



# CIRCULAR STARTUPS IN A LINEAR WORLD: BARRIERS IN RAISING CAPITAL

MASTER THESIS

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## Abstract

Circular startups [CSUs] in the Netherlands play a leading role in the transition to a circular economy. However, CSUs experience challenges in securing the external capital needed to realize and scale their business cases, and thus, jeopardizing the government's goal of realizing a fully circular economy by 2050. Although literature touches upon the financial barriers of CSUs, there has been no scientific research specifically focused on this topic to date. Through literature review and interviews with CSUs and financial regime actors, this research provides an answer to the question: *What are the barriers faced by circular startups in securing external capital while operating in a linear regime?* Partially, CSUs face barriers common to startups due to their lack of familiarity *with*, and intransparency and fragmentation *of* the capital market. However, the findings show that the main difficulties in securing capital lie beyond the process of attracting external capital and are caused by the perceived challenges in creating a viable business case due to the misfit with the dominant linear market, and the misfit between the dominant financial regime and the characteristics and practices of CSUs. If the CE is to be realized by 2050, these barriers are to be addressed through interventions aimed at establishing a level-playing field and addressing the linear focus of the financial regime.

## Foreword

This thesis is written as part of the MSc Environment and Resource Management at the 'Vrije Universiteit' in Amsterdam. I would like to thank the following people, without whom I would not have been able to complete this research and make it through my master's degree! Thank you to my university supervisors Hanna Dijkstra and prof. dr. Pieter van Beukering, for providing me with guidance and feedback throughout this project. Thank you also to my host organization, Het Groene Brein, who warmly welcomed me into the organization, and especially to my company supervisor Marjolijn de Boer for her advice and coaching. Another big thank you goes out to all interviewees, whom have been so kind to share their personal experiences with, and knowledge on, the subject matter and whom made this research possible. Finally, I wish to acknowledge the support of my great friend, Joris, and great love of my sister, Deborah. They kept me going throughout the past three months.

Amsterdam, June 30

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# 1. Introduction

From 1970 to 2000, the extraction of raw materials has tripled, and it continues to grow. This has led to growing concern about assuring affordable, equitable and environmentally sustainable access to these resources (Schandl et al., 2016). Breaking this trend in material extraction requires a decoupling between economic growth and material consumption (Schandl et al., 2016). To achieve this, industry professionals and scientists increasingly propose the circular economy [CE] as the new economic regime (e.g. Henry, Bauwens, Hekkert & Kirchherr, 2020; Reike, Vermeulen & Witjes, 2018). As such, CE has recently received much attention from practitioners, policy-makers and scholars (Kirchherr, Reike & Hekkert, 2017; Nußholz, 2017). Following this trend, the Dutch government has recently presented a program aimed at transitioning towards a fully circular economy by 2050 (Dijksma & Kamp, 2016).

The CE is defined as an economic system based on business models that aim to use resources as efficiently as possible through circular strategies of reducing, reusing and recycling, thereby ultimately contributing to sustainable development (Kirchherr, Reike & Hekkert, 2017). As such, it is identified as a response to the inefficient management of the resources in the current linear model (Michelini, Moaesa, Cunhab, Costaa, Omettoa, 2017). The importance of circular business models [CBM] in the transition from a linear to a CE is widely acknowledged in literature (Kirchherr, Reike & Hekkert, 2017; Michelini et al., 2017), and considered the cornerstone of the CE (Nußholz, 2017). The CBM describes *“how a company creates, captures, and delivers value with the value creation logic designed to improve resource efficiency through contributing to extending useful life of products and parts [...] and closing material loops”* (Nußholz, 2017, p. 12).

So far, research on the adoption of the CBM has focused primarily on the circular practices of established firms (Henry, Bauwens, Hekkert & Kirchherr, 2020). However, according to Hockerts and Wüstenhagen (2010) smaller, less established businesses are more likely to pursue radical and transformative sustainable innovation than larger incumbents firms. In line with these findings, Henry et al. (2020) conclude that startups are the first to pursue disruptive circular innovation. Thus, startups pursuing a CBM - commonly referred to as circular startups [CSUs] - play a leading role in the transition to a CE.

The role of the CSUs in transitioning from a linear economy to a CE can be theorized with the use of the multi-level perspective (MLP). According to the MLP, transitions originate from interaction between three socioeconomic levels: the macro-level socio-technical landscape, the meso-level regime and the micro-level niches (Geels, 2011). An exhaustive description of the MLP is presented by Geels (2011) and referred to by researchers of sustainability in business (e.g. Hörisch). In MLP, the *regime* represents the incumbent system that constitutes dominant patterns and institutions. The linear economic system is considered the regime for this research. It is characterized by lock-in and resistance to transitions. Yet, macro-level *landscape* pressures such as climate change, resource scarcity and changing consumer

preferences create instability, inspiring niche-level experimentation. The micro-level *niches* are protected spaces in which actors, e.g. CSUs, work on radical innovation that substantially deviate from the dominant regime (Geels, 2011). By introducing circular innovation into the market, CSUs inspire and challenge the established linear regime (Hörisch, 2015), acting as a catalysator of the transition to a CE.

In order to play a role in the transition, CSUs must attract sufficient funds to operate. However, it is found that CSUs in the Netherlands experience challenges in securing the external capital needed to realize radical circular innovation (Oliver Wyman, 2017), ultimately hindering the transition to a CE.

In 2019, the Netherlands Enterprise Agency (RVO) conducted a study on the barriers in financing circular SMEs in the Netherlands (Verster & Van der Werf, 2019), identifying the following six barriers: (1) the financial sector's lack of knowledge and experience with CBMs, (2) the entrepreneurs' lack of finance knowledge and skills, (3) the inappropriateness of current government schemes for the CE, (3) the fragmentation of the venture capital market, (4) the competitiveness of vested interest, (5) the lack of a trans-sectoral focus, (6) the linear assessment of the circular operations. While some of the challenges faced by CSUs are inherent to being a startup, others are specific to the circular nature of CSUs and its mismatch with the dominant linear regime (Bauwens et al., 2020). Despite their importance, surprisingly little research has been conducted within both the field of CSUs (Bauwens et al., 2020; Henry et al., 2020) and circular finance (Mellquist, Vanacore, Olofsson & Polesie, 2019).

To contribute to the theory on the field of CSUs and circular finance, this research studies the financial barriers of CSUs in the context of transition science. Through scientific case study research, this paper builds upon RVO's findings, taking a different conceptual stance. Firstly, the present research focuses on startups explicitly as these are considered to be the circular niche market pioneers. Secondly, by applying the MLP, this research emphasizes the friction between the linear financial regime and the niche-level CSU. In order to do so, this research does not only study the barriers from the perspective of the CSU, but also from the perspective of finance professionals operating at the regime level. Lastly, the process of attracting external capital is considered as the basis for this research. This approach allows for a systematic analysis of the challenges perceived, and the opportunities for support in each step of the process: definition of the need, orientation on the financial market, application for external capital and application outcome. The findings will be analysed and compared to the earlier findings of Verster & Van der Werf (2019).

In doing so, this research answers the following research question: '*What are the barriers faced by circular startups in securing external capital while operating in a linear regime?*'. Specifically, it identifies those barriers that are directly attributable to the circular nature of the CSU and the mismatch with the linear regime. For this purpose, data is collected through literature review and semi-structured interviews with CSUs (niche players) and finance experts in the field (regime actors).

The research question will be answered through the following sub-questions:

1. What are the barriers faced by traditional startups in the process of raising external capital?
2. What are the barriers faced by the CSUs throughout the process of raising external capital?
3. To what extent is sufficient support provided to CSUs throughout the process of raising capital?

Outcomes of this study are of value to policymakers, practitioners and the field of science. Firstly, the research provides insight in the financial barriers that withhold the niche-level CSUs from inducing radical market transformation. Thereby, it gives direction to the development of effective measures that allow CSUs to access the needed capital to realize their ambitions and contribute to the acceleration of the circular transition. Secondly, the insights are of value to practitioners in the field of startup finance by delineating the mismatch between the current financial regime and the capital need of CSUs. Lastly, the research contributes to the field of science by adding empirical insight in the financial barriers of CSUs against the background of transition theory.

The further part of this research paper presents the theoretical framework in Chapter 2. The methodology is highlighted in Chapter 3, after which the literature presents relevant insights from previous research on the subject in Chapter 4. The results are presented in Chapter 5, and discussed by means of comparison with previous literature in Chapter 6. Chapter 7 provides a conclusion, providing an answer to the research question.

## 2. Theoretical Framework

Even though the role of CSUs in a CE is discussed in several research papers (Bauwens et al., 2020; Henry et al., 2020), there is not yet a consistent theoretical framework that helps understand the vital role of CSUs in leading the transition to a CE. While researchers have recently taken up the line of research on the role of business models in sustainability transitions (e.g. Bidmon & Knab, 2018; Sarasini & Linder, 2018; Schaltegger, Lüdeke-Freund & Hansen, 2016), this has thus far not been applied to the context of the CE. Within this research, the multi-level perspective on transitions (MLP) serves as a theoretical framework to synthesize the role of CSUs in the transition towards a CE. Thus, this paper offers a first contribution to a grounded theory on the role of CSUs in the transition.

### 2.1. The multi-level perspective on transitions

The MLP is a theoretical model that views transitions as originating from the interaction between three socioeconomic levels: the macro-level socio-technical landscape, meso-level regime and micro-level niches (Geels, 2011), as visualized in figure 1. As a transition is defined as a shift from an old to a new regime, the regime is the central focus of the framework. The landscape and niches derive its meaning from its relation to the regime (Geels, 2011).

Increasing structuration  
of activities in local practices

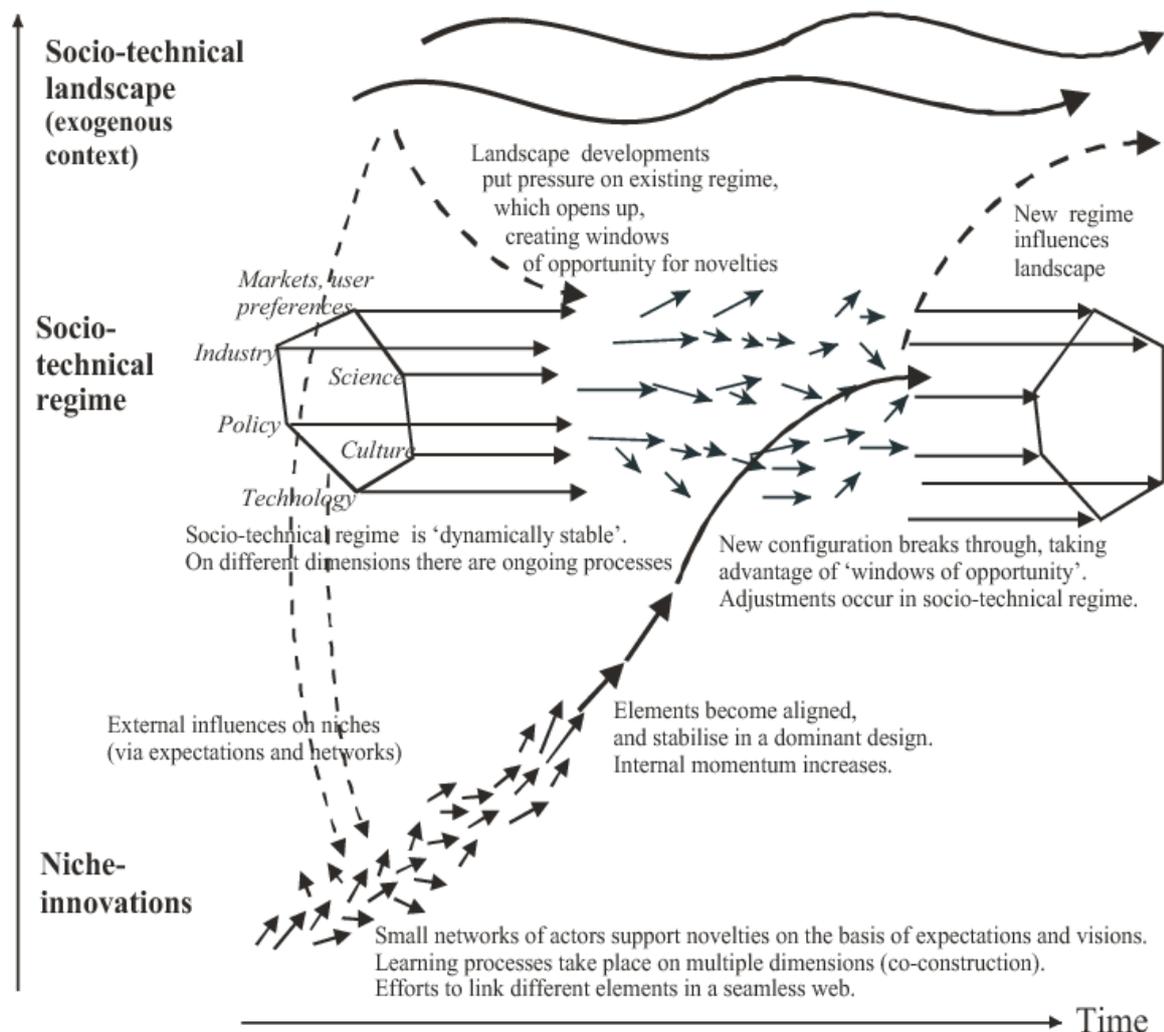


Figure 1: The multi-level perspective on transitions (Geels, 2011)

The *regime* is a “*semi-coherent set of rules*” (Geels, 2011, p. 27) that determine the way in which social groups act. The rules not only refer to legally binding contracts and regulations, but also constitute shared beliefs, consumer behavior and standardized procedures. The regime is characterized by a lock-in and is resistant to transitions (Geels, 2011; Hörisch, 2015). The linear economic system can be considered such a dominant regime, as policies, infrastructure, consumer behavior, etcetera are centered around the linear paradigm (Bet et al., 2018). The micro-level niches are protected spaces in which actors work on radical innovation that substantially deviate from the dominant regime (Geels, 2011). Macro-level landscape pressures may destabilize the dominant regime, creating windows of opportunities for niche-level innovations to break through, and ultimately transform the regime (Geels, 2011).

## 2.2. The role of startups in the sustainability transition

Within this research we follow the definition of a CSU by Henry et al. (2020, p. 2): “*new, independent and active companies pursuing a CBM*”. A CBM is a business model that integrated CE principles with the aim to extend the useful life of materials (Henry et al., 2020; Nußholz, 2017). Through an analysis of 128 CSUs Henry et al. (2020) identified five CSU archetypes, namely design-based, waste-based, platform-based, service-based, nature-based and ‘other’. The definition of each of these archetypes is given in table 1. The service-based CSU is characterized by a product-service system (PSS), commonly referred to as a PaaS model. In a PaaS model the business retains ownership over physical goods. The physical goods are rented out or leased to the customer (Henry et al., 2020; Michellini, Moraes, Cunha, Costa, & Ometto, 2017).

*Table 1: Categorization criteria and definition for CSU typologies (Henry et al., 2020)*

CSU archetype	CBM strategy	Innovation category	Definition
<b>Design-based</b>	<b>Reduce/Reuse</b>	<b>Core technology</b>	Aiming to increase usage efficiency or avoid residual resource streams, design-based CSUs adopt circular innovations mostly in the pre-market phase of their product or service through source material minimization, product design or production process efficiency.
<b>Waste-based</b>	<b>Recycle, Recover</b>	Industrial symbiosis	Waste-based CSUs seek to extract value from unexploited external waste streams (e.g. recycled plastic, CO <sub>2</sub> , surplus food) mostly based on innovative process solutions.
<b>Platform-based</b>	Various	<b>Enabling technology</b>	Platform-based CSUs pursue business models built around B2B, B2C or C2C marketplaces for (excess) resources. Thus, they facilitate trading or sharing of products, knowledge, infrastructure or services.
<b>Service-based</b>	Various	<b>PSS</b>	Service-based CSUs embed products in a service-system without customer ownership of the physical good aiming for higher, and better controllable usage efficiency.
<b>Nature-based</b>	<b>Regenerate</b>	Various	Nature-based CSUs' operate nature-based systemic solutions to deliver services (or products) with the objective to lower input of non-renewable natural capital and increase investment in renewable natural processes.
<b>Other</b>	Reduce, Reuse, Recycle	Various	CSUs operating natural urban air filters, circular city tours or apply several CBM strategies and innovation types.

Note: mutually exclusive archetypes, dominant criterion for archetype stated in *Georgia/Italics*.

As noted by (Hörisch, 2015), although a sustainable startup might also operate on the regime level, its innovative, transformative role takes place at the niche-level. The activities undertaken by CSUs at the niche-level indirectly and directly contribute to the shift to a new regime. First, CSUs can contribute to the circular transition by selling circular products and services, thereby gaining market share at the expense of non-circular alternatives (direct impact) (Hörisch, 2015; Bauwens et al., 2020). This is visualized by the red arrow originating at the micro-level in figure 2. While niche-level CSUs may act to push, regime-level actors may actively pull circular innovation to the mass-market through e.g. public policies (Hörisch, 2015; Bauwens et al., 2020). This is visualized by the red arrows originating at the meso-level. Secondly, startups contribute to sustainability transition by influencing regime actors (indirect impact). An established firm may recognize the success of a CSU and either consider it to be a competitive pressure or as an inspiration. In both cases the established firms will adopt similar practices (Bauwens et al., 2020). CSUs may also demonstrate what is possible to e.g. the government, thereby potentially setting new benchmarks for law and regulations (Bauwens et al., 2020).

While the above demonstrates that sustainable startups can provide a significant contribution to the sustainability transition, it is by no means an easy task for CSUs to realize such a transition. CSUs face challenges in realizing radical innovations that are able to withstand the rigidity of the regime (Bet et al., 2018; Hörisch, 2015). Moreover, while a startup is in operation for five years on average, a process of a transition can last a century (Hörisch, 2015). It is thus not through the actions of an individual CSU, but through the combined efforts of CSUs and other actors, including policy makers and established firms.

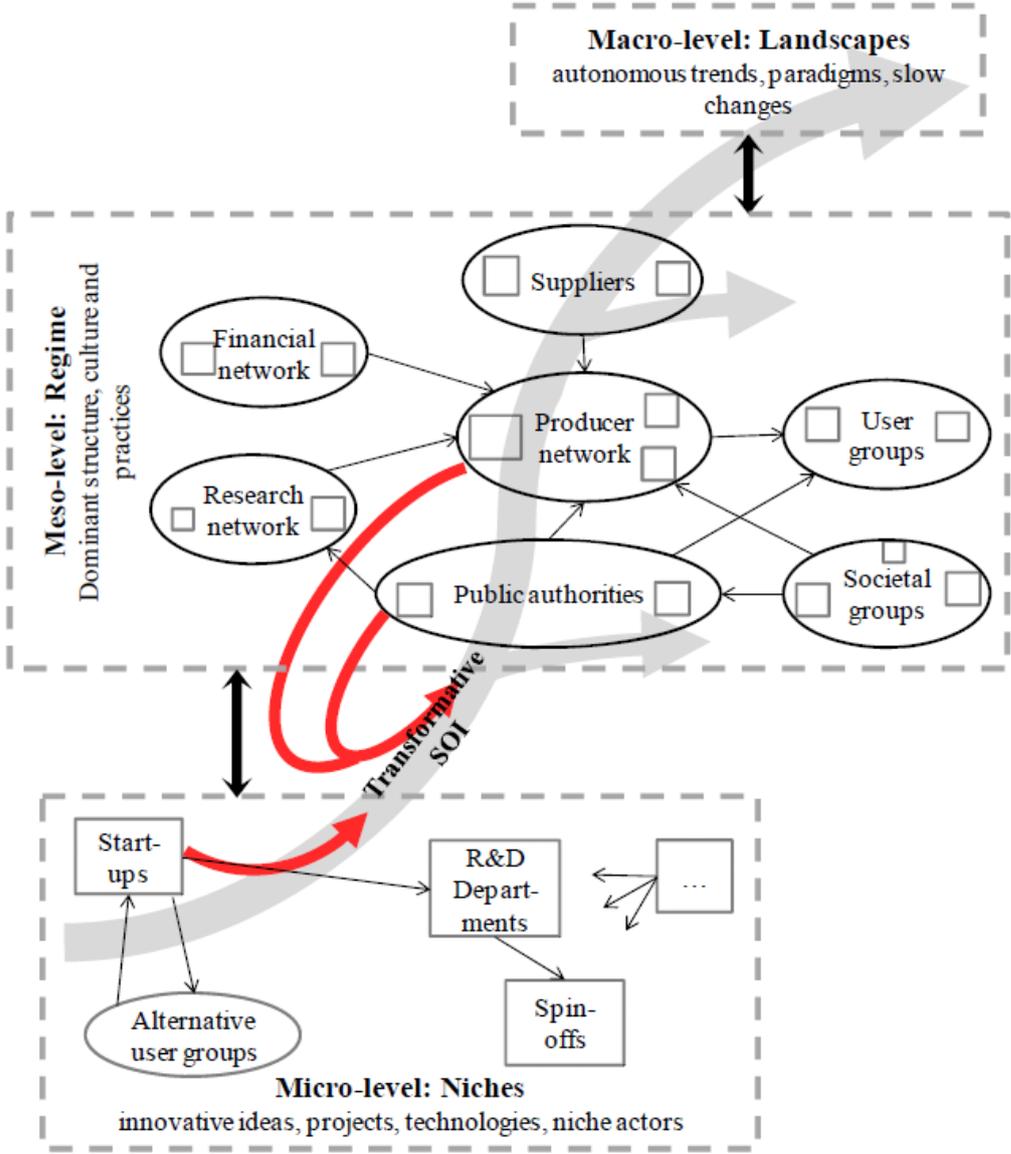


Figure 2: Actor perspective on the MLP framework depicting typical transition pathway (grey arrow) and the potential role of actors (blocks) and actor groups (circles) in pushing and pulling the niche innovation to the regime (red arrows) (Hörisch, 2015)

### 2.3. The process of attracting external capital

A survey conducted by Oliver Wyman (2017) among circular businesses in the Netherlands, revealed that 67% of CSUs perceive securing the external capital to be “*difficult*” to “*very difficult*”. This may prevent startups from realizing and scaling the niche-level innovation, and ultimately from acting as a catalyst in the transition to the circular economy. By analyzing the process of attracting external capital from the perspective of CSUs, we can identify where in the process the CSUs experience challenges, what these challenges are, and how these can be addressed.

Although the fundraising process is a much-discussed topic within the entrepreneurial finance literature, little literature discusses the process from the entrepreneur’s perspective (Hagen, Bergh & Christensen, 2018). Extensive desk research was conducted to identify literature that discussed the process of attracting capital from the entrepreneur’s perspective. Only one research was identified that met this criterion, namely a research conducted by Statistics Netherlands (CBS, 2019) on the search for funding by SMEs in the Netherlands.

According to CBS (2019), the process of raising capital can be seen as consisting of five steps. The first phase, need, is concerned with the identification of the need for external capital. If the venture is serious regarding its plans and capital needs it will proceed to the second step, the orientation on the financial market. In 2019, seventy-seven percent of Dutch startups with a capital need actively followed-up on this need by researching the financing opportunities (CBS, 2019). An application will follow as a third step, if the venture considers it has a good chance of the application to be honored. Thirty-one percent of SMEs suspends the process of attracting capital after the orientation phase (CBS, 2019). The main reason for suspension is that the entrepreneurs do not expect the application to be successful (CBS, 2019). The application will result in an outcome, the fourth step in the process. Ultimately, sixty percent of startups succeed in attracting at least part of the sought capital sum. Startups’ applications for capital prove unsuccessful, and startups receive less capital than applied for, more frequently than established SMEs (CBS, 2019). The three most prominent reasons for rejection are: (1) the inadequacy of the enterprise’s financial performance; (2) the inability to provide sufficient securities e.g. due to absence of collateral or joint liability; and (3) the mismatch between the application and the policy of the capital provider (CBS, 2019).

### 2.4. Conceptual framework

This research aims to identify the barriers perceived by CSUs in the process of attracting capital. The conceptual framework is based upon the process of raising capital as conceptualized by CBS (2019). In the process of attracting external capital the CSUs interact with the financial regime. Next to the common barriers discussed in the previous paragraph, CSUs face challenges specific to the circular nature of the startup and the mismatch with the financial regime. In this research we are interested in the barriers, represented by the lines between the steps, that hinder startups in successfully passing through the

different stages. Although the fundraising process is represented as a linear process, in practice the process is likely to be more dynamic and iterative with potentially overlapping steps.

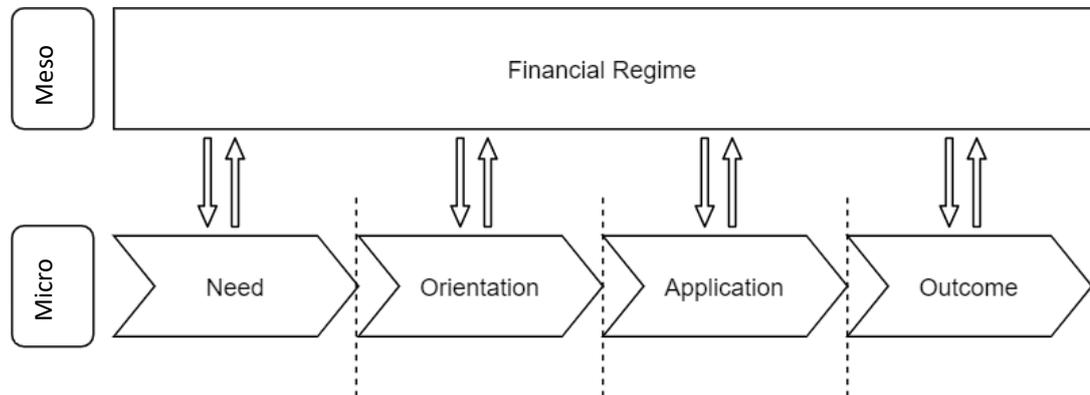


Figure 3: The conceptual framework representing the capital raising process of CSUs, as adapted from CBS (2019), and the interaction with the financial regime

### 3. Research Methodology

This research answers the need for exploratory research in the field of financial barriers of CSUs. In line with earlier research on general CE barriers and drivers (Ranta et al., 2018; Tura et al., 2019), a case study approach is adopted. The following section provides the motivation for the chosen research approach and describes the research methods used, including the methods for data selection, collection, management and analysis.

Qualitative case research is an established method for research on “*a contemporary phenomenon in its real-life context*” (Yin, 2014, p. 16). It allows for a holistic, in-depth understanding of the perceived barriers while taking into account the heterogeneous nature of start-ups (Yin, 2014). As stated by Tura et al. (2019), the approach allows “*to provide rich empirically grounded descriptions and create more holistic understanding*” (p. 92). A multiple-case study was adopted, as it provides a number of benefits over a single-case study. Firstly, a multiple case-study is less vulnerable to unexpected circumstances (Yin, 2014). Secondly, it allows for the comparison of findings (Gustafsson, 2017). Lastly, as being embedded in richer empirical evidence, findings are more likely to be accurate, relevant and testable (Eisenhardt & Graebner, 2007).

Data was collected through interviews with representatives of CSUs and the financial regime. Additionally, a review of grey literature was conducted. The following section provides the motivation for the chosen research approach and describes the research methods used, including the methods for data selection, collection, management and analysis.

### 3.1. Population sample

In the context of this research, a case is the experienced process of attracting external capital of a specific CSU based in the Netherlands. According to Bauwens et al. (2020), the Netherlands counts 147 CSUs. Heterogeneity sampling was used to construct a holistic understanding by ensuring the representation of CSUs in different stages of development and holding different CSU archetypes (Suri, 2011). The cases were identified by two sources. First, *Nederland Circulair!* and *het Groene Brein* were approached for sharing relevant cases. *Nederland Circulair!*, an initiative aimed at supporting entrepreneurs in their circular ambitions with the aim of realizing a CE in the Netherlands by 2050. *Het Groene Brein*, is an organization that aims to connect science and business also with the aim to realize a CE. Secondly, in order to identify CSUs that are less established, an open call for interviews with CSUs was shared with my professional network through LinkedIn.

### 3.2. Data collection

Data collection for this paper has been undertaken between March and June 2020. The primary source of data for this paper is derived from semi-structured interviews with representatives of the selected CSUs and interviews with industry professionals in the field of circular finance. However interviews are an efficient way to gather rich, empirical data, this source leaves space for bias (Eisenhardt & Graebner, 2007). Therefore, desk research was conducted to provide a holistic view on the barriers faced by circular startups in securing external capital. Additionally, various data sources allow for triangulation of the data and strengthen grounding of the theory (Eisenhardt, 1989).

#### 3.2.1 Desk Research

While several scientific papers discuss the general barriers to a CE, to the best of my knowledge, no scientific literature on the financial barriers of CSUs in specific and a CE in general. Instead, as recognized by Kirchherr et al. (2018), the literature on CE is largely dependent on practitioner writing. Therefore, next to the review of the scientific literature on general CE barriers, a review of grey literature was conducted. Relevant grey literature was identified through Google searches with the keywords 'financial barriers' and 'circular economy' and several synonyms and closely related concepts. Seven advisory reports, working papers and white paper were identified and reviewed to identify the financial barriers as recognized by practitioners. These findings allow a means to triangulate interview data and provide unobtrusive background on the different selected cases. included industry reports,

#### 3.2.2 Interviews

Data was collected by conducting semi-structured interviews with the representatives of the selected CSUs and with professionals in the field of circular finance. Due to the special circumstances in which this research is executed, namely during the COVID-19 pandemic, the interviews were held digitally

with the use of Zoom or Skype. In total eight CSU representatives and six regime level actors were interviewed. Table 1 provides an overview of the interviewees. During the interview with startups we discussed the process of raising capital and discussed the barriers they perceived in the different stages and the extent to which sufficient support was provided. Next to the entrepreneurs, financial regime actors were interviewed. The aim of interviewing experts in the field was threefold: (1) to verify the barriers identified through the startup interviews, (2) to gain a deeper understanding of the underlying causes and, (3) to gain insight into the differences between the barriers of circular and regular startups.

*Table 2: Overview of the cases and interviewees*

<b>Circular startups</b>				
<b>Interview code</b>	<b>CSU Archetype*</b>	<b>Product/service</b>	<b>Development stage</b>	<b>Interviewee</b>
S1	Service-based	PSS for household appliances	Early growth phase	Co-founder
S2	Service-based & Design-based	PSS for (modular) electronic device	Early growth phase	Co-founder
S3	Platform-based	Sharing platform for consumer goods	Early growth phase	Founder
S4	Design-based	Bike made of recyclable plastics	Early growth phase	Founder
S5	Design-based	Reusable notebook	Seed phase	Founder
S6	Waste-based	Ink made of coffee waste	Seed phase	Co-founder
S7	Waste-based	Various design products of waste materials	Seed phase	Co-founder
S8	Nature-based	Food forestry	Seed phase	Founder
<b>Financial regime actors</b>				
<b>Interview code</b>	<b>Position</b>		<b>Company</b>	
F1	Business Angel and publicist in the field of sustainability		Self-employed	
F2	Senior Manager Circular Economy & Sustainability, former Sustainable Business Developer		Consultancy firm, bank	

F3	Commercial Advisor Product-as-a-Service	Bank
F4	Investment Advisor	Investment fund
F5	Project Manager Circular Economy, Business Developer Circular Economy	Regional development agency, regional development agency

*\*Based on CSU archetypes as conceptualized by Henry et al. (2020)*

### 3.3. Data management and analysis

All interviews were recorded, transcribed with the use of Amberscript and analyzed in Word. The outcomes were checked and corrected manually. Amberscript is a Dutch software and conforms to the GDPR standards. Initial codes were deducted from the fundraising process of CBS (2019) which allows for the understanding of data along a specified structure. Then, the barriers identified through literature were added to the coding framework. Throughout the process it was found that the use of the fundraising process in the analysis of the data was restricting, as many of the barriers discussed could not be placed in the framework. Thus, the coding framework was adjusted to include the CBM and the (risk) assessment. Finally, open coding was adopted to allow new themes to emerge. The data was analyzed through a combination of within-case and cross-case analysis. First, the barriers were analyzed per individual case study (within-case). Following, multiple cases are compared to allow for the discovery of similar themes (Eisenhardt, 1989) and ultimately the identification of the main barriers that CSUs experience in securing external capital .

## 4. Results: Desk Research

The following chapter provides an overview of desk research findings, starting with an introduction to the general barriers to a CE. In addition to the review of the scientific literature on general CE barriers, a review of grey literature, including advisory reports, working papers and white paper was conducted to identify the financial barriers to a CE as recognized by practitioners. The second part of this chapter, provides an overview of the identified financial barriers, comparing those of SMEs in general, to those specific to CSUs.

### 4.1. The barriers to a circular economy

As to date there is no scientific literature that specifically addressed the financial barriers to a CE, however through analyzing literature on general CE barriers it was found that many of the general CE barriers are finance related, the scientific literature on general barriers has been reviewed to identify the main barriers and the extent to which these are finance related.

Despite the proclaimed support for the CE from both the field of business and politics, CE implementation remains to be slow (e.g. Kirchherr et al., 2018; Tura et al., 2019). Even more so, a recent study concluded that on a global scale the level of circularity is decreasing, from 9.1 percent in 2015 to 8.6 percent in 2017. Although the level of circularity in the Netherlands lies above the world average by approximately 16 percent, results presented by Koch et al., (2020) indicate that there is much improvement to be made to realize a fully circular economy by 2050 .

The lack of progress in the transition towards a CE is generally attributed to the perceived barriers in the implementation of the CE. Several authors have attempted to identify these barriers (e.g. Govindan and Hasanagic, 2017; Kirchherr et al., 2018). An overview of the scientific research on the barriers towards a CE is provided in table 1. The examined studies adopted various approaches to identify the CE barriers, from large-scale N studies (Kirchherr et al., 2018) to in-depth case studies (Ritzén & Sandström, 2017). Moreover, each study took a different perspective on CE implementation, from the focus on a specific industry and area, the Pakistani automobile industry (Agyemang, Kusi-Sarpong, Khan, Mani, Rehman & Kusi-Sarpong, 2019), to the focus on a specific strategy CE strategy, eco-innovation (Jesus & Mendonça, 2018). The researchers identified different types of key drivers: technological (e.g. availability of technological solutions), economic (e.g. lack of profitable business cases), financial (e.g. high investment costs) and cultural (e.g. lack of awareness). Although the researchers came to different conclusions on the main barriers to the transition towards a CE, it is obvious that economic and financial factors play an important role herein.

*Table 3: Overview of research on CE barriers*

Authors	Method	Sample	Focus	Main barriers identified
Govindan and Hasanagic, 2017	Systematic literature review	60 Research papers	Supply-chain	High upfront investment costs; Profit-driven nature of businesses
Ritzén and Sandström, 2017	Case-studies, interviews	2 Cases 18 Interviews	Manufacturing firms	Lack of profitable business cases; Responsibilities and dependencies in the supply chain

Agyemang, Kusi-Sarpong, Khan, Mani, Rehman & Kusi-Sarpong, 2019	Survey, interviews	112 Surveys 28 Interviews	Pakistani automobile industry	Managers' unfamiliarity with the CE, financial cost of investment
Jesus & Mendonça, 2018	Systematic literature review	141 Research papers	Eco-innovation	Availability of technical solutions; Financial factors (economic and market limitations)
Kirchherr et al., 2018	Survey, interviews	208 Surveys 47 Interviews	EU businesses and policy-makers	Lack of consumer interest and awareness, a hesitant company culture

#### 4.2.2. The financial barriers to a circular economy

Through literature review, different types of barriers are identified. The first barriers can be categorized from an actor-perspective, namely those related to the financial sector, the policymakers (regime actors) and the CSUs (niche actors). The table below presents a summary of the findings. Second, as it was found that many of the challenges in securing capital as recognized by practitioners relate to the risks involved in CBMs, the second part of this chapter reflects on these risks.

*Table 4: Actor-perspective on CE financing barriers*

Category	Barriers	Sources
Regime actors		
Financial sector	Underdeveloped and fragmented venture capital market	Oliver Wyman, 2017; Verster & Van der Werf, 2019
	Lack of knowledge on CE	Bet et al., 2018; FinanCE, 2016; Tilburg, Achterberg & Boot, 2018; Verster & Van der Werf, 2019;
	Short-term, high returns focus	Bet et al., 2018; Tilburg, Achterberg & Boot, 2018; Verster & Van der Werf, 2019

	Inability to reliably estimate risk and return of CBM	FinanCE, 2016; Verster & Van der Werf, 2019; Bet et al., 2018
Policymakers	Unfit government schemes, e.g. subsidies targeted at CO2 reduction and renewable energy	Oliver Wyman, 2017; Verster & Van der Werf, 2019
	Lack of regulation aimed at internalization of externalities	Tilburg, Achterberg & Boot, 2018; Verster & Van der Werf, 2019; Bet et al., 2018
Niche actors		
CSUs	Lack of knowledge regarding financial market	Verster & Van der Werf, 2019; Bauwens et al. 2020
	Lack of viable business case	Bet et al., 2019; Verster & Van der Werf, 2019

*Circular startups.* The perceived challenges in realizing a profitable and scalable business model is one of the most barriers, if not *the* most important barrier, to securing external capital (Bet et al., 2018; Verster and Van der Werf, 2019). According to Bet et al. (2018) circular enterprises often fail to combine the consideration of the environmental impact with an economically strong business case. According to Verster and Van der Werf (2019) circular enterprises lack the knowledge on how to operationalize profitable circular business cases. Besides this, circular enterprises are considered to have limited skills in terms of enterprise finance and knowledge regarding the financial market (Verster and Van der Werf, 2019; Bauwens et al., 2020).

*The financial sector.* The knowledge and awareness of financial actors about the CE is low. For instance, financiers have a limited understanding of the financial implications of the adoption of, or transition to CBMs (Tilburg, Achterberg & Boot, 2018; FinanCE, 2016; Verster & Van der Werf, 2019; Bet et al., 2018). Subsequently, the financial sector is not yet able to make a reliable estimation of the level of risks and the potential financial return of CBMs. Current risk models are based on metrics and criteria derived from experience with linear business models and are thus unsuitable to CBMs (FinanCE, 2016; Verster & Van der Werf, 2019; Bet et al., 2018). Furthermore, current risk models do not yet take account of business risks resulting from e.g. climate change, resource scarcity and the sustainability- and circularity transition (FinanCe, 2016). Thus, while CBMs partially mitigate such risks, this does not result in an improved accredited risk level. Moreover, the financial sector is perceived as being conservative.

Financiers value high returns and have a short-term focus, whereas CBMs are generally characterized by longer payback periods and lower rates of return. Finally, the Dutch venture capital market is recognized to be fragmented, intransparent (Verster & Van der Werf, 2019) and underdeveloped (Oliver Wyman, 2017). As a result, the financing opportunities for startups are limited and/or are difficult to identify.

*Policymakers.* Three barriers are identified relating to policy. Most importantly, circular businesses face challenges due to the lack of a level playing field. Whereas circular businesses aim to internalize externalities related to resource extraction, material use and waste, which is generally accompanied with expenses, there is no regulation compelling businesses to do so. As a result, circular businesses face challenges in the competition with regular businesses that do not take responsibility for externalities (Tilburg, Achterberg & Boot, 2018; Verster & Van der Werf, 2019; Bet et al., 2018). The lack of a competitive business model makes it difficult, if not impossible, for circular businesses to secure external capital. Subsequently, the establishment of a level playing through the regulation of externalities, would greatly improve the ability of circular businesses to secure capital. Moreover, according to circular businesses, current policies and government schemes lack vision and insufficiently facilitate and stimulate the transition to a CE (Verster & Van der Werf, 2019). For instance, current sustainability subsidies are targeted at CO2 reduction and renewable energy and are inappropriate for circular strategies (Oliver Wyman, 2017).

#### 4.2.1. The risks involved in circular business models

Circular businesses face specific operational, market and financial risks that decrease the chances of securing external capital. Table 5 below provides an overview of the identified barriers. In the remaining chapter, these risks are discussed.

*Table 5: Risks of CBMs*

Risk category	Barrier	Sources
Operational risks	Unproven business model and technology	Goovaerts et al., 2018;
	Supply-chain and third-party dependence	Oliver Wyman, 2017; Goovaerts et al., 2018; FinanCE, 2016; Achterberg & Tilburg, 2018; Verster & Van der Werf, 2019
	Retained ownership	FinanCE, 2016

Market risks	Uncertainty regarding market demand	Achterberg & Tilburg, 2018; FinanCE, 2016; Goovaerts et al., 2018
	Competition with established actors and products (that do not have to take account of externalities)	Bet et al., 2018; FinanCE, 2016; Tilburg, Achterberg & Boot, 2018; Verster & Van der Werf, 2019
	Innovation spillovers	Tilburg, Achterberg & Boot, 2018
Financial risks	Prolonged payback period and lower rate of return	Achterberg & Tilburg, 2018; Oliver Wyman, 2017
	Illiquidity of assets and absence of collateral	Goovaerts et al., 2018; Oliver Wyman, 2017
	High upfront investment costs and high working capital requirements	FinanCE, 2016
	Installed payments	Achterberg & Tilburg, 2018; FinanCE, 2016

*Operational risks.* Circular businesses are largely reliant upon unproven business models and technologies (Goovaerts et al., 2018). Consequently, there are many uncertainties surrounding e.g. the profitability and feasibility of the plans. Secondly, circular businesses have an increased dependency on third parties, especially of supply-chain actors (Achterberg & Tilburg, 2018; FinanCE, 2016; Goovaerts et al., 2018; Oliver Wyman, 2017; Verster & Van der Werf, 2019). Besides this, CBMs are characterized by an increased supply-chain dependency. Lastly, service-based circular businesses retain ownership over assets that are rented or leased out to customers. The retained ownership is accompanied by certain responsibilities, e.g. the maintenance over assets, and legal liabilities.

*Market risks.* As discussed in the previous chapter, circular businesses face challenges as it must compete in a ‘linear market’ (Bet et al., 2018) . Besides this, circular businesses also face other market risks. Firstly, there is much uncertainty surrounding the development of market demand for circular products and services, leading to uncertainty regarding the potential of the business case. Secondly, circular businesses face the risk of innovation spillovers, referring to the potential of innovation transfer in the market with one’s own innovation. While competitors may benefit from the innovation, it is the innovating company that carries the development expenses (Tilburg, Achterberg & Boot, 2018).

*Financial risks.* CBMs are characterized by cost and cash flow structures and balance sheets that differ from those of regular businesses. The following characteristics are considered to be of relevance and ultimately result in higher (accredited) levels of risk: (1) prolonged payback periods and lower rates of return (Achterberg & Tilburg, 2018; Oliver Wyman, 2017), (2) low liquidity assets and limited availability of (easily retrievable) collateral (Goovaerts et al., 2018; Oliver Wyman, 2017), (3) high upfront investment costs and high working capital requirements (FinanCE, 2016), (4) installed payments (Achterberg & Tilburg, 2018; FinanCE, 2016). It is important to note however, that some of these characteristics are especially or exclusively attributable to specific types of CBMs. For instance, the illiquidity of assets is specific to the product-as-a-service model. Due to the fact that the product is rented out, rather than sold, the assets are considered to be less liquid, meaning the period it takes to convert the asset to money is longer. Besides this, the limited retrievability of collateral is also a common characteristic of PaaS models. While the customers possess the products (or assets), the assets are still owned by the company. However, retrieving these assets, e.g. in the case of non-payment by customers or bankruptcy of the businesses, is time-consuming and costly. However, while some of the characteristics are exclusively attributable to specific business models, this is commonly not specified in the literature.

## 4.2. The financial barriers for SMEs

In order to be explicit about whether financier barriers perceived by CSUs are due to the circular nature, this research provides insight into common barriers in securing capital of SMEs in the Netherlands. In order to scrutinize the role of the circular nature of the enterprise, i.e. explicitly identify barriers to CSUs rather than common barriers to accessing finance. The preliminary analysis of financial barriers towards a CE is followed by an analysis of common barriers to securing external capital. Practitioners indicate several financial barriers that SMEs face, these are summarized in table 6.

Industry professionals agree that due to a lack of orientation and familiarity with the different financial products and reluctance towards certain financial products, entrepreneurs regularly apply for financing types which are inappropriate when considering the nature of the capital need (Rauwerda, Abid, van Teeffelen & de Graaf, 2018; NEMACC, 2019). Authors specifically note that:

- Entrepreneurs are reluctant to invest private money (NEMACC, 2019).
- Entrepreneurs are often reluctant to pursue venture capital due to the unwillingness to give up ownership and control (AWT, 2011; Commissie Hoek, 2013).
- Entrepreneurs are sometimes reluctant towards crowdfunding due to the need to enter the spotlight and publicly share information that is considered to be competitive-sensitive (Rauwerda et al., 2018).
- Entrepreneurs are generally unfamiliar with new, alternative forms of finance (CBS 2019; SER, 2014) and reluctant towards applying for these forms of finance (Rauwerda et al., 2018).

Moreover, financiers of SMEs point out the poor preparation of the capital application process (AWT, 2011), inadequacy of business competencies (SER, 2014) and an inadequately thought out business case by the applicant (Rauwerda et al., 2018), which often lead to an inadequate quality of funding applications. Subsequently, applications are not processed or rejected by the auditor (SER, 2014). Although entrepreneurs would greatly benefit from existing support from e.g. a financial advisor, entrepreneurs are often unable and/or unwilling to spend money on professional support in the process of securing external capital (NEMACC, 2019; Rauwerda et al., 2018).

Lastly, there are limited funding opportunities for small investments due to the relatively high transaction costs and low profitability (NEMACC, 2019).

*Table 6: Actor-perspective on common financing barriers for SMEs in the Netherlands*

Category	Barriers	Sources
Regime actors		
Financial sector	Limited funding opportunities for small investments	NEMACC, 2019
Niche actors		
CSUs	Inability or reluctance to spend money on support in the application process	NEMACC, 2019; Rauwerda et al., 2018
	Inadequate quality of application	AWT, 2011; Rauwerda et al., 2018; SER, 2014
	Unfamiliarity with new forms of finance	CBS 2019; SER, 2014
	Reluctance towards alternative forms of finance	NEMACC, 2019; Rauwerda, Abid, van Teeffelen & de Graaf, 2018;

## 5. Results: Interviews

To gain empirical insight into the barriers faced by CSUs in the process of attracting external capital, thirteen semi-structured interviews were held with industry practitioners. Eight interviews were held with founders of CSUs and five interviews with professionals in the field of circular finance. The following chapter presents the findings derived from these interviews.

Based on data analysis along the lines of the process of attracting external capital (CBS, 2019), findings are structured per step of the fundraising process - i.e. need, orientation, application, outcome.

Through open coding, additional clusters are identified. Namely, it is clear that many of the barriers in raising external capital can be traced back to (1) the challenges in creating a viable CBM and (2) the way in which applications are assessed. Although these two aspects do not form part of the research 'conceptual framework, due to the importance the interviewees have given to the subject matter, the challenges regarding the CBM and assessment have been included in the findings.

The business case is found to form the starting point of the process of attracting external capital. Hence, the results chapter commences with a reflection upon the identified challenges in establishing a strong business case. Following, the identified barriers will be discussed according to the process of attracting capital: the need for external capital; the orientation on the capital market and selection of the capital provider; the application and the outcome. An overview of the identified barriers per step in the process of attracting external capital is provided in table 5. The discussion of each finding holds a similar structure.

### 5.1. The circular business model

Besides the common barriers perceived by startups in realizing viable business models, CSUs face challenges which are specific to the circular nature and innovativeness of the startup. Four barriers were identified: a need for experimentation, the lack of a level playing field, uncertain market development and linear customer behavior. These challenges are found to be key in realizing a viable business case, and thus, in the inability to secure external capital.

#### **A need for experimentation**

Due to the lack of circular best practices, realizing a profitable CBM is often a matter of experimentation. The waste-based CSUs are exemplary in this matter. In a fully circular economy waste is eliminated, thus we must find ways to reduce and *repurpose* waste materials. For the two interviewed waste-based CSUs such waste material formed the starting point of the startup journey. The entrepreneurs set out to experiment with the waste material to discover ways in which the waste materials could be repurposed in a profitable manner. The final product and value proposition was yet to be determined. However, the presentation of a fully-conceptualized business model is often a prerequisite for a funding application.

The entrepreneurs that were still in this phase of experimentation considered the level of detail required for the application to be challenging.

The absence of a fully thought-through business model was indeed considered to be one of the main reasons for the inability of CSUs to secure external capital. While on the one hand the experts recognized the need for experimentation, on the other hand the financiers stressed the importance of having a clear focus, value proposition and business case.

### **The lack of a level playing field**

In its business model, the CBM aims to internalize certain externalities. In other words, it takes into account the effect it has on the external environment, such as resource waste and the impact on society, and takes measures to compensate for any negative implications. As such, there is a lack of level playing field when the CSU competes with SMEs in a linear market, in which limited to no responsibility is taken for externalities. Therefore, CSUs must find a balance between its circular ambition and the business case in order to be able to offer a competitive product or service. Subsequently, startups may be discouraged to pursue radical innovation. Policies aimed at the internalization of externalities, such as tax on materials rather than labor, would create a level playing field, and thus benefit the ability of CSUs to establish a profitable business model. The lack of such policies is commonly considered a barrier in the realization of a CE.

Experts acknowledge the challenge CSUs face in competing in a linear market and the need for policy that aims to internalize externalities. Several experts considered this to be the most important barrier in the transition to a CE. One expert stated: “As long as there is no level playing field, a lot of business cases will never be profitable.”

### **Uncertain market development**

While the development of a market for circular products and services is an important determinant of the potential scalability of a business case, and thus in the ability of a startup to attract capital, there is much uncertainty regarding the development of the market for circular products and services, especially regarding the sharing economy and PaaS models.

One of the experts touched upon the role of the government in addressing the market insecurity through a longer-term strategy. In this context, the expert referred to the policies on electric vehicles which have been subject to much change over the last years, leading to unpredictability regarding future demand. However, while the experts recognized the uncertainties regarding the market development, the experts stressed the CSUs role of allowing for growth by offering a strong value proposition. The Swapfiets case shows that with a strong value proposition, consumers are relatively easily persuaded to switch to PaaS models. Thus, the supply of circular products and services influences the market development.

## Linear customer behavior

CSUs operate in a market in which customer behavior is characterized by ‘linear custom’. For instance, purchase decisions are generally based upon the purchase price rather than the lifetime costs of a product. CSUs are disadvantaged by this matter when offering longer lasting products, yet against a higher price. Moreover, standard procurement procedures are often unfit for circular goods and services, thereby discouraging circular procurement and ultimately forming a barrier for CSUs.

The level of sustainability or circularity of a product or service is rarely a decisive factor in a purchase decision, thus again the experts again stress the importance of a strong value proposition.

*Table 7: Exemplary quotes Business Model barriers*

Barrier	Interviewee	Quote
Need for experimentation	Circular entrepreneur	Specifying every detail of the business model in advance is almost impossible.
Lack of level playing field	Financial regime actor	“As long as there is no level playing field, a lot of business cases will never be profitable.”
Uncertain market development	Circular entrepreneur	“In the end, there is a lot of uncertainty about [...] how big it can become [...]. Whether sharing will be an important part of the economy, or whether it will remain a relative niche.”
Linear customer behavior	Financial regime actor	“Sustainability is rarely a reason for consumers to buy a product.”

## 5.2. The external capital need

The need is the first phase of the fundraising process. This phase revolves around the identification of the need for capital and determining the amount of capital to be attracted. One theme regarding the external capital need was identified, namely the determining the capital need.

### Determining the capital need

All but one entrepreneur did not face barriers in determining the amount of finance to be attracted. Where needed, the entrepreneurs were able to gain support from various actors, such as investors, accountants, support programs and individuals within their personal and professional network in determining the need. One entrepreneur considered it to be a challenge to determine the investment need, as the investment need is largely based upon (uncertain) growth projections.

Several experts noted that the challenges in determining the amount of capital to be attracted, are likely to be the result of a lack of a clearly stipulated plan. According to one expert, the sought investment sum

is often set too high due to the absence of a (focused) short-term strategy. Support programs, such as accelerators, may help in creating such a strategy.

*Table 8: Exemplary quotes Capital Need barriers*

Barrier	Interviewee	Quote
Determining the capital need	CSU founder	“I wouldn’t say we are experts. But we have done it before.”

### 5.3. The orientation on the external capital provider

Once the entrepreneur has identified and determined the capital need, and if the entrepreneur is serious regarding need, it will proceed to the orientation on the financial market. During the orientation phase, the entrepreneur familiarizes itself with the capital market and the various funding opportunities available. In this chapter five themes will be discussed, namely (1) the (un)familiarity with the capital market, (2) the limited funding opportunities for startups, (3) the traditional sustainability focus, (4) the diverging values and (5) equity capital and ownership.

#### **Familiarity with the capital market**

The level of familiarity with, and degree of orientation on the financial market varies per entrepreneur. Whereas some of the entrepreneurs visit e.g. masterclasses and read books to become more knowledgeable and skilled in enterprise finance, and e.g. visit fairs to meet potential investors, others largely rely on external advice in identifying and selecting financing opportunities. All entrepreneurs took account of the startup’s phase of development in the selection of the financing type. Funds were selected in the earliest stages of development, followed by friends, families and fools, crowdfunding and venture capitalists and finally debt capital. Nevertheless, some entrepreneurs noted that they had considered credit financing from the bank even in the early stages of development, however were quick to recognize that bank credit was not a promising opportunity.

Unfamiliarity with, in combination with a lack of orientation on, the financial market may lead CSUs to be unaware of (the appropriateness of) specific funding opportunities. Moreover, according to the experts entrepreneurs too easily assume that banks will (and should) provide finance. However, becoming familiar with the different types of finance is also considered to be a matter of “*learning while doing*”. Thus, the level of familiarity with the capital market and the different products was not considered to be among the main barriers in the inability to attract external capital.

## **The limited financing opportunities for startups**

The startups were dependent on the limited opportunities available suitable to the phase of development which they were in. For instance, in the experimentation phase, CSUs are generally dependent on funds; venture capitalists only become interested once there is a proven business case; bank credit generally becomes available when the CSU can show positive track records. Thus, the phase of development limits the type of funding opportunities available.

The financial regime actors stress the general inaccessibility of capital to startups. Firstly, as a startup is considered a high-risk investment, startups rely on risk-bearing capital providers. This rules out the most institutional investors, which manage the large majority of capital investment in the Netherlands. Of the remaining capital providers, a large chunk is not interested in small financing amounts, due to the relatively high transaction costs. For instance, venture capitalists are jokingly said not to get out of bed for investments under €2 million euros. This further limits the opportunities for startup financing.

## **Impact funds and investors**

According to the entrepreneurs, most existing sustainability funds and impact investors focus on traditional metrics of sustainability, such as CO2 reduction. Capital providers must oftentimes be convinced of the positive environmental impact of CBMs. Two circular entrepreneurs noted that impact investors would not consider their startup to be a suitable investment. This is likely to be due to a lack of awareness and knowledge regarding the CE. One entrepreneur stated: *“Impact investors ask me: “But what is the impact angle? [...] I am willing to explain it, but if it already starts right away...”*

According to one of the experts, one of the reasons for e.g. funds to focus on metrics such as CO2 reduction, is the lack of alternatives indicators to indicate the environmental impact. There is a need for new tools to calculate the environmental impact of CBMs. Moreover, this expert emphasizes that even impact funds have a traditional ‘linear’ approach towards investment decisions. According to the expert, funds take the following steps to come to an investment decision: (1) checking if the investee meets the (exhaustive) selection criteria, (2) assessing the potential profitability of the business case, (3) considering the environmental impact. Instead, the expert stated, funds should work the other way around. The environmental impact should be the basis of the investment decision. Moreover, the selection criteria should be perhaps less strict. The expert noted that currently certain funds have money to spend, which they cannot spend due to a lack of investment opportunities that meet these stringent selection criteria.

### **Diverging values: long-term impact versus short-term profit**

An often-discussed theme brought up by the entrepreneurs during the interview related to the values of the CSU versus that of the capital provider. The financial market is considered to be profit-driven, whereas the majority of the startups are impact-driven. One entrepreneur stated: *“We just look at the economy in a different way than. [...] For me the goal is not to make as much profit as possible, for me the goal is to make the world a little bit better.”* The diverging values are especially an important matter of concern, at least for some entrepreneurs, when investors gain ownership over the startup. This will be discussed in the following section.

Several experts noted that if we are to move to a sustainable economy, the financial sector must be willing to accept lower returns and prolonged payback periods. Moreover, several experts suggest taking the environmental impact into account in the investment decision. However, some of the experts also stress the negative perception of many entrepreneurs towards the financial sector. One expert noted that despite the crucial role of venture capitalists in facilitating the realization of business plans and despite the risk they take, in the Netherlands entrepreneurs often have a negative perception towards venture capitalists. According to the expert, venture capitalists are considered to be greedy.

### **Equity capital: the question of sharing ownership**

The entrepreneurs had different views on the risk of pursuing equity capital. One founder stated: *“What you want to be careful for [...] is that we take an profit-driven investor on board, which may cause us to lose our values, which I really wish to hold on to.”* However, another founder is not as concerned about the matter losing ownership and holding on to its values. This entrepreneur noted: *“We just have to want to make it big together, that's the important thing.”* This founder notes that as long as you have a strong value proposition and business case, the investor will support the sustainability strategy. Finally, another entrepreneur considered it to be only valuable to have an investor on board, as the investor brings with knowledge, expertise and a network.

Two experts noted that the Netherlands is characterized by a different attitude towards capital providers as e.g. the USA. In the USA, entrepreneurs consider it to be merely logical that in order to attract finance as a startup, you must give up part of your ownership. In the Netherlands however, there is a reluctance towards sharing ownership. The experts stress the risk that venture capitalists take in investing in the startup. Indeed, when the startup succeeds, the investor will benefit from the success. But for the same startup that succeeds, the investor may have invested in 50 startups that failed. Thus, due to the risk involved, the price is high. Besides this, one expert noted that startups must be careful about whom it does business with. An investor seeking for ‘quick cash’, is unlikely to be a good fit for a CSU. Instead, a CSU should search for an investor that is willing to make a long-term commitment and preferably has a sustainable ambition itself.

Table 9: Exemplary quotes Orientation barriers

Barrier	Interviewee	Quote
Familiarity with the capital market	Circular entrepreneur	“I have been to all kinds of fairs and meetings and masterclasses and I know a lot, also about financing.”
The limited financing opportunities for startups	Financial regime actor	“For seed capital about 99 percent of the financing options are dismissed.”
Impact funds and investors	Circular entrepreneur	“They want to see we have a direct impact, like CO2 compensation and things like that”
Diverging values	Circular entrepreneur	“We just look at the economy in a different way [...]. For me the goal is not to make as much profit as possible, for me the goal is to make the world a little bit better.”
Equity capital	Circular entrepreneur	“We just have to want to make it big together, that's the important thing.”

#### 5.4. The application for external capital

An application will follow as a third step, if the venture considers it has a good chance of the application to be honored.

##### **Variety in application requirements**

The application activities and requirements vary per financing type and individual capital provider. Thus, the applications must be adjusted for each financing type. For some entrepreneurs, understanding the wishes for the application of the individual capital providers and adjusting the application to each of these wishes is perceived as a challenge.

The fact that the application activities and requirements vary between the different capital providers, was also recognized by the experts. It requires quite some effort to adjust the application to the specific requirements of the different parties. One expert noted that the application procedures and/or application requirements can be rather complex for, or unclear to the startups.

##### **Financial prognosis**

Furthermore, the majority of the applications for external capital require a financial prognosis of some sort. Although the founders understand the need for such a prognosis in the assessment of the

application, several entrepreneurs consider it to be challenging to make such a prognosis, especially in the early development phase of the startup. However, the entrepreneurs were all able to find support in developing a financial budget and prognosis when needed.

The majority of the experts recognize the challenges startups experience in developing a financial prognosis, especially as there are many uncertainties surrounding CBMs. However, the experts share different views on the experienced challenges. Whereas, some experts consider the financial prognosis to be inevitably complicated, one considered the experienced challenges likely to be a sign of insufficient validation of assumptions. According to the expert, in order to make a reliable estimation of future income and expenses, startups can and should actively approach the potential target customer, supplier etc.

*Table 10: Exemplary quotes Application barriers*

Barrier	Interviewee	Quote
Variety in application requirements	Circular entrepreneur	“That is the biggest barrier. That in your application you have to match the information needs of the capital provider.”
Financial prognosis	Circular entrepreneur	“That's one of the hardest things about getting the money. These are of course just growth figures.”

### 5.5. The assessment of the application

The assessment of the funding application was found to be a key bottleneck in the fundraising process. Three themes were considered crucial in the assessment of CSUs: the presented business case, the lack of CE knowledge and awareness and the consideration of (environmental) impact.

#### **The presented business case**

According to the entrepreneurs, capital providers’ main selection criteria is the potential of the presented business case. Important metrics include the startup’s (future) revenue and growth. When discussing the assumed reasons capital providers reject the applications of the CSUs, each entrepreneur reflects upon the uncertainties regarding the profitability of the business model in some way or another. Although, one entrepreneur noted that circular entrepreneurs generally focus too much on the sustainability aspect, and too little on the business case, all interviewed entrepreneurs seemed aware of the importance of a strong value proposition.

According to the experts, many of the difficulties in securing capital can be traced back to the lack of a well-defined and well-founded, profitable business model. In many cases the business model is either

not yet fully defined, has a weak value proposition or has no profitable or scalable revenue model. Moreover, several financial experts note that circular entrepreneurs regularly fail to validate the business model.

### **The lack of CE knowledge and awareness**

Due to the lack of experience and knowledge of the financial sector, capital providers are generally unable to make reliable estimations of the risk-level and potential of CBMs, as recognized by the entrepreneurs.

Due to the inexperience with CBMs, there is greater uncertainty regarding the success of CSUs. One expert stressed that, it is not so much the return, but the level of risk of CBMs that plays an important role in investment decisions. As CBMs largely remain unproven, the risk is often considered to be too high. Moreover, unfamiliarity with CBMs may lead to the rejection of funding applications as the business model may be considered to be unnecessary complex or risky. Moreover, due to the lack of knowledge and experience financiers are not yet able to make a reliable estimation of the risk level of CBMs. Currently, risk assessments of CBMs are based on linear risk models. Firstly, the metrics and criteria considered in risk models of formal capital providers, such as banks and pension funds, are based upon decades of experience with linear business models. In some cases, these risk models have been digitized and the risk assessment is conducted with the use of software. As CBMs, especially PaaS models, are often characterized by different cash flow structures and extended balance sheets, assessing CBMs against 'linear investment criteria' will result in a high-level risk classification. Secondly, a CBM, such as a PaaS model, may offer securities, e.g. the underlying contracts and strategic partnerships, that are not considered in the linear risk models. Finally, the current models do not consider the transition risks, the risks resulting from the transition towards a low-carbon and circular economy, which are especially relevant for linear business models, one interviewee noted. Ultimately, the assessment against traditional linear criteria and exclusion of certain securities may lead to a rejection of a funding application or increased costs of capital. Thus, the emergence of CBMs requires new risk models to be developed.

### **Impact Assessment**

The entrepreneurs have a different perspective on the degree to which capital providers take the environmental impact into account. This may be since the startups have experience with other (types of) capital providers.

Several experts believed that the capital provider should take the environmental (and social) impact into account in investment decisions. However, assessing the environmental (and social) impact of an investment remains challenging. Certain capital providers, such as banks are, however actively seeking

to develop processes and/or standards that allow for the assessment of the environmental impact, e.g. with the use of industry impact benchmarks and circular certifications.

*Table 11: Exemplary quotes Assessment barriers*

Barrier	Interviewee	Quote
Business case presentation	Circular entrepreneur	“I think that a circular company is always a company, so you just have to show that you are scalable and that there is money to be made.”
Lack of CE knowledge	Circular entrepreneur	“ If you remain to think in a linear manner, then circular just doesn’t fit.”
Impact assessment	Circular entrepreneur	“These entrepreneurs act from a certain value proposition that they find important, namely sustainability. But the investor could not care less”

## 5.6. The outcome

At the time of the interview, three entrepreneurs had successfully closed the discussed funding round and one entrepreneur was in the process of negotiating the details of an investment deal. The remaining five startups had not yet been able to secure the sought capital sum. One entrepreneur stated: *“In general it is a lot of trying and then seeing what works. The fundraising process is probably speaking with 100 investors and you end up with one success.”*

### **The lack of constructive feedback**

The startups do not always receive feedback on their application. Moreover, the feedback that is received is often not considered to be constructive. The entrepreneurs mention several potential reasons for this. Firstly, the capital providers have little to no incentive to spend the limited time it has available providing feedback on rejected applications. Secondly, the capital providers may lack required knowledge on CBMs to be able to provide constructive feedback. Lastly, the capital provider may intentionally remain vague in order to not leave the option open to invest in the startup in the future. The lack of constructive feedback makes it more difficult to understand the reasons behind the rejection and improve the application in the future.

The reasons behind the lack of constructive feedback, as brought up by the startups were largely confirmed by the experts, namely a lack of knowledge, time and priority. While most experts consider this understandable for the point of view of the capital providers, one interviewee stressed the responsibility of the capital provider in providing constructive feedback.

*Table 12: Exemplary quotes Outcome barriers*

Barrier	Interviewee	Quote
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Lack of constructive feedback	Circular entrepreneur	“Feedback to entrepreneurs about the reasons why a credit application is not processed or bounced off, that only takes time and does not yield anything extra”
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## 5.6. Support

Overall, the entrepreneurs were able to gain support when and where needed. It is for this reason that support has remained a little discussed issue throughout the interview findings. When asking the entrepreneurs to what extent sufficient support was provided in each phase of the funding process, the entrepreneurs generally concluded that the support offered sufficed. Instead, the entrepreneurs discussed the importance of structural changes, such as the development of a logistical infrastructure and the introduction of policies aimed at internalizing externalities. However, three minor shortcomings regarding support were mentioned. One entrepreneur noted that it would benefit from a centralized center for questions regarding CE finance. Although the entrepreneur recognized the role of e.g. *Nederlands Circulair!* in this matter, in answering the question, the organization refers the entrepreneur to several other parties. While the entrepreneur noted that this is perhaps unavoidable, it would be of value if the services could become more centralized. Another entrepreneur noted that it would be helpful to have an overview of e.g. startup contests in which the startup could participate such as the Postcode Lotteries Green Challenge. Finally, while there is an online community for circular entrepreneurs on which they can pose questions e.g. regarding financing, the platform is rather inactive.

The experts on the other hand stressed the value of support for entrepreneurs in creating focus, improving and validating the business plans and ‘getting the figures right’. Fortunately, the experts noted, there are several ways in which startups can gain support in establishing and validating the business model. However, if there are opportunities for support, why is e.g. the business case still considered a challenge in the process of attracting external capital? First, the entrepreneur must thus experience the need for such support. If it is not aware of the shortcomings of its plans or business skills and does not see the advantage of the support, it is unlikely to seek such support. Second, the startups must be aware of the opportunities for support. One expert noted that while support for CSUs is available, it is still a relative niche and thus may be difficult to find. Third, especially in the early phases of development, startups may not have the necessary funds to pay for the needed support. Another reason, one expert discussed, may be the young, dynamic image of many support programs to which some entrepreneurs may not feel attracted.

## 6. Discussion

This section will interpret the results against the background of the theoretical framework and in the light of known literature. The main insights that can be derived from the findings are discussed and recommendations for a way forward are given. Finally, this section furthermore suggests future research directions.

### 6.1. The barriers in securing external capital

By providing insight in the financial barriers that withhold the niche-level CSUs from securing capital, this research gives direction to the development of effective interventions that allow CSUs to access the required capital to realizing radical innovation and thereby contribute to the acceleration of the circular transition. Furthermore, the analysis of the issue against the background of transition-theory provides practitioners with an understanding of the role of CSUs the circular transition. The findings suggest that the main difficulties in securing capital lie beyond the process of attracting external capital. Three major insights are derived from the findings.

The first insight is that many of the difficulties in securing capital can be traced back to the perceived challenges in establishing a strong business case. Although the challenge in realizing a viable business case is a common struggle of startups, there are a number of CSU-specific issues that create an extra bottleneck. This is in line with earlier findings of Verster and Van der Werf (2019). However, whereas Verster and Van der Werf (2019) largely ascribe the perceived difficulties to the gap in knowledge regarding circular revenue models, our findings suggest that the challenges in establishing a viable business case can largely be attributed to the misfit between the CBM and the dominant linear regime. Firstly, CSUs are disadvantaged by the lack of a level playing field. CSUs must compete with firms that take no account of externalities. Secondly, CSUs must operate in a market in which consumer choices are largely based upon ‘linear custom’. For instance, the purchase price is generally considered to be more important than the lifetime costs. Finally, CSUs experience an extra challenge in the validation of the business case due to the lack of data and best practices and CSUs are largely reliant on their own research and experimentation.

A second insight derived from the findings is that there is a misfit between the dominant financial regime and the characteristics and practices of CSUs. In this context, Verster and Van der Werf (2019) refer to the lack of knowledge, experience and familiarity of the financial market with the CE. The authors also identify the linear assessment of CBMs as a barrier. The findings of this research support their conclusions. Moreover, our research findings suggest the financial market is considered to have a short-term and high-return focus. Moreover, the lack of circularity impact assessment and certification create a barrier for capital providers for taking the positive impact of CSUs into account in the funding decision. While there are sustainable funds and impact investors, these are focused on traditional sustainability activities.

The third insight derived is that while specific barriers can be identified *within* the process of attracting external capital are not significantly different from the barriers commonly perceived by startups. Here, we identify the intransparency and fragmentation of the financial market. There is a multiplicity of financing types offered by a multiplicity of capital providers, each holds different application procedures and makes decisions upon the basis of different criteria. Simultaneously, many of the entrepreneurs are unfamiliar with the financial market. Consequently, it may be perceived as a challenge to identify appropriate funding opportunities and adjust the application to the specific wishes of the capital provider. Moreover, funding applications are sometimes considered to be time-consuming and complex.

Outcomes of this study are of value to policymakers, practitioners and the field of science. Firstly, the research provides insight in the financial barriers that withhold the niche-level CSUs from inducing radical market transformation. Thereby, it gives direction to the development of effective measures that allow CSUs to access the needed capital to realize their ambitions and contribute to the acceleration of the circular transition. Secondly, the insights are of value to practitioners in the field of startup finance by delineating the mismatch between the current financial regime and the capital need of CSUs. Lastly, the research contributes to the field of science by adding empirical insight in the financial barriers of CSUs against the background of transition theory.

## 6.2. The way forward

Following our findings, the difficulties in securing finance can be divided in three categories: the challenges in creating a viable business case due to the misfit with the dominant linear market, misfit between the dominant financial regime and the characteristics and practices of CSUs and general barriers within the process of attracting external capital. As a result of the identified barriers, CSUs face difficulties in realizing and scaling their business cases, ultimately hindering the transition to a CE. If the CE is to be realized by 2050, these barriers are to be addressed. In this section we discuss possible interventions for policymakers, financial actors and the field of science.

Firstly, CSUs would be greatly benefited by the establishment of a level-playing field. To achieve this, policy reforms aimed at the internalization of externalities would be of great benefit. In this context, we can think of the much-discussed carbon tax, but also tax on materials. Such regulations would incentivize more sustainable choices by both businesses and consumers and would indirectly contribute to more sustainable investment choices of the financial market. However, less disruptive measures can also be considered, such as the introduction of regulations regarding producer responsibility and waste management. In considering policy interventions, it should be kept in mind that uncertainty regarding governmental policy may lead to unpredictable markets. Vice versa, the projection of future policy interventions would create more certainty regarding the market development and therefore may act as a basis for a circular business case, and ultimately circular investments. Adding a specified long-term strategy to the 2050 government-program, would therefore be beneficial to the circular transition.

Secondly, the existing policy measures aimed at stimulating circular activity must be critically assessed. In specific, (governmental) funds should be made more fitting to circular business cases and take a new approach to the investment decisions, taking the environmental impact as a starting point.

Thirdly, large-scale interventions are required within the financial sector. Many of the difficulties in financing CBMs are the result of a lack of knowledge, experience and awareness regarding CE finance. Several financial actors are already working on the development of new risk models and attempting to raise awareness on the issue within the sector. In doing so, we advise financial actors to collaborate within other actors in the field of policy, business and science.

The fourth recommendation regards the barriers perceived *within* the process of attracting external capital. An improved transparency of the financial sector can be achieved in several ways. Firstly, startups would benefit from a centralized point of information on financing opportunities. Secondly, financial actors can increase transparency regarding the application requirements and format by e.g. sharing a best-practice application on their website. More cooperation within the sector to establish more coherency in application procedures and formats of the different capital providers.

### 6.3. Research limitations and future directions

This paper presents the findings of a first scientific research on the financial barriers of CSUs. The ability of CSUs to access external capital is a complex matter dependent on various internal and external factors. Thus, casualties are difficult to determine. Although this has been addressed by means of triangulation, it remains difficult to identify precisely what factors are key in the (in)ability to secure external capital. Moreover, while this research has identified several financial barriers of CSUs, the research sample for this research was limited. Considering the CSUs dependence on external finance to realize radical innovation, and ultimately to act as a catalyst in the transition to the circular economy, the issue of CSU financing deserved more empirical investigation.

By analyzing the process of securing external capital from the entrepreneur's perspective against the background of the MLP, this research adopted a highly innovative approach. Throughout the process it was found that the use of the fundraising process in the analysis of the data was restricting, as many of the barriers discussed lie beyond the process of attracting external capital. The application of the MLP, on the other hand, proved beneficial as it allowed for an understanding of the key barriers as a mismatch between the CSUs activities and the CBM and the current linear regime. As such, this research provides an initial contribution to a grounded theory on the CE (barriers) from a transition-theory perspective. I conclude that a transition-theory perspective provides a valuable framework to understand and interpret the current slow CE progress and identify potential interventions to accelerate a circular regime shift. The CE literature would greatly benefit from more research that takes a transition-theory approach.

The findings of this research point to several other relevant avenues for future research. Firstly, Scientific research on the risks of CBMs could contribute to the development of much needed new models for risk assessment. Moreover, scientific research could benefit the development of impact assessment tools for CBMs. Finally, similar studies on the financial barriers of CSUs can be conducted in different contexts, e.g. focusing on specific business models.

## 7. Conclusion

Following the government-wide program, the CE must be a reality in the Netherlands by 2050. Although CSUs play a crucial role in the transition to a CE, the majority CSUs in the Netherlands perceive difficulties in securing the external capital needed to realize and scale their business case (Oliver Wyman, 2017). Despite its importance, CE finance remains largely under-researched. This research was the first scientific contribution on the financial barriers of CSUs. Moreover, the research took an innovative approach to identifying the barriers. While the use of the framework of the process of attracting capital was found to be restricting in the analysis of the barriers, the use of the MLP framework proved to conceptualize the role of CSUs in the transition to a CE and understand the challenges in this process. Through desk research and interviews with both circular niche players and regime actors several barriers in accessing finance by CSUs have been identified.

The research has shown that the main difficulties in securing capital lie beyond the process of attracting external capital. In specific the key barriers are found to be the challenges in creating a viable business case due to the misfit with the dominant linear market and the misfit between the dominant financial regime. The barriers *within* the process of attracting external capital are caused by the intransparency and fragmentation of the capital market and the complexity of application requirements. These barriers are not found to be significantly different from the barriers commonly perceived by startups. Finally, it was found that rather than improved support for CSUs during the application process, circular entrepreneurs call for structural changes in government policy and the financial regime. As a result of the identified barriers, CSUs face difficulties in realizing and scaling their business cases, ultimately hindering the transition to a CE. If the CE is to be realized by 2050, these barriers are to be addressed, especially by creating a level playing field and intervening in the linear financial regime.

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