

# **Does finance as usual work for circular economy transition? A financiers and SMEs qualitative approach**

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## **HIGHLIGHTS**

- There are specific external circular risks that SMEs cannot control.
- Regulatory and market risks and a lack of external support constrain the financing of CE transition.
- Financiers find CE innovations riskier than standard innovations due to a misunderstanding of CE business models.
- Finance as usual does not work for circular economy transition.
- Blended finance and “circular finance” are proposed as potential solutions.

## **Abstract**

Transitioning to a circular economy (CE) particularly challenges small- and medium-sized enterprises (SMEs), and a deeper understanding of CE financial barriers is needed. We draw on SME and financiers views to qualitatively study the risks associated with CE, how such risks limit access to financial resources and how financial institutions perceive those risks. We find that transitioning to a circular economy entails regulatory, cultural and market risks and that CE business success does not depend solely on SME resources or capabilities. Contributions include combining business model perspectives with transition theories and showing that new circular business models entail major reforms to political, regulatory, and market structures, including financial markets. From a practical perspective, to accelerate CE transition, we recommend reducing fragmentation, uncertainty and incoherence in regulation of the remodelling of information and risk assessment systems and new co-financing mechanisms and alternative instruments such as blended finance or “circular finance”.

## **Keywords:**

Circular economy, small and medium enterprises, eco-innovation, sustainability, financial resources management, circular business model.

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## 1 Introduction

The circular economy (CE) has gained attention in the literature and managerial practice due to the belief that circular models can maintain the value of products, materials and resources in an economy for as long as possible (Merli et al., 2018) such that waste is eliminated and used as a resource for new goods. After reviewing 114 definitions, Kirchherr et al., 2017 defined CE as an economic system that replaces the “end-of-life” concept with reducing and alternatively reusing, recycling and recovering materials in production/distribution and consumption processes.

The circular economy has recently been popularized as a driver of sustainability transition (Geissdoerfer et al., 2017). Such transition is characterized by multidimensionality and multiactor processes where policy making and firms play an important role (Loorbach, Frantzeskaki and Avelino, 2017). The recent literature on CE and sustainability transition at a micro level has mostly focused on the initiatives carried out at the firm level (Franklin-Johnson et al., 2016; Geng et al., 2012; Ghisellini et al., 2016; Su et al., 2013) (Bocken et al., 2016). As innovators, firms develop new products, services and business models; contribute to market creation for novel technologies; and work towards the formation of new industries to face sustainability challenges (Köhler et al., 2019). According to the sustainability transition research, it is necessary to understand whether business model innovation can assist in this transition and how finance can help restrict or promote change in a certain direction (Köhler et al., 2019).

It has been argued that businesses can achieve a competitive advantage by creating new CE business models (CEBMs) or by circularizing their existing business models (Stahel, 2010) (Demirel and Danisman, 2019) (Acsinte and Verbeek, 2015; Ormazabal et al., 2016; Ormazabal et al., 2018). However, the transition from tried-and-tested linear production methods to new circular ones could entail specific circular risks (Ghisetti and Montesor, 2020) as these business models (i.e. second hand markets or pay per use) question the current production and consumption model. Thus, the process of balancing short-term margin and long-term stability could impact third-party perceptions of creditworthiness and the stability of the underlying business. To achieve CE, companies must be able to envision sustainable designs, technologies, products and processes that are not yet on the market (Hamel & Prahalad, 1991; 1994) and overcome uncertainties as well as market and cultural barriers (Tura et al., 2019) that could affect the innovation process and discourage new investments, both of which have financial implications (Kerr and Nanda, 2015).

This is particularly relevant in the European context, where there is a scarcity of internal firm resources for innovation and a market structure based on SMEs (Hall et al, 2016).

The EU's commitment to the circular economy is reflected in the European Green Deal (EGD) (COM/2019/640). The Action Plan for the Circular Economy (COM/2020/98) develops the EGD by incorporating legislative measures such as those aimed at eco-design or the empowerment of consumers with the establishment of the right to redress. The Action Plan pays special attention to SMEs, providing incentives for symbiosis, support for R&D and financial support measures through

CE was also included among the five priorities of the Sustainable Finance Action Plan of the EC (EC, 2018). The European Investment Bank (EIB) and other European public financial agencies launched a specific line of financing to foster CE during 2019-2023 with 10.000 million euros by prioritizing agencies related to innovation, environment, and SMEs.

To obtain a significant transition to CE in Europe, the participation of SMEs is essential as, according to the Annual Report on European SMEs (Bassi & Dias, 2020), SMEs account for 99.8% of nonfinancial business enterprises, 66.4% of employment, and 56.8% of added value generated by the nonfinancial business sector.

SMEs should be involved in CE activities not only because of regulatory requirements (Geissdoerfer et al., 2017) but also because of the volatility in resource prices and limited access to resources (Acsinte and Verbeek, 2015; Ormazabal et al., 2016) and the increasing awareness of consumers (Ferasso et al., 2020; Jabbour et al., 2020).

However, past work has shown that SMEs have limited resources with which to accomplish this major shift to circularization (Ghenta and Matei, 2018; Ormazabal et al., 2018). SMEs also have problems accessing the external financial resources necessary to implement CE projects (Rizos et al., 2016; Tura et al., 2019), which exposes them to the borrowing costs of implementing the monitoring and improvement activities usually required by CEBMs (Dervojeda et al. 2014).

Access to financial resources has therefore become a key element in implementing circular economy activities. However, the discussion concerning the financial side of CE has mainly taken place in the academic domain. Little attention has been given to the specific risks of circular business models (circular risks) (Merli et al, 2018) and how financial markets assess such risks. Past studies have suggested that supply and demand do not align when there is a mismatch between financiers' requirements and SME investment needs (Rizos et al., 2016, Scarpellini et al., 2018). In the case of such a mismatch scenario, SMEs will use their resources to self-finance circularization (Ghisetti & Montresor, 2020) or resort to public financial incentives and support (Aranda-Usón et al, 2019; Ormazabal et al, 2018; Prieto-Sandoval et al,

2018). This financial strategy limits SMEs to the use of mainstream circular business models as only a limited number of SMEs can be involved in this type of transition.

Thus, a deeper understanding of why mismatch between financiers' requirements and SME investment needs occurs, and a more fine-grained identification of the "circular risks" is necessary. One reason for this limited understanding is that past scholarship has focused on SMEs' needs but has failed to contrast them with those of financiers. By examining a variety of actors involved in the design and implementation of circular business models, this study provides a more thorough and systematic account of the financial mismatch that jeopardizes the development of circular business models. More specifically, this study aims to elucidate whether there are specific risks associated with circular activities; whether all CE activities, innovations and industries entail the same types of risk (Kirchherr et al. 2018, p.271; Vermunt et al., 2019) and how such risks are perceived by the financial industry.

To answer these questions, we conducted a qualitative study with 4 focus groups and a total of 59 participants from 50 institutions in Spain. We go further than Ormazabal et al. (2018) in their study as, for the first time, we introduce the point of view of financial institutions in addition to that of SMEs. European studies have revealed that the majority of SMEs in Spain use internal funds to finance their projects (Eurobarometer, 2016), limiting the ability to mainstream CE. CE strategies and practices vary depending on the industry (Kirchherr et al. 2018, p.271; Vermunt et al., 2019). Our sample of SMEs belongs to three specific sectors that have been identified by the European Commission as crucial for moving towards circularity: construction, agri-food and textiles (COM/2019/640). For explorative studies such as this, qualitative methods seem to be a suitable choice (Strauss and Corbin, 1990).

We use sustainability transition as an analytical framework to support our understanding of the dynamics of change from a linear system to a more circular one by examining the roles of different actors (Geels, 2004; Smith et al., 2010; Loorbach et al., 2017; Naidoo, 2020). The research on finance within the sustainability transition field remains promising, and we aim to fill this gap from a practical perspective. We seek to understand the explicit demands that transitions impose on companies, the financial system, and the public sector (De Carvalho Ferreira et al., 2016, Rizos et al., 2016), reflecting on the implicit assumptions that frame finance (O'Sullivan, 2005) and considering solutions.

The study shows that the transition to a circular economy demands changes in business models, regulations, market structures and culture and confirms that extant financial systems are not prepared to finance such a transition. Financiers find CE innovations riskier than standard innovations and accordingly more difficult to collateralize and finance. Uncertainty and obsolete modes of evaluating firms could explain their misunderstanding of CE business models. This financial constraint on the supply side conditions the rate

and trajectory of innovation in the circular economy and demands a facilitating role of the public sector. We propose blended finance as a potential solution.

The paper is structured as follows. In the second section, we review the literature on circular risks in CEBMs and financial access and with a special focus on SMEs. We propose a framework to analyse the main circular risk considering the main barriers found in the literature. In the third and fourth sections, we present the methodology and empirical results of the four experiential focus groups. We end with conclusions and suggestions for potential solutions.

## 2 Literature review

### 2.1. CEBMs: Barriers and specific risks

A CEBM can be defined as the rationale for how an organization creates, delivers, and captures value to close and slow material loops (Antikainen and Valkokari, 2016; Bocken et al., 2016a).

FinanCE (2016) defines three CEBM typologies with different risk profiles (technological, operational, market, legal, etc.). The first typology, identified as “circular innovation modes” (CIMs), focuses on the development phase and is based on product innovations (e.g., newly designed products that are easier to repair) and/or process innovations (e.g., new and/or re-engineered processes to increase recyclability and waste streams) through which the CE value logic is implemented. The second CEBM is “circular use modes” (CUMs), which aim to extend the use of already realized products either by retaining their ownership and selling their services to customers (as in PSS) or by offering maintenance and add-on services once a product is sold. Finally, “circular output models” (COMs) are developed in the after-use phase and aim to transform used products into new ones or into useful resources mainly by reducing if not eliminating their residual waste. CIMs, like such as other innovative business practices, entail high technological and operational risk, but this risk is lower in the business of after-use products. CUMs, however, are expected to have high and wide financial risks because the capital required to finance assets remains on the balance sheet, and the cash flow pressure is due to diluted subscription, rental or lease rates or even to customers with low creditworthiness (Ghisetti and Montessor, 2020; ING, 2015 and BNP Paribas 2019).

Scholars have begun to construct analytical frameworks that combine business model perspectives with transition theories (Bolton and Hannon, 2016), showing that new business models cannot act as a basis for sociotechnical transformations without major reforms to political, regulatory and market structures including financial markets. Under a multilevel perspective (MLP), CEMBs are niche experiments that must address the meso level (linear regime) and a landscape in which regulations, consumer practices and financial constraints, among other barriers, make this transition difficult.

Tura's (2019) in-depth literature review identified 18 CEBM barriers grouped into six categories: economic, social, institutional, technological, supply chain and organizational. Considering this classification and the work of FinanCE (2016), in Table 1, we propose a categorization of CE-specific risks and their relationship to the main barriers (Table 1).

Without being exhaustive, examples of the risks that are characteristic of circular business models are those related to solvency risk due to adverse selection of uncreditworthy users of pay-per-use customers (FinanCE, 2016, ING); contract risk due to uncertainty in operating- or maintenance costs in servitization operations (EIB 2015, ING) or collateralization risk due to uncertainty in intellectual property rights in circular strategies of industrial symbiosis.

CE market risks are related to uncertainties in the market relationships of the CE along the value chain. Here, in three subcategories, we include topics such as the final client acceptance of products and services and their price evolution; the quantity, quality, price volatility and security of the supply chain; and the uncertainty related to secondary raw materials and used product markets in a low-development stage that addresses key issues such as the residual value of assets.

CE operational risks are related to uncertainties in two main categories: first, regulatory risk due to the changing legal framework of CEBMs, especially when secondary raw materials (i.e., construction products or treated wastewater for irrigation) are involved or when innovative property rights are used; and, second, profitability and costs due to the untested nature of CEBMs at different scales.

CE innovation risks occur when new technical solutions are applied in the production or delivery of products and services. At this stage, innovation plays a key role in CE.

In the category of CE financing—investment and support—we include financial institutions' difficulties in implementing risk assessment methods in relation to CE, which becomes a barrier to financing.

Here, we also include the lack of funds or adequate instruments for the necessary investments in the CE transition and low support from public administrations. As the major impediments towards the transition from LE to CE are financial resources (Sharma et al., 2020), (Ormazabal et al., 2018, institutional frameworks and financial systems need to be redesigned to support the growth of circular business models (Zucchella and Previtali, 2019).

**Table 1. Circular economy business model specific risks**

CE barriers (Tura et al, 2019)		CEBM specific risks
High costs and lack of financial capability and support.	Economic	Operational risks – profitability and cost.
Lack of tools and methods to measure benefits.		
Lack of social awareness and uncertainty of consumer responsiveness.	Social	Market risks – consumers and prices.
Lack of clear incentives.		
Lack of market mechanisms for recovery.		Market risks – secondary raw materials and used products markets.
Complex and overlapping regulation.	Institutional	Operational regulatory risk.
Lack of governmental support.		Financial – investment and support
Lack of CE know-how of political decision makers.		
Lack of information and knowledge.	Technological	Innovation risks.
Lack of technologies and technical skills.		
Strong industrial focus on linear models.	Supply chain	Market risks – raw materials. Market risks – secondary raw materials and used products markets.
Lack of network support and partners.		
Lack of collaboration and resources.		

Source: Tura et al (2019), FinanCE Working Group (2016) and own elaboration

## 2.2. Financing SMEs' CE transition

Natural resource-based view theory (NRBVT) states that “strategy and competitive advantage in the coming years will be rooted in capabilities that facilitate environmentally sustainable economic activity” (Hart,

1995, p. 991). Developing green capabilities will bring cost reductions (Hart & Ahuja, 1994); increase productivity and efficiency (Smart, 1992); improve performance, especially in terms of business innovation (Mura et al., 2020); provide a competitive advantage over competitors; and enhance revenues and profitability. According to all these factors, a positive disposition from the financial sector towards CE investments would be expected, as these investments are recognized as a growing business model with competitive advantages, lower costs and the ability to improve the public image of financial entities. However, companies also report difficulties when measuring the long-term value of CE (Tura et al., 2019) and the limited interest of consumers for the new products and services (Ormazabal et al., 2018). The obstacles identified in the previous section can be perceived in terms of financial risk given their potential to harm companies' profitability and cash flow and, consequently, their solvency. For example, the lack of market mechanisms for the recovery of used goods or materials as secondary raw materials is a barrier to CE implementation but can also be interpreted as a financial market risk due to uncertainty about the prices and availability of these materials and thus about a company's cash flow and financial solvency. This might explain why financiers may not want to engage in CE activities.

Regarding demand-pull instruments to stimulate environmental innovation, Ghisetti (2017, p. 181) concludes that "there is agreement that governmental intervention is needed to favour the adoption and diffusion of EI" and that "there is room for public policies to compensate for the risk of under-investment in environmental innovations due to the absence of proper market signalling" with environmental policy instruments and the allocation of tax credits for innovation and subsidies to R&D activities as well as technology transfer instruments.

CEBMs may require research and innovation. Kerr and Nanda (2015) describe four features that characterize the innovation process. First, innovation is inherently uncertain, which is why it is difficult to evaluate potential innovative projects that may require funding. Second, returns from the innovation process are extremely skewed, and standard ways of evaluating projects often require specialized intermediaries or techniques. Third, the innovator may still know more about the project than the financier, which allows for a significant increase in agency costs. Fourth, firms engaged in innovation have a high percentage of intangible assets; in that context, knowledge is often embedded in the human capital of the firm's employees, and this key resource carries the risk of being lost if those employees leave or are laid off.

In pursuing circular economy business, firms conduct activities other than R&D or innovation that question current production and consumption models and customer cultures (i.e., pay-per-use, collaborative models in the value chain, industrial symbiosis, reverse logistics, and other research activities). These new business models produce changes in the nature of cash flow, increase capital needs, and alter balance sheets and guarantees (more assets, less liquidity, uncertainty in intellectual property rights, etc.), thereby producing



different costs and different degrees of risk relevant to the demand and supply of their external capital (Hall et al., 2016; EIB, 2015).

However, companies involved in CE activities perceive such activities not in terms of cost but rather as an investment. This is because CE creates new value networks and intangible values. CE reduces company risks and raw material price volatility while it increases procurement process efficiency (Mura et al., 2020).

These different perceptions are due to information asymmetries and have an important bearing on how the financial sector deals with and finances CE activities. The financial sector perceives CE as an innovative process with an especially slow period of maturity and especially high credit and liquidity risks. For example, retaining ownership of an asset while selling services can attract insolvent customers and involve liquidity risks as firms' cash flow changes (Weber, 2019; BEI, 2019; ING, 2015; FinanCE, 2016, Ghisetti and Montresor, 2020). CEBMs also require changes in how balance sheets are analysed to give adequate value to intangibles, which are of key importance in CEBMs (Romain, 2016, ING, 2015) and whose value is often neglected or considered null by analysts. The financial evaluation of CE business models is often too conservative (Weber and Stuchtey, 2019), and there is a lack of understanding on the part of financial entities with regard to the inherent risks in CE transitions. In addition, due to the specific risk profile of these business model innovators, it is crucial to analyse the solvency and reliability of the critical links of the value chain that are decisive for the operation (raw materials, waste markets, etc.), for the strength of the supply, sale and service contracts, which are key to the operation of the business, and for the optimization of cash flow (EIB, 2019).

The uncertainty associated with CEBMs also implies a high level of collateral for the granting of loans (Kin et al, 2016 and Cecere et al., 2018) and reduces the flow of funds towards this type of investment (Polzin et al.,2017). In addition, the level of collateral required for a company to finance activities in the CE framework is higher than that required for other investments (Aranda-Usón et al. 2019). For example, the low residual value of CE assets undermines opportunities for bank financing to a greater extent for SMEs than for large companies given SMEs' relative disadvantage in terms of collateral availability (Hyz 2011).

SMEs are also exposed to the borrowing costs associated with implementing the activities usually required by CEBMs. Schafer et al. (2004) study German innovative SMEs and find that the increased risk in the project to be financed implies a greater orientation towards internal financing because lenders tend to demand higher costs, which are more difficult to meet under certain profiles. In a study based on 87 Spanish eco-innovative companies, Scarpellini et al. (2018) find that financial sources that are not explicitly penalized are preferred. SMEs use their resources to self-finance circularization for their business models (Ghisetti & Montresor, 2020) or resort to public financial incentives and support (Aranda-Usón et al, 2019; Ormazabal et al, 2018; Scarpellini et al, 2018; Prieto-Sandoval et al, 2018). Only a small percentage of

SMEs present the necessary profiles required to attract equity finance, and the recently popularized financial instruments of peer-to-peer finance and crowdfunding fail to play a significant role in SME growth (Demirel, 2019). D’Orazio and Valente (2019) suggest a potentially crucial role for public investment banks (PIBs) in improving the functioning of the financial system by filling the so-called green financial gap.

In summary, the availability of guarantees and external funds at an adequate cost becomes crucial for CE transition by SMEs. Their dependence on internal funds hinders this transition. Market failure demands the selection of new metrics and financial instruments that lower project risk (Naidoo et al., 2014; Mathews, 2015; Volz et al., 2015). Financial public support and a greater involvement of the public sector in financing the transition to CE to cushion and share risks (Singh et al., 2018) could facilitate the profitability for certain projects (Scarpellini et al, 2018) and the likelihood of the use of bank loans (Hottenrott et al., 2018).

### **3. Empirical analysis**

#### *3.1. Sample selection and data collection*

To gather data, this study used an experiential focus group method (Fern and Fern, 2001). In the focus group, the researchers played a moderating role in facilitating the discussion among the participants (Bloor et al., 2001) and addressing the research topics. This methodology allowed us to explore more perspectives in less time and to draw conclusions based on the participants’ experiences, differences, perceptions and attitudes (Cornwall and Jewkes, 1995; Diefenbach, 2009).

The empirical study was carried out in Spain and focused on SMEs with CE experience in three relevant sectors in terms of CE: construction, agri-food and textiles. The first two are major industries in Spain (COTEC, 2019). Spain has a concentration of 8.6% of European SMEs that account for 72.4% of employment and 62.4% of value added in the nonfinancial private sector (European Commission 2019). The textile sector has acquired importance in the new CE strategic plan published by the Spanish government in 2020 (Spanish CE strategy 2030). We aimed to determine whether various transitions to CE generate different risks and demand new investments and funding depending on the industry. The agri-food and textile industries account for 25.3% of the Spanish manufacturing sector, while construction represents 6.1% of the national economy. Within the agri-food, textile and construction sectors, SMEs accounted for 50.7%, 86.8% and 86.3% of GVA, respectively.

The focus group discussion followed a semi structured protocol (Nyumba et al. 2018) with a total of 59 participants from 50 institutions. Three focus groups focused on SMEs along the entire value chain: design, production, distribution, recycling and waste management (see Table 2). Some academics and representatives of large companies, SME associations and consultancy firms also participated in the discussion. In the fourth focus group, the representatives of 9 financial institutions participated.

Each focus group session lasted between 90 and 120 minutes and was recorded and transcribed for subsequent analysis. We structured the discussion in three main areas: the barriers and risk exposure of SMEs in the transition to CE, financial constraints, and proposals and solutions. The main conclusions of each focus group were validated by the participants and shared afterwards among the focus group. To conduct reliable qualitative research and permit readers to access concrete observations, we included direct quotations from these transcripts in the analysis when necessary (Silverman, 2006). The context in which the data were collected was considered (Pole and Lampard, 2002).

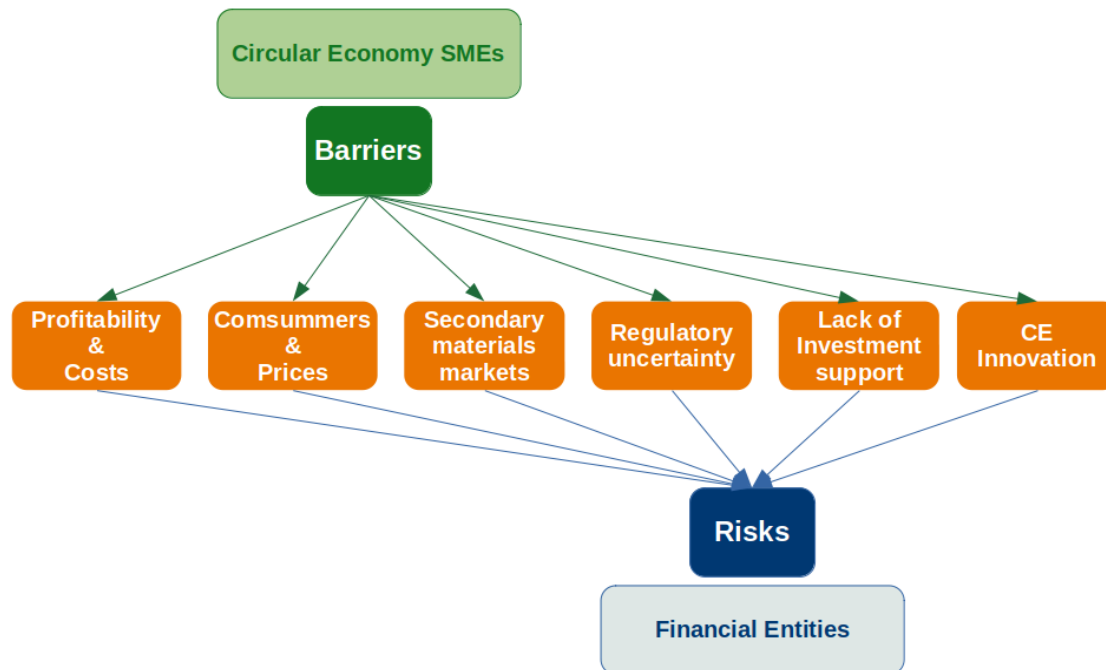
**Table 2. Participants in the focus groups**

Sector	Typology
Agro (13)	Cooperatives (2)
	Expert (1)
	Large enterprise (1)
	SMEs (9)
Construction (14)	Large enterprises (2)
	Research and training (2)
	SMEs (10)
Textile (10)	Large enterprise (1)
	SMEs (9)
Financial (12)	Advisory firm (1)
	Commercial bank (1)
	Crowdfunding platform (1)
	Experts (2)
	Public funders (5)
	Sustainable banking (1)
Venture capital (1)	
Others (10)	Large enterprise. Other sectors (1)
	NGOs (3)
	Public administrations (3)
	Scholars (3)

### 3.2. *Data analysis*

The discussion transcripts served as the basis of the qualitative data analysis. To operationalize the data in the transcriptions, we linked a tree of nodes to the focus group guide to facilitate the codification process. These nodes reflect the objectives of the research whereas the analysis of the nodes leads to the results and facilitates the identification of possible relationships between the nodes (Solomon et al., 2011). The preliminary definition of nodes was based on our theoretical proposal (see Table 1) and was revised during

the analysis taking into account the content of the focus group (Tregidga et al. 2014). The resulting nodes are presented in Figure 1.



These nodes respond to specific topics related to the main barriers shown by SMEs that are perceived as risks by financial institutions. To improve the reliability of the results, we implemented various measures within the research process, such as triangulation of the data and analysis of the transcripts by multiple coders (Wilmshurst and Frost, 2000).

We used computer-assisted qualitative data analysis software (CAQDAS) to perform this task (Stubbs and Higgins 2014). CAQDAS facilitates both the systematization of the analytical process and the comparison of researchers' outputs (Weitzman, 1999). QSR NVivo was chosen from among the various CAQDAS programs available due to its advantages (reported in previous studies (Solomon et al. 2011)).

#### 4. Results and discussion

Table 3 summarizes the results of the qualitative data analysis by distinguishing between the specific industries and the financial institutions' perceptions and following the nodes (risks) identified. Our hypothesis is that the CE-specific obstacles are perceived as risk factors by the financial sector due to the potential capacity of these obstacles to damage firms' cash flow, balance or liquidity and, therefore, their

creditworthiness. The greyscale code shows the intensity of each risk factor. At the end of the table, we also include the occurrence of references identified as CE opportunities by the participants, especially by SMEs, which are considered to have a low level of risk in circular business models and an edge over competitors (growing demand, client loyalty, differentiation or adaptation to future regulations).

To illustrate the qualitative results of the discourse analysis, we synthesize the main ideas into groups according to our research questions.

**Table 3. Specific Circular Risks perceived by SME and financial institutions**

**Perceived risks for SMEs involved in CEBM**

		Agri food	Construction	Textile	Financing
Market – raw materials	10	2	5	3	2
Market – consumer and prices	44	12	8	24	3
Market – Secondary markets	11	1	2	8	1
Operational – regulatory	70	38	22	10	22
Operational – profitability and costs	22	8	5	9	5
Innovation	15	7	3	5	22
Financial – investment and support	37	16	6	15	36
Strenghts and opportunities	28	6	7	15	10

#### 4.1. Are there specific risks associated with CE?

According to our results, the SMEs first highlighted questions related to regulatory obstacles (70 allusions) followed by the market risks associated with consumers and prices of products and inputs (44) and the lack of external support for investments (37). However, the risks related to operational aspects, profitability and costs appeared substantially less frequently than other issues (a total of 22 allusions). This illustrates the companies’ and financial institutions’ relative confidence in the utilized techniques and production methods, with their interactions with external factors being the main sources of risk.

The SMEs from the three industries indicated the uncertainties generated by unexpected changes in laws or incentives; by incoherencies in regulatory frameworks, which are sometimes different among regions and not well supervised; or even by regulatory loopholes. They agreed that these uncertainties generate a low level of development of the market for circular products. These obstacles were expressed in comments such as “You suffer”, “A titanic task, almost impossible”, “Everything is forbidden, just in case”, and “Ultimately, you are a guinea pig”.

Regulatory uncertainty was also perceived as one of the great risks for financial entities, especially in innovation scenarios. This was expressed with declarations such as “Regulatory issues without certain juridical security from the beginning, it is really difficult” and “A turn of the screw has been given to current fiscal norms. It is a question of improving the company’s R&D, but after that, new problems emerge about who is the owner of patents (when different companies collaborate in the process) and the outflows generated by them”.

The above difficulties become an obstacle to obtaining the necessary financial resources for investing. This explains the many references to external support (mainly public support) enterprises. All these recurrent demands for public funds demonstrate an intense difficulty in obtaining private capital or in obtaining it at a reasonable risk premium (Scarpellini et al, 2018; Marín-Vinuesa et al., 2018; Schafer et al. 2004; Aranda-Usón et al. 2019).

When discussing CE projects, financial entities address high uncertainty factors related to CE business models as a major obstacle for financing investments: “Many times, it is not because of money. It is difficult to generate something that passes through the filters of the national securities market commission.” Financial entities have declared that they face difficulties in financing CE projects because of their own risk assessment methodologies, their enterprise valuation tools or interest rates and term-setting methods, none of which are well adapted to CE characteristics and demand new financial pathways and instruments (Mazzucato, 2014). Multiple references were made to these difficulties when describing the role of assessment factors, with expressions such as “We must revisit our usual way of doing things”; “Finally, all of them use a typical risk assessment, looking at if the company has solvency or not”; “Banks should accept they must analyse balances in a way other than the one they have used all their lives”; “Financial entities should be aware that a company could have a minor risk precisely because its circularity makes that company free from linear risks”. “I have a lot of doubts about the measurement of social impact in terms of how it really isolates the effects of other trends there. I do not see a standardized methodology... there is a lack of tools, a lack of techniques”. These are implicit acknowledgements of the thesis highlighted in FinanCE and other research works about the inadequacy of traditional models, a problem that requires qualitative changes in modes of funding (FinanCE, 2016, Ozili, 2021 and Zucchella and Previtali, 2019).

#### 4.2. Are these risks different for each sector?

Our results indicate that the agri-food sector is especially sensitive to regulatory difficulties because of the strict food safety legislation in the European Union. These regulations are often linked to the linear model and are not adapted to CE production and distribution methods. We recorded expressions such as “We find a society that wants to be circular but a regulation that doesn’t”; “There is a regulatory conflict between ecology and health”; and “It is necessary to adapt safety regulations to twenty-first-century requirements”.

References were also made to the ecological incoherence problem of packing: “increasing normativity requires that everything must be packed, while the quantities to sell are getting smaller”. For example, the participants reported that “new regulations such as those calling for the use of biofertilizers require high innovation in the process of the collection and treatment of organic waste and the acceptance by the farmer of the quality of product, the price, and other aspects such as health, which increase the cost of these new CE activities”.

The difficulty of complying with the proximity principle of CE was also highlighted as regions specializing in the agri-food sector need to sell abroad to be competitive: “The costs of making local processes are higher than paying for the transport of products produced far away”. Similarly, EC elements such as the elimination of plastic packaging become a competitive disadvantage due to the lack of public incentives or regulation, while sanitary packaging requirements make plastic the most economically efficient alternative. However, market risk is not considered relevant. Consumers value healthy food (ecologically and circularly produced food) and are prepared to pay more for these products. Finally, large distribution companies were identified as those that have better capabilities to adapt to CE requirements as they dominate the industry.

SMEs in the construction sector were also concerned about regulation risks. Construction firms demand clearer and more effective legislation through, for instance, specific standards for the sector in relation to recycled materials: “Companies in the construction sector follow different technical codes, and there is confusion about which regulations should be applied depending on the country and even the region in which it is located”. In addition, “these codes are not adapted to new materials originating in the circular process”. Different regulations, for example, in waste management, increase the risk of free riders who decide to move to regions with more relaxed regulations that for “ecological dumping”. “Although there are many regulations, they are not monitored by the administration, and therefore, in practice, they are not applied”. In this sector, the risks linked to the quality of secondary raw materials and their market provision were also mentioned. In this sense, one of the sector’s demands is the environmental labelling of materials to differentiate environmental products as a competitive element in the market.

However, in the textile sector, SMEs recognized high uncertainty related to demand and market risks, where strong competence prevails with low-cost offshore production based on low-quality and low-priced fabrics. There were frequent references to necessary changes in consumer culture and values. Although in the agri-food sector, an increasing health culture can stimulate demand, in the textile sector, the influence of ecological vs. traditional fabrics on individual health is very low. Status, luxury, fashion, comfort and proximity are already the main values, and customers are not ready to pay more for quality and more durable products. A cultural change is required in which companies find a strong factor for competitiveness and a minor market risk: “It’s necessary to create an awareness that buying less clothes but of a higher quality can be cheaper”. SMEs report problems of scale with high relative production and marketing costs, which

leads to very low margins given the high level of competition in the textile sector. In contrast, the tractor effect of large companies is also shown, for example, in eco-design, which also facilitates the use of waste and reduces the cost of business models relating to waste management and recovery. Regarding solutions, the participants described intelligent forms of transport in “the globalization of the supply chain and the increase in e-commerce as it seems quite difficult to reverse the current mode of production and consumption” as well as in traceability and transparency standards in labelling to improve the competitiveness of sustainable products.

Finally, all these uncertainties and risks are obstacles to obtaining adequate financing for CE projects that end in the rejection of projects or the imposition of terms and interest rates that make funding unfeasible. The importance of the financial investment and support category reflects demands for commercial banks and public agencies to trust enterprises and finance CE projects. The participants encountered difficulties in market development once the prototype and the R&D investment were developed: “The cost of introducing an innovative product to the market is 10 times higher than the cost of developing it”. They insisted on market demand and culture change as necessary conditions for the success of a CEBM: “There is no need, and as long as the market does not have the need, everything that is done will be based on ‘artificial’ financing”, and “In Europe, money is allocated to industry, companies, and technology centres, but ‘landing’ these projects and maintaining them over time is what is more complicated”.

#### 4.3. Are financial institutions aware of circular risks? Do they perceive the risks in the same way that SMEs do?

Entities from the financial sector perceive CE as an innovative business with an especially slow period of maturity and especially high solvency and liquidity risks (Weber, 2019; BEI, 2019; ING, 2015; FinanCE, 2016, Ghisetti and Montresor, 2020). During the discourse analysis, we found expressions such as “The business warranty is not clear”; “If the company hasn’t passed a first phase whereby it has solvency”; “It is a risky investment without warranties to cover those defaults”; and “You must assume that there is a part that is a ‘bluff’ (sic) that you don’t know anything about its behaviour or how it’s going to meet the market because you don’t have comparative parameters at all”. Therefore, the use of CEBMs implies a high level of collateral for the granting of loans (Kin et al, 2016 and Cecere et al, 2018) (Hyz 2011).

The representatives of financial institutions in the discussions demanded more data and new metrics and methodologies without biases to measure the level of circularity of a project (BEI, 2019). They asked for new ways to analyse balance sheets that give adequate value to intangibles, which are of key importance in CEBMs (Romain, 2016, ING, 2015), the value of which is often neglected or considered null by analysts: “Very innovative companies are usually characterized by very out-of-balance sheets, with high intangibles but low cash generation that makes financing difficult”, and “It is very difficult... you go to the commercial



register data and, basically, the balance sheet is as full of holes as Swiss cheese: you do not know if current assets exist, do not exist or what is happening”. “To apply discounted pricing, you have to know how to measure physical risk and transition risk. Social impact is not just a word; it is not something qualitative—it must be measured”. Given the lack of comparable precedents, financial institutions are forced to assume a greater risk; they must “bet” with the expectation of obtaining high returns in successful cases: “You don’t know how it will react, how it will reach the market, because you have no comparable parameters. So you have to bet... but of course, you have to risk, and you have to see or visualize where that company can go”. Therefore, most financial evaluations of CE business models are too conservative (Weber and Stuchtey, 2019), and there is a lack of understanding of circular risks (EIB, 2015). “The information has to be analysed without historical and classical parameters”.

The financial institutions agreed with the SMEs regarding the relevance of regulatory risks and changes that can disrupt payback and alter standard metrics such as return on investment. Regulatory risks can be decisive for the financial sustainability of a project, nullifying any forecast of a company’s evolution. There is uncertainty and legal insecurity in which “pay-per-use” or symbiotic circular initiatives are developed in advance of normative activity. Similarly, there is a regulatory risk in the field of secondary raw materials given, for example, the absence of quality standards or clear norms in the agri-food sector. Such regulatory risks are also reflected in the value of the investment funds or venture capital involved in the companies. The participants expressed these worries in comments such as “Some banks and rating agencies are measuring physical risks with a time horizon of three or four years... but a physical or transition risk is twenty years. Furthermore, a regulatory risk such as the one that occurred in 2015 breaks your payback ...and you ask, where do I get my return, which was planned for six more years? If it turns out that I have a lapse of two, that I am standing, plus another six, eight...”.

The financial institutions also agreed with the SMEs with regard to asking for more public support to reduce risk by means of securities, guarantees or public lending to raise more funds from the private financial industry (Naidoo et al., 2014; Mathews, 2015; Volz et al., 2015). We documented expressions such as “Financial institutions can go up to a certain point. If the company has not gone through a first moment in which it has solvency... it is very difficult for the bank to finance a company that does not have economic and financial solvency and even previous experience”. “It is necessary to look for specific financing for the CE, adapted to SME”. “We must move towards hybrid models in which the risk is shared between public and private”. Therefore, financial public support could allow banks to obtain a larger share of their financing mix (Hottenrott et al., 2018; Raes and van Ast, 2020). “This is the way for them to take on more risk in certain operations. ... Sharing risk... is the channel for them to change their mentality a bit” In addition, banking interest could increase according to the FS taxonomy (EC, 2018)

In addition to these risks, the SMEs, much more than the financial institutions, highlighted the potential benefits of addressing CE practices versus those of the linear economy (Hart & Ahuja, 1994; Smart, 1992; (Mura et al., 2020). These strengths and opportunities can be understood as risk reduction in the future according to the European Action Plan on Sustainable Finance (EC, 2018). Among them, we find increasing and less predictable prices in resource markets and high competition and stagnating demand in certain sectors. The participants said, “A business and differentiation opportunity against competition”; “Proximity is important too because long-distance transport is going to be more expensive environmentally and economically unfeasible”; “We must raise a zero-carbon industry by 2050. This seems far, but it is tomorrow, really”; “For a company, this [residuals] is a critical topic because legislation is harder every year”; and “If you look at the pipelines of the enterprises that are getting funding from platforms, you’ll see that everything is related to sustainability”.

Therefore, it seems that the CE-specific barriers identified by Tura (2019) become a factor that constrains financing supply when it is processed by the traditional risk assessment systems of financial institutions. The specific risks identified by the financial sector can be attributed to a lack or asymmetry of information and the traditional ways in which financial institutions manage and model risk (FinanCE, 2016). Traditional assessment models of solvency, cash flow, and return are not useful and do not consider the advantages of CE activities and the risks associated with the linear paradigm questioned by public policies (Mura et al., 2020). To scale up, disruptive solutions are needed, not only in environmental, social and technological innovations but also in financial innovations (Naido, 2019). Standard forms of financing are not generally suitable for dealing with the premium risk that supporting CE projects entails, and alternative instruments are necessary (Ghisetti and Montresor, 2020).

## **5. Conclusions**

Circular activities require technological innovation to transform the design of materials and processes, the development of new markets (secondhand markets) and the provision of new investments and funds, which are difficult for SMEs to obtain (Marín-Vinuesa et al., 2018, Aranda-Usón et al., 2019).

According to our results, apart from the traditional features identified in the financial innovation literature (Kerr and Nanda, 2015), there are specific circular risks in CE activities (Rennings, 2000; FinanCE, 2016) and external factors that render firms unable to control and determine this transition (Daddi et al., 2018; Aranda-Usón et al., 2019; Portillo-Tarragona et al., 2018). CE business success does not depend only on the resources and capabilities of SMEs as posited by natural resource-based view theory (NRBVT) (Hart, 1995, p. 991).

CE transition entails specific market risks associated with consumer demand and supply chain prices and specific cultural and regulatory risks that introduce important financial frictions. Surprisingly, technical

aspects and innovation in production methods are not highlighted as relevant risks. This can be explained by how the participants in the study engage in less innovative CE activities such as circular outputs or use models (FinanCE, 2016; Ghisetti and Montresor 2020) or by how SMEs may primarily resort to exploiting current publicly generated knowledge and adopt only those CE activities that require minimum investments (Garrido-Prada et al., 2021). In contrast to Mura et al. (2020), our results show some differences between the obstacles reported by companies in different sectors in their transition processes to the CE. While the agri-food and construction sectors are particularly sensitive to regulatory risk, the textile industry is more sensitive to market risk and has called for a change in consumer culture. Financiers find CE innovations riskier than standard innovations and thus more difficult to collateralize and finance. Uncertainty and obsolete ways of evaluating firms could explain their misunderstanding of CE business models. Both the SMEs and the financiers are in agreement in terms of claiming a greater involvement of the public sector in financing the transition to CE to cushion and share the risk (Singh et al., 2018) to increase profitability for certain projects (Scarpellini et al, 2018), limit their dependence on internal funds and increase the use of bank loans (Hottenrott et al., 2018).

Therefore, to move from niche experiments to a circular economy regime, some barriers must be overcome. The study contributes to the literature combining business model perspectives with transition theories (Bolton and Hannon, 2016) showing that new circular business models entail major reforms to political, regulatory, and market structures including financial markets. The combined analysis of different actor perceptions (SMEs and financial institutions) has permitted us to understand the dynamics of change from a linear system to a more circular one (Geels, 2004; Smith et al., 2010; Loorbach et al., 2017; Naidoo, 2020). Financial constraints on the supply side condition the rate and trajectory of innovation in the circular economy and demand a facilitating role of the public sector.

From a practical point of view and to accelerate the transition to CE and involve more SMEs and financiers, we propose the following recommendations that could improve the investment environment.

Regarding public policies, we agree with Mura et al. (2020) that reducing fragmentation, uncertainty and incoherence in regulations will enable CE transition. Traceability and transparency standards can also reduce uncertainty about demand, improve SME competitiveness and support the investment phase of scaling up to the production process. A legislative initiative is needed to simplify and harmonize the rules based on the innovation obtained by CEBMs and the differences among the industries identified in this study. Policies must prioritize not only specific industries (which are considered in public action plans), but they must also design specific instruments or incentives (i.e., tax or cost reduction incentives, public guarantees, subsidies, and labelling) that are more appropriate for SMEs and particular industries.

To increase the involvement of financial institutions, new mechanisms of co-financing, shared risk or guarantees are needed (BEI, 2019). Standard forms of financing, such as debt vs. capital and internal financing, are not generally suitable for dealing with the premium risk entailed by supporting CE projects (Ghisetti and Montresor, 2020). The development of new products potentially requiring government subsidies or support becomes necessary (Rizos et al. 2016; FinanCE, 2016). This can be done through public lending, endorsements, public venture capital or other methods of risk sharing. Although in the early stages, public development institutions can play an essential role (D’Orazio and Valente, 2019), we propose blended financing as an appropriate instrument to mobilize private capital beyond more traditional loans and grants (OECD, 2018) (Meltzer, 2018) and to accelerate the development of eco-innovations (Cecere et al., 2020).

Regarding practitioners, we recommend driving the remodelling of information and risk assessment systems. The specific risks identified in this work can be attributed to a lack of information and the traditional ways in which SMEs and financial institutions report information and model risk (FinanCE, 2016). Financiers find CE innovations riskier than standard innovations and probably do not understand CE business models. Obsolete ways of evaluating projects can explain this lack of understanding (Kerr and Nanda, 2015). Better information supplied by SMEs about demand, supply chains and costs and the development of specific methods for measuring CE-related risks and opportunities is necessary to capture the true nature of circular companies and business models. To reduce uncertainty and information asymmetry, it would be interesting for financiers to consider the entire value chain as a unit to be financed. Financial institutions could become active partners to ensure the liquidity of payments and to improve the ability of the entire chain to be financed. Some examples of this activism could consist of putting CE entrepreneurs in contact with each other to generate collaboration mechanisms or new circular projects, with a bank as a potential financier; providing the guarantee for the operation and institutional backing; or financing the subsequent cycles of repurposing and reuse of the product with leasing lines. Knowledge of the solvency and margins of all the actors involved could reduce uncertainty, strengthen the supply, sale and service contracts and optimize the cash flow (BEI, 2019). This “circular finance” would require the completion of prior agreements between agents regarding quantities, prices and terms in the supply chain and the establishment of solid trust mechanisms and information sharing. We are aware of the changes that this mode of “circular finance” requires in financiers’ ways of thinking and doing business, but some experiments along these lines have already been conducted (Rabobank, 2016; DLL, 2020).

The conclusions of this work are conditioned by the study’s participants. As they mainly represented SMEs in the initial stages or medium-sized financial institutions already involved in CE financing, in future work, we would like to contrast our conclusions with those obtained when including participants from more SMEs, industries, large banks and more complex CEBMs.

In future research, we would like to identify metrics and management practices that can help financial institutions become more involved in CE financing. We would like to analyse different practices of blended finance to test their adequacy for more advanced and comprehensive CE models (symbiosis and pay-per-use models).

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## Tables

**Table 1. Circular economy-specific risks**

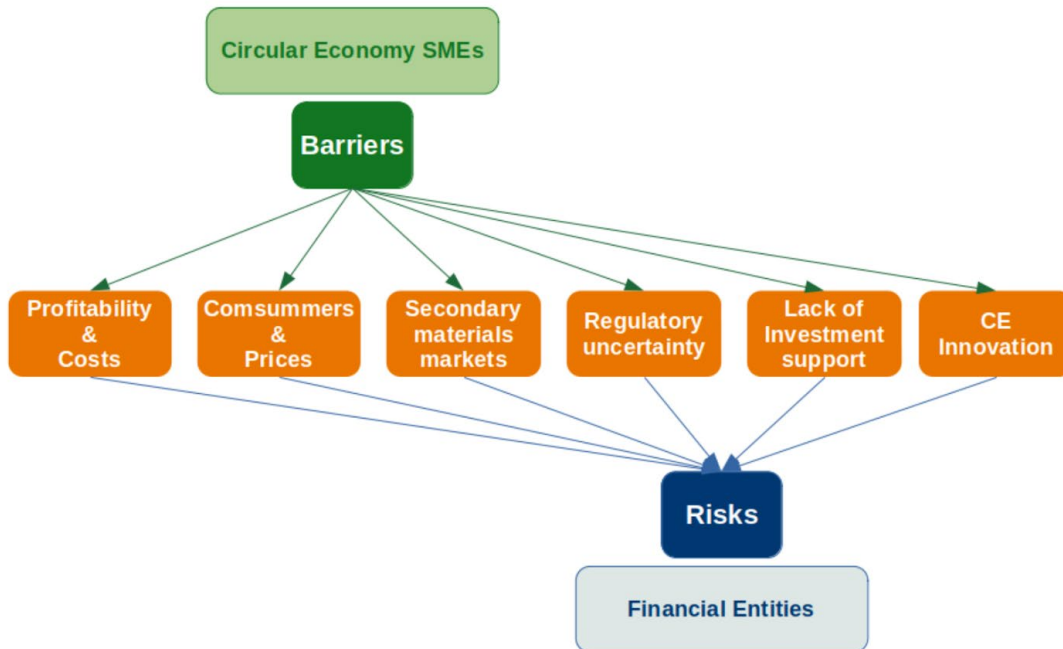
CE barriers (Tura et al, 2019)		CE-specific risks
High costs and lack of financial capability and support.	Economic	Operational risks – profitability and cost.
Lack of tools and methods to measure benefits.		
Lack of social awareness and uncertainty of consumer responsiveness.	Social	Market risks – consumers and prices.
Lack of clear incentives.		
Lack of market mechanisms for recovery.		Market risks – secondary raw materials and used products markets.
Complex and overlapping regulations.	Institutional	Operational regulatory risk.
Lack of governmental support.		Financial – investment and support
Lack of CE know-how of political decision makers.		
Lack of information and knowledge.	Technological	Innovation risks.
Lack of technologies and technical skills.		
Strong industrial focus on linear models.	Supply chain	Market risks – raw materials. Market risks – secondary raw materials and used product markets.
Lack of network support and partners.		
Lack of collaboration and resources.		

Source: Tura et al.,(2019), FinanCE (2016) and authors' elaboration

**Table 2. Participants in the focus groups**

Sector	Typology
Agro (13)	Cooperatives (2)
	Expert (1)
	Large enterprise (1)
	SMEs (9)
Construction (14)	Large enterprises (2)
	Research and training (2)
	SMEs (10)
Textile (10)	Large enterprise (1)
	SMEs (9)
Financial (12)	Advisory firm (1)
	Commercial bank (1)
	Crowdfunding platform (1)
	Experts (2)
	Public funders (5)
	Sustainable banking (1)
	Venture capital (1)
Others (10)	Large enterprise, other sectors (1)
	NGOs (3)
	Public administration (3)
	Scholars (3)

**Figure 1. Resulting nodes**



**Table 3. Specific circular risks and opportunities perceived by SMEs and financial institutions**

Type of circular risk	Total mentions	Number of mentions by sector				Financial industry
		Agri-food	Construction	Textile		
Market – raw materials	10	2	5	3		2
Market – consumers and prices	44	12	8	24		3
Market – secondary markets	11	1	2	8		1
Operational – regulatory	70	38	22	10		22
Operational – profitability and costs	22	8	5	9		5
Innovation	15	7	3	5		22
Financial – investment and support	37	16	6	15		36
opportunities	28	6	7	15		10