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# FINANCING BUSINESS MODEL INNOVATION: BANK LENDING FOR FIRMS SHIFTING TOWARDS A CIRCULAR ECONOMY

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Sustainable Finance Lab working paper

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# Financing business model innovation: bank lending for firms shifting towards a circular economy

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**Abstract:** In the current wave of circular business model innovation (BMI), access to finance for BMI emerged as a key constraint but remains unaddressed in the literature. We fill that gap by studying access to bank finance for BMI using the current wave of circular BMI as an empirical base. We study the importance of different business model components for bank lending techniques using qualitative data obtained from banks and firms engaged in circular BMI. On the one hand, we assess bank willingness and lending technologies used to lend to enterprises that innovate towards circular business models. On the other hand, we document financing challenges of circular enterprises that applied for bank credit. Our results show that finance for circular business model innovation creates a shift from assessment based on (standardized) assets towards (future) cash flows as a basis for bank lending. We also find that per lending technology, different components of the business model are assessed by banks. Banks mostly assess BMI based on evidence of future cash flows, relating to the value capture part of the business model and, in the case of account receivables, on contract terms and quality of customers. Building relationships with banks, suppliers and customers shows to be a promising route for financing BMI. Asset-based lending for BMI is underdeveloped due to firm- and context-specific assets (resources) but can be improved by standardization, modularity and flexibility as well as secondary market development. Our findings have strategic implications for innovative firms looking for bank finance and banks aiming to finance (circular) BMI.

JEL codes: D24, D62, G11, G21, L22, L26, O35

Keywords: business model innovation, lending technologies, innovation finance, circular business models, bank lending

# 1 Introduction

Business model innovation (BMI) is a crucial activity for firms to sustain competitive advantage in the market place under changing circumstances (Chesbrough, 2010; Schneider and Spieth, 2013; Teece, 2010; Wirtz et al., 2016). Much of the BMI literature evolved from the shift towards internet-based companies in the 90s and 00s (Achtenhagen et al., 2013; Foss and Saebi, 2017). Currently, the BMI literature is fuelled by a need for companies to deal with worldwide environmental challenges and adjust their operations to create value for a closed-loop (circular) economy while at the same time capturing value for the firm itself (Bocken et al., 2014; Hall and Wagner, 2012; Kortmann and Piller, 2016; Rauter et al., 2017; Schaltegger et al., 2015).

A crucial and well-known constraint of developing innovative activities is obtaining external finance (Colombo and Grilli, 2007; Hall, 2010), especially for SME's and young firms (Angilella and Mazzù, 2015; Beck and Demirguc-Kunt, 2006; Brown et al., 2009; Lee et al., 2015). Credit constraints arise primarily from informational opaqueness between the firm and its potential financiers, moral hazard issues and high transaction costs (Carpenter and Petersen, 2002; Hall and Lerner, 2010; Myers and Majluf, 1984; Stiglitz and Weiss, 1981). Lack of collateral and financial track record inherent to intangible R&D investments aggravate these constraints (Brancati, 2014; Cincera and Santos, 2015; Hall and Lerner, 2010; Lahr and Mina, 2014; Mina et al., 2013).

Although access to external finance has been recognized in the business model literature as a crucial constraint for BMI (e.g. Bocken et al., 2014; Linder and Williander, 2015; Schneider and Spieth, 2013; Zott and Amit, 2010), it is remarkable that to date there has been little structured effort to analyse how to improve firm access to external finance for BMI. Along with the growing literature on using BMI to reap profits *and* solve environmental challenges (Foss and Saebi, 2017), understanding how to improve access to finance for BMI appears highly relevant. Also, BMI is argued by some to be a prerequisite to reap the benefits of shifting to a more environmentally friendly way of doing business (Hall and Wagner, 2012). Specific types of BMI can inform the BMI literature more generally, just like the business model concept evolved on the back of internet-based business developments in the nineties (Amit and Zott, 2015).

In this paper, we study circular (closed-loop) supply chain BMI to 'jumpstart' academic understanding of the relationship between BMI and finance. In particular, we focus on the role of banks in providing external finance, building on the innovation finance literature in this field (Brancati, 2015) and noting the large role of banks in providing business funding, in particular to SMEs (Cincera and Santos, 2015; de la Torre et al., 2010; Giudici and Paleari, 2000). Credit constraints are empirically understudied and

when studied, indirect measures are often used due to the difficulty of observing credit demand and supply (Brancati, 2015). Our qualitative data collection approach allows us to collect fine-grained insights about bank lending decisions that are otherwise difficult to access. We study the current wave of circular BMI to address the following research question: *How can firms obtain bank finance for (circular) business model innovation?*

The remainder of this paper is structured as follows. The theoretical framework consists of an overview of the BMI literature, with a focus on circular (sustainable) BMI, and we link lending technologies used by banks to evaluate potential clients. Section 3 describes our case-study methodology. In our findings section, we elaborate on the role of business model components in the bank credit decision and discuss these in section 5. We find that bank lending for BMI is indeed a constraint, mainly due to lack of track record and specificity of assets. Access to bank finance for BMI can be improved in the first place through relationship building with value chain partners (suppliers and customers) and banks, and secondly by 'proving' capture of future cash flows (through customer contracts/orders). Asset-based lending is enhanced by secondary markets that indicate residual values as well as by standardization, flexibility and/or modularity of assets.

## **2 Theoretical background**

### ***2.1 Business model innovation (BMI): generic, sustainable and circular***

Firms commercialise new ideas and products through their business model but also innovate the business model itself to stay competitive in the market place (Chesbrough, 2010). The business model concept has evolved over the past few decades, with considerable efforts undertaken to merge towards a common definition and understanding (Wirtz et al., 2016; Zott et al., 2011). Within this field, BMI has become a key topic (Amit and Zott, 2015), with particular attention given to the components of a business model that can be affected during the innovation process (Gambardella and McGahan, 2010; Osterwalder et al., 2005; Schneider and Spieth, 2013; Teece, 2010). A review of the business model literature by Wirtz et al. (2016, p. 41) resulted in the following definition of a business model, which we adhere to in our paper:

*"A business model is a simplified and aggregated representation of the relevant activities of a company. It describes how marketable information, products and/or services are generated by means of a company's value-added component. In addition to the architecture of value creation, strategic as well as customer and market components are*

*taken into consideration, in order to achieve the superordinate goal of generating, or rather, securing the competitive advantage.”*

A business model is often defined in terms of its components, which allows for a higher level of specification and allows us to be more specific about where in the firm business model innovation is taking place (including its impact on financing). We apply the review article of Wirtz et al. (2016) and interpretations of others (Bocken et al., 2014; Osterwalder et al., 2005) to define three main parts of a business model and their subordinate business model components (see Figure 1). First, the value proposition describes the market offering of the company. *Second*, the value creation and delivery includes the firms’ strategy, resources, network (partners) and target customers. *Third*, the value capture component includes revenues and costs.

Value proposition	Value creation and delivery				Value capture	
Market offering	Strategy	Resources	Network	Customers	Revenues	Costs

**Figure 1: Business model innovation framework. Adapted from Bocken et al. (2014) and Wirtz et al. (2016)**

Within the business model literature, BMI addressing environmental and/or social challenges receives increasing attention both in academia and practice. This type of BMI is addressed from different angles: sustainable business models (Bocken et al., 2014; Boons and Lüdeke-Freund, 2013; Rauter et al., 2017; Schaltegger et al., 2015); circular business models (Linder and Williander, 2015; Murray et al., 2017) and business models for closed-loop supply chains (Kortmann and Piller, 2016). These literature streams have in common that different (archetypes of) business models are developed and analyzed for their ability to create societal value, with a common assumption that BMI should allow societal value creation and private value capture to co-exist in a firm’s business model (Bocken et al., 2014; Rauter et al., 2017).

Many firms are currently strategizing to shift from a ‘linear’ business model to a ‘circular’ business model. In a linear business model, value creation is based on an incoming virgin material flow, which is manufactured, consumed and deposited as ‘waste’. In a circular business model, “value creation is based on utilizing economic value retained in products after use in the production of new offerings” (Linder and Williander, 2015). This means that firms carrying out circular BMI act or collaborate in one or more parts of the value chain to optimize use and recover value from their product. This is very similar to the concept of closed-loop supply chains, in which firms take responsibility for the entire lifecycle of the products they produce, both to save the environment and to maximally

recover their investments into a high quality product (Kortmann and Piller, 2016). Just like closed-loop supply chains, circular BMI can be categorized based on their place in the value chain: pre-use (design and manufacturing), use (during customer use) and post-use (refurbishment and recycling) product phases (Achterberg et al., 2016). Often, circular enterprises strive to retain product ownership since this improves their ability to organize return logistics of their products (Linder and Williander 2015).

The three types of circular BMI affect business model components differently. In the design and manufacturing phase (pre-use), products (tangible resources) are designed, developed and manufactured in such a way to increase longevity and-/or ease of maintenance, repair, upgrades, refurbishment, remanufacturing or recycling (Achterberg et al., 2016). This affects the resources used in the business model: materials are developed and-/or sourced according to a set of criteria e.g. renewables, bio-based, low resource intensiveness or full recyclability (Achterberg et al., 2016; Bocken et al., 2014; Lewandowski, 2016). Additionally, the value proposition can change when aiming to address a customer need with lowered resource use, which can also affect the target group of *customers*. *Costs* arise due to (re-)design of a product, mostly related to R&D. *Revenues* may be affected if the customer base needs to be grown from scratch and depending on the pricing strategy.

Second, retained ownership and servicing of products by the firm is a core BMI strategy taken by firms in the use phase (Mont, 2002; Tukker, 2015). Services such as repair and maintenance, upgrades, extensions or extended support are added to the value proposition to increase the product lifecycle. Product-service system (PSS) BMI entails a shift from selling a product to servicing a product (Ceschin, 2013; Gaiardelli et al., 2014; Maxwell and van der Vorst, 2003; Reim et al., 2015; Tukker, 2015). This ownership shift creates a financial incentive for the firm to invest in longevity and re-use of products and materials (Baines et al., 2007; Bocken et al., 2014; Mont, 2002; Tukker, 2004; Williams, 2007). However, it also entails tying up large amounts of capital, leading to a shift of financial risk from the customer to the firm (Linder and Williander, 2015). Increased contract length can lower this risk but may lead to a less attractive customer value proposition (Besch, 2005). Also, cost and revenue uncertainty are high compared to investments required (Linder and Williander, 2015). In a case analysis of shifting from a sales to a service business model for baby prams, Mont et al. (2006) note that this shift leads to higher expected profits but delays incoming revenue, creating an external finance need. Furthermore, the pram design is adjusted to increase longevity and decrease cost of upgrading between users to make the service model more feasible (Mont et al., 2006). Other 'use' BMI types are: sell/buyback, sharing platforms, lifetime extension and tracing facilities (Achterberg et al., 2016; Bocken et al., 2014; Lewandowski, 2016).

BMI in the 'use' or customer phase affects the value proposition and strategy by setting up an integrated product service solution and increasing customer engagement/retention. It entails intensive use of specific partner networks to deliver an integrated product service offering. Finally, a shift in *revenue* structure occurs when moving from sales to servicing which also affects its *costs* (high upfront investment costs and long payback period).

Circular *post-use* BMI increases the added value of a product at the end of its lifecycle. Revenue is generated through recapturing and refurbishing products, components or material, recycling or second-hand sales (Achterberg et al., 2016; Bocken et al., 2014; Lewandowski, 2016). This process requires an accessible take-back program and technological expertise. Some products might not be suitable for this type of business model, such as fast-moving consumer goods (Linder and Williander, 2015). Post-use business model innovation may impact the value proposition and related the customer base if the recovered products, components or materials lead to alternative, non-virgin material use. Recovering materials as input for a new value proposition requires building unique supplier and logistical *networks*. Furthermore, the *cost* structure shifts away from material costs (since 'waste' is used) towards refurbishing and/or recycling costs, which can require high upfront investments into infrastructure (e.g. refurbishing plant). *Revenue* can be affected depending on whether the value proposition and the target customer are altered due to marketing recycled material, components or products.

Table 1 gives an overview of how business model components are affected in linear and different types of circular BMI.

**Table 1: 'Linear' vs. circular business models; framework based on Wirtz et al. (2016), Bocken et al. (2014) and Linder & Wiliander (2015)**

Business model/ business model components	Value proposition	Value creation and delivery				Value capture	
	market offering	strategy	resources	network	customers	revenues	costs
<b>Generic (linear)</b>	Product or service	Create company value added/ serving a market	Tangible and intangible assets	Mostly uni-directional (selling), limited interaction	Linear relationship, selling point, limited after sales	For the firm (economic value), sales oriented	Materials, labor
<b>Pre-use (design and manufacturing)</b>	Longevity, reparability, re-usability of product, high price, product category restriction	Serving a market, lowering resources dependency, solving resource depletion and facilitating resource recovery,	Tangible assets, designed for longevity and/or modularity and/or recyclability	Mostly uni-directional (selling), long-term customer relationship, partner restrictions	Linear relationship, selling point, customer restrictions	Higher prices, longer time between sales due to durable product / material, possible service revenue	Higher upfront costs for design and manufacture of durable materials / components / products
<b>Use (services)</b>	Integrated product and service solution, product category restriction	Serving a market and solving a lifecycle problem	Combination of intangible assets (services) with tangible assets (not necessarily owned)	Bi-directional, partner restrictions, large customer network / economies of scale for sharing platforms	Over lifetime, customer restrictions	Services, solutions, long-term spread out cash flow from contracts and fees	Labor, high upfront investment for products, ICT investment for sharing platforms and/or monitoring
<b>Post-use (refurbishment)</b>	Recycled materials, re-furbished products, higher residual value, product	Serving a market and solving a waste problem	Tangible assets, recycling technologies	Bi-directional, partner restrictions	Closing the loop, possibly customer restrictions	From recaptured of used materials / components / products	Lower costs due to use of recycled materials, higher costs for collection and/or refurbishment/recycling

	category restriction						
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## **2.2 Bank finance for BMI**

Firms, especially SMEs and start-ups, rely on external sources of finance both to fund day to day business activities (i.e. working capital) and for investments into innovation (Cincera and Santos, 2015). Bank credit represents the major share of external finance for SMEs in Europe and over 80% in the Netherlands (Beck and Demirguc-Kunt, 2006; Cincera and Santos, 2015; DNB, 2015; European Commission, 2014).

*Strategies* of innovative firms are high risk (Brancati, 2014); the majority of innovations fail (Mazzucato, 2013). High expenditures on wages and salaries, high uncertainty about the outcome of the investment (value proposition) and intangible capital creation in the form of tacit knowledge of employees create financing constraints for innovative activities (Hall, 2010). The high uncertainty of return at a project level is argued to be particularly problematic for SMEs since they are not able to build an innovation portfolio like large firms (Lee et al., 2015). Innovative firms invest in intangible (R&D) and tangible firm-specific assets (resources), whose context-specificity makes them difficult to use as collateral (Brancati, 2015; Carpenter and Petersen, 2002). Even when R&D investments are registered as patents, their salvage value is likely to be low if the firm goes bankrupt (Hall, 2010). Lack of historical cash flow data (revenues and costs) is mentioned specifically as an obstacle to financing innovation (Hall et al., 2016). These aspects are summarized in the BMI framework (section 2.1).

Banks invest in proprietary information gathering (Boot, 2000) and develop different methodologies for extending credit, referred to as lending technologies (Berger and Udell, 2006; Berger and Udell, 2006), to reduce credit/default risk (Angilella and Mazzù, 2015; Chaibi and Ftiti, 2015). We group these lending technologies into cash flow-based, asset-based and relationship-based. Figure 2 depicts which elements of the business model components would be relevant for banks per lending technology. The mechanisms will be described in sections 2.2.1-3. In practice, different lending technologies will often be combined, e.g. a relationship banker will ask for collateral and will want to see financial statements of a firm. However, there are differences in what the primary lending technique is, and these can lead to different credit decisions. We therefore take an in-depth perspective on lending technologies and view how these can be understood to improve access to finance for (circular) BMI.

Business Model components	Value proposition	Value creation and delivery				Value capture	
Lending technologies	Market offering	Strategy	Resources	Network	Customers	Revenues	Costs
<b>Cash flow-based</b> <ul style="list-style-type: none"> <li>Financial statement lending</li> <li>Client contracts</li> <li>Credit scoring</li> </ul>		●		●	●	●	●
<b>Asset-based</b> <ul style="list-style-type: none"> <li>Fixed asset lending</li> <li>Inventory</li> <li>Personal assets</li> <li>Leasing</li> </ul>	●		●		●	●	
<b>Relationship-based</b>		●	●	●	●	●	●

**Figure 2: Theoretical relationship between business model components and lending technologies**

### 2.2.1 Cash flow-based lending

Banks deploy financial statement analysis (cash flow-based lending technologies) when audited financial statements are available as a primary information source upon which funding decisions can be based. Collateral and/or personal guarantees might be used to secure the loan and monitoring is done on the basis of loan repayments. In general, this lending technology can be applied to firms that offer a transparent *value proposition* and *value capture*. When audited financial statements are not available, banks can still assess cash flows through credit scoring. Credit scoring uses automated procedures to screen an entrepreneur’s personal financial information together with the available data on the firm itself to determine credibility and is often used for (opaque) small businesses (Berger and Frame, 2007; Frame et al., 2001). The rise of big data is increasing the potential of this lending technology (Mayer-Schönberger and Cukier, 2013). If *past* cash flows and/or credit scores are not available or not sufficient for lending, banks can still extend a loan based on already secured future cash flows in the form of accounts receivable, in particular client contracts, which are a crucial part of circular *use* business models. Hence, the (quality of the) *customer* component of the business model plays an important role in the loan application process as well as the terms of the client contract (the essence of the *value proposition* to the client). Cash flow-based lending (financial statement lending) for innovation is challenging for banks due to lack of track record (Hall and Lerner, 2010).

### **2.2.2 Asset-based lending**

In asset-based lending, banks use valuation and pledging of underlying (physical) assets of the enterprise (owner) as a basis for the lending decision. *Fixed-asset lending* uses physical assets of an enterprise that are not sold in the course of business as collateral for the loan such as real estate, machinery or equipment or vehicles (Berger and Udell, 2006). The asset is often uniquely identified and the size of the loan is dependent on its liquidation or market value, with repayment tied to the amortization schedule of the asset. *Leasing* is a lending technology based on assets where the asset ownership is transferred to the bank for the duration of the loan, often with a buyback construction at the end of the contract (Chemmanur and Yan, 2000; Hendel and Lizzeri, 1998). When using *asset-based lending*, working capital loans are provided based on the current value of assets used in the course of business such as inventory. All asset-based lending technologies focus on the tangible *resources* used in the business model, creating room for an enterprise to obtain finance even when the value capture of the enterprise (*revenues*) does not (yet) allow for this. Asset-based lending for innovative projects might be difficult for banks because the context-specificity of assets makes their market value uncertain (Lee et al., 2015; Mina et al., 2013).

### **2.2.3 Relationship-based lending**

In relationship-based lending the lending decision is undertaken based primarily on proprietary information known only to the bank and the borrower (Boot and Thakor, 2000). Boot (2000, p. 10) defines relationship banking as "the provision of financial services by a financial intermediary that (i) invests in obtaining customer-specific information, often proprietary; and (ii) evaluates the profitability of these investments through multiple interactions". The financier takes a long-term perspective in its lending decision, creating the opportunity to benefit over time from the information gathered, in particular in multiple lending decisions (Petersen and Rajan, 1994). Monitoring of the loan is operationalized through continued direct contact and observation of the SME's performance, taking a holistic approach that encompasses most business model components. Relationship lending allows banks to provide additional services such as market intelligence, access to customers and other stakeholder crucial for the firm's success and sector expertise, similar to a venture capitalist or business angel (Boot and Thakor, 2000). Relationship lending is also associated with small, opaque and/or innovative firms due to the use of 'soft' information which is particularly valuable if hard information about track record, assets or cash flows are lacking (Brancati, 2014). Strong relationships between banks and firms are shown to increase bank willingness to take risks/lend for innovation since potential costs (of default) are spread out over a longer period of bank earnings from a client (Brancati, 2015; Jiménez and Saurina, 2004; Petersen and Rajan,

1994). Also, relationships are shown to lower collateral amounts requested by banks (Berger and Udell, 1995). However, it can be difficult for young, innovative firms to build up a strong banking relationship if they require major capital injections early in their existence (Carpenter and Petersen, 2002).

To sum up, although the innovation finance literature, including lending technologies, has a rich empirical base, there is no explicit understanding of how firms that carry out business model innovation should strategize at a business model component level to increase their access to external (bank) finance. By addressing this question in the current paper we add unique empirical richness to our understanding of access to external finance, as an important requirement for carrying out BMI (Foss and Saebi, 2017).

### **3 Methods**

To understand the effect of business model innovation on a firm's access to bank credit, we employ a case-study based theory-refining approach, building on the BMI and lending technologies frameworks and focusing on the actual decision as the unit of analysis (Flyvbjerg, 2011; Yin, 2013). This fits well with the process-oriented nature of the underlying research question, the aim of building additional theory (Suddaby, 2006) and the limited accessibility for researchers of companies and financiers (especially banks) via more quantitatively oriented instruments (Bettis et al., 2015; Eisenhardt, 1989). We outline the steps that we have taken to operationalize our research design and its relevance for the research context below.

#### ***3.1 Research context***

The research reported here was conducted as part of two research projects running from 2015-2017. The first project formed part of the Nederland Circulair! consortium, which was financed by the Dutch Ministry of Infrastructure and Environment. Focusing on financing barriers experienced by circular businesses, this looked at 13 circular business cases and brought them together with financiers to (potentially) solve these barriers. The second project, financed by the Confederation of Netherlands Industry and Employers (VNO-NCW) focused on similar issues, analyzing 31 company cases (not banks).

#### ***3.2 Case selection***

To unravel the mechanisms underlying a credit decision and consequently answering our research question, we used purposeful theoretical sampling (Eisenhardt, 1989; Siggelkow, 2007). Hence, we included companies innovating their business models as well as banks.

The use of multiple cases allows us to ground the research empirically and to generate sufficiently complex theory (Eisenhardt, 1989).

To observe actual financing decisions in the companies, we applied an information-oriented selection (Flyvbjerg, 2011; Seawright and Gerring, 2008). We collected evidence from SMEs, start-ups and established corporations representing the three types of circular business model innovation (pre-use, in-use, post-use) as explained in section 2.1, that had an (external) financing need (Achterberg and van Tilburg, 2016; Bocken et al., 2014).

Regarding financiers, we focused on banks due to their important roles in providing corporate finance in general (European Commission, 2014), and for financing a big part of the transition to a more sustainable, long-term efficient economy (Campiglio, 2016). The banks deploy lending technologies to make their financing decision as described in section 2.2. In this regard, the Netherlands is a particular interesting case study, as it possesses one of the most developed bank-oriented financial sectors in Europe and the world (DNB, 2015). In addition, Dutch banks have shown both individual and joint commitment in their willingness to finance the circular economy (ABN AMRO, 2015; ING, 2015; MVO Nederland, 2016; Rabobank, 2015). To obtain a representative sample, we contacted representatives from all major banks active in business banking in the Netherlands. The four banks that agreed to cooperate represent at least 61.4% market share (DNB, 2016). Both sustainability-oriented banks as well as generic commercial banks were included to account for the fact that circular BMI may be financed only by niche-banks that have a mission-driven focus to do so. This increases the transferability of our findings.

### ***3.3 Data collection***

Data collection encompassed three distinctive elements to allow for data triangulation (Gibbert et al., 2008; Patton, 2002; Yin, 2013). First, we used archival documents of all the organizations as well as additional stakeholders such as think tanks and NGOs to pinpoint the most relevant characteristics of circular business models and their financing challenges. From the banks, we also obtained confidential archival documents such as documentation about companies and credit assessment process documents.

Second, 32 interviews were held both with company representatives and bank employees. They lasted between 1-2 hours and were recorded and transcribed verbatim. See appendix for a full (anonymized) list of interviewees. For each company, an interview took place that included questions on whether there had been or is a financing need and whether they applied for bank credit. If so, we asked follow-up questions on the amount, the bank that financed them, and why they were financed. If they did not

receive credit, we asked why the bank rejected their application or what prerequisites were asked for in order to obtain credit in the future. In this way, we collected evidence about financing decisions for innovative (circular) business models based on real loan applications from enterprises developing a circular business model.

For each bank, representatives from the credit committee were interviewed. These included experienced bankers with sustainability, commercial and legal backgrounds, such as loan officers, (sector) managers, as well as legal department, risk management and front office (commercial) staff. Questions revolved around credit decision processes and included perspectives on companies innovating their business model to become more 'circular'.

Third, the author team organized four workshops (focus groups) with the four participating banks (Geissler and Zinkhan, 1998; Greenbaum, 1998). These lasted between 2-4 hours and included a representative sample from each bank's credit committee discussing the business model cases (between 6-20 participants). The workshops were recorded and transcribed verbatim. Transcripts were sent to participants to verify accuracy ('member checking') (Vuori and Huy, 2016). We asked broad questions regarding past credit applications of circular enterprises at their bank and their credit decision-making process (lending technologies) in general. For each workshop, together with our bank contact person we selected two representative companies that had recently been looking for credit as part of their developing a circular business model. We asked each bank to explain their credit decision-making based on these two representative cases. We elaborated on the challenges, opportunities and solutions of financing these enterprises. Finally, we determined the basis by which bank participants were most likely to extend credit (assets, contracts, relationship, financial statements/going concern). Characteristic shortcomings of focus groups-based research – such as participants publicly agreeing to views of the group despite private disagreement, and limited data validity due to the formation of a consensus view in group interaction – have been mitigated by creating a private space/atmosphere for open exchanges and encouraging the discussion of different views (Geissler and Zinkhan, 1998; Greenbaum, 1998).

Through a combination of insights from archival documents, interviews and workshops with representatives from the banks' credit committees and other employees involved in the credit decision, feedback was obtained on their ability and willingness to finance different circular enterprises, which we related to the business model of these enterprises (Moran-Ellis et al., 2006).

### **3.4 Data analysis**

Corresponding to the theory-refining approach, data analysis followed an abductive procedure (Dougherty, 2002; Mantere, 2008). We started with an initial frame of reference (Suddaby, 2006) explained in section 2 and made new linkages between the main theoretical concepts, i.e. BMI and the financing of a company through banks (theory building), by detecting patterns and matching them with the data. These steps involved a constant back and forth between theory and the collected data, which ensured internal validity of our study. To ensure reliability of analysis, a case study database was developed using Nvivo 11 that allowed for the integration of the different data sources (archival documents, interview and workshop transcripts) and corresponding perspectives (Gibbert et al., 2008; Jick, 1979; Moran-Ellis et al., 2006).

Then archival documents, interview and workshop transcripts were screened as bottom-up codes for central topics, such as factors in the decision-making process, to derive implications of how lending technologies are deployed and how differences in generic business models vs. innovative circular business models were seen. We developed bottom-up codes from the insights in shifting to a circular business model, potential financing challenges and credit allocation processes at banks and specific lending technologies or approaches which are consolidated under top-down codes (BMI/lending technologies) from our theoretical framework. This process of coding and revisiting our initial frame of reference developed in several rounds (Dougherty, 2002). The overlap between BMI codes and lending technology codes allowed us to establish an empirical link. The coding procedure<sup>1</sup> of archival documents, interviews and focus groups resulted in 1155 coded segments.

Three researchers carried out the data analysis, one of them present at each interview/workshop. At each workshop/interview one researcher was absent to add an 'unbiased' view to data analysis to ensure inter-coder reliability and construct validity (Gibbert et al., 2008; Yin, 2013). We also reflected our findings to a group of finance sector experts (key informants in the FinanCE working group) to verify and extend them. The findings from banks were anonymized during the process (Bank A-D are reported). To improve external validity, we also compared sustainability oriented vs. classical commercial banks in a cross-case analysis. The authors are fully aware that the findings are context-dependent (Flyvbjerg, 2011), however the research here contributes to a larger understanding of a bank's perspective on BMI in general.

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<sup>1</sup> The coding scheme is available from the authors upon request.

## 4 Findings

In the following section, we report our findings on the role of business model components and the use of different lending technologies for circular BMI. In general, bank interviewees and entrepreneurs recognize the three types of circular BMI (pre-use, use, post-use), which confirms our theoretical framework. Also, they recognize the financing challenge created by circular BMI due to changing nature of cash flows, increased capital needs and legal issues surrounding collateral and its value (bank C, circular economy documentation). Furthermore, the importance of business model components – strategy, value capture – for the loan decision is confirmed by internal credit process documentation (Bank D, credit process document).

We report on the most important BMI components from a bank finance perspective, specified per lending technology. The BMI components and their financing challenges are illustrated with quotes from firms and banks (see Tables 2-8). The quotes refer to the bank interviewees and workshop participants listed (anonymized) in Table A.1 in the appendix. A summary of all findings (BMI components/lending technologies) is reported in Figure 3. To answer our research question, we look at each business model component in turn. Our findings suggest that all business model components are relevant in at least one type of lending technology.

### 4.1 Value proposition

The *value proposition (or market offering)* plays an important role in bank finance for circular business models. When lending is oriented specifically at circular and sustainable businesses – at the sustainability-oriented bank in our sample – the value proposition is screened to confirm that it is in line with their values. In the face of resource scarcity and climate change, even mainstream banks have an urgency to move to a more sustainable/circular way of doing business, which is expected to be more profitable in the long-term. However, for them it is not central to all their lending decisions; rather it is something they want to move towards with part of their lending portfolio. Recognizing the circularity of a value proposition is therefore a screening approach that banks want to develop further, e.g. by training their relationship bankers to understand (and therefore recognizing) circular BMI.

The value proposition embodied in circular BMI plays a part in the lending decision due to expectations of *higher levels of value creation and capture*. This expectation is based on the logic that circular business models should lead to optimal value management because of better incentives and resource management. Both banks and enterprises note that the increased value and lifetime of the underlying product – due to its circularity – is expected to increase the value of the business over the product's lifetime – especially if

brought to market in a product-service model or within a buyback construction. The benefit of this increased value can be shared between the producer and the consumer, making both the market offering and the revenue model competitive. Therefore, a value proposition that embodies servicing a circular product is generally perceived as value enhancing and with potential to generate profits in the future.

Client contracts offered in a service model are a crucial part of the value proposition for bank lending. In service models, *the terms of the client contract* embody the specific value proposition to the client in terms of service versus costs and flexibility of opting out of the product after a certain time period. Contract conditions, in particular duration and opt-out clauses, affect the perceived riskiness of future cash flows (accounts receivables). For clients, it is generally beneficial for conditions to be formulated as flexibly as possible; however, banks perceive that stringent conditions increase the security of future cash flows. Banks are used to lending on the basis of contracts that have the same duration as the economic lifetime of the underlying asset, offering robust future cash flows. In circular BMI, assets are expected to last longer and produce cash flows in (multiple) consecutive client contracts, which means future cash flows are potentially higher. However, at the time of the lending decision these contracts have not yet been signed. The ratio between the signed contract and the asset value becomes important in the lending decision. Also, in the case of a buyback construction, the future value of the asset at the end of its (first) use cycle needs to be assessed and compared with the future cash outflow corresponding to the buyback price.

The (technical) specifications related to the asset in the value proposition/market offering can affect the *ability to finance the underlying asset*, and can be influenced through its level of standardization or modularity. Products offered to the market that have a long lifetime and are also very standardized, e.g. in terms of size, color and material, are more marketable, including in a second or third round of use. For asset-based lending in particular, the value proposition (in terms of the asset offered to the market) can play an important role since it affects the asset value and its (re-)marketability. The relevance of the value proposition is deemed particularly relevant in the context of circular real estate, where buildings are not only very attractive in the current market but are also designed to be multipurpose as a whole and at component level. This flexible value proposition lowers perceived risk for banks.

**Table 2: Importance of the value proposition (market offering) for different lending technologies**

Lending technology	Cash flows (future)	Assets	Relationships
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<b>Value proposition (market offering)</b>	Terms of client contracts (duration, opt-out clause) in product-service BMI affect perceived risk level of future cash flows.	Level of standardization/modularity of market offering and underlying product affects its marketability in multiple rounds of use (and therefore lowers risk as collateral).	Value proposition is assessed on circularity/sustainability due to values and expected profitability.
<b>Key quotes</b>	<i>"From a financial point of view this is a hard one. For example, a wind turbine. At least you want an offtake time of 5-10 years. Here it [the contract duration] is only 3 months. Your robustness of your cash flow is very low. [...] A newcomer could take all your customers, which makes it hard to finance."</i> - Head of Commercial Banking, Bank B3, workshop	<i>"You can take the building apart in components or sell it in parts. Every part has a different residual value. Instead of a residual value of 0 or 1 (it is rented out or not) there is now a whole array of value propositions which makes the risk for the bank smaller."</i> - Director Sustainable Banking, Bank D1, interview	<i>"Through conversations with many stakeholders we saw that the sustainability of a building is becoming a more dominant factor in its rentability. Investing in this is a future-based strategy to make sure our portfolio is robust."</i> - Director Sustainable Banking, Bank D1, interview

## 4.2 Value delivery

The four value delivery components – strategy, resources, customers and networks – impact the credit decision through particular lending technologies. We discuss findings for each component in turn.

### 4.2.1 Strategy

Banks seem to be more willing to finance circular BMI when existing, established clients strategize to shift gradually from linear business to circular business. Through this strategy, banks obtain access to more established, secure cash flows from existing business to de-risk their loan. Also, bankers note that it is more worthwhile for them to invest time and funds in existing, larger clients since they are also obtaining revenue on other products. In contrast, bank interviewees also mention that circular initiatives set up by start-ups are very unlikely to get financed, and neither are initiatives by established businesses that are not expected to become a regular client of the bank. Phased transition from a linear to a circular business model is therefore a lending

enhancing strategy available only to established firms with an existing bank relationship (or those aiming to obtain a bank relationship).

The *strategy* becomes relevant in terms of how to organize the manufacturing process including which customers to target (notably B2C or B2B) and which materials to use. By using or combining existing/proven production processes, perceived technological risk can be lowered, which increases the chance of obtaining a bank loan.

**Table 3: Importance of the strategy BM component for different lending technologies**

Lending technology	Cash flows	Assets	Relationships
<b>Strategy</b>	Through gradual transition of firms from linear to circular, cash flows can be secured by existing (linear) cash flows from existing business units.	Strategizing to develop products that can be brought to market for many years affects its marketability in multiple rounds of use (and therefore lowers risk as collateral).	Phased transition of established firms from linear to circular in line with their existing strategy with an existing bank relationship is lending enhancing (i.e. same industry).
<b>Key quotes</b>	<i>You believe in the solution. [...] It was a strategic decision of the client to stay in the same industry. [...] You are not too concerned about assets or contracts. You look at the debtor and what is happening.” Sector banker public banking, Bank D4, workshop</i>	<i>“The most circular product is one that you do not adjust, which can be used for very long in its current form. [...] In the pay-per-use construction the residual value increases if you take a <u>white</u> desk. We want to stimulate that because we can circulate it more easily. So, you can design products in such a way that they are timeless.” Ahrend, CEO AA1</i>	<i>“Who is our client and what is their relationship with our bank: existing or new, and why are they shifting banks?” Bank D, credit documents  “Many of our clients are both linear and circular. They are making a phased transition to a circular business model. In particular the good clients who we have known for ages, who now realize they want to become circular, we are right in the in-between phase at the moment.” Senior Sustainable Business Strategist, Bank A1, workshop</i>

#### 4.2.2 Resources

##### 4.2.2.1 Tangible resources for asset-based lending

The most important tangible resources for a bank loan are the assets that are brought to market as part of circular BMI (e.g. washing machines, carpets, elevators or smartphones). This underlying asset is mentioned in product service BMI in particular, since these assets remain on the balance sheet of the firm asking for a loan. In theory, these assets can be used as a security for the bank for asset-based lending, as in the traditional lease industry (for cars and printers). Sometimes resources can also be relevant for asset-based lending at a component or material level. Asset-based lending seems very logical in circular BMI since the materials, components and/or products are

expected to retain their value after use. This can lead to lower depreciation costs and a longer period of cash flows from a single asset. However, our findings suggest that currently, using tangible assets as a basis for a lending decision leads to several challenges.

Firstly, underlying assets in BMI are often innovative, which leads to *a lack of historical/market data on their long-term value*. This makes it difficult for banks to lend based on past cash flows over the asset lifetime. The claim, that an asset will produce cash flows for a long period of time, is therefore difficult to prove.

Active second-hand markets in underlying products can increase the belief of banks that there is residual value to build on as part of a bank loan. Interestingly, the new and distinguishing characteristic of a product (its ability to be long-lasting or be easily reused) makes the product less attractive as collateral when it is still in an innovation stage and this long-term market value is unproven. Furthermore, banks prefer loan durations from 5-7 years whereas firms with long-lived assets need a financing term up to 20 years, which led to financing constraints as well.

Second, apart from uncertainty about their long-term value, the underlying assets in BMI may *suffer from characteristics that further lower their ability to serve as collateral*:

- a. Specificity – an elevator tailor-made for a building cannot be re-used at the product level
- b. Illiquidity – difficult to move, such as a carpet glued in a building, making re-use difficult
- c. Dispersion – washing machines situated at individual consumer homes makes collateral collection costly.

Since these characteristics make assets less suitable as collateral, thinking about these characteristics already in the product design can help firms obtain a bank loan. One electronics firm designed their lighting solutions so that they can be easily removed from a building. Removable, standardized carpet tiles have a higher residual value than tailor-made fixed carpet. An elevator producer created a materials passport so that at the end of an elevator's lifetime they are able to value it at a material level. Bundles talked about a 'red button' option so that the service provided to non-paying customers terminates (since a washing machine is costly to collect). Fairphone could, for example, collaborate with a network provider, who can switch off connectivity when a customer does not fulfill their payment obligations.

Third, *availability of parties who could take over the assets as part of a running business* was mentioned as a financing challenge related to resources. The underlying assets are worth more to a bank if they can be sold to other players in the same field (competitors)

that are willing to buy them. Selling a client portfolio to a competitor retains more value than selling underlying assets separately, terminating client contracts. If the underlying product is innovative and there are no other parties offering the same type of services, the asset become less valuable for the bank as collateral.

Finally, one bank in our study has a special leasing division aiming to promote circular business models by leasing various types of business assets to customer firms - such as vehicles and agricultural or construction equipment – and encouraging clients to increase their lifetime through repair and alteration. By leasing crucial business assets from a bank, financial constraints of firms engaged in circular BMI can be alleviated.

**Table 4: Importance of the resources BM component for different lending technologies**

<b>Lending technology</b>	<b>Assets</b>
<b>Tangible resources</b>	<p>The higher expected residual value of assets used in circular BMI in contrast to linear BMI can lower depreciation costs for firms and increase duration of cash flows. (1) Assets underlying in BMI are often novel, leading to a lack of historical data on their long-term/residual value. Banks do not easily include the long-term value as a security in a bank loan because of the uncertainty that this value will be captured (no second-hand contracts and no secondary markets). Long-lived assets need longer loan durations, which is a challenge for banks. (2) Assets are often costly to collect and therefore not deemed suitable as collateral. (3) The availability of other players that can take over the assets as part of a running business affects the riskiness of using these assets as collateral (and the value that banks are able to place on them). As an alternative route, firms can lease key business assets (vehicles, equipment) from banks to alleviate financing constraints.</p>
<b>Key quotes</b>	<p><i>"When, in closed supply chains, the residual value of products increases, the basis for a loan improves" Circular Economy Guide, bank D</i></p> <p><i>"I expected this to be mentioned as a challenge, the residual value. When you take back your product to close the material loop, what will be its value? What do you dare to expect, what can you still use from it? That is really a challenge." Sector banker construction, Bank D11, ws</i></p> <p><i>"[...] banks get stuck on financing these kinds of models. It is about a fixed asset with a period of minimum of 20 years. They are allergic for that, because it needs to fit with a period of 5-7 years and it needs to be mobile to serve as collateral. These are the tensions." Sales manager Mitsubishi elevators, AC1</i></p> <p><i>"[...] what on earth do we do with 10,000 washing machines? [...] We cannot go selling them one by one and store them somewhere. So, the residual value for a bank is much lower, since we're not specialized in selling 10,000 washing machines. Is there a market for the residual value?" Head of Commercial Banking, Bank B3, workshop</i></p> <p><i>"[...] All that is fixed to a building, loses directly its value. In a lease construction you need collateral, thus residual value. 'Flooring as a service' obviously has no residual value. [...] The bank helped us and calculated based on residual value of resources." Director sustainability, Desso, office furniture firm AE1</i></p> <p><i>"[...] Traditional lease did not fit the financing need of our M-Use, elevators as a service, because the elevators are fixed in the building. It is not easy to attract</i></p>

	<p><i>funding for our proposition.” Sales manager Mitsubishi elevators, AC1</i></p> <p><i>“[...] An elevator is much more difficult: a copy machine you can easily remove, but an elevator cannot be easily removed. Additionally, copiers have an established second-hand market.” Vice president large &amp; key accounts, Bank A19, workshop</i></p> <p><i>“That is exactly the core risk of the re-marketing, the ability to bring the asset to the market again, which is unknown and new. A bank is not going to take that risk.” Director Sustainable Finance, Bank C1, workshop</i></p> <p><i>“Bank C’s subsidiary promotes circular business models by offering its customers the opportunity to lease, rather than own, various types of business assets. Bank C’s subsidiary also encourages its customers to extend the economic lifetime of these assets [...]” Document on website bank C.</i></p>
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#### 4.2.2.2 Intangible assets

The *quality and commitment of the entrepreneur* is a key factor for both relationship-based and future cash flow-based lending. (Personal) commitment from entrepreneurs is important to guarantee the continuation of the business, both through fundraising and personal financial support. One bank mentioned they put a lot of effort into judging the quality of the entrepreneur by looking at their skills, relevant experience and judging whether the team is effective. They also judge whether the entrepreneur ‘fits’ with the business she/he aims to carry out.

**Table 4 continued**

<b>Lending technology</b>	<b>Cash flow (future)</b>	<b>Relationships</b>
<b>Intangible resources</b>	Commitment of the entrepreneur to the business is needed to secure future cash flows.	The expertise, quality, ‘fit’ and track record of the entrepreneur and, if relevant, the team.
<b>Key quotes</b>	<p><i>“There is a client, but if the contracts are withdrawn, someone needs to take care that a new client is found for the machine, that payments come in every month, that someone carries out this whole operation. So, people say: what if you stop, that risk is too large. Then the washing machines are standing there and if no-one will collect the fees, how will I ever get my loan back?”</i></p> <p><i>Founder Bundles, washing service provider, Z1</i></p>	<p><i>“If there is one factor that would be most important to lend or not to lend, it is the quality of the entrepreneur or the combination of people who are running a business. [...] You could do any analysis of financials, but an accountant can help with that. If the entrepreneur doesn’t understand what he is doing, there is no way we are going to finance him.”</i></p> <p><i>Managing Director, Bank B4, workshop</i></p> <p><i>“[...] Not everyone has a team in which everyone has over 30 years of experience and two Harvard MBAs, which played a role in succeeding to attract a bank loan.”</i></p> <p><i>– CEO Black Bear Carbon, K1</i></p>

#### 4.2.3 Customers

The customers targeted as part of a circular business model can serve three functions in the bank lending decision, mainly as a signal of revenue expectations and market

demand. First, having customers willing to sign contracts creates a security for the bank (future cash flows). Second, their credit quality affects the quality of accounts receivable in case of client contracts. Third, their willingness to pre-finance a product can lower market risk and show proof of legitimacy.

Having *signed customer contracts* is an important signal for (future) cash flow-based lending. Both enterprises and banks mention signed customer contracts as a positive factor in obtaining a bank loan. A firm that upcycles used car tires into carbon black had large potential clients who carried out tests with their product and then confirmed they wanted to become a client. This helped them obtain a bank loan for building a factory. Similarly, Ioniqa - a plastics firm that developed (nano)technology to decolor plastic waste for reuse - mentioned the lack of willingness of future clients to commit as one of the reasons why they were not able to obtain a bank loan to finance their factory.

Banks also aim to screen the *credit quality of customers* who have committed to buying/leasing a product to assess the robustness of this future cash flow. It is always possible that this future cash flow will not materialize if customers do not pay, which can lead to loan default. However, screening credit quality of clients can be costly, and banks note that it either needs to be done automatically or is only viable for large deals/clients. A preference for B2B customers by banks stems from the fact that these can agree to longer contractual periods; consist of larger volumes and the collection of collateral in case of default is easier. However, development of credit scoring intelligence of B2C clients could be a potential business development undertaken by banks that improves firm and bank screening procedures for contracts and lending respectively. One bank noted that assessing creditworthiness of potential customers could even be developed as an automated tool they could offer to SMEs that want to sell subscriptions (director sustainable banking D1, bank D, workshop).

A third channel through which customers can affect access to bank loans is *when customers display willingness to pre-order* their product, i.e. through a reward crowdfunding campaign. In the case of one bank loan, customer commitment to pay in advance for their electronics product was considered by the bank to positively affect the lending decision as it signaled market demand. Similarly, positive test reports from large clients mitigated market risks for another firm.

**Table 5: Importance of customer BM component for different lending technologies**

<b>Lending technology</b>	<b>Cash flow (future)</b>	<b>Assets</b>	<b>Relationships</b>
<b>Customers</b>	(1) Having signed contracts with customers. (2) The creditworthiness of clients	Targeting B2B customers can lead to larger volumes thus less dispersion,	Having committed, pre-ordering customers indicates market demand

	targeted in a business model affects the perceived robustness of future cash flows.	easing collection of collateral in case of default.	
<b>Key quotes</b>	<p><i>"The bankability of circular business models in many cases requires the acceptance of 'contractual comfort' instead of the right of legal ownership over assets in case things go wrong. Secondly, it requires a more cash flow based approach to finance rather than an approach based on collateral values." Bank C, documentation</i></p> <p><i>"At this moment, in the lease, we agreed with the bank that they would do a credit check on every new client." Ahrend, office furniture firm, product designer, AA2</i></p> <p><i>"[...] one of our challenges is to get clients to commit for future procurement. [...] Without market demand we cannot scale. [...] But without scale, clients will not commit. And without committed clients we cannot attract funding for building the factory." CEO Ioniqa, H1</i></p> <p><i>"If an SME wants to market an online service for 3-5 years, he has to know instantly whether a client is creditworthy, as a financial sector we might need to develop tools for that." Director Sustainable Banking, Bank D</i></p>	<p><i>"A carpet producer creates value from returning materials. But this is not value for the financier. For Fairphones/Iphones: if you receive enough back from the market you get 50-100 Euro per phone. As long as you get enough volume (10.000's) you can send them to the refurbisher. With those volumes that is possible. With carpet that is not the case." Vice president large &amp; key accounts A19, bank A workshop</i></p>	<p><i>"[...] we had many test reports from large clients that tested our product who stated that 'if that factory will be built, we want to become a client'. [...] this helped to mitigate market risk." Blackbear Carbon, CEO K1</i></p> <p><i>"[...] the commitment from pre-paying customers was mentioned as a factor in the positive lending decision". Fairphone, resource efficiency manager G1</i></p>

#### 4.2.4 Networks

*Networks* (and partnerships) play a role in obtaining bank credit in several ways. Firstly, we find that *partnerships/collaboration in the supply chain*, in particular with larger firms, can lower risks for banks. Shared ownership of underlying resources organized in the whole chain, for example through a joint venture, enables the inclusion of a larger

balance sheet in risk assessment, lowering risk. In addition, it confirms the commitment of necessary partners to secure supply and bring to market a successful innovative product. For circular business models in particular, dedicated networks can increase the chance of delivering a circular value proposition.

Secondly, through a *buyback construction with a supplier* the underlying asset value for the bank can be increased, facilitating asset-based lending. In the course of this research project a buyback construction between a washing machine service provider and the washing machine producer was set up, which led to a series of successful debt crowdfunding campaigns for the service provider.

Third, evidence of *embeddedness* of a firm within a (local) community or network lowers the perceived risk of default. A firm that is well embedded in a community is less likely to suffer from withdrawal of funds, customers and (local government) support. This is a crucial factor in the credit decision making process of one of the banks researched.

**Table 6: Importance of the networks BM component for different lending technologies**

<b>Lending technology</b>	<b>Cash flow (past)</b>	<b>Assets</b>	<b>Relationships</b>
<b>Network</b>	Joint venture (shared balance sheet) with established supply chain partners can lower risk for the bank.	Buyback constructions with the supplier of the product brought to market can increase asset values (lower risk) for a bank.	(1) Embeddedness of a firm in networks indicate business proposition relevance to others (2) Involve relevant parties (in and outside the bank) at early stage of loan request.
<b>Key quotes</b>	<p>"[...] we set up a joint venture with an existing party, who had a balance sheet" CEO, Black Bear Carbon, K1</p> <p>"Define the extended credit base: all other parties whose financial health is a prerequisite for repayment of our loan. These need to be included in the analysis." Bank D, internal credit document</p>	<p>"I think there is an elementary role for Miele [washing machine producer] in the financing, it is key that there is a buyback obligation from Miele against a certain price. That would improve the financeability [of Bundles] substantially." Relationship manager corporate banking, Bank A18, workshop</p>	<p>"I think what we did especially well – and this is quite extraordinary, especially at banks – is that we involved all people internally in the bank (about 30) in a very early stage." CEO, Black Bear Carbon K1</p> <p>"Projects or institutions which are important to the community or local government may be supported if they run into financial problems thus lowering the probability of default." Bank B, internal credit document</p>

## 4.3 Value capture

### 4.3.1 Revenue

Proof of ability to generate *revenues* (through past or confirmed future customers) is deemed crucial by all banks and enterprises for a positive credit decision. The absence of robust historical revenue data is also seen as a key challenge for financing BMI. Because historical revenue data is lacking, loan applications for BMI often do not fit in the standard financing models. Also, BMI towards a product-service model leads to cash flows (revenues) coming in later, which makes the financing gap that needs to be covered, longer. There are two main ways that were reported by our interviewees in which lack of past revenue data for BMI is circumvented.

*BMI within a larger firm* benefits from an existing track record from other business lines. In both cases, a bank loan may benefit from the bank's incentive to nurture or start a long-term relationship with the established firm that carries out/partners in the (circular) business model innovation.

Furthermore, reliability of (future) revenues can be improved by *structuring client contracts to optimize future cash flows*. A longer duration of contracts and a costly opt-out clause can lower the risk for banks that cash flows will not materialize. Also, improved data on the 'stick rate' of customers can improve reliability of future cash flows (i.e. knowing what percentage of customers end their contract in each time period). Confirmed or expected orders from clients can be viewed as proof of future cash flows, in particular if a customer is large and creditworthy.

We found that many banks – and also large firms that decided to fund BMI internally – are more willing to fund a certain type of BMI when they believe in *the logic of the business case and its potential to create revenue*. This increases their willingness to take risks. We see this in particular in the shift from a for sales- to a product-service business model: there is a general understanding that a product-service model allows firms to capture more value from a product that is durable and/or modular than a sales model is able to capture for a linear (short-lasting) product. Our finding is that the general belief that circular BMI is an attractive and logical business case that will create revenues, increases the willingness of both firms and banks to invest 'learning money' into understanding how to finance this type of BMI.

*The expected revenue captured from the first client* is important, as this is the most 'secure' revenue that has already been contracted. Assets in BMI often have no secondary markets, which makes residual values insecure. The revenue-generating capacity of assets therefore depends more on what part of the asset value has been

recovered within an existing contract, and what the 'stick rate' of the assets is expected to be after the contract ends.

**Table 7: Importance of the revenues BM component for different lending technologies**

Lending technology	Cash-flow (past)	Cash-flow (future)	Assets	Relationships
<b>Revenue</b>	Banks prefer to have historical cash flow data but this is often not available for BMI. Joint ventures with supply chain partners and BMI with(in) existing firms alleviate this challenge.	(1) Optimizing contract terms and customer portfolio signal robust and predictable cash flows. 2) Belief in the revenue-generating capacity of a particular type of BMI.	Lack of secondary markets makes BMI residual values insecure. It is important what part of the asset value is recovered within an existing contract, and expected 'stick rate' of the assets after the contract ends.	Banks are more willing to invest in BMI for an existing client or a large potential client than non-clients and/or small firms because it is more likely to create additional business/revenues.
<b>Key quote</b>	<i>"The process of the bank is filling in the model by historical facts. For new business models there is no historical data. For those data you have to look into the future (or into the entrepreneur)."</i> Sustainable Business Manager, Bank A2, interview	<i>"In the first conversation with the bank they told me, you don't exist for two years, period. I came back after two years, but then I didn't have a track record in cash flows. After two years of track record of cash flows, I again returned, and then was told: 'Sure you now have this track record, but you have no secured cash flows for the future.'"</i> Bundles, founder/CEO Z1	<i>"Residual value is fictive, after five years there is no market. [...]. Two things are important: (1) strong clients and (2) do I get the assets back in the first place? We say: 'they bet on the stick rate' - after five years these assets are still in there."</i> Philips Capital, Head of financial sourcing, in workshop Bank D	<i>"We will never finance an individual firm that arranges all its banking business elsewhere. [...] And the smaller the firm the stronger is that rule. If it is, for example, Apple, we might see what we can do."</i> Director Sustainable Banking, Bank D1, interview

#### 4.3.2 Costs

Finally, costs enter into the credit decision when *high upfront investment* costs for BMI lead to large loan sizes in relation to incoming revenue. This generally increases the duration and perceived riskiness of the loan, which makes it less attractive for the bank. This problem was mentioned for both infrastructural investments (for factories) and for shifting to a product-service model. The high upfront investment cost of shifting from a

for sales- to a product-service business proposition is seen as an important funding constraint, even though banks agree that this model can be attractive in the long-term since it can lead to steady cash flows from lasting customer relationships and durable products. Also, BMI in the post-use phase (processing of products, components and materials for re-use) requires large infrastructural investments for scaling up, in particular for setting up factories for carrying out large-scale processing. Here, banks concentrate on market, technological and operational risks: they want to have proof that market demand is present and that the technology works at scale.

We find that firms perceive the longer lifetime of assets as financially attractive due to lower yearly *depreciation costs* of assets. However, for banks, the willingness to spread out depreciation over a longer time period depends on the residual value financiers are willing to account for – and this often depends on the duration and flexibility of contracts. Firms therefore indicate higher willingness to depreciate assets over a longer period than banks. Firms such as Mitsubishi and Fairphone also mention that *lower repair costs* due to smart, modular and/or durable design and proactive repair and maintenance make the business case for a product-service model more attractive.

*Just-in-time asset holding lowers financing costs.* Shifting to a service model can mean that firms are holding many assets on their balance sheet. Bank employees suggest that a preferred strategy from a financing perspective is to only hold those assets on the balance sheet which are contracted out to clients. This creates a more specific and smaller financing need instead of pre-financing a larger amount of assets, which are not yet bringing in any revenues.

**Table 8: Importance of the costs BM component for different lending technologies**

Lending technology	Cash flow (future)	Assets
<b>Costs</b>	(1) BMI takes time to prove itself, which makes it costly and difficult to finance upfront. (2) In a product-service business model, growth will entail high upfront investment costs. Long-term costs are expected to be more stable due to efficient maintenance. (3) Lower financing costs can be reached by pre-financing only assets that are <i>actually</i> set out to customers.	Lower depreciation and repair costs in a product-service model make financing of this type of BMI more attractive.
<b>Key quote</b>	"Why would Bundles buy in 200 washing machines? Why not buy in stock-based, directly from Miele.[...] It creates a more focused and smaller financing need. Now you would finance 200 machines and already pay interest to the bank while you do not yet have 200 contracts signed." Assistant	"We think there is a much healthier model with the leasing construction especially with a device which is so easy to repair. [...] When you would take 100 phones back from Unilever because they had the leasing contract, and 50 of those have a scratched screen, we need to

	<i>Accountmanager A15, bank A, workshop</i>	<i>change those, and for Fairphone 1 that would take 30 minutes. For Fairphone 2 only 10 seconds, so that decreases the repair costs." Fairphone, Resource Efficiency Manager G1</i>
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Lending technologies		Cash-flow based		Asset-based	Relationship-based	
BM components		Past	Future			
Value proposition	Market offering	-	Terms of client contract affect security of incoming cash flows, expected higher profits through better value management	Standardized/modular product improves value of collateral	Circularity screening due to bank values	
Value delivery	Strategy	-	Gradual transition from linear to circular, existing (linear) cash flows secure circular cash flows	Developing long-term marketable products improves collateral value	Finance existing bank clients who carry out BMI as part of business	
	Resources	Tangible	-	-	Long-term asset values depend on market value, specificity, moveability and competitors	-
		Intangible	-	Commitment of entrepreneur needed to secure cash flows	-	Expertise, quality and 'fit' of entrepreneur is screened
	Customers	-	Signed and creditworthy customer contracts signal robust future cash flows	Targeting larger (B2B) customers lowers dispersion, creates scale and eases collateral collection	Having committed, pre-ordering customers indicates demand	
	Network	Joint ventures with large supply chain partners provide robust balance sheet	-	Buyback constructions with product supplier lowers risk for a bank.	Embeddedness in networks improves BMI relevance and support by bank	
Value capture	Revenues	Historical cash flow data available for BMI within existing firms or JV's	Optimized contract terms and customer portfolio, and logic of business case signal robust cash flows	Size and diversity of contract portfolio i.r.t. asset value and expected 'stick rate' signal revenues	Existing, large clients are more likely to get a BMI loan due to additional revenue expectations	
	Costs	-	Often high upfront investment costs; expectations of future cash flows determine bank loan willingness	Lower depreciation and repair costs and 'just-in-time' stock make financing more attractive	-	

**Figure 3: Empirical mechanisms in the relationship between BMI and lending technologies**

## 5 Discussion, conclusions and implications

The research question guiding our inquiry was: *How can firms obtain bank finance for (circular) BMI?* We find that all components of the business model (value proposition, value delivery and value capture) can positively affect the bank lending decision, which makes it relevant for business model innovators at firms to understand how to optimize their business model to obtain (bank) finance.

### 5.1 Access to bank credit for (circular) BMI

The way banks make financing decisions based on how they perceive a firm's BMI is of strategic importance for companies (Chesbrough, 2010; Teece, 2010). Our findings confirm finance to be a major challenge in (circular) BMI, in particular in the shift from a sales to a service model (Linder and Williander, 2015). Innovative (circular) business models differ from traditional business models in ways that are highly relevant for financiers. A lack of financial track record (value capture) is a crucial challenge experienced by most innovative businesses in their search for bank credit, which is not alleviated (yet) by the higher expected lifetime of underlying assets. A shift to a product service business model – a common objective of circular enterprises – leads to additional financial challenges such as long-term asset holdings on the balance sheet, higher retained value of assets and cash flows from contracts versus sales (Bocken et al., 2014; Rauter et al., 2017). Long-term asset holdings are seen by banks as a technological and financial risk rather than as valuable collateral, due to a lack of secondary markets for these assets and high collection costs (low value per product distributed across consumers and/or buildings). Furthermore, the duration of credit need is too long for banks that expect a 5-7 year payback period, whereas most of the innovative (circular) business models need time to scale up and expect a long life and therefore payback period for their products.

The shift to a circular product-service business model leads banks to rely on confirmed future cash flows: the quality, duration and size of contracts with clients. Even for circular enterprises that carry out a sales model, confirmed orders/clients create more trust than collateral value. This focus on cash flow lending can be seen as a major impediment for innovative circular business model as their aim is to 'close the material loop': to increase the (market and use) value of underlying resources. Banks do not adhere to this value yet, as it may need time to develop and for secondary markets to grow. Our evidence shows that enterprises starting as or shifting towards circular business models have difficulty finding the necessary financial resources due to the longer payback period and lack of experience in evaluating financial risks (Linder and

Williander, 2015) and is in line with the literature on innovation finance (Brancati, 2014; Hall, 2010).

## ***5.2 The relationship between lending technologies and BM components***

Our study highlights that successful financing of BMI is improved by awareness of entrepreneurs and managers about how banks screen based on different business model components. Our research bridges the strategic management and innovation finance literature by integrating business model components and bank lending technologies in one theoretical framework (Bocken et al., 2014; Linder and Williander, 2015; Wirtz et al., 2016). It also adds empirical rigour to the emerging debate through in-depth, qualitative empirical insights on access to bank finance for BMI (Gambardella and McGahan, 2010; Osterwalder et al., 2005; Schneider and Spieth, 2013).

The *value proposition (market offering)* can influence a lending decision because a bank is (un)favorable towards the *type* of innovation carried out; the value proposition is stable over time, the asset is standardized or modular, leading to higher expected asset values; or it embodies contractual terms that indicate stability of future cash flows. The relevance of signed client contracts for financing a service model confirms earlier findings in the PSS literature (Linder and Williander, 2015). Banks offer concrete suggestions such as adjusting contractual terms to make them more secure for financiers – although this may be unattractive for clients (Besch, 2005) – and gathering data on ‘stick rates’ of customers that give more robustness to future cash flow information. Also, we find delaying of incoming revenues in the shift from a sales to a service model is seen by banks as problematic in the short term (Mont et al., 2006) but attractive in the long term due to higher stability of cash flows and client retention. Banks report they are particularly willing to engage with firms and develop sector expertise if they believe this ‘type’ of BMI (i.e. service models) (Bocken et al., 2014) is promising from a cash flow perspective.

In the *value delivery* part of the business model, two strategies were found to help firms obtain bank finance for BMI (Bocken et al., 2014; Lewandowski, 2016; Wirtz et al., 2016): existing firms and clients that strategize to gradually shift towards BMI, and strategizing to position standardized/modular products increases collateral values of underlying assets. *Tangible resources* developed/used in the process of BMI can theoretically serve as collateral but BMI-related assets are often found to suffer from context- and firm-specificity as well as from lack of secondary markets and players that would be able to take over assets as part of a running business in case of default. Their ability to serve as collateral depends largely on characteristics such as specificity,

movability, dispersion and (il-)liquidity. *Intangible resources* play a role in bank lending – largely in terms of the commitment and quality of the entrepreneur to make sure that BMI is executed as planned. Our findings confirm the problem of firm-specific resources (assets) employed in BMI, making assets less suitable as collateral for a bank loan (Brancati, 2015; Carpenter and Petersen, 2002). Which *customers* are targeted as part of BMI is also important for a bank lending decision: their creditworthiness and willingness to sign client contracts/pre-order are important signals for a bank to judge future cash flows. Location and size of customers matter for service models, since dispersed collateral makes collection in case of default costlier. Successful engagement of *networks* (partners) can be a crucial factor for obtaining a bank loan since joint ventures or buyback constructions with supply chain partners (Kortmann and Piller, 2016) can deliver a more robust balance sheet and increase underlying asset values. Furthermore, embeddedness in (social) networks can signal the relevance and potential success (future cash flows) of the BMI. Our study underlines the important role of relationships/networks (Bocken et al., 2014; Osterwalder et al., 2005) for bank finance for (BM) innovation, in particular for obtaining borrower-specific ‘soft’ information about the innovating firm (Berger and Udell, 2006; Boot, 2000; Brancati, 2015). Specific types of information banks look for are quality and commitment of the entrepreneur, a hitherto neglected aspect in the BMI literature (Amit and Zott, 2015). Banks use formal and informal commitments from the firm’s network to determine their credit decision. Networks and embeddedness have been suggested in the literature to enhance access to finance (Berger and Udell, 2002; Uzzi, 1999).

The *value capture* part of the business model is highly relevant for obtaining bank finance for BMI which has been indicated by earlier work (Schneider and Spieth, 2013; Zott and Amit, 2010). Banks prefer historical cash flow data, which can be available when established firms gradually innovate their business model or in the case of joint ventures with established firms. Signed contracts and orders from clients are useful signals of future cash flows: the size, expected growth and ‘stick rate’ of the portfolio of contracts in relation to the underlying asset that needs financing is an important factor for obtaining bank finance. We confirm the lack of historical cash flow data as an obstacle to bank finance (Hall et al., 2016). We do find that this problem can sometimes be overcome by setting up joint ventures with established supply chain partners or by carrying out BMI within an established firm adding to previous research (Kortmann and Piller, 2016). Finally, *costs* related to BMI are highly relevant since they determine the size of the financing need. Timing of costs (upfront or periodical) affects the size and duration of the financing need and lower operational costs can shorten payback periods, which lowers risk for the bank. However, we find a larger willingness to engage in ‘risky’ lending with existing and relatively large bank clients due to the ability to spread out

costs over time and across products, which confirms relationship banking theory (Boot, 2000). The larger, hierarchical banks in our sample confirm the need to automate the lending process to this type of BMI in the middle- to longer term in order to make it cost-effective, which is in line with the literature on bank organizational structure (Brancati, 2015).

### ***5.3 Limitations and future research***

Our study has several limitations and offers avenues for future research. One limitation of our study is the degree to which our insights – coming from empirical data on circular BMI – are transferable to BMI, in general (Bocken et al., 2014; Linder and Williander, 2015). Since we find that many of the financing constraints faced by the firms in our sample are similar to those pinpointed in the innovation finance literature in general, we think this problem is manageable. Nevertheless, a similar study using data from firms who carry out different types of BMI (e.g. based on digitalisation, artificial intelligence, blockchain) would further our understanding of BMI finance and how this is affected by firm / BMI characteristics. Just like previous BMI literature evolved out of the development of internet technology in the 90's, empirical data collection in this field is limited to BMI that is occurring.

A second limitation is that our data collection is partly self-reported by banks (workshops and publications about circular economy). It could be possible that in the workshops, banks report to be more positive about their willingness to finance circular BMI than their 'real' loan decision show. However, bank willingness to finance circular BMI is not higher than the outcomes of the real credit decisions as reported by the entrepreneurs/firms. We do find that the public publications of banks about circular economy seem somewhat more optimistic than their real decisions and the workshops, but these are also less concrete.

Future research could delve further into alleviation of financing constraints for BMI using all three types of lending technologies: cash flow, asset and relationship-based. From a cash flow perspective, we recommend setting up and testing quantitative models for cash flow prediction of service models (see e.g. Fischer and Achterberg, 2017). From an asset perspective, improved understanding is needed about how asset characteristics influence their ability to serve as collateral for access to finance. Our study shows that there are large differences between types of assets and their ability to serve as collateral in bank loans. Since increased asset lifetimes can serve sustainability purposes, firm profits and collateral value, further research should delve into specific asset characteristics that optimize all three. Finally, further research should aim to improve our understanding of how relationships facilitate bank financing decisions for BMI. Our

study does not provide enough data to clarify what are the parameters that decide which firms are able to get finance based on relationships with banks, suppliers and customers, and how these relationships interact (Kortmann and Piller, 2016). Finally, the current study limits itself to bank loans, whereas other sources of finance for BMI – such as venture capital and crowdfunding – should be studied as well, including combinations and pecking orders between them.

## ***5.4 Managerial implications***

### **5.4.1 For entrepreneurs and managers**

Entrepreneurs wanting to attract credit for BMI can undertake several concrete actions to make their business model more financeable. Firstly, engagement of customers and networks will help obtain a bank loan. Engaging a bank at an early stage can create buy-in and willingness to develop insight into the particular type of BMI. Commitment from value chain players such as (potential) customers and suppliers – as a signal of future cash flows – will help lower risks from a bank perspective. This can be organized by building customer communities, running (pre-order) crowdfunding campaigns and setting up joint ventures or buyback constructions with suppliers. Identifying similar market players that could potentially take over running the business in case of default may also help obtain a bank loan. Secondly, entrepreneurs wanting to finance their BMI should consider how their value proposition and strategy could be designed to optimize the value of underlying assets and increase robustness of future cash flows. By marketing assets that are durable, flexible, moveable, modular and/or at some level standardized means these assets can embody multiple 'value propositions' in the future, which may increase their collateral value for the bank. A materials passport can also improve residual value of assets. At the same time, the value proposition still needs to be distinguishing enough to merit financing without fear of competitors capturing their market share – a challenge that entrepreneurs need to navigate.

However, the most important signal found to improve access for BMI bank finance is robustness of future cash flows. This means that – in service models – contracts need to be designed in such a way that they guarantee long-term revenues, while also keeping the terms attractive for clients. It can also mean that if entrepreneurs obtain commitment from launching customers that are large and/or creditworthy, this can have a positive influence on access to bank finance, as well as data collection on the 'stick rate' of clients – all signals of robust future cash flows. One strategic option for innovative firms offering product-service business value proposition is to first obtain long-term B2B contracts (i.e. service all smartphones for a large firm or all washing machines for a housing corporation), which gives a bank the security of future revenue

and allows for free cash flow to grow the B2C market. Joint ventures and buyback constructions with suppliers also increase future cash flow robustness.

#### **5.4.2 For banks**

To overcome financing challenges residing within innovative (circular) business models, banks that wish to lend to a certain type of BMI should develop product/sector expertise and innovate their use of lending technologies to best overcome information asymmetries. In practice, this can mean learning to determine quality of future cash flows (accounts receivable), assessing creditworthiness of clients and evaluating collateral values of new products for asset-based lending.

Our research indicates that building relationships with innovative firms can help banks understand this type of BMI and also increases the chance of them being able to extend credit based on multiple components of the business models, since cash flow or assets will often be insufficiently available. Banks therefore need to invest in expertise to be able to screen technological innovations to gauge their potential for creating future cash flows enabling them to service a loan. With time, the increased investments into relationships with innovating firms can pay off in the form of expertise on this specific type of innovation leading to a larger and growing market (share) in the future and can be used to develop automated lending models once this type of business model has mainstreamed. In addition, a bank could develop additional services for firms, such as client acceptance procedures based on credit scoring models, which can improve the competitive position of the firm.

Another way to lend to BMI is by sharing risks with other financial and market players. Buyback constructions and joint ventures with suppliers, (pre-)orders from customers, syndication between banks and other financial players as well as re-selling to long-term financiers such as state investment banks or pensions, are ways to share BMI financial risk.

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## 8 Appendix

**Table A.1: List of interviewees/workshop participants (face-to-face) (49)**

<b>Code</b>	<b>Role</b>	<b>Date</b>	<b># Interviewees</b>	<b>Workshop/interview</b>
A1	Senior Sustainable Business Strategist	Dec 2015	3	Interview
		Sep 2016	2	Workshop
A2	Sustainable Business Manager	Dec 2015	3	Interview
A3	Account manager	Sep 2016	2	Workshop
A4	Account manager	Sep 2016	2	Workshop
A5	Innovation manager	Sep 2016	2	Workshop
A6	Innovation manager	Sep 2016	2	Workshop
A7	Asset manager	Sep 2016	2	Workshop
A8	Account manager	Sep 2016	2	Workshop
A9	Financial specialist	Sep 2016	2	Workshop
A10	Marketing manager	Sep 2016	2	Workshop
A11	Account manager	Sep 2016	2	Workshop
A12	Account manager	Sep 2016	2	Workshop
A13	Sustainability Program Manager	Sep 2016	2	Workshop
A14	Credit analyst	Sep 2016	2	Workshop
A15	Assistent Accountmanager	Sep 2016	2	Workshop
A16	Young Professional Trainee Rabobank	Sep 2016	2	Workshop
A17	Economist	Sep 2016	2	Workshop
A18	Relationship manager corporate banking	Sep 2016	2	Workshop
A19	Vice president large & key accounts	Sep 2016	2	Workshop
B1	Manager Innovation Lab	Jan 2016	2	Interview
		Feb 2016	2	Workshop
B2	Intern Innovation Lab	Jan 2016	2	Interview
		Feb 2016	2	Workshop
B3	Head of Commercial Banking	Feb 2016	2	Workshop
B4	Managing Director	Feb 2016	2	Workshop
B5	Sector manager business banking	Feb 2016	4	Workshop
B6	Senior relationship manager SME banking	Feb 2016	4	Workshop
B7	Senior relationship manager SME banking	Feb 2016	4	Workshop
B8	Relationship manager SME banking	Feb 2016	4	Workshop

B9	Director operations, investment management	Feb 2016	4	Workshop
B10	Corporate Communication & Strategy Intern	Feb 2016	4	Workshop
B11	Controller investment management	Feb 2016	4	Workshop
C1	Director Sustainable Finance	Jan 2016 Aug 2017	2 2	Interview Workshop
C2	Director Sustainable Lending	Jan 2016	2	Interview
C3	Manager Sustainable Finance	Aug 2017	2	Workshop
C4	Senior Risk Manager	Aug 2017	2	Workshop
C5	Sector Banker	Aug 2017	2	Workshop
D1	Director Sustainable Banking	Jan 2016 Jun 2016	2 3	Interview Workshop
D2	Head of Sustainability Corporate Banking	Jan 2016 Jun 2016	2 3	Interview Workshop
D3	Sector banker industry	Jun 2016	3	Workshop
D4	Sector banker public banking	Jun 2016	3	Workshop
D5	Senior Procurement Consultant	Jun 2016	3	Workshop
D6	Director Corporate Lending	Jun 2016	3	Workshop
D7	Director Strategy & Business Development	Jun 2016	3	Workshop
D8	Procurement consultant	Jun 2016	3	Workshop
D9	Sector banker industry	Jun 2016	3	Workshop
D10	Head Real Estate Risk & Portfolio Management	Jun 2016	3	Workshop
D11	Sector banker construction	Jun 2016	3	Workshop
D12	Product manager maintenance corporate buildings	Jun 2016	3	Workshop
D13	Innovation manager	Jun 2016	3	Workshop
D14	Risk management	Jun 2016	3	Workshop

**Table A.2: List of interviewees at firms (face-to-face) (37)**

Code	Firm name	Role	Sector	Date	# Inter- viewers
E1	Auping	Product Development	Bed producer	Nov 2016	2
E2	Auping	Procurement	Bed producer	Nov 2016	2
F1	DSM	Manager Circular Economy	Chemicals	Oct 2016	2
G1	Fairphone	Resource efficiency	Consumer	Nov 2016	2

		manager	electronics		
H1	Ioniqa	CEO	Plastics	Dec 2017	2
I1	Gyproc	Sustainability Manager	Building materials	Dec 2017	2
J1	Rockwool	Public affairs	Building materials	Oct 2016	2
K1	Black Bear Carbon	CEO	Car tire upcycler	Nov 2016	2
L1	Interface	Sustainable Development	Carpets	Nov 2016	2
M1	Coolrec	Directeur	Waste recovery	Jan 2017	2
N1	Closing The Loop	Founder	Electronics recovery	Aug 2016	2
O1	HVC	CEO	Waste	Oct 2016	2
P1	Canon	Sustainability Manager	Electronics	Dec 2016	2
P2	Canon	Sustainability Manager	Electronics	Dec 2016	2
P3	Canon Lease	Business Controller Solutions Financing	Electronics	Jan 2017	2
Q1	Gerrard Street	Founder	Consumer electronics	Sep 2016	2
Q2	Gerrard Street	Founder	Consumer electronics	Sep 2016	2
R	Desko	General Directeur	Office furniture	Nov 2016	2
S1	Philips	CEO	Electronics	Nov 2016	3
S2	Philips	Global Head Sustainability	Electronics	Nov 2016	3
S3	Philips	Director Sustainability	Electronics	Nov 2016	3
S4	Philips (Lighting)	Director Sustainability	Electronics	Feb 2017	2
S5	Philips (Lighting)	Head of Global Public & Government Affairs	Electronics	Feb 2017	2
T1	van de Sant	Founder	Furniture	Jan 2017	2
U1	Greenwheels	Business development mgr	Car sharing	Mar 2017	2
V1	Peerby	Founder / CEO	Sharing platform	Dec 2016	2
W1	United Wardrobe	Founder / CEO	Clothing resale platform	Oct 2016	2
X1	Blabla car	Country Manager	Car sharing	Dec 2016	2
Y1	NS: OV fiets	Sustainable business manager	Bicycle renting	Dec 2016	2
Z1	Bundles	Founder / CEO	Washing	Dec 2016	2

			service provider		
AA1	Ahrend	CEO	Office furniture	Feb 2017	2
AA2	Ahrend	Product Design	Office furniture	Feb 2017	2
AA3	Ahrend	MVO	Office furniture	Feb 2017	2
AB1	Gispen	Manager Circularity	Office furniture	Nov 2016	2
AC1	Mitsubishi electronics	Sales Manager	Elevator firm	Mar 2017	2
AE1	Desso	Director sustainability	Office furniture	Jan 2017	2
AF1	Philips Capital	Head of Financial Sourcing	Office Lighting	Jun 2016	3