, they can be structured in a way that facilitates easy extension once it has reached its initial completion period. Discounts for contract renewals can further stimulate this. Moreover, adding a penalty of some sort can discourage ending the contract prematurely.

In order to use the same products multiple times, it is important that the product is in optimal condition when it is returned to the service provider after the contract period. Installing a reward for returning the product, depending on its state, can incentivize the proper use of products. Products returning in a 'like-new' state can save maintenance and repair costs, resulting in more stable cash flows. Rewarding the customer with a lower fee after they have proven to have a good payment record and maintenance behaviour can also encourage customers to continue the contract (game element).

Contracts with supply chain members are also important for establishing stable cash flows. Clear agreements on information sharing, aligning activities and take back schemes will diminish noise and stabilize cash flows. However, flexibility and trust are important factors, which are not increased by more stringent contracting. Balancing

contractual agreements and flexibility is therefore a challenge both with customers and throughout the supply chain.

8. Mitigate debtor risk

Financiers state debtor risk as one of the main hurdles for financing PSS, especially for a B2C market. Whereas a one-time sales transaction has no such risk, a PSS with on going transactions creates the risk of customers defaulting on their obligation to pay for the service. Moreover, the asset is being used by the customer, which hinders easy access to the collateral in case of default. These risks can be mitigated in several ways.

Firstly, PSS businesses can service new customers that have not yet proven their payment behaviour or have greater risk of liquidity issues, with second cycle assets. These assets are past their pay-back period and therefore impose a reduced risk on the company. If the new customers then prove to be creditworthy, they can receive first cycle assets at the start of their next contract period.

Second, collaborating with a party already involved in credit checks and payment structures can also mitigate

B2B B2C

B2B versus B2C

There is no specific focus on the differences in challenges for B2B versus B2C PSS models. However, it can be assumed that B2C PSS models will encounter more difficulties than their B2B equivalents, due to increased debtor risks (credit checks and monitoring) and increased complexity in (reverse) logistics in a B2C context.

debtor risk. This could be a bank, lease company or a factor. Lease companies can resolve working capital requirements while in the case of factoring, credit collection activities are outsourced to the financier. This way, risk is shifted from the PSS business to the financial partner. Note however, that the risk premium for the financial partner will increase the price of the service, which reduces the PSS business' profit margin in exchange for the security of payment. Therefore, such a collaboration is only worthwhile for a certain scale and clientele.

A third option is to invent a 'red button'; a button that the service provider can use to disable the service from a distance if the customer fails to pay the service fee. While this can work for some products, this is impossible for others. For instance, it is impossible

for Mud Jeans to prevent their customers from wearing their leased jeans if they have not paid. Products that work in combination with a network (water, electricity, data) provide opportunities to cut off access to the network, illustrated in the Fairphone example.

Fourth, a classic tactic for mitigating debtor risk (and moral hazard) is to ask for a deposit or an upfront payment for the first couple of months of the contract term. When the customer makes their payments on time the deposit may then decrease in a second or third contract term.

Fifth, and last, social networks can also be used as a means for decreasing risks. For instance, Bundles - a business providing the service of washing machines and dishwashers - asks a lower deposit from new customers



Proof creditworthiness with second-cycle equipment

Start-ups and small SME's that do not have the financial means to buy new expensive equipment impose a higher risk on a company. They, more often than large corporates, run into liquidity problems, increasing the risk that their bills cannot be paid. New start-ups and small SMEs can therefore be serviced with second (or more) cycled equipment so that their payment behavior can be monitored while

using less valuable assets. Customers that prove to have good payment behavior can then receive first cycle assets in a subsequent contract.

FAIRPHONE

Fairphone: White label network is risk mitigation

While creating a PSS model for the Fairphone 2, the possibility of collaborating with a network provider was discussed. Besides being able to offer a complete package, the service of the phone in combination with a network contract, this 'white label' network can also mitigate debtor risk. When customers fail to pay the service fee, the phone can be disconnected from the network.

that were referred by existing customers. Moreover, Bundles notes that establishing a close relationship with their customers creates sympathy, therefore mitigating debtor risk.

9. Match asset value, payback period and contract duration

Low asset value imposes a risk to the financing party, which can be reduced by shortening the payback period; the sooner the asset is paid back, the shorter the period of risk exposure. This issue was raised earlier in the report published by ING, stressing the importance of *cash flow optimisation* in financing circular business models. Spreading out cash flows over longer periods of time increases the relevance of the payback period in terms of riskiness for the financier. Charging higher fees in the first year(s) of a service contract

can shorten the payback period and mitigate risk (ING 2015). A PSS model with a product of low collateral value⁴ is more easily financed when accounted for with a short payback period. At the same time, another way to secure funding is to harmonize the payback period with the contract duration. Via the contract, cash flows can be secured during the highest risk period (i.e. during the payback period).

10. Measure environmental impact on financial performance

Measuring the environmental impact of the circular business can help a company to link its impact to its financial performance. This justifies actively working to make a company's environmental impact and level of circularity a core part of its operations. Moreover, showing numerical evidence can convince financiers to



Mud Jeans: Payback period and contract duration

A financier sees jeans as an asset of low value, so the contract duration for 'Lease a Jeans' is one year although the jeans are paid for entirely before the end of the contract period. However, for Mud Jeans, the underlying assets are not the most important thing. It is the establishment of a long-term relationship with the customer that counts. In that sense, asset value may play a less

important role in financial decision making in a circular economy.



Copier industry: environmental cost accounting

Ricoh uses environmental cost accounting to measure the impact of its environmental activities on the company's financial performance. Costs incurred for environmental conservation activities during a given period are compared with the economic benefits. For example, installing an environmentally friendly air conditioning system may require a substantial initial investment, but the new system will reduce operating costs as well as CO2 emissions. The difference in investment cost between implementing a new system compared with a conventional system is accounted for as an environmental investment cost (Eccles et al. 2011).

consider these factors alongside the traditional financial factors when making decisions, supporting a shift to a more inclusive financial decision making process. This requires also general reporting guidelines and methodologies to enable comparison between different companies. Circle Economy is currently developing a CIRCLE assessment tool to measure this. On the other hand, when investments in environmental initiatives do not yield positive results this potentially uncovers (normally hidden) externalities and can be an input for policy-makers in pricing these externalities.

According to accounting standards companies should divulge the costs and benefits of their environmental activities. If the company's profits are affected by more than 5%, either positively or negatively, investors will not be able to ignore that impact⁵. Monitoring this impact can lead to the conclusion that their environmental initiatives induce vast cost reductions and profit improvements (Eccles et al. 2011).

It is helpful to note that environmental accounting is easier for large companies than for SMEs and start-ups that often do not have the capacity to

monitor the effect of environmental activities. Moreover, when collaborating with other businesses in a circular supply chain, environmental and circular investments at one company will yield improvements for the other companies operating throughout the chain, further supporting the notion that collaboration is essential in order to optimize circular processes.

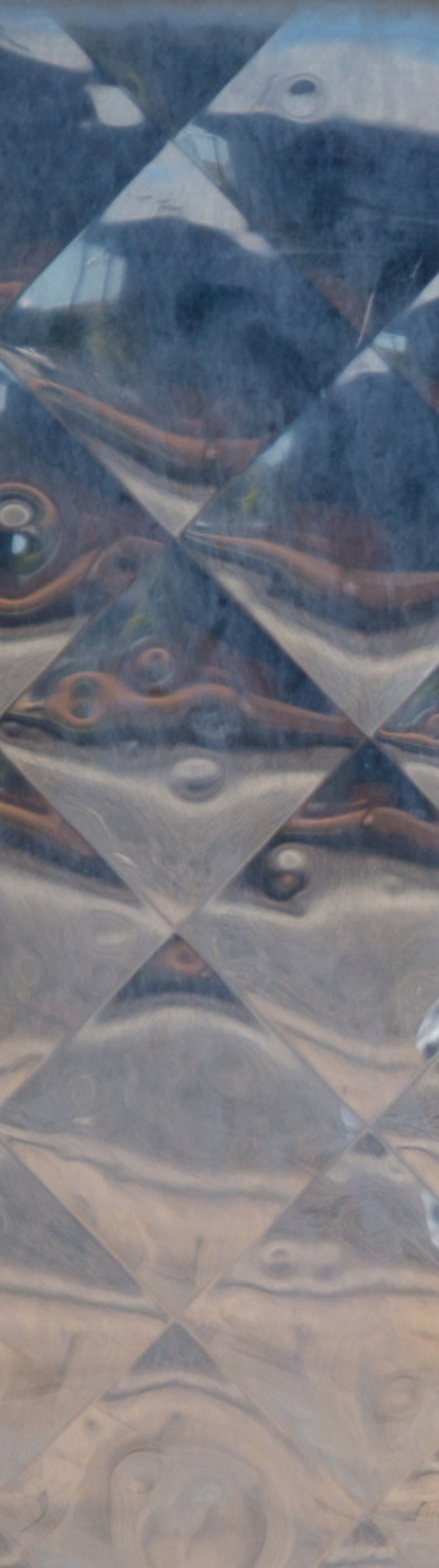
I REFLECTING REMARKS

The foremost challenge in the development of a financeable business model is translating optimal incentives for circularity to a financeable plan. This paper provides a 10-step guideline on how to overcome these challenges while illustrating these steps with solutions of circular frontrunner businesses. When implementing or improving a circular strategy in your business, please keep in mind that solutions are context dependent. It is essential to extensively reflect on choices that are made at every step, often in consideration of- or rather collaboration with supply chain partners.

Also, some products are better suited for PSS models than others. Products that require skilled (technological) knowledge for extending user life in multiple use cycles and that are not highly trend sensitive (e.g. satiated market) are more easily translated in a viable PSS business model. In addition, according to some, high value products are better suited for PSS models than low value products. To substantiate this hypothesis additional research is required.

The need for more stringent policy and legislation was not explicitly mentioned in this paper, but is of significant importance. Designing and implementing legislation for internalizing external costs will speed up the pace of businesses adopting circular strategies. The example of Sweden reducing the tax on reparations is promising (The Guardian 2016). Moreover, this will motivate financiers to extend financial decision making processes beyond monetary profits.

Financiers and investors also need to pull their weight to make the life of circular business managers easier. Financiers have to take a different perspective and make room for trial and error in order to get acquainted with financing businesses in the circular economy. What the financial sector can do to adjust their decision making process towards circularity will be presented in the forthcoming white paper *Empower financial decision makers for a circular economy*.



Notes

1. Note: There are also PSS in which sale is combined with additional services (e.g. maintenance). With circular PSS we mean the service of the product is offered without transferring ownership to the user.
2. The Ellen MacArthur Foundation (2012, p. 30) has mentioned similar concepts, called 'the power of the inner circle' and 'the power of circling longer' as sources of value creation in a circular economy.
3. Also see FinanCE working group (2016), p80.
4. Collateral value is the estimated fair market value of an asset that is being used as loan collateral (www.investopedia.com)
5. Also see Van Tilburg & Achterberg: 'The financial sector as a new agent of change; The case of natural capital accounting and reporting, 2016

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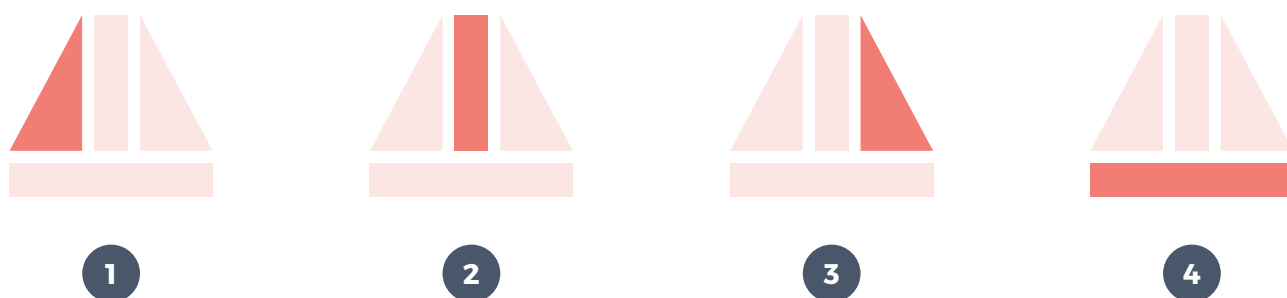
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HOW TO READ THIS APPENDIX

For the purpose of categorising the different circular strategies of the selected business cases, the Value Hill framework is used (Achterberg, Hinfelaar, and Bocken 2016). Per business case, one or more of the following categories of circular strategies are applied and are highlighted accordingly.



1. Circular Design

Circular Design corresponds to business activities that occur during the pre-use (the design, production and distribution) phase of a product. These activities are positioned on the upward slope of the Value Hill and are focussed on prolonging the use phase (e.g. product longevity), accounting for end-of-life suitability (e.g. modularity), minimising resource-intensiveness and re-using existing products, components or materials.

2. Optimal Use

Optimal Use relates to the in-use phase of a product. Business activities in this category seek to optimise the use of the product by providing services or add-ons to extend the lifetime of a product or provide ways to improve productivity of a product. These business activities are positioned

on the top of the Value Hill. PSS models are part of this category.

3. Value Recovery

Value Recovery involves the post-use phase of a product. These business models generate revenue by capturing the value from used products (formerly known as waste or by-products). Value Recovery involves using recaptured materials, providing refurbished products, selling second hand products, and facilitating remanufacturing and recycling.

4. Network Organization

Network Organisation involves business activities that involve the management and coordination of circular value networks. This entails coordination and management of resource flows, optimising incentives and other supporting activities in a circular network.

I INTRODUCTION

As a result of previous findings we selected 7 business cases to deepen the knowledge and understanding of the financing barriers circular businesses face. Pivotal to this research were (1) the challenges faced when financing PSS models and (2) the specific financial challenges (or lack thereof) for value recovery models.

This led to the analysis of circular PSS models for different types of products and target markets including Lena Fashion Library, Mud Jeans, Fairphone, Water Systems as a Service, one chain collaboration case with three companies jointly providing a service, and three value recovery models, including Recover-E, Green Mobile and Blackbear Carbon. Please note that the cases presented have multiple circular strategies.

OPTIMAL USE: LENA FASHION LIBRARY



BACKGROUND

LENA fashion library makes better use of garments by allowing many people to use them. The growing clientele for this concept creates new opportunities for transforming the concept of a 'library in shop' to having a library system run in collaboration with several shops, allowing for people to borrow garments from their favourite stores. LENA only sources high quality garments that are vintage or from up and coming designers and collections of eco-labels.

LENA improves the durability and access to high quality garments with the library concept. At the moment LENA fashion library is a mix of a library and a shop. The classic retail business model (i.e. sale of garments) is combined with a circular Product-as-a-Service business model. A subscription for LENA fashion library costs €19,95/€34,95/€49,95 per month and is respectively worth one

hundred, two hundred or three hundred points. A certain amount of points is ascribed to each garment (for example a dress can be 50 points) and customers can borrow items based on the amount of points they subscribe to monthly. If they exceed the number of points they have monthly, customers can opt to pay extra for borrowing additional garments. Besides buying and borrowing, a third option customer's have is to buy a garment after they have borrowed it, in which case a discount on the sales price is applied: 10% after one month and 20% after two or more months.

CIRCULAR BUSINESS MODEL

Optimal Use

LENA has a circular use model. They enable the borrowing of garments and thus prolong the lifespan of them. With the library model, LENA sources high quality, long-lasting clothes and has an incentive to prolonging and optimizing the use-phase of the garments for as long as possible.

Circular Organisation

LENA is developing a 'Library in shop' concept that includes an underlying software structure. Moreover, LENA is increasingly providing consulting and chain management services to grow the fashion library concept. As experts in this domain, this can become a main aspect of the business for LENA in the future. With this in mind, the business model could change from running their own fashion library to creating a network of libraries in shops and using their knowledge to grow the

access over ownership concept in the fashion industry.

Challenges for the Business Model

Conciliation

An implication of garments in conciliation is that brands do not receive any revenue for the borrowing of their garments unless they are ultimately sold. Moreover, garments may be borrowed so many times that they get worn down and will never be sold. For the library concept to grow a solution is needed for rewarding brands for lending out their garments. LENA is working to find a solution for this challenge.



We believe it will make all the difference if brands would be rewarded for their garments being borrowed.

- Smulders, 2016

Scale up

Ideally LENA would focus on lending only. LENA needs 450 library members and 50% revenue from sales to break even. The lending business model needs a longer start-up phase than a regular sales business model and therefore, there is a need for an extensive amount of members for the business model to be profitable. LENA forecasts that 1350 – 1800 members would be sufficient for an exclusive library business model (i.e. no sales).



Lending is more circular, but the revenues from sales are currently needed.

- Smulders, 2016

FINANCIAL ASPECTS

Initial funding

As a start up, LENA has encountered problems finding initial funding. After winning ABN AMRO's 'Best start-up' prize it turned out ABN AMRO was unable to fund the business, due to its lack of a track record and the relative small sum that was needed to fund the start up. LENA needed €140.000 to start the library, whereas the ABN AMRO impact fund starts investing from upwards of €500.000. This resulted in funding their start up with the help of their own savings and family members. Although this made the start up phase harder it allowed LENA to have full control over their business.

New funding round

After building a successful concept LENA has recently secured new funding in the form of a convertible loan from a social impact fund. The funding enables LENA to grow while making a positive social impact. LENA has plans to create a daily activity for young adults who have become burned out by letting them help with washing and ironing the garments.

Working capital needs and ownership models

If this 'library in shop' model grows, upfront investment costs will also grow somewhere within the textile chain. The firm that owns the products carries the burden of a growing balance sheet and high working capital needs. What sets LENA apart from other PSS models is that LENA is not the owner of the garments, but an intermediary. Therefore LENA can play a vital role in scaling this concept without having the burden of increasing working capital needs.

The question remains whether shops and brands are willing to invest upfront, especially in the highly competitive fashion industry. Start-ups and SMEs are incapable of upfront investing whereas large brands, like H&M, Zara and Mango are more likely to have access to the necessary capital, however they likely lack an incentive to do so, since they profit from the current for sale model.

Another aspect in financing this concept is the low value of underlying assets (e.g. the garments) and the low residual value of garments. Therefore, a financier would need a short payback period. Cash flows and customer loyalty are the keys to establishing a sound business model.

FUTURE VISION

Revenue for brands

As stated above LENA currently has garments in conciliation and pays the designers and brands only if they are sold. In order to grow the library concept, brands – or the industry - need an incentive to lease their garments. For

example, a percentage of the borrowing fee could be transferred to the brand. LENA is currently developing an earning model that includes revenue (e.g. an incentive) for designers and brands.

Library in shop

To grow the library concept LENA aims to increase their lending capacity. LENA plans to create swap points and 'library in shops' to reduce the physical distance for clients. This way the library concept can be expanded without needing to enlarge LENA's physical space, and can lead to higher revenues without increasing operating costs for renting store space.

Management- and IT systems

Organizing such a library in shop system requires a management and IT system to track and trace garments and organize how the garments are moved between shops and customers. LENA is developing an online platform that manages this process so that they can extend their reach to new customers.

Knowledge partner

LENA's fashion library concept has gained interest from several parties. For example, the concept is gaining traction in China and fashion businesses there are seeking LENA's extensive knowledge and experience in running the library, so that they can create a library concept of their own. Consulting services, combined with the implementation of a management system and embedded IT logistics can become core competencies for LENA.

OPTIMAL USE: MUD JEANS



These are environmentally friendly alternatives for the chemical treatments that are usually used to create the ‘washing’ effect. MUD Jeans stresses these techniques should become a standard instead of something special since they have the capability, if applied on a large scale, to heavily reduce the environmental impact of the textiles industry. By establishing strong relationships throughout their value chain, MUD Jeans receives quick and accurate feedback on how the jeans are perceived by their customers and can then work closely with their supplier network towards a demand-based production approach. MUD Jeans chooses to work with small suppliers who share their no-waste goals. Manufacturing takes place in Tunisia and has a lead time of four weeks. Their diversity in ‘looks’ is created with minimum raw materials² and the Fair Wear Foundation has audited the MUD Jeans factory in Tunisia. Printed labels, instead of leather, are used because it makes recycling easier.

BACKGROUND

MUD Jeans invented the concept of ‘lease a jeans’ and incentivises customers who would rather purchase the jeans to return them once they are no longer using them with a deposit. With both of these concepts MUD Jeans ensures the return of their jeans to the value chain. MUD Jeans are then re-used or recycled into fabric for sweaters.

MUD Jeans garments are made from both organic- and recycled cotton, when they are available. Jeans are washed with ozone and treated with laser techniques.

CIRCULAR BUSINESS MODEL

Circular Design

The jeans are made of 100% cotton (organic if possible) and are produced under fair working conditions.



Volatility of cotton prices

In recent years cotton prices have been very volatile¹. The use of recycled cotton for the production of MUD Jeans reduces the dependency of virgin cotton and therefore partly mitigates this risk. As cotton is a water-intensive industry, this also mitigates ‘water-risk’.

Additionally, the company only works with Global Organic Textile Standard (GOTS) certified or BCI certified cotton³. Furthermore, labels are not made from leather and stitched on but painted on the jeans, which makes it easy to recycle the jeans and use them to make sweaters once they have reached the end-of-use phase.

Optimal Use

Lease

Customers can lease the jeans for a one time membership fee of €20,- and a monthly fee of €7,50. After the contract period of a year customers can swap the for a new model and continue paying €7,50 per month⁴. This actually equates to buying the jeans for €90,- plus a one-off €20,- membership fee, but is spread out over one year. 80% of MUD Jeans' customers who have leased jeans have opted to continue their contract after the first lease period⁵.

Sell and buyback

Besides leasing the jeans, it is also possible to buy a pair of MUD jeans outright for €98,-, in which case a deposit of €10,- is paid and becomes a discount on a new purchase when the jeans are

returned after they reach the end-of-use phase.

Repair service

Throughout the lease period, repairs are made for free.

Value Recovery

Capturing the second hand market

MUD Jeans captures the second hand market as well. When jeans are returned in good condition they are sold as vintage jeans. In some cases repair (e.g. stone of enzyme wash is given) is required before entering the vintage market⁷. The jeans are named after the previous owner (in the lease contract) and are sold with their own, individual story to make them a more personal item. By creating a second life for the jeans, an additional revenue stream is generated. On the balance sheet the second hand jeans have a low value, because they are entirely written off after one year, resulting in high margins for the lease and sale of second life jeans.

Recycling denim

Batches of old jeans are send to Spain or Italy for shredding and the cotton is recycled to make new yarn. However,



MUD JEANS

Growing target group for lease a jeans concept

MUD Jeans encountered some start-up difficulties after two years, the volume of leased jeans was not enough to be profitable⁶. But when they followed the advice of a consultant to drop the lease model due to financing difficulties, MUD Jeans encountered an immediate drop in demand. Therefore, after a couple of months 'Lease a Jeans' was re-installed and revenues started increasing again. This shows

that there is a (growing) market for the 'Lease a Jeans' concept and customers value the social and environmental benefits of leasing instead of owning jeans.

recycling cotton into new yarn is more expensive than buying virgin cotton, which is still a major barrier for the circular economy. The production price of recycled cotton sweaters made in Italy is about four times as expensive as a regular sweater produced in Bangladesh.

Challenges for the business model

In order to participate in the 'lease a jeans' concept, customers have to order their jeans online. Shops that carry MUD Jeans cannot lease the jeans due to the small margin they have on sales as they need to cover costs like rent. Margins received from the 'lease a jeans' concept should therefore be shared with shops but this is not yet possible. Moreover, even if this challenge is overcome, the slow start for cash flow will negatively impact a shop's revenues in the beginning and jeopardise their liquidity. As it stands, this leasing model requires a direct relationship between the manufacturer and the customer.

Aside from the fact that the 'lease a jeans' concept is hard to scale due to the limitations of offering this option in shops, the jeans can also only be leased with a Paypal account or credit card. For MUD Jeans the advantage of Paypal lies in the fact that they take on all responsibilities for the customer's payments however



Lease a Jeans is too spectacular, it is beyond the formulas and ratios of banks

- Bert van Son, 2016

they are also now looking into using Ice pay and Ideal.

FINANCIAL ASPECTS

Because textiles have a very low collateral value, the payback period is very short: one year.

Funding the business

MUD jeans founder Bert van Son says that the company has a 'non-financeable' business model. Initially, the business was fully funded by equity: van Son's own savings and two crowd funding campaigns (Van Son 2016). According to van Son you need an angel investor, with a long-term vision, who does not require the money to be returned with a 20% return on equity (Vermunt et al. 2016).

More recently, a former G-star executive and textile engineer joined the board of MUD Jeans. The knowledge that he has brought has already resulted in better models and an increase in revenue. Additionally, MUD Jeans was able to attract additional funding from 'Stichting Doen'.

Revenue for shops

As stated above, MUD Jeans are currently sold in several shops, but the 'lease a jeans' model is only available online. In order to increase revenue for their leasing model the company must come up with an incentive for shops to offer the leased jeans. Another option is grow the 'lease a jeans' concept with a strategy targeted to the online market.

Break even point lease / sale

MUD Jeans is currently making profit,

indicating that the breakeven point has been crossed. However, 75% of the revenues are still regular sales (25% online sales and 50% in shop sales) while 25% is from leased jeans. This implies that the breakeven point for the leased jeans has not yet been reached. This is due to the need for high upfront investment costs which creates a gap between the point of investment (i.e. producing the jeans) and the breakeven point (i.e. after x monthly payments). Moreover, the greater amount of infrastructure and transactions needed for the lease model leads to higher costs than the regular sales model. This requires more leased jeans if the company would like to only depend on the lease model to make profits.

However, the revenues from second hand sales can be used to bridge this gap. Combining the company's earning models (sale, lease and second hand sale) seems a viable strategy in growing the lease concept gradually without having the burden of being strapped for cash.

Working capital needs and ownership models

In the 'lease a jeans' concept, MUD Jeans remains the owner of the jeans during the first year. After the first year the customer becomes the owner of the jeans, or swaps them out for a new model. By retaining ownership of the jeans, the company requires a large amount of working capital. This model can be partially cross-funded out of the sales of new and vintage jeans.

When compared to Lena fashion library's situation, MUD Jeans has a higher need for working capital. Lena has to find a

way to reward the brands for servicing their garments, whereas MUD Jeans has to find a way to reward stores for making the 'lease a jeans' concept available. It could be interesting for these two businesses to work together to calculate and experiment with sharing the reward for garments as service. Both business models can help to develop an incentive for the product as service model resulting in earning models for both the shops and brands they work with.

FUTURE VISION

Management- and IT systems

MUD Jeans intends to increase their revenue from the leasing model by extending the lease structure to their complete collection. There is already the membership fee of €20,- and the additional €7,50 per month per pair of jeans. This can be extended with a simple system of €x,- per month for a sweater or blouse. This way, customers are incentivised to lease more items, since the membership fee is a one time occurrence regardless of how many items a customer leases.

There are also plans to create maternity jeans, a garment that is only worn for a couple of months and makes sense to share between multiple users. Additionally, in collaboration with the government, the 'lease a jeans' model may be offered as part of a program to challenge obesity. This program would combine social and health aspects, by promising that the users jeans can be swapped for a smaller size once they lose weight. These examples illustrate the opportunities that are available to use leased products to tap into new markets and make a positive social impact.

OPTIMAL USE: FAIRPHONE



BACKGROUND

Fairphone was established in March 2010 to raise awareness for the sustainability issues in electronic supply chains and to collaboratively design a prototype of a fair smartphone. One of the goals of the campaign was to raise public awareness about how minerals used in smartphones and mined in the Democratic Republic of Congo have led to local civil conflicts. Soon it became clear that there was actual demand for a 'fair' phone, but their organisational structure was not fit for designing a 'fair' phone and bringing it to the market. In January 2013, the possibility of marketing their phones and generating money to reinvest in their long-term mission led to Fairphone's decision to start a social enterprise.

At this turning point Fairphone needed a partner with engineering expertise who would adhere to Fairphone's goal of improving supply chain conditions

and producing a high-quality smartphone made of conflict-free components. After a long search, Bas van Abel (CEO) and Miquel Ballester (Product Manager) found a mid-size smartphone factory (Guohong in Chongqing, China) that agreed to license their smartphone design to Fairphone for a small fee. Moreover, Guohong managers were willing to reveal who their suppliers were, to use some conflict-free components in the phones and to open their factory for a social assessment and a worker-managed joint fund. The expectation was that preselling 5.000 smartphones would generate enough to cover the down payment for 20.000 smartphones.

Since the goal has always been to involve the public, Fairphone chose to crowd-fund the initial investment need to produce the first batch of phones. The proposition was structured in the following way: customers could pledge to pay €325 upfront and receive a Fairphone by autumn 2013 when the threshold of 5000 customers would be reached. After three weeks of campaigning the 5000 phones were sold. Two weeks later the amount of phones sold exceeded 10.000. Fairphone's crowdfunding campaign raised substantial international media attention and by February 2014, Fairphone had produced and delivered 25.000 smartphones to customers in 32 countries worldwide.

Fairphone 2

Following Fairphone's ambition to be an industry leader not only in the design of their phone but also in ensuring

FAIRPHONE

Fairphone's mission

"We aim to create positive social and environmental impact from the beginning to the end of a phone's life cycle. We believe in long-lasting design, fair materials, good working conditions, and reuse and recycling."

maximum circularity (i.e. return of materials after the user lifecycle is complete) is an important topic to address. Currently Fairphone has a traditional model based on product sales. This means Fairphone loses control of the phones and it is unclear how many will be returned after they are no longer being used. This can be seen as a leakage point for valuable assets (i.e. technology, design and materials). The unique design of Fairphone 2 allows for a more circular business model, which could be realized by developing a leasing model for the second generation phone. Moreover, Fairphone is looking for new sources of income. Besides the phone leasing model, there is also the possibility for Fairphone to become a network provider (i.e. a service provider constructed in a white label manner).

CIRCULAR BUSINESS MODEL

Circular Design

Fairphone collaborates with a manufacturing company in China to improve labor conditions in the supply chain and use conflict-free materials. The phones are designed for a longer use phase and the Fairphone 2 has been designed as a modular, repairable phone.

Optimal Use

Since Fairphone 2 is a modular device, self-repair is easy. When a component of

the phone is broken the user can replace it by ordering a new part and following a simple manual to switching it out. Customer support during the repair process is also available. Moreover, software updates are offered for older Fairphone models so that prolonged use of the phones is possible.

FUTURE VISION

Fairphone-as-a-Service

Fairphone has successfully managed to design and build a modular phone, to offer customer support and spare parts in order to extend the product's lifecycle, and to attract a loyal customer base that supports Fairphone's mission of improving labor conditions and minimizing environmental pressure. They now aim to further increase their circularity by leasing the Fairphone 2 in a service contract (e.g. in a PSS model). Installing a PSS model creates a flow of phones back to Fairphone and its supply chain. Moreover, by creating a sound service model, customers are charged only for what they use during the contract period, at a fair price.

Where to start

Due to the need for a large amount of working capital, it is challenging to finance a leasing model. Therefore, it would be wise to start leasing the phones that come back after their first use cycle.

By creating a return flow and leasing phones multiple times (after maintenance, refurbishing, updating activities) prices for leasing the phones can be adjusted accordingly. For instance, the leasing fee for the newest model should be higher than for an older (but updated) model that is in its second or third use cycle. To stimulate the leasing of older models (and longer use in general), costs for using the phones (e.g. calling, texting, internet) can be made less expensive than for new models. If starting with new phones is preferred, increased funding is needed to pre-finance these devices, resulting in a delayed breakeven point (also see step 6).

Role of the supply chain

Ideally, to create a successful PSS model, collaboration with manufacturers upstream in the supply chain should be established. Since the phones are returned after they have been used, these upstream manufacturers could be involved in the maintenance, repair and refurbishing activities. Moreover, when the phones are too old to enter an additional use cycle, Fairphone and the manufacturers should agree on a residual value of the devices. Agreeing on who is responsible for what parts and on the internal and residual value (e.g. in the supply chain network) of a new, second cycle and third cycle phone allows Fairphone to put a price on every step in the circular process. Moreover, this can be used as the foundation for setting prices for service contracts (also see step 3).

ATTRACTING FINANCIERS

To attract financiers Fairphone has to convince potential investors of the

soundness of the new business model and its capability to succeed. Moreover, risks and rewards should be carefully balanced. Evident risks of the PSS model lie in the lack of incentives for the consumer to take good care of the phone, debtor risk, and lack of liquidity due to high working capital requirements.

Customer incentives

If the user is not the owner of the phone, there is a risk of moral hazard. In order to incentivize users to take good care of their phone, Fairphone can ask for a deposit which is returned to the customer if the phone is returned in good condition. Moreover, customers could be rewarded in the form of a discount on a new contract if they have proven to be careful users. Longer use of the phone can be stimulated by a reduction in costs for calls or data the longer the phone is used. This incentivizes prolonged use of the same device versus switching to the newest model. Finally, returning the phone has to be incentivized by a reward for returning it. If not there is a risk that old phones end up in customer's drawers instead of being added back to the supply chain.

Ownership of the phones

There are multiple ways to structure the leasing of the phones. This also has to do with the question of who becomes the owner of the phones. There are several scenarios of ownership. These three scenarios were discussed with Fairphone however, there are many different possibilities and these are merely examples.

1. Fairphone stays owner of the phones.

If Fairphone stays owner of the phones they are solely responsible for pre-financing them. They then has to attract funding for this business model. The difficulty with this scenario is that the supply chain needs to have an incentive to create more durable, modular phones. Contracts can help this, but when the revenue model in the chain is based on selling more stuff (e.g. new parts sold to Fairphone) the members of the supply chain remain at odds with an optimized, circular solution.

2. Supply chain stays owner of the phones.

This requires collaboration between supply chain actors in which the phones are owned by the consortium of the supply chain (including Fairphone). This allows for the sharing of the burden of pre-financing the phones, but also increases interdependence between the actors. Important advantages of this structure are that it incentivizes suppliers to create more durable, modular devices and everyone in the chain will benefit from decreasing costs for repair, refurbishment, et cetera.

3. Fairphone shares ownership of the phones with the end-users.

In this structure ownership is shared with the end-users. Customers can invest in Fairphone and besides receiving a future return on investment they receive the phone as a service. This can also incentivize proper use of the phones, since the users are stakeholders at the same time. They benefit from careful use of the phones in order to minimize maintenance and repair costs for additional use cycles.

Responsibilities and Insurance

From a 'product as service' perspective it would make sense to construct a full service lease. This means that maintenance and repair costs are included in the lease fee and Fairphone is responsible for these costs. However, there can be incidents of phones getting broken due to poor care by users and it is Fairphone's responsibility to create contractual clauses providing the right incentives for both Fairphone and their users. Moreover, by insuring the phones the uncertainty of the costs of maintenance and repair can be reduced.

White label network as value added and risk mitigation

In addition to adding services like maintenance and repair there is also the opportunity to provide the service of using the Fairphone in combination with a network connection. This would entail collaboration with an existing network provider that offers a white label network. The advantage of this is increased control over the phones, which can be used to mitigate debtor risk. Moreover, collaborating with a network provider adds value to the PSS proposition since both the phone and the network connection are serviced, unburdening the user. Note that when the clients are businesses (B2B), a white label construction is less important since companies with a good track record impose less debtor risk on Fairphone.

Considerations from a financiers' perspective

To finance this PSS model a collaboration with a financial service provider, for instance DLL (a financial service provider

specializing in lease structures) could be a possibility. In this scenario DLL would become owner of the phones, shifting debtor risk, as well as the company's working capital constraints to DLL. In this scenario Fairphone and DLL would agree on a structure for returning the phones to Fairphones' supply chain after being returned to DLL. However, this structure can currently only be applied for B2B leases, due to debtor risk and increasing transaction costs for B2C leases. Moreover, substantial scaling of this financial collaboration is needed in order to make it viable (e.g. due to overhead and transaction costs).

An additional option for financing large amounts of assets without creating risk for the company is to structure a special purpose vehicle (SPV). An SPV is a separate entity in which the assets are situated. However, such an SPV is only viable when the assets are valuable enough to serve as collateral, in case of default. In this case, it is Fairphone's must to organize and sustain an integrated system of cycling assets, thereby attracting and retaining customers in the long term, to compensate for the reduced value of the phones. Financiers are less likely to be interested in financing an SPV than to be interested in financing the company Fairphone, because of their loyal customer base and strong brand.

Fairphone is currently exploring what structure will fit a PSS model best. To be continued.

CHAIN COLLABORATION: WATER SYSTEM AS A SERVICE



BACKGROUND

Three businesses are collaborating on creating a sustainable water system that will be offered through a circular proposition. Homij is the installation company for the system in the building, M.J.Oomen is concerned with the system outside of the building and Mijn Waterfabriek is the company offering sustainable water systems that use rain and sewage water in a closed circular system. These three companies (henceforth the consortium) can build a water system that operates off the (tap water and sewer) grid, by only using the influx of sky water. All (grey and black) water is cascaded and can be purified on site and used in new water cycles. This means theoretically 99.99 % of drinking water (from the tap water grid) can be saved (Mijn Waterfabriek, M. J. Oomen, and Homij 2016).

This sustainable water system consists of three steps. First, water saving douches,

toilets and faucets are installed, yielding a 30-40% reduction in drinking water use. Secondly, sky water is collected and purified. This purified skywater can be used for washing and showering and is of drinking water quality, yielding a 40-95% reduction of drinking water. The third step is to purify waste water organically, by using a helophyte filter and return the purified water to the building to be used in toilets and for other uses that do not require drinking water quality. These three steps allow for cascading water, with the potential to create a water neutral building or residential area. It should be noted that the law currently obliges a connection to the water network for drinking water. However, in the future, sky water can be used to replace drinking water obtained from the water network (Mijn Waterfabriek, M. J. Oomen, and Homij 2016).

The consortium has the potential to make a two-fold, circular impact. As explained, their water infrastructure will use sky-water and wastewater in circular cycles. Besides using water in a circular manner, they aim to offer the infrastructure necessary to achieve this in a circular manner. This means that the value proposition of the water system is not a one-time sale, but a recurring fee i.e. the water system will be offered as a service (henceforth WAAS). Delta Development, developer of the new business department of the Circular Valley, requested a proposition for a Water System as a Service, coming up with a price per m³, a work spot fee or another logical entity.

Note that this consortium has not established a formal collaboration at the

moment. The structure of this project will be decided based on further analysis of the PSS potential of WAAS.

CIRCULAR BUSINESS MODEL

Optimal Use

The business model created for (WAAS) is a product-service combination. The costs for the customer will be predictable (fixed fee) and the responsibility and ownership of the system - including maintenance and repair - is for the consortium. The customer of the WAAS can be the developer, real estate investor, or the end-consumer (i.e. the users of the building) (Huijsmans and Bel 2016). The business model has to be shaped around the value contributed by all three parties. In other words it is a supply chain collaboration that can only be realized if an agreement is reached that addresses the responsibilities of all of the parties and the legal structure of the agreement.

Network Organisation

This collaboration can yield a substantial increase in value, because continued responsibility for the water system can incentivise collaboration in order to optimize the entire system instead of focusing on company specific gains. Through this collaboration, systems will be built to last longer and will be monitored regularly in order to circumvent the large costs associated with system breakdowns. The materials used to build the system must also be of outstanding quality in order to minimize maintenance and repair costs over time. Moreover, building systems for easy repair and disassembly will enable frequent monitoring. Creating such a water infrastructure involves long-term, modular thinking.

Challenges for the Business Model

Structuring value chain collaboration

Challenges lie in the newness of these value chain collaborations. Pioneering is required in order to develop the right legal structures, underlying contracts and financial instruments. Parties involved will deliberately become more mutually dependent by adjusting processes to better connect to the processes of other supply chain members, in order to capture added value.

Therefore, it is important to strike a balance between depending on one another and remaining flexible as an organisation. A legal structure such as a joint venture or foundation can provide solutions for this dilemma as they can exist as a third party

Incentivising a circular system

As stated above, a circular water system should be designed for a long lifespan, accessible for maintenance and repair, and in the end, easily disassembled in order to upcycle or recycle modules and materials. Additionally it should be designed with quality in mind in order to minimize maintenance and repair costs during its operating period. The revenue model for regular one-time-sales business models is to sell as much and often as possible. In reality this leads simply creating a product that is of poor quality but can last until the next sale in order to keep customers happy (VPRO Tegenlicht 2015).

In order to create a circular system incentives in the supply chain must be aligned to create a collaborative environment

with a shared goal of generating revenues by offering optimal water services. One question to address when developing such a collaboration is, whether other parties besides the consortium should be involved in this collaborative environment as well. For example, companies upstream in the chain manufacture the installation and pipes. This means the consortium should involve these manufacturing companies in order to create installations and pipes that are in line with the circular requirements for the WAAS proposition. The pipe and/or helophyte filter manufacturer can improve their manufacturing processes to align with the needs for the WAAS proposition. However, including more parties in the consortium will also lead to more complexity during the decision making process and when managing stakeholders. Here a trade off appears between increasing incentive alignment and reducing complexity.

FINANCIAL ASPECTS

As stated above, this consortium does not have a formal way of collaborating at this time. The business model outlined is currently under development and has not been installed or financed. The goal of WAAS is to develop a financially viable business model around the sustainable water infrastructure in a product-service combination. The investment has to be covered with a recurring fee (i.e. contracts with customers).

Companies struggling with financing their PSS business models are looking for tools to connect with financial institutions and overcome the barriers that arise when attracting funding. This has led to the request to develop

a financeable PSS business model. However, financial institutions request more insights into actual financial ratios, statements and cash flow projections in order to understand the long term financial reality of PSS business models and the potential benefits and risks they imposes on financiers.

VALUE RECOVERY: RECOVER-E

Research by Vermunt et al. (2016) found that Recover-E and Green Mobile have no financing challenges. Additionally, FinanCE working group (2016) also found that value recovery models have no specific circular financing challenges. On the contrary, they have less financing needs due to the nature of their businesses. The following case studies aim to verifying this assumption.



BACKGROUND

The ICT Industry is heavily dependent on (scarce) metals and minerals. The EU's own domestic production of these metals is limited to about 3% of the world's production⁸ and therefore depends on imports. The market prices for these scarce raw materials are likely to increase in the near future and are highly volatile.

The Recover-E Foundation, an initiative

established by Royal Haskoning DHV and SiSo, recovers used ICT equipment from companies and provides the ability for users to reuse the refurbished equipment. They lease the second hand ICT equipment and recycle the materials when receiving them after the second use cycle. This way Recover-E takes a first step in reducing the industry's dependency on raw materials, which is important for the entire ICT value chain.

CIRCULAR BUSINESS MODEL

Optimal Use

When entering into the Recover-E program a contract is drafted with a typical term of 2-4 years. All new equipment that is purchased by the client company over the duration of the contract is registered into the Recover-E program.

During the products' lifetime, Recover-E provides free services such as management of the assets (new, re-used, spare parts, etc.), registers all movements of the assets and plans all of the services, including logistics. The only responsibility of the user is to provide the labelled equipment and make it available to the Recover-E Foundation after it is no longer being use.

Value Recovery

Recover-E's main goal is to recover ICT 'waste' and refurbish equipment to it can gain a second life. SiSo, an ICT life cycle manager, collects the used equipment and the Salvation Army is supporting Recover-E with the handling, testing, refurbishing and disassembling it.

First cycle

Depending on the state of the recovered equipment, Recover-E offers a buyback incentive for used equipment that is determined by calculating the net benefit that the company can earn from the re-use and recycling of the equipment in a second and third cycle. On average, laptops yield an amount that meets current resale prices (e.g. € 50), but if they are unable to be reused, the net benefit is actually a cost and the customer has to pay for disposal of it. In this way the model provides an incentive for the user to manage their equipment properly. The foundation is contractually obliged to settle the buyback price within six months, which provides time to determine the equipment's actual residual value.

Second cycle

Refurbished equipment is leased out via the webshop for a period of at least two years with warranty. After 2 years the equipment can be used longer at no additional cost, but warranty is void. A deposit of 50 euro for a laptop/desktop and 25 euro for a screen is paid when the customer initially receives the equipment and will be returned to the customer when the equipment is returned in working order. Instead of periodic payments, a lump sum is paid for the whole 2 year period. Note that a two year warranty is quite exceptional for refurbished material and currently knowledge is being gained around the feasibility of such warranties (Kimmel 2016). After the 2 year period the customer has the choice to keep using the equipment for free, without service and warranty, or extend the contract in combination with

a new product. In all cases the equipment is returned to Recover-E after it is not longer in use and the deposit is paid back to the customer.

Third cycle

Only after its second use cycle is the equipment prepared for recycling.



We are used to looking at each link in a chain separately, but investments at one point in the chain can create a return somewhere else.

- Kimmel, 2016

Organisation between all business activities and managing data relating to ICT products, parts and materials is central to the value proposition of Recover-E. This collaboration enables all chain partners to share responsibility, which is an important driver for a circular economy⁹. To optimize product, waste, information and financial flows throughout the value chain, Recover-E uses LogIT, a track and trace system that records information during the life cycle of the equipment.

To manage all business activities and information, an independent platform was required (special purpose vehicle) for which Recover-E established a foundation. A foundation was chosen because it is very flexible, provides Recover-E with a sustainable image, is a vehicle for independent and transparent communication between all stakeholders and allows



Recover-E is like a bank: clients have an account and their assets are managed.

- Jan-Paul Kimmel

for subsidies and donations to be made (Jonker 2015; Kimmel 2016). The foundation is not-for-profit, but the selected service providers (i.e. Royal Haskoning DHV and SiSo) receive a service fee that includes a profit margin.

The European Fund for Regional Development (EFRO) funded the development of the business model, the creation of contracts and other administrative tasks for the company.

While defining the structure of the business model, a foundation was established that manages the assets and solves pre-financing problems by paying for resources (i.e. used ICT equipment) after the residual value is proven.

To overcome the hassle of managing invoices, a lump sum is paid for using the equipment during its second life and comes with a corresponding 2 year warranty by contract.

Innovation of recycling and recovery is funded out of the foundation's Innovation Fund, which is maintained by a proportion of revenues generated from the re-use of ICT equipment. Additionally, a separate reserve is held to account for a certain percentage of failures, as Recover-E is not insured for the 2 year warranty period.

To make this lease concept even more viable, green finance could be involved to reduce interest payments.

Challenges

Vermunt et al. (2016) found that large ICT departments have difficulties reusing ICT equipment, as they prefer to use new hardware. Additionally, large companies are not concerned with the equipment after they are no longer using it. Recover-E has also experienced that employees are not treating their laptops with care. For example, they put them in their bags along without proper protection (Kimmel 2016). A way of rewarding employees when they treat their equipment well could be a means of improving this issue.

FUTURE VISION

Recover-E aims to deliver a blueprint of a viable business model for managing operational leases (and other processes) to those that want to change to a circular business model.

Eventually Recover-E would like to become a material bank. The materials, parts and products that are recovered from a particular customer can easily flow back into the chain for that same customer.

Lastly, the B2C market is being explored but comes with various challenges, particularly the monitoring of the assets and credit ratings of customers.

VALUE RECOVERY: GREEN MOBILE



BACKGROUND

In the Netherlands 4-6 million mobile phones are sold per year and it is estimated that 15-21 million used phones are kept unseen in drawers and cupboards. Globally, this amounts to 2 billion phones that are being produced annually. The total amount landfill that has accumulated from old mobile phones amounts to 160 million tons. Not only does this cause pollution, it is potentially a valuable source of minerals¹⁰. Green Mobile, founded in 2014, taps into this value by providing refurbished mobile phones to customers (B2C) and green mobiles as a service to the business market (B2B).

CIRCULAR BUSINESS MODEL

Optimal Use

Green Mobile provides a Product-as-a-Service model (B2B) where end-users (employees) swap their phone for

a new Green Mobile phone every year for a period of three years. Included are repair services in case of damage and a substitute phone in case of loss or theft. This PSS model is an operational lease construction and was newly developed in collaboration with De Lage Landen (DLL). DLL innovated to structure the lease of refurbished phones as opposed to new ones.

Value Recovery

Individuals as well as companies can return any their used or defected smart-phones in return for money or a voucher. The bulk (80%) of the returned phones are Apple or Samsung and are well-suited for re-use (Werff 2016). These phones are being investigated, disassembled, cleaned and tested to refurbish them into perfect, functioning smartphones. Efficiency of disassembly would increase drastically if this would be standardized due to that fact that after disassembly the different parts and components cannot be directly reused and are instead sent to Umicore (Belgium) to be recycled.

FINANCIAL ASPECTS

Green Mobile applied for funding from an innovation fund, but was refused because the fund was targeted to inexperienced starters. They were recommended to apply for a regular bank loan, however, not one of the three big banks in the Netherlands were willing to provide them a loan. The loans were denied not because of the business case itself but because of the banks were downsizing and restructuring at that time and the circular economy was not yet a focus

area in the Dutch banking sector. Now days it is easier to collect bank credit to fund business activities according to Werff (2016). Finally, a private equity fund was willing to invest and a crowd funding campaign for €100.000 was posted live and closed within 6 hours.

The refurbishment of the phones is mainly done by hand thus, there is no high technological process involved. This lack of technology processes leads to less funding needed for innovation and upfront costs are much lower for used phones compared to new ones however to scale up this business model funding is always needed.

FUTURE VISION

Consumers are becoming more and more aware of the cost savings realised when separating the purchase of a smartphone from their network subscription, Werff (2016) expects that the market for refurbished smartphones will grow because of this.

Green Mobile hopes to develop a machine that automatically dismantles a certain inserted phone and fills containers with all the different components and materials such as gold, copper, silver and platinum. The only manual task is to enter the phone's type, model and some other characteristics of the smartphone into the machine. This would require high technological innovation and drastic changes in the nature of the business model. This would therefore also require a different kind of funding.

VALUE RECOVERY: BLACK BEAR CARBON



BACKGROUND

Black Bear Carbon uses old tires to produce carbon black, an additive for coatings, ink, tires, plastics and rubbers. Contributing to solving the climate crisis and reducing the amount of burning or landfilling of used tires is their goal. Moreover, the traditional process for producing carbon black consumes a high amount of energy and heavily pollutes the environment. By using only tires, Black Bear Carbon saves five tons of CO₂ for each ton of carbon black they produce and currently saves around to 20.000 tons of CO₂ annually (Financieel Dagblad 2016a).

Black bear Carbon started producing carbon black and executing different steps in the production process in different locations in Germany. The market, with clients such as Michelin and AkzoNobel, require high quality carbon black and they demanded thorough testing before

shifting to this new source. In 2014, when larger clients were convinced of the high quality of Black Bear Carbon's carbon black, the company formed a joint venture with Kargro Group, called 'Dutch Green Carbon'. A factory was built in Nederweert where all of the production steps were combined. Since the summer of 2016 the factory is fully operational and is capable of processing 1,5 – 2 million tires per year (Financieel Dagblad 2016a).

CIRCULAR BUSINESS MODEL

Value Recovery

Black Bear Carbon, recovers value from used tires by shredding them into rubber granulate, which is in its turn recycled by means of pyrolysis. Pyrolysis uses heat in the absence of oxygen to decompose the granulate to yield volatile gases (10-15%), oil (45%) and carbon black (40%). The gases can be used to generate electricity for the pyrolysis process. This process allows for the recovery of carbon black from old tires and ensures the process will result in high quality material, making it suitable for coatings, ink, tires, plastics and rubbers (RvO 2010).

Challenges for the Business Model

A challenge for Black Bear Carbon is the competition it faces with low priced virgin carbon black due to low oil prices. On the other hand they have a competitive advantage thanks to the high quality of their carbon black which is used by specialized segments and can be offered at a competitive price.

Another challenge they face is how to convince potential customers of the benefits of the circular product. Since industries are used to carbon black of a certain quality, made by a certain process, offering this material from a different source and produced with different technology heightens customer's doubts.

Lastly, the classification of waste and non-waste is a limiting factor. The by-product created in the pyrolysis process – oil – is difficult to sell since it is defined as a waste product. Nevertheless, using this oil is much better for the environment than using crude oil (Kuile 2016).

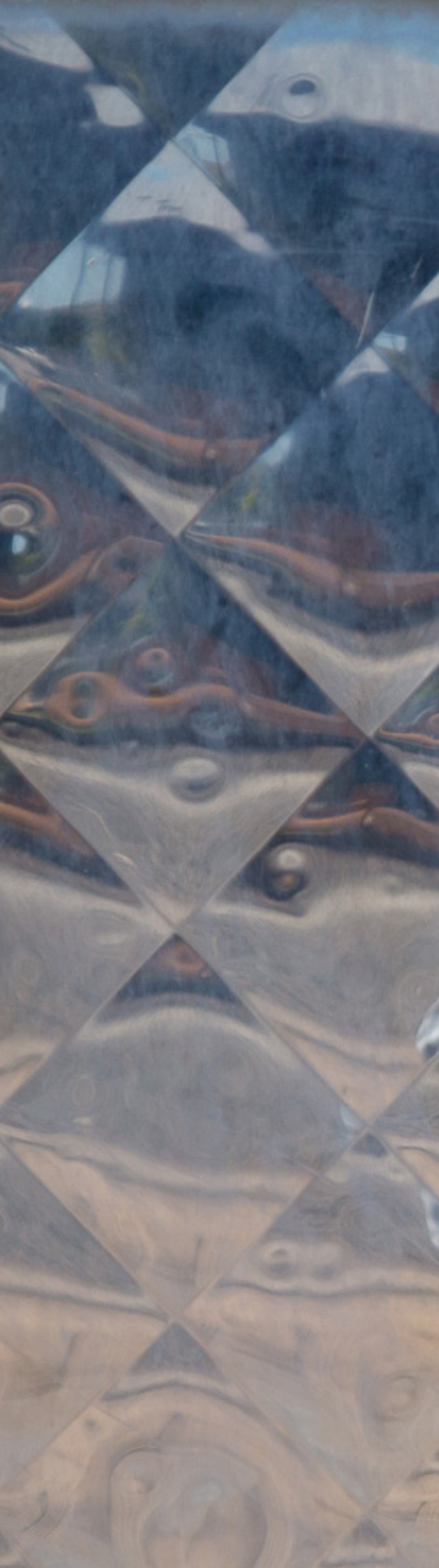
FINANCIAL ASPECTS

Funding Black Bear Carbon

European and Dutch subsidies funded the initial development of Black Bear Carbon's technology. This experimental process took place at three factories in Germany and when the technology was sufficiently tested a partnership was initiated with the company Kargro. Black Bear Carbon and Kargro founded the joint venture Dutch Green Carbon and €10 million was raised for building the first factory. The basis of this funding was an equity investment by both companies and based on this equity investment, Rabobank and the energy fund of Limburg (Limburgs Energiefonds) stepped in to help. Pre-existing relationships with Rabobank helped to create trust in the project. Moreover, MIA & VAMIL subsidies have been supporting the business over time, providing tax benefits on the investments. Risks have been reduced by aligning the interests of the partners and sharing the company's learnings (Kuile 2016).

FUTURE VISION

Besides further growth in the Dutch market, the company's goal is to expand their operations in Europe and globally. The global market for carbon black equates to €12 billion and the technology they have developed is scalable. Black Bear Carbon calculated that the amount of tires world wide are enough to build 800 factories like the one in Nederweert (Financieel Dagblad 2016a). Therefore, the expansion potential for Black Bear Carbon is promising. If the current factory delivers a positive proof of concept this could be the basis for international expansion in the form of factories or licensing of the technology to other companies (Chemelot Ventures 2015).



Notes

1. <http://www.indexmundi.com/commodities/?commodity=cotton&months=120>
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