Utrecht University

Towards the Circular Economy:

Success Factors for Service-Based Circular Startups

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Summary

This study set out to research critical success factors for service-based circular startups (SBCSUs). Service-based circular startups may play a vital role in a global transformation towards Circular Economy. However, little research has been done to find out what determines whether a SBCSU can turn a business plan into a profitable business.

The methodological approach is a multiple-case study. This multiple-case study revolved around a research framework developed through a combination of several strands of business literature. This helped shed light on different aspects of business success. Aggregation of these literary strands was done to find success factors for a multitude of dimensions of business practice. These preliminary success factors were used to guide five case studies. Document analysis was done to find relevant businesses, whereafter interviews were held. Guided by the previously found success factors, interviewees were questioned what they believed contributed to the success of their business. Thereafter the responses were contrasted and compared with the other case studies, as well as with the literature used to guide the research. The findings resulted in a list of hypothetical success factors which are meant to serve further research.

This study found that the success factors found in literature are generally not applicable to SBCSUs, besides the need for sufficient financial resources. There are common findings in the results of the case studies which may indicate critical success factors for SBCSUs do exist. These findings require further investigation. Further research on a larger number of cases is recommended, guided by the findings of the current study.

Preface

During my final research project in high school on Silent Spring by Rachel Carson, I discovered my ambitions to create positive impacts in the environment. During my Bachelor's degree my interest in governance and sustainable business practices grew, and led me to enroll in the Sustainable Development Master's Program, where my interests only grew. Taking courses on the Circular Economy and sustainable business practice I discovered my interest in regulations for the transition to a more sustainable society, and curiosity as to how small players can have big impacts. It seemed only fitting that my time as a student would be finalized with research that encompassed these interests.

This study was conducted during hectic times which added to the challenge of showcasing the knowledge and skills developed over two years. I am very thankful for the businesses agreeing to take part in my research project. It became clear very quickly how much difficulty the pandemic caused the type of businesses I was interested in. Most of them -understandably- could not afford to spend their time on helping research projects. I am extremely grateful for the participants taking valuable time out of their hectic schedules to help me realize my Master thesis.

I would like to thank dr. Frank van Laerhoven, my supervisor, for all the insights and encouragement he provided. I cannot imagine receiving better guidance and support throughout this process.

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Abbreviations

CE	Circular Economy
CSU	Circular Startup
CSF	Critical Success Factor
SBCSU	Service-based Circular Startup
TBL	Triple Bottom Line
MLP	Multilevel Perspective
TIS	Technological Innovation Systems
SNM	Strategic Niche Management
SEE	Sustainable Entrepreneurial Ecosystems
PSF	Preliminary Success Factors

1. Introduction

Around the world we see that governments and businesses have committed themselves to Circular Economy (CE) goals. For instance, the principles of the circular economy have been adopted by the European Union and China to develop their economic strategies for the future. An example is the EU Action plan for the Circular Economy (European Commission, 2020), which contains measures to stimulate Europe's transition to a circular economy, such as encouragement policies for more energy efficient product design and minimum-conditions for transparency and cost-efficiency of waste management activities in EU member states (European Commission, 2020). The Dutch government has expressed its ambition to create a fully circular economy by 2050 (Rijksoverheid, 2020), and similar CE ambitions can be found at regional and local levels of the Dutch government.

The general idea of a CE is to replace the current economic system by one that revolves around reducing resource extraction and reusing materials. The theoretical underpinnings can be traced back all through the 20th century (Reike, Vermeulen and Witjes, 2018). Not only minimizing the use of the natural environment as a residual waste sink, but also diminishing the use of virgin materials is supposed to create benefits (Andersen, 2007).

Even though many actors have committed themselves to the CE, the concept is far from fully developed. For instance, one critique is that it is not clear how the Circular Economy concepts will affect population carrying capacity, employment, international trade or the role of institutions (Ghisellini, Cialani and Ulgiati, 2016). Furthermore, there is no framework providing definitions and tools for generalized assessment methods, though assessments are already being made (Ghisellini et al., 2016). An interesting question for instance, is whether CE should be envisioned within a capitalist society based on economic growth, or whether circularity can only truly be realized in line with concepts as degrowth or steady state economy. Some definitions include economic growth, whereas others see the stabilization of product demand as a prerequisite for circularity to work (Allwood, 2014). Some scholars stress the necessity to view the CE as idealistic, because of the far-reaching consequences of closing material loops (Brennan, Tennant and Blomsma, 2015). However, due to the increasing commitment to the concept, the current research will use the CE goals as a starting point.

Businesses are at the core of any economic system and therefore must play a large role in the transformation to a CE. Dominant business practices are forming an increasing risk to grave and irreversible environmental degradation (Abdallah, Diabat, Simchi-Lemi, 2012). Adoption of circular business models among businesses has remained insignificant, although the business sector is responsible for a large increase in extraction of natural resources during the 20th century, as well as a great amount of pollution and

environmental threats caused by production and consumption processes (Bauwens, Mees, Gerardts, Van Dune, Friedl, Von Daniels, Teurlings, Brasz, Henry, Hekkert and Kirchherr, 2020). The business sector is responsible for large impacts on the environment. This is caused by a linear economic system; one that relies on disposing of a product at the end of its lifecycle (Antikainen and Valkokari, 2016). For large, established companies it is challenging to adapt to a CE, since it requires far-reaching changes to most business models including their very foundations, and likely does not coincide with their current revenue models. Larger incumbent firms may find difficulties implementing circular business models due to the administrative layers that are paired with larger sized companies, and the financial and contractual lock-ins with external partners (Bocken, 2015).

Because of their size and flexibility, small, new businesses are thought to be more capable of conforming to a CE (Bauwens et al., 2020). Recently the Circular Startup (CSU) has started to gain attention for its role as a potential vehicle for the transition towards a circular economy. Circular startups are thought to have a specific business advantage in the CE transition because they can build their business models around CE principles from the start (Bauwens et al., 2020). When a circular startup employs a service-based business model, where a product is offered as a service, we speak of a service-based circular startup (SBCSU) (Henry, Bauwens, Negro, Kuhlmann and Smits, 2007). An example from the Netherlands is BikeFlip, a startup company which offers a children's bike-membership, rather than selling the bikes as a product. Users pay a monthly fee and in return they get the service of having a bike delivered, repaired and replaced whenever the child grows out of it. The bike itself is owned by the company; the customers become users rather than owners of the product. In the envisioned circular economy, the service-based business model could potentially become a popular business model (Antikainen et al., 2016; Bocken, 2015) This type of business model could prevent further resource extraction through the incentive for businesses to make qualitatively better products which require less repair- and service costs. Furthermore, companies would ensure that broken or discarded products are repaired and reused and recycled, rather than thrown out.

However, even though it is claimed that startups can be driving forces in the transformation of the business sector towards CE goals, oftentimes entrepreneurial ideas for startups fail to transition from plan on paper to a running business (Blank, 2013) Because of their potential, it would be valuable to know how to create more successful circular startups, and therefore create more driving forces towards a CE. Because it has been suggested in scientific literature that service-based circular startups have large potential in accelerating the transition towards a circular economy, this study aims to provide hypotheses on critical success factors for SBCSUs in order to guide further research.

2. Research Design

2.1. Research Objective & Research Question

The objective of this study was to gain a better understanding of how the Circular Economy could be further developed. Because SBCSUs were suggested to play a contributing role in this goal, conditions that create a successful SBCSU were sought after. The study aimed to establish hypotheses on critical success factors in order to establish a starting ground for further research into the development of the SBCSU sector. In order to realize the research objective, the following research question was developed:

What are critical success factors of service-based circular startups?

The focus of this research is on the viability of these service-based circular startups based on the opinions and experiences of successful entrepreneurs within this particular business sector.

2.2. Research Framework

The research is structured as can be seen in figure 1. This research is of explorative nature and consists of several phases.

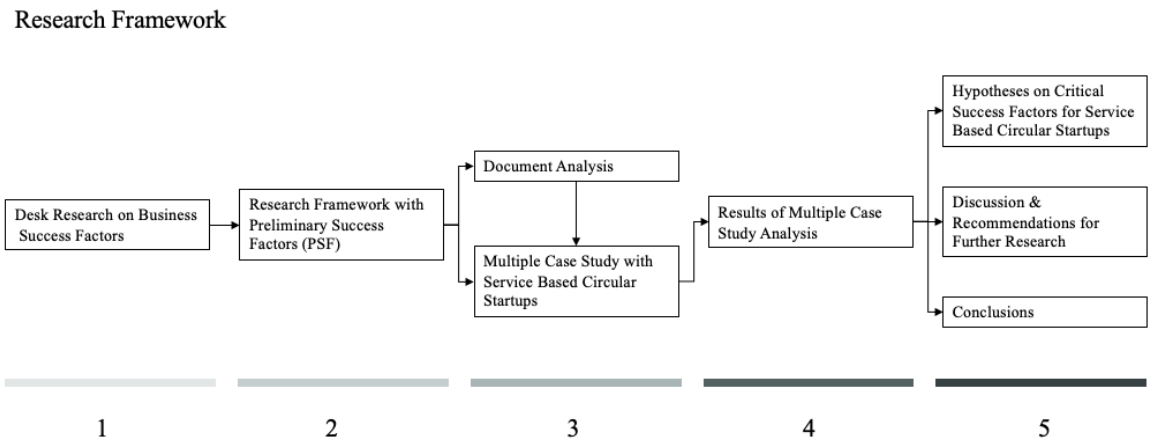

Figure 1. Research Framework

First desk research was done into success factors found in literature on business analysis. This desk research focused on Multilevel Perspective (MLP), Technological Innovation Systems (TIS), Strategic Niche Management (SNM), Sustainable Entrepreneurial Ecosystems (SEE) and additional literature on

successful business practices. This desk research was used to find preliminary success factors (PSF) for the SBCSUs. These PSFs were used to guide the following phase, consisting of document analysis and interviews, all part of a multiple-case study. The document analysis was predominantly used to consider whether businesses qualify to take part in the multiple-case study. The interviews of the multiple-case study have been used to explore whether entrepreneurs view that the PSFs are applicable for SBCSUs.

During the multiple-case study the PSFs have been categorized and adjusted to fit the data. The results of this multiple-case study were analyzed and finally hypotheses on the critical success factors for SBCSUs have been produced. As can be seen in the research framework, the study concludes with a set of hypotheses and a discussion and recommendations section for further research.

2.3. Societal Relevance & Scientific Relevance

Climate change mitigation requires large scale changes in society, among which the transformation of the business sector is essential. Because the Dutch government has set out to create a Circular Economy in 2050. Realizing a Circular Economy may be a solution for creating a sustainable business sector. Research into critical success factors of service-based circular startups provides valuable insights on how to recreate these SBCSU business models in larger quantities. When SBCSUs take up a larger share of their respective industries, this may push the CE goals forward.

3. Theoretical Background

The theoretical background is divided up into two section. The first section provides several concepts with their definitions and background in order to create a level playing field. Due to the relative novelty of most of these concepts there is not an established paradigm. Therefore, it is important to delineate which definitions were used and how the concepts were interpreted and used.

The second section provides an overview of the literature on business analyses. In this section the preliminary success factors with their respective indicators found in these literary strands can also be found.

3.1. Concepts and definitions

3.1.1. Circular Economy

Circular Economy falls in line with concepts such as Cradle-to-Cradle, Industrial Ecology and Spaceship Earth, which all express thoughts on responsible waste management and resource extraction. With developments in sciences such as chemistry, biology and physics, more people became concerned about the way resources were used and disposed of, and the impacts this had on the natural environment (Blomsma and Brennan, 2017). For this study we use the definition provided by Geissdoerfer et al. (2017): “we define the Circular Economy as a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling”. This study uses the previous definition for its general acceptance, but as previously mentioned, controversy around the CE definition exists. As can be seen in figure 2, a Circular Economy differs from currently dominant economic systems in that it does not extract raw materials or dispose of residual waste; all materials are used and reused.

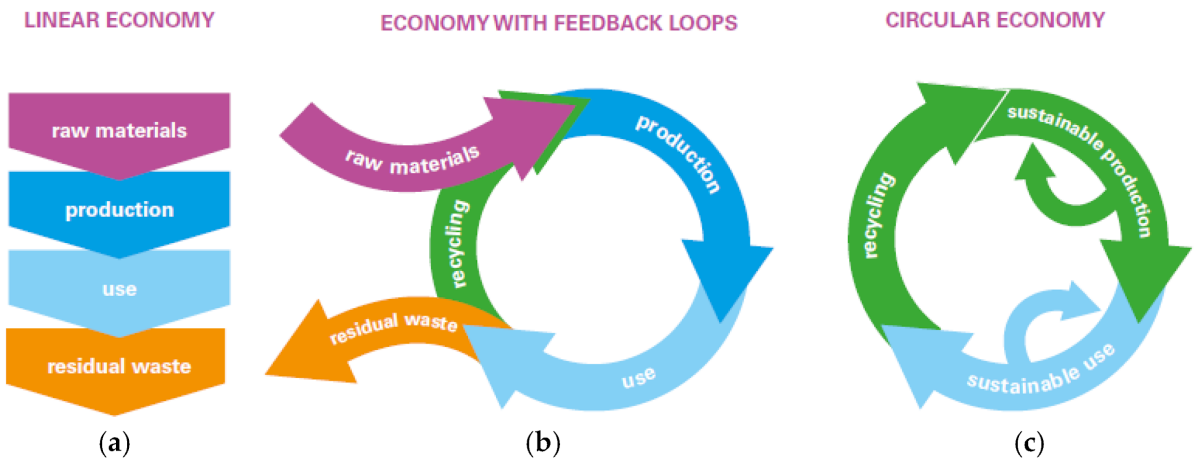

Figure 2. Circular Economy versus Linear Economy and Economy with Feedback Loops (Van Buren, Demmers, van der Heijden and Witlox, 2016).

A common critique of the CE is that the concept is underdeveloped. For instance, the idealistic eternal use and reuse of materials is physically impossible, due to the Second Law of Thermodynamics: to recycle and reuse materials more energy, materials and/or labour have to be added in order to make the product useful again (Brennan et al., 2015). Another critique is that, although many policy documents and consultancies speak of CE as a means for decoupling growth and resource extraction, various researchers have found no empirical evidence for this phenomenon and expressed that resource decoupling is entirely incompatible with economic growth (Hickel and Kallis, 2019). According to some researchers, degrowth or a steady state economy is a better fit for the Circular Economy, since it does not require economic growth which seems inherently tied to resource extraction and environmental pollution. Though it is not disputed here that the Circular Economy paradigm requires further development, for the current study the definition provided by Geissdoerfer et al. (2017) is maintained.

3.1.2. Service-based Circular startups

Business models are simplified representations of the value creation, value proposition, value delivery and value capture elements and the interactions between those aspects within an organization (Geissdoerfer, Morioka, Carvalho and Evans, 2018). Circular business models (CBM) use CE principles as direction for the design of the business model (Heyes, Sharmina, Mendoza and Gallego Schmid, 2018) and can be defined as "circular operations on the micro-level that aim at fully closing product or material loops and thereby making the 'end-of-life' concept obsolete or keeping resources in use for as long as possible through reducing, alternatively reusing, recycling or recovering them (Kirchherr, Reike and Hekkert, 2017). Circular

startups (CSU) are a type of circular business models and can be defined as 'new, independent and active companies pursuing a CBM' (Henry et al., 2020). For this study we use the definition of a startup by Henry et al. (2020), which describes startups as "'new' (i.e. typically operating for four to six years) and 'independent' entrepreneurial ventures designed to effectively develop and validate a scalable, repeatable and at least break-even business model".

In the current study startups are researched which maintain a circular business model and are service-based. Service-based circular startups use product-service systems which focus on the 'sale of use' rather than the 'sale of product'. A product service-system is defined as 'a system of products, services, networks of "players" and supporting infrastructure that continuously strives to be competitive, satisfy customer needs and have a lower environmental impact than traditional business models' (Goedkoop, Van Halen, Te Riele and Rommers, 1999). Some discussion exists around whether service-based business models are in fact the right method of achieving a CE, for instance due to the fact that in countries where services occupy a large percentage of the market, domestic material consumption has not declined, and the material footprint is outpacing the GDP growth (Hickel and Kallis, 2019). It is important to understand that service-based business models are not necessarily 'circular'; this is only the case when the business simultaneously uses the CE principles as direction for their business model design.

3.1.3. Triple Bottom Line

In order to define some of the criteria for the case sample selection, the triple bottom line is used to assess the businesses. The triple bottom line gained traction after the view was put forth in the United Nations Conference on Environment and Development in 1992 (Blomsma and Brennan, 2017). As defined by the author that coined the term: "In the simplest terms, the TBL agenda focuses corporations not just on the economic value that they add, but also on the environmental and social value that they add – or destroy" (Elkington, 2013). The triple bottom line is a means of assessing success of businesses in terms of environmental and social benefits and economic profits. This is a suitable tool for service-based circular startups since this type of business categorically aspires for environmental, social and economic profits.

3.1.4. Critical Success Factors

Critical success factors can be identified in order to assess the threats and opportunities an organization faces in its environment, as well as an assessment of the firms strengths and weaknesses (Leidecker and Bruno, 1984). Together the assessment of environmental threats and opportunities and specific firm resource analysis are basic building blocks for strategic planning and strategy development process. Leidecker and Bruno (1984, p. 24) define Critical Success Factors as follows: "Critical Success Factors (CSF's) are those

characteristics, conditions, or variables that when properly sustained, maintained, or managed can have a significant impact on the success of a firm competing in a particular industry. A CSF can be a characteristic such as price-industry advantage, it can also be a condition such as capital structure or advantageous customer mix; or an industry structural characteristic such as vertical integration."

3.1.5. Lean-startup

The interviews repeatedly produce the lean-startup concept. This entails a strategy for developing the business on the basis of continuous evaluation and adjustment of the procedures. As the article by Blank (2013, p.4) states, the strategy "favors experimentation over elaborate planning, customer feedback over intuition, and iterative design over traditional "big design up front" development". It thus contrasts with creating a thorough business model upfront and aiming to realize this plan.

3.2. Theoretical basis

Though literature on success factors of SBCSUs is scarce, there are a multitude of literary strands explaining success factors of different aspects of business. In the following section five different strands of business literature are summed up and the success factors and their given indicators are summarized in their respective tables. These success factors form the basis of the research framework and are later used to compose the Preliminary Success Factors (PSFs).

3.2.1. Multi-Level Perspective & Technical Innovation Systems

The technological innovation (TIS) approach is used to assess technology specific transitions by looking at the organizational and institutional changes that need to run parallel to the technology development (Markard, Raven and Truffer, 2012). The function of innovation systems approach is used to determine which of the most important processes are necessary to successfully achieve technology development (Hekkert, Suurs, Nergo, Kuhlmann and Smits, 2007). Another approach to analyze sustainability transitions is the Multilevel Perspective (MLP) (Geels, 2011). Studies using the MLP approach are used to explain the success of green niche-innovations through analyzing the learning processes, network dynamics and struggles with existing regimes on multiple dimensions (Geels, 2011).

The MLP is used to gain understanding of how sustainability innovations come about and how these can replace, transform or reconfigure existing unsustainable systems. According to MLP, sustainability transitions are dependent on three overarching concepts: the socio-technical regime, niche actors related to achievement of sustainability transitions and the sociotechnical landscape, which describes the larger context where niche and regime dynamics are influenced by (Geels, 2011). Both TIS and MLP are used to

look at technological transitions on a higher governance level, here through the interactions between the niches, regimes and landscapes (Markard et al., 2012). A combination of the TIS and MLP approach was previously suggested by Markard et al. (2008), to complement the detailed analyses of niche developments of TIS with the relationship between the niche and the regime of MLP. Below the success factors of the combined TIS and MLP as developed by Markard and Truffer (2012) are set out in table 1.

Table 1. Multiple Level Perspective & Technological Innovation Systems (Markard and Truffer, 2012)

Success Factor	Indicators
Knowledge Development	Sufficient R&D projects, patents and investments
Knowledge Diffusion	Sufficient number of workshops, conferences, large network size and intensity
Guidance of the Search	Targets set by governments, expectation raising articles published in the news, belief in growth potential, regulatory pressure and tax incentives
Market Formation	Large market size, sufficient customer groups and lead users, specific tax regimes in place and niche markets present
Resource Mobilization	Adequate amount of capital and venture capital, as well as sufficient human resources and complementary assets
Creation of Legitimacy	Growing amount of interest groups, lobby actions and an alignment with current legislation, standards, visions and expectation.

3.2.2. Strategic Niche Management

Strategic Niche Management (SNM) is an approach, which like TIS focuses on niche developments, and is used to trigger regime shifts through niche developments. The focus of SNM is on the help in creating and supporting specific niches by different actors, such as governments, users and societal groups, with the aim of giving traction to a widely aspired sustainability goal.

To answer the question why so many new technologies do not survive the leap between the R&D laboratories and market introduction, researchers developed strategic niche management (SNM) research (Schot and Geels, 2008). In SNM the main idea lives that selective exposure of new sustainable technologies to the market, through a process of niche development, can in the course of time, lead to replacement of currently used unsustainable technologies (Schot and Geels, 2008).
In SNM, the three processes determined to explain successful development of niches are: expectation and vision formulation, social network development and learning process establishment. The indicators of the three processes are depicted below in table 2.

Table 2. Strategic Niche Management (Schot & Geels, 2008)

Success Factor	Indicators
Expectation & Vision Formulation	Formulated ambitions which attract attention, provide direction to the learning process and legitimize niche protection and nurturing
Social Networks	Existence of social networks which create constituencies behind new technology, facilitate interactions between relevant stakeholders and provide financial and human resources and complementary assets.
Learning Processes	Learning processes are in place for technical-, design, market-, user preferences-, infrastructure-, maintenance-, cultural-, symbolic-, industry-, production-, regulatory- governmental policy- societal- and environmental aspects of the niche.

3.2.3. Sustainable Entrepreneurial Ecosystems

A Sustainable Entrepreneurial Ecosystem (SEE) is defined as "an interconnected group of actors in a local geographic community committed to sustainable development through the support and facilitation of new sustainable ventures" (Cohen, 2006, p.3) and can be analyzed to determine what contextual factors allow or restrict entrepreneurs in sustainability efforts. The intention of developing this field of study was to

stimulate economic growth through entrepreneurial innovation. Stam (2015, p.5) states: "the systemic conditions are the heart of the ecosystem: networks of entrepreneurs, leadership, finance, talent, knowledge, and support services. The presence of these elements and the interaction between them predominantly determine the success of the ecosystem". The SEE approach establishes a comprehensive view of entrepreneurship incorporating activities of several actors as well as their interrelationship with a variety of contextual factors (Pankov, Velamuri and Schneckenberg, 2019). The indicators of the success factors as found by Stam (2015) can be found below in table 3.

Table 3. Sustainable Entrepreneurial Ecosystems (Stam, 2005)

Success Factor	**Indicators**
Accessible Markets	Large, medium and small companies and governments as customer
Human Capital	Management talent, technical talent, experienced entrepreneurs available, outsourcing possibilities and immigrant workforce available.
Financial Resources	Financial support available through professional services, incubators, personal relations and networks of entrepreneurial peers,
Support Systems	Access to advisors, incubators and networks of entrepreneurial peers
Regulatory Framework	Regulations allow starting a business with ease, tax incentives and business-friendly policies in place, access to infrastructure, transport and telecommunications.
Education & Training	Available workforce with (pre-)university education and available workforce with entrepreneurship training
Universities as Catalysts	Universities promoting a culture of respect for entrepreneurship, playing a role in idea-formation for

	new companies and providing graduates for new companies.
Cultural Support	Societal tolerance for risk and failure, support for entrepreneurship and innovations, preference for self-employment, role models and success stories available, research culture in place.

3.2.4. New successful business ventures

All of the approaches above are focused on the external business environment. For the research question of this study, merely looking at the systemic factors of success would not provide an answer. Both the external business environment in which the companies are embedded, as well as the internal business environment need to be investigated.

However, the internal business environment of circular startups is a largely unresearched field of study (Song, Podoynitsyna, Van Der Bij and Halman, 2008; Groenewegen and de Langen, 2012). Groenewegen and de Langen (2012) use the explanation that research on innovation patterns usually focus on larger firmers and empirical studies which exclude smaller companies.

To structure the research into the internal business environment we use the research by Song et al. (2008) on success factors in new ventures. These factors are complemented by success factors for the survival of start-ups with radical innovation from the article by Groenewegen and de Langen (2012). Several of the factors found by Song et al. (2008) overlap with the factors found by Groenewegen and de Langen (2012), so an integrated table with all success factors for the internal business environment was developed below, including definitions of the factors corresponding to both articles.

Table 4. Song et al. (2008) and Groenewegen and de Langen (2012) on success factors for new business ventures

Success Factor	Indicators
Wide & Varied Market Scope	Variety in customers and customer segments, their geographic range, and the number of products

Industry experience	Experience of the firm's management team in related industries and markets
Marketing experience	Experience of the firm's management team in marketing
Financial resources	Level of financial assets of the firm
Patent protection	Availability of firm's patents protecting productor process technology
Large size of the founding team	Size of the management team of the firm
Supply chain integration	A firm's cooperation across different levels of the value-added chain (e.g., suppliers, distribution channel agents, or customers)
Business Plan & Strategy	Thorough business plan, a clear strategy/mark analysis/competitor analyses and aggressive competitor strategy, the usage of an innovation as a business idea.
Network Participation	Being a member of a formal network
Entrepreneurial Qualities	The need for achievement, having locus of control, the willingness to take risks, experience as an entrepreneur, industry specific experience, management experience and a relevant social network.

3.3. Theoretical Framework

The theories discussed in the previous section have all claimed certain indicators for success which are critical for businesses. All success factors found in literature have been categorized into seven Preliminary Success Factors: Business Strategy, Network, Guidance, Human Resources, Entrepreneurship, Market Formation and Capital. As illustrated in figure 2, the tables 1 to 4 have been integrated and combined and for each of the seven PSF along with their indicators.

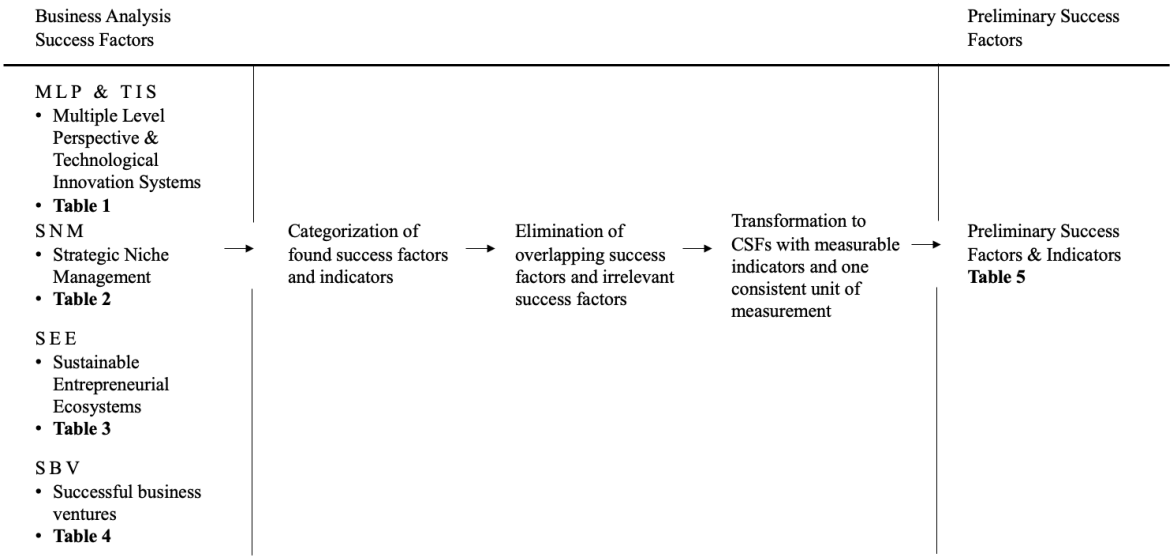

Figure 3. Development of Success Factors and Indicators.

The indicators have been formatted in order to have one common unit of measurement. The final indicators are formulated to represent the core of the theories on business literature as discussed above whilst matching the data obtained in the multiple-case study. These final success factors with their indicators can be found below in table 6 and are the basis of the current research.

4. Methods

4.1. Sample Selection

For this research the framework by Seawright and Gerring (2008) was used to validate the case sample selection. The framework is used for small-number case studies focused on causal inferences (rather than descriptive or predictive inferences). As the current research is of explorative nature, purposive and non-probabilistic sampling techniques are used, where useful variation regarding the independent variables are sought-after. Gerring and Seawright (2008) distinguish between several types of case studies. One of these typologies is a Typical Case, which is used to exemplify a stable cross-case relationship. Typical cases are used to explore causal mechanisms which can be generalized and offer the possibility of different conclusions (Gerring and Seawright, 2008). In this study, typical cases are used in order to see whether the suggested causal pathways in theory are confirmed in pattern-matching outcomes of the several typical cases. A short summary per business will be given below in the results section.

Five sample cases were selected through this framework through case selection criteria summed up in table 5 below. The cases were all found in the Netherlands and Germany. Each case is characterized by a service-based circular startup but differs from the other cases in its specific business activity. This ensures that the results cover a range within the service-based circular startup category, and not merely a limited type of business within that category. A business cannot be established too long ago to qualify as a startup, but the startup phase can take some time. No formal 'age limit' for the startup was found in literature. Therefore, a limit has been set for 2012 as the earliest foundation year. A circular business model as previously defined must be adhered to in the business. A service is defined as the replacement of traditional material intensive product utilization through provision of services (Mont, 2002). This can take shape as the sale of the use of the product instead of the product itself, the change to a 'leasing society', or providing a service which realizes the reuse of materials. Finally, the business must pursue the Triple Bottom Line, meaning creating environmental and social benefits as well as having the aim to make profits (Dyllick and Hockerts, 2002). This means that the business activities must benefit the environment or reduce impacts on the environment through environmentally sustainable practices. The social benefits mean the business must add value to the community by helping achieve common goals. In this study this may be realizing the Circular Economy, since this is an established goal in Europe. Lastly the company must pursue profit. Non-profit organizations or charities are not the subject of this study.

Table 5. Case Selection Criteria

Case Selection Criteria
1. The business must be a startup, meaning new organizations created by entrepreneurs to launch new products. 2. The business must be established between 2012 and 2020. 3. The business must have a circular business model, meaning the CE principles are taken up in the business strategies and practices. 4. The business must provide a service. 5. The businesses must adhere to the Triple Bottom Line, meaning they create environmental and social benefits as well as profit.

4.2. Operationalization of the variables

The study takes a qualitative-deductive approach, meaning that established theory was used to see whether it applies to specific instances (Hyde, 2000). Preliminary indicators were developed through desk research, whereafter final indicators have been developed whilst data was being gathered, with the final result being indicators which match the obtained set of data seamlessly.

To operationalize the indicators, they have been refined into concretely measurable units matching the gathered data. According to the scoring system indicated in table 8 the success factors will receive a strong, medium or weak score. This will indicate the likeliness of their influence on the success of SBCSUs.

The preliminary success factors will be scored per case study visualized in a radar plot, complemented with a descriptive analysis of the results. Thereafter the multiple-case study results will be united in a combined overall score per success factor, and again a radar plot will be provided as a visual aid.

Table 6. Preliminary Success Factors including indicators and scoring.

Critical Success Factors	Indicators	Scoring
Business strategy	1. Having a thorough business plan. 2. Using active marketing. 3. Having learning and articulation processes in place in various dimensions, e.g. technical design, market demand and user preferences, infrastructure requirements, organizational issues. 4. Organizing structural knowledge development through R&D Projects, patents and investments in R&D.	Strong = all four indicators are affirmed Medium = two or three of the indicators are affirmed Weak = One or none of the indicators are affirmed
Network	1. Being part of a formal network. 2. Cooperating with large companies which have specific departments and programs to encourage high-growth start-ups. 3. Making use of support systems e.g. incubators/accelerators. 4. Making use of engagement opportunities e.g. workshops, conferences and competitions.	Strong = all four indicators are affirmed Medium = two or three of the indicators are affirmed Weak = One or none of the indicators are affirmed

Guidance	1. Making use of governmental policies and/or regulatory opportunities e.g. tax incentives, business-friendly legislation/policies. 2. Actively creating legitimacy/credibility for the business. 3. Articulating (and adjusting) expectations or visions, which provide guidance to the innovation activities, and aim to attract attention and funding from external actors. 4. Having help from universities functioning as catalysts e.g. Providing grants, office space, guidance and employees. 5. Having cultural support e.g. making use of role models or benefiting from societal tolerance for risk and failure, research culture, positive image of entrepreneurship and celebration of innovation.	Strong = Four or five indicators are affirmed Medium = two or three of the indicators are affirmed Weak = One or none of the indicators are affirmed
Human Resources	1. Employing people from all educational levels in all sectors and areas of expertise. 2. Having personnel with combined management talent, technical talent and entrepreneurial company experience. 3. Having an advisory board.	Strong = all four indicators are affirmed Medium = two or three of the indicators are affirmed Weak = One or none of the indicators are affirmed

Entrepreneurship	1.The entrepreneur(s) feeling a need for achievement. 2. The entrepreneur(s) having the locus of control. 3. The entrepreneur(s) being willing to take risks. 4. The entrepreneur(s) having (combined) experience as entrepreneur, industry specific experience, management experience. 5. The entrepreneur(s) having a relevant social network.	Strong = Four or five indicators are affirmed Medium = two or three of the indicators are affirmed Weak = One or none of the indicators are affirmed
Market Formation	1. Having a sufficiently large market for the business activities. 2. Having a varied customer base from a variety of customer segments and geographical ranges. 3. Having large, medium and small companies and governments are customers. 4. Being a part of a niche market.	Strong = all four indicators are affirmed Medium = two or three of the indicators are affirmed Weak = One or none of the indicators are affirmed
Capital	1. Having sufficient financial resources through personal capital, investors, grants, loans and/or prize money.	Strong = indicator is affirmed Weak = Indicator is denied

4.3. Data Collection

4.3.1. Desk Research and Interviews

The current study chose a qualitative research design to allow for a broad understanding of the critical success factors of SBCSUs. Data collection consisted of two phases. First, document analysis informed case sample selection. For business documentations the website of the Netherlands Chamber of Commerce was used to find publicly available annual reports and statutes of the potential cases. Furthermore, websites of the businesses were investigated to find out more about the business model employed, the services offered, the business' history and the expressed goals by the company. Besides case sample selection, the findings of this phase were used to inform the second phase of data collection, which consists of interviews.

Interviewees were selected using purposive sampling, to ensure interviewees provide valuable information on the topic and to increase the likelihood of obtaining heterogeneous findings. The chosen cases were successful businesses identified as SBCSUs and could be represented in interviews by the founding entrepreneurs. Entrepreneurs were chosen in order to ensure a level of heterogeneity regarding the business role of the interviewees and the high level of information they would be able to provide. Here the assumption is made that the entrepreneur is most knowledgeable of the workings of the business and the factors that led to its success. The interviews were guided by the PSFs, but no standardized questions were formed. Using this method provided flexibility to question findings from previous interviews in the following case-studies.

In the second phase data was collected through the interviews. Semi-structured interviews, guided by the PSFs (Table 6), were conducted with entrepreneurs of service-based circular startups in the Netherlands and Germany. The interviews were used to form a final list of hypotheses, containing success factors and indicators. During the interviews, subjects were given the opportunity to provide their opinions on additional success factors regarding SBCSUs.

4.3.1. Additional Considerations

The research process was carried out with consideration of ethical aspects. For instance, privacy of interviewees and their respective companies were respected so the subjects are in control of what they are willing to disclose for the research. Interviewees were asked for permission to record the interview, to ensure all valuable information is collected. The interviews made use of informed consent forms which were read and signed in order to guarantee full anonymity in data storage and the report, as well as safe processing and storing of data. As this research was conducted during a global pandemic (COVID-19), specific ethical considerations were taken into account regarding health and hygiene. All recommendations made by the Dutch National Institute for Public Health and the Environment (RIVM) which can be found on the website

of the Dutch Government (Government of the Netherlands, 2020) were adhered to during the course of this research in order to prevent further spreading of disease. Here, the most prominent conformance is that interviews were conducted through (video-)calls.

4.4. Analysis

As data collection was done in two separate phases, so was the analysis. First the data resulting from theory analysis was combined, organized and transformed into operable PSFs and indicators.

In the second phase of data analysis the data gathered from interviews and business documentation was combined. Interviews were transcribed ad verbatim and analyzed using thematic content analysis. The program NVivo was used to code the interviews. Interviews were searched for all relevant information which was coded and categorized according to the PSFs. After individual case-analysis, the results of all cases have been combined in a cross-case analysis to search for similarities, patterns and contrasts between cases.

Radar plots were used to visualize the results per case and for the combined cases. The radar plot can be used for graphing multivariate data. It is chosen for its ability to provide a clearly understandable summary of complex data.

5. Results

The results are made up of the five case studies and a synthesis of all combined results. Each case study section will provide a short summary of the business and the results that followed from the interviews. The summary will describe the business activities, the time the business has been active, a description of the entrepreneur(s) and the interviewee(s) and all other relevant information. Due to privacy considerations the businesses have been anonymized and will be identified as business A, B, C, D and E. For the same reason business documentation and websites have not been included in the references. As specified in the methodology, the results will be structured through radar plots complemented with a descriptive interpretation of the results. The results will be described per category of indicators, in the order Business Strategy, Network, Guidance, Human Resources, Entrepreneurship, Market Formation and Capital. For each category the appropriate scoring will be indicated (strong-medium-weak) as explained in table 6.

At the end of each results section the additional findings from the interviews are provided. A selection has been made of the additional findings on the basis of their relevance and repetition throughout the case studies. If multiple interviewees describe a certain factor to their business success without being guided by the PSFs, this may be an indication that this is a success factor relevant for the SBCSU sector. However, if only one of the interviewees mentions a certain factor, this is likely more relevant to their specific business and not generalizable. Following all five separate case results, a synthesis will be provided with the most interesting findings from the research.

5.1. Business A

5.1.1. Summary Business A

Business A was established in 2017 in the province of Limburg, Netherlands. The business was founded by an experienced entrepreneur who owns several companies alongside Business A. The entrepreneur has previously been employed by a University as a teacher in Economics. The company provides a service by reallocating used building materials for new building projects through a platform for real estate operators. The entrepreneur was approached by a start-up program and asked to set up this type of business. The service provided was meant to reduce extraction of new building materials in order to relieve stress on the environment. Currently the business is run by two people and offers its services predominantly to the governments of the Netherlands, Belgium, France, Germany and the European Union.

5.1.2. Results Business A

For each case study a radar plot was created to visualize the results. In each radar plot the blue line indicates the maximum score a business could attain, and the other line indicates the received score per success factor. For business A, in the radar plot below we see that for Network, Market and Capital, Business A received a full score, whereas Human Resources received a score of 1 where the maximum score is 3. Here it is interpreted that for Business A, Network, Market and Capital were seen as important contributing factors to their success. Guidance and Entrepreneurship have generated mediocre results, and the results show little evidence that Human Resources and Business Strategy contributed to the success of business A.

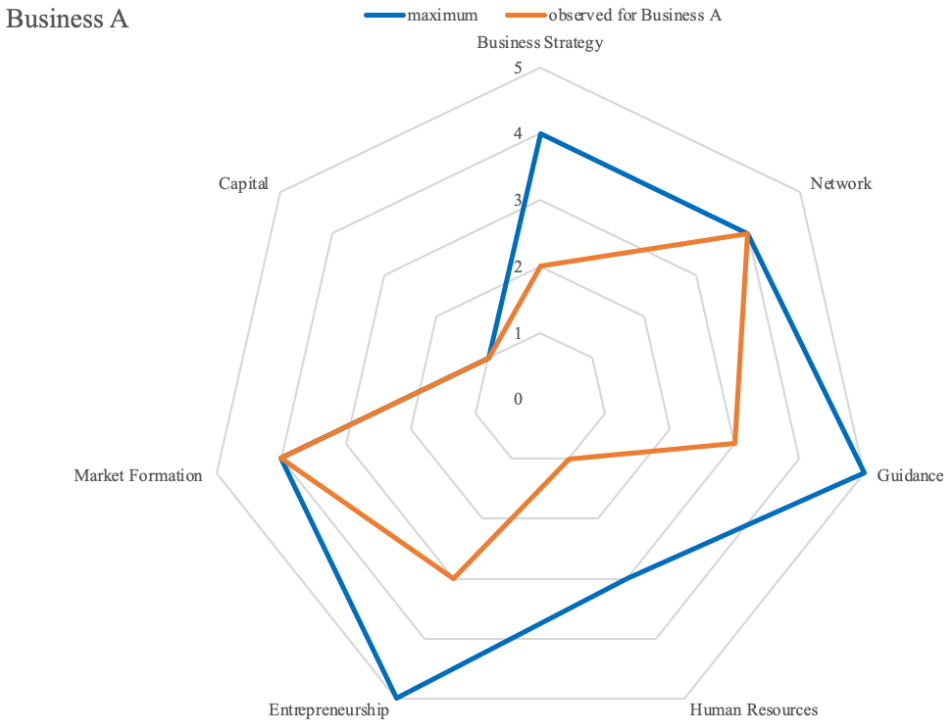

Figure 4. Radar Plot Business A

Business Strategy - ***Medium***

Regarding Business Strategy, business A stated that a thorough business plan may hurt rather than help the business, due to the restrictions in flexibility this would imply. This is interesting, since it directly rejects the findings of the literature research. According to business A, flexibility is important for creating a successful startup. The business does stress learning by doing, evaluating and adjusting the business endeavors continuously. This falls in line with the ideas behind the lean-startup strategy, as defined in chapter 3. Structural knowledge development through R&D projects and investments is also carried out, with the explicit exception of the use of patents; according to business A they have no novel patentable

product or technology to protect. This is also in conflict with the findings in literature, which emphasizes the importance of patenting to protect your business activities. Benefiting from active marketing was not mentioned by business A. This means that regarding business strategy, only two out of four of the aggregated indicators provided by the used business theories were affirmed.

Network - ***Strong***

Continuing with the category Network, business A stresses the importance of being part of a formal network. This falls in line with the findings in literature. A network can provide workplaces, interaction and feedback from other professionals, workshops and more, according to business A. Business A is part of a 'startup campus', which is a joint effort with large companies in the region, the main local university and startups. Cooperation with large companies is therefore seen as conducive to creating a successful SBCSU. Business A provides the advice that the first thing these types of startups must do is find startup programs to sign up for, because they relieve startups from organizing certain aspects and so startups can put more energy and resources into building up their business. All four indicators of Network are seen as important for business A.

Guidance - ***Medium***

Business A indicates that certain government policies did help the business develop, for instance tax incentives and special regulations giving small businesses financial aid in difficult periods (such as the current COVID-pandemic). Business A states that having a vision and the corresponding patience, is very important. Patience is highly stressed by the entrepreneur; he views it as the number one quality for a successful entrepreneur. As part of the startup campus the local university serves as a catalyst in the sense of Stam (2015). This means that the previous three affirmed indicators confirm findings in literature. However, contradictory to the findings in literature, the business gave no weight to the creation of legitimacy or support in society in the form of tolerance for business failure or otherwise. Therefore, the Guidance success factor shows affirmation for three out of five indicators.

Human Resources - ***Weak***

With respect to Human Resources Business A gives no importance to any of the indicators besides the presence of combined experience in all respects; industry-, management-, and entrepreneurship experience should be represented in the staff of the company. The entrepreneur mentioned that some variety in gender, age, background or education of the companies' employees may be valuable but is not present in the company as of now, thus it is not an indicator for a critical success factor. Therefore, this indicator is seen as unfulfilled. Furthermore, no mention was made of the importance of an advisory board in the business. Only one out of four indicators for Human Resources was found here.

Entrepreneurship – ***Medium***

According to business A, for an entrepreneur it is important to have a need for achievement, to be willing to take risks, though with appropriate caution. You have to be able to spread your risks, for instance by investing in more projects at one ("not putting all your eggs in one basket", as he explains it) and foresee some of the issues you will run into. This confirms and adds to the indicators found in literature. Furthermore, he repeatedly mentions the benefits of having experience in entrepreneurship and business. These findings confirm three of the indicators found in literature. There is no indication that being the locus of control is very important for the success of the SBCSU. This means that three out of four indicators for the preliminary success factor Entrepreneurship are present.

Market Formation - ***Strong***

Business A deals with customers from a variety of countries and customer segments. The company has a sufficiently large market for its business and is part of a niche market. This, of course, does not refer to the entire building sector, but to the trading of used building materials in a circular fashion. Primarily governments as well as a variety of companies are customers of Business A. Business A states that finding your first customer is the most important thing for a startup, more important than a business plan for instance. We can thus see that Business A shows positive affirmation on all four indicators of Market Formation.

Capital - ***Strong***

Business A had access to sufficient financial resources for the creation of the SCBSU, through personal capital and grants from incubators and winning contests for startup initiatives. Business A therefore affirms the sole indicator for Capital.

Additional findings

Three interesting findings that were deducted from the interview with business A were not covered in the literature findings of this study. The first is the importance of **having a long-term vision**. The entrepreneur is adamant that having a long-term vision is crucial for the building of a successful startup, because it is not unusual for this process to take a long time. Making profits may take years, so financial planning, patience and persistence should all be shaped with a long-term vision.

Another subject which should be named is the importance of a solid **business case**. A business case must not be confused with a business plan, which is much more elaborate. A business case is described as 'a situation where economic success is increased while performing in environmental and social issues' (Schaltegger, Ludeke-Freund and Hansen, 2012), which can be simply translated to the entrepreneurs' idea on how to make profits whilst serving social or environmental goals. Business A stresses that the business case must be solid. He relates this back to the use of experience; experience helps entrepreneurs evaluate what makes up a good business case and recognize business cases they come upon.

Related to this is another aspect he mentioned; according to Business A entrepreneurs must **combine a good business idea with something they are passionate about**. He states that merely the goal of making profits is not enough; more often than not entrepreneurs do not become rich from their business, so if the entrepreneur wants to run a SBCSU, their motivation must come from more than just the prospect of large profits.

5.2. Business B

5.2.1. Summary Business B

Business B was established in 2012 in North-Holland by an entrepreneur who considers himself inexperienced in entrepreneurship. The entrepreneur previously owned a foundation to raise awareness on e-waste, before establishing Business B. Business B charges customers (mainly companies) a small extra fee whenever they buy IT hardware and uses this fee to ensure collection and recycling of IT hardware on the African continent. The company means to ensure responsible recycling of IT materials in order to relieve stress on the environment and provide income for employees on the African continent.

5.2.2. Results Business B

A visual overview of the results is found in the radar plot in figure 4 below. We can see that, besides for Capital which only has one indicator, business B sees none of the preliminary success factors as strong contributors to the business success. Besides Capital, the maximum line on the radar plot (blue) is not reached or nearly reached by the grey line on any other preliminary success factor. Below we describe the results of business B in more depth.

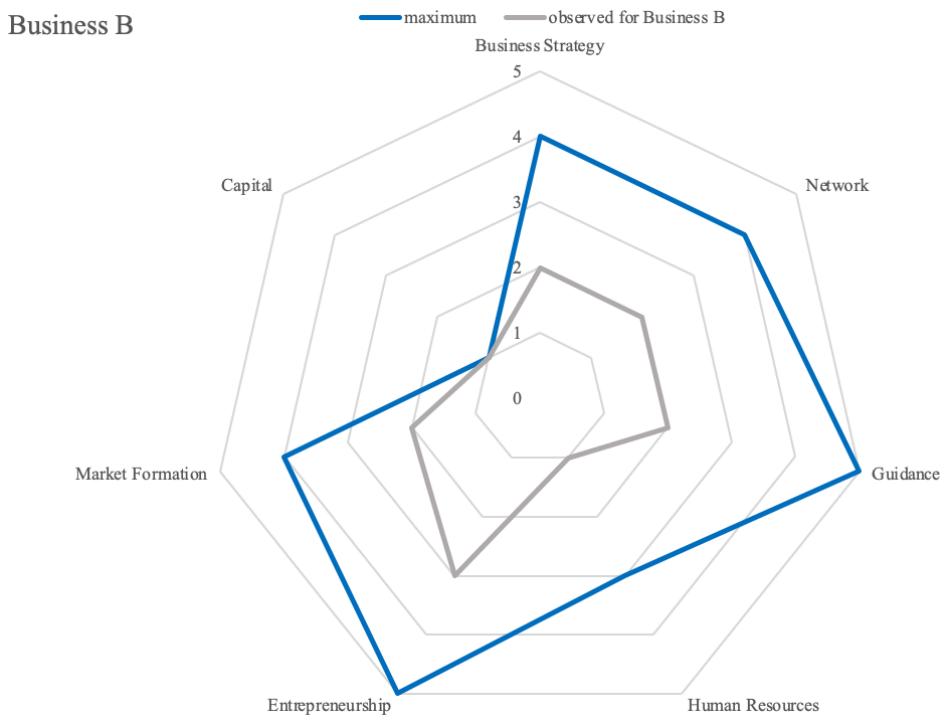

Figure 5. Radar Plot Business B

Business Strategy - ***Medium***

Starting again with Business Strategy, business B gives no importance to a well-developed business plan or structural knowledge development. This contradicts the findings in literature. The business did profit from active marketing in the form of profiles in professional magazines; the publicity provided the business with new customers and external business partners. The business also names media attention as a way for staff to feel validated and appreciated. Business B explicitly names the lean-startup strategy as an important success factor. As explained before, the lean-startup is an established learning and articulation process and therefore confirms the findings in literature. It can be seen that for business strategy two out of four indicators for business strategy are affirmed.

Network - ***Medium***

Regarding Network, business B responds with mixed answers to the indicators. Being part of a formal network is important for the business, but merely to find secondary partners: neither the members of the network nor the knowledge provided by the network are important but becoming aware of the professional partners of the members of the network is important for establishing new business relations. The business does not mention making use of collaboration with large companies with departments dedicated to supporting startups and specifically states not gaining advice or mentoring from any external parties.

Engagement with other professionals through conventions and workshops is considered as beneficial as it functions as a way to gain publicity for the company and find external partners to work with. For network business B affirms two out of four indicators.

Guidance - ***Medium***

For Guidance business B expresses no importance to external factors; it is firmly stated that searching for beneficial government policies and/or tax regimes takes too much time to find and apply for, and no mention is made of benefits provided by universities providing as startup catalysts or a societal culture stimulating or giving preference to entrepreneurial endeavors. Creation of legitimacy is seen as important and was done, amongst other things, through outings in conferences and media.

The necessity of a vision is also named by business B in order to structure the business activities and convey its message to the outside world. Business B affirms only two out of five indicators for Guidance.

Human Resources - ***Weak***

Like Guidance, Human Resources is also not something business B gives much weight to. No mention is made of necessary qualities of personnel or an advisory board, but business B does state that having combined experience in the industry, management and entrepreneurship available in the personnel is important. Therefore, only one out of three indicators for Human Resources is affirmed by business B.

Entrepreneurship - ***Medium***

Business B is quite clear that a need for achievement, willingness to take risks and having experience in the industry, management and entrepreneurship is very conducive to establishing the SBCSU. However, a relevant social network or being the locus of control were both not seen as success factors. Therefore the business affirms three out of five indicators of Entrepreneurship.

Market Formation - ***Medium***

Regarding Market Formation business B affirms that a sufficiently large market is needed for the business to be established, as well as the fact that the company is part of a niche market. The variety of customer types and their geographical ranges however are not seen as success factors by business B. For Market Formation two out of four indicators are affirmed.

Capital - ***Strong***

Capital was generated through investors and loans and is seen as a success factor by business B. The indicator for Capital is therefore affirmed.

Additional findings

An interesting finding from this interview is that the additional results from business A are repeated almost literally by business B. Business B stresses the importance of having a **long-term vision** with corresponding

financial stability and patience. On top of that business B states that the startup must be shaped by **doing something you like** combined with a **business case**.

5.3 Business C

5.3.1. Summary Business C

Business C was set up by two younger entrepreneurs who recently finished their University degree in BSc Textile Engineering in Germany. They both followed courses in management and had internships at large retail companies. The company was established in 2019 and offers an online platform, where users can rent clothing items for a finite period, after which the clothes are sent back and offered to the next users. The goal of Business C is to reduce textile waste and environmentally harmful clothing-production processes by turning shopping into renting. The company is focused on individual customers.

5.3.2. Results Business C

The radar plot for business C is quite different from the previous one. We see that Network and Capital both received maximum results, which is interpreted as them being success factors according to business C. Business Strategy receives a relatively high score, whereas Guidance, Market Formation and Entrepreneurship generated mediocre results. Human Resources is not seen as a success factor for business C at all, as is interpreted by the zero score in the radar plot. Further elaboration is provided below.

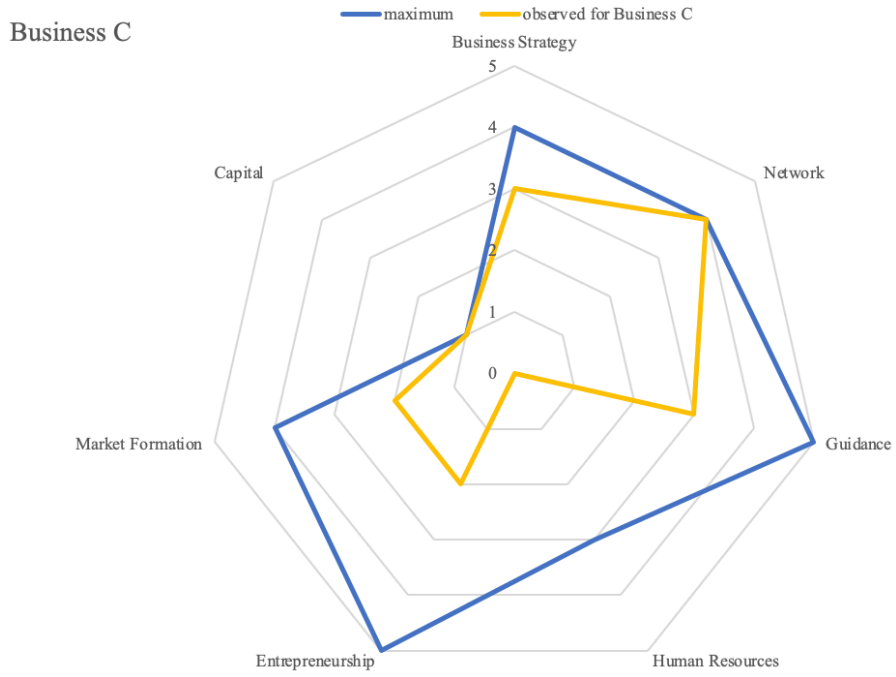

Figure 6. Radar Plot Business C

Business Strategy - ***Medium***

Business C gave quite some importance to Business Strategy. Though they stated that it would not be wise to make a thorough business plan since it would involve making a lot of guesses and planning of things that could not be made sure, all three other indicators were found valid. Using active marketing, having learning and articulation processes in place and constituting structural knowledge development were all found very important for establishing their SBCSU. Active marketing was mostly used to find new funding and learning and articulation processes were captivated in their lean-startup strategy. Three of the four indicators were affirmed for Business Strategy.

Network - ***Strong***

Network is even more validated as an important success factor. Through interviews with larger companies with more experience they gained many insights into running a successful business. The formal networks the business is part of provides a constant support system, so whenever the entrepreneurs are stuck or not sure how to proceed, they can find support from their professional peers and experts in their field. The network benefits involve professional advice, financial aid, business experience and visibility of the business to external partners and customers. For business B, all four of the indicators are affirmed for Network.

Guidance - ***Medium***

For Business C, not much emphasis is put on Guidance. The business states that no governmental policies or regulations are benefiting the company as of yet, and creation of legitimacy is not mentioned as an important factor. These findings both contradict the literature. However, articulating visions, the aid of university and cultural support are all three considered imperative for the business' success. Having a vision functions as a motivation for the entrepreneurs to continue, and they state that being able to clearly and convincingly convey this vision is crucial for finding new customers and partners. Business C states specifically they learned a lot from two role models who were further along in the business development. This means that three out of five indicators are affirmed for Guidance as a success factor.

Human Resources - ***Weak***

The two entrepreneurs have until this moment not employed anyone other than themselves, which results in the business not fulfilling any of the indicators for Human Resources. Thus, for business C Human Resources is not considered a critical success factor for this business.

Entrepreneurship - ***Medium***

Entrepreneurship raised less convincing results. According to business C a need for achievement and a willingness to take risks is very important to their business success. They state that risks will always be there, even risks the entrepreneur may not be aware of, but they must be prepared to deal with them. This confirms the theory. In contrast, having the locus of control is not mentioned specifically as contributing to the business' success and having experience as an entrepreneur and having a relevant social network is not considered important. Therefore, Entrepreneurship is affirmed by two out of five indicators.

Market Formation - ***Medium***

A sufficiently large market is considered important for the business success, and the business is also confirmed by the entrepreneurs as part of a niche market, the textile renting market. Both of these indicators are confirming literature findings. However, the business does not have a large variety of customers from different geographical ranges or businesses and governments as customers, they work with individual customers exclusively. Therefore, only two of the four indicators for Market Formation are affirmed by business C.

Capital - ***Strong***

Business C gained sufficient financial capital through crowdfunding and scholarships, thus the indicator for Capital is fulfilled. A visual overview of the results is found in the radar plot in figure 5 below.

Additional findings

Once again, we find similar results in the additional findings. Business C also states that a **long-term vision** is very important. Profits may not come quickly so it is important to take this into your planning. Furthermore, the entrepreneurs are very passionate about the prospect of a society which is more environmentally sustainable, which pushes them to work hard and stick to their business activities. So again, we see a combination of **passion and a business idea**.

5.4. Business D

5.4.1. Summary Business D

Business D was established by three acquaintances with different backgrounds; one an accomplished researcher who investigated sustainable business practices, one an entrepreneur in the sustainable food start-up industry and another a business man with experience in larger corporations. The company was established in 2016 and offers subscriptions to washing machines with a pay-per-use payment model. With this the company aims to keep washing machines in use for a longer time and simultaneously steer users toward more economical and environmentally friendly programs with their price differentiation per washing program. The business was built on the hope that the industry is turned to a circular system, so the ultimate goal of business D is to make profits in an environmentally sustainable way.

5.4.2. Results Business D

A visual overview of the results is found in the radar plot in figure 6 below. We see that besides the singular indicator for Capital none of the preliminary success factors received a maximum score, however Business Strategy, Network, Human Resources and Entrepreneurship all receive a relatively high score. Guidance and Market Formation generated mediocre results. Below each of the preliminary success factors the results for business D will be clarified.

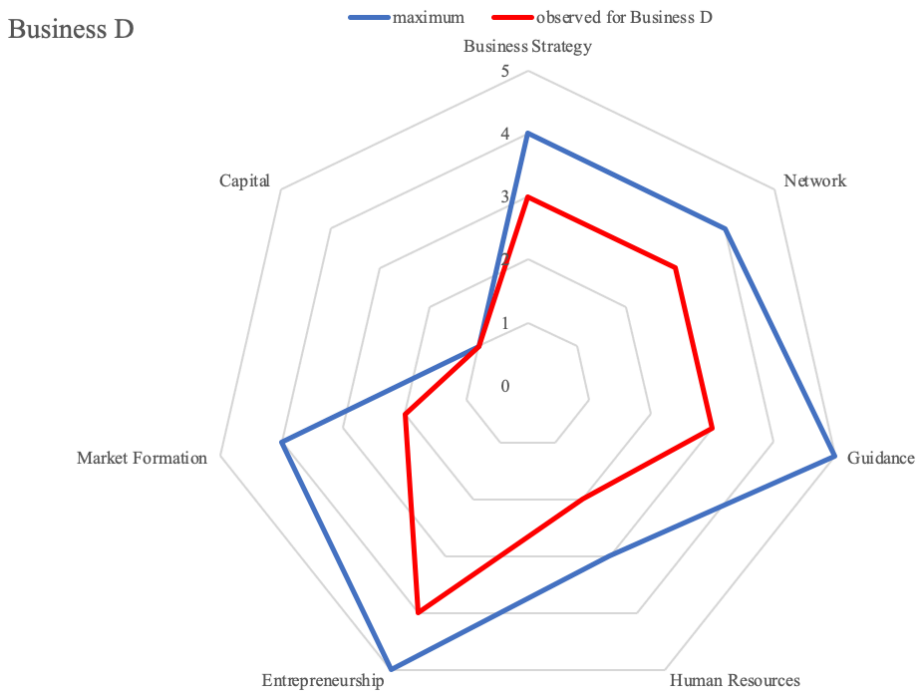

Figure 7. Radar Plot Business D

Business Strategy - ***Medium***

Business Strategy is relatively important for business success according to Business D. Similar to the previous businesses, a thorough business plan is seen as a negative influence on the business. Furthermore, active marketing benefited the business in gaining more customers and external business partners. Business D is a big proponent of the lean-startup method, it calls this one of business' 'three main success factors'. Being able to learn and adapt as you go, constantly evaluating and improving the business is seen as very positive. Again, this is seen as learning and articulation processes in place and therefore confirms to the literature. Business D also has structural knowledge development in place in the form of research and

development. An interesting fact is that they report on their business results and publish scientific articles, which then helps build credibility and trust. The business states that they have been able to get loans from the bank because they had scientific evidence that their business was viable. It can thus be seen that three out of four indicators for Business Strategy are affirmed.

Network - ***Medium***

Being part of a formal network is important for the success of the business, according to business D. Support systems were applicable; the business had help from the local university to do a trial run, gain access to some university grants and office space. Furthermore, engagement was named as important for the success of the business, workshops and conferences helped attracting attention and collecting advice. Only the help of large companies with sections dedicated to helping startups were not applicable to this business. Three out of the four indicators were affirmed here.

Guidance - ***Medium***

Business D puts a fairly big emphasis on Guidance as a successfactor. Government policies such as the government providing surety for medium- small businesses was named as extremely important for the business endeavors. Here the government takes on the responsibilities of paying back bank loans if a company should fail. This meant that banks would risk nothing by providing loans to businesses like business D. The creation of legitimacy through publishing scientific reports of the business activities was seen as important as well, and therefore also confirms what was found in literature. The importance of articulating the vision or goals of the business was stressed by business D. It is highly important that people understand what the company is trying to accomplish in order to gain customers as well as business partners. As mentioned before, the local university functioned as a catalyst for the business in the sense that it provided the entrepreneurs with financial grants and office space. Business D did not mention the influence of cultural support or tolerance for entrepreneurship. For Guidance four out of five indicators were affirmed.

Human Resources - ***Medium***

Though the business does not mention having an advisory board, unlike the other businesses it does employ a variety of educational levels in their personnel, as well as people with varying backgrounds, nationalities, genders and ages, which they believe to be an asset to the firm. This means two of the three indicators were affirmed for Human Resources.

Entrepreneurship - ***Strong***

Regarding Entrepreneurship business D is convinced that four indicators, namely the need for achievement, having the locus of control, having willingness to take risks and having industry-, entrepreneurship- and management experience are all important for the business' success, and did not elaborate on this. The need for a relevant social network was not seen as beneficial to the business, and therefore contradict the indicator

found in literature. In conclusion, four out of five indicators were affirmed for Entrepreneurship, which is a relatively high score.

Market Formation - ***Medium***

The company does state it has a sufficiently large market for the business activities. In a trial run of the business more than triple the expected amount of customers wanted to participate, and this was characteristic of the further business developments. Business D does not have customers from a variety of customer segments and geographical ranges, nor does it have governments as a customer, and therefore cannot confirm these findings from literature. The business mainly focuses on individual customers and some business customers. The company does state it is part of a niche market. It can be seen that Market Formation is affirmed by two of the four indicators.

Capital - ***Strong***

Capital for Business D is generated through university grants and government policies as well as bank loans and private investors. Business D calls the organization of finances as another one of it's three main success factors. The surety provided by the government played a prominent role in the gathering of funds for the business. Business D may have had a larger initial financial burden since the business dealt in leasing out expensive home appliances, washing machines. Where other service-based startups may have relatively low initial expenses (think of the platform for reuse of building materials of business A) business D must invest a large amount initially, and deals with a long pay-back period, since the return of investment is paid in monthly fees. This larger challenge could explain why business D put much more emphasis on the finding of funding than the previous companies had. In conclusion, the indicator for Capital is affirmed.

Additional findings

Business D mentions as an additional finding that persistence and a **long-term vision** are important assets for the success of their business. Added to that they state that setting up the logistical process for their business is the last of the three main success factors for their business. They state that, because the business needs to not only deliver and install washing machines, but also take them back in a safe way in order to be able to restore them and reuse them for another customer. This requires specific logistic processes which not traditional transportation parties are not accustomed to handle. Therefore, according to business D, **logistics** is a highly important success factor.

5.5. Business E

5.5.1. Summary Business E

Business E was established in 2014 and was founded by three entrepreneurs. The three founders have combined experience in business, entrepreneurship and innovation. Business E offers household appliances as a subscription with a set monthly fee. The company offers products such as coffee machines, laundry machines, dishwashers and mattresses as a subscription. The goal is to reduce product waste by ensuring reuse, repair and recycling of products when they are returned to the company, whilst also making profits.

5.5.2. Results Business E

The radar plot for business E is quite mixed. As for all the businesses, Capital receives a full score. Furthermore Business Strategy, Entrepreneurship and Market Formation all score high according to business E. Network and Guidance receive mediocre scores, and Human Resources scores zero. Again this is interpreted as a factor which does not contribute to the business success according to business E. The results will be further explained below.

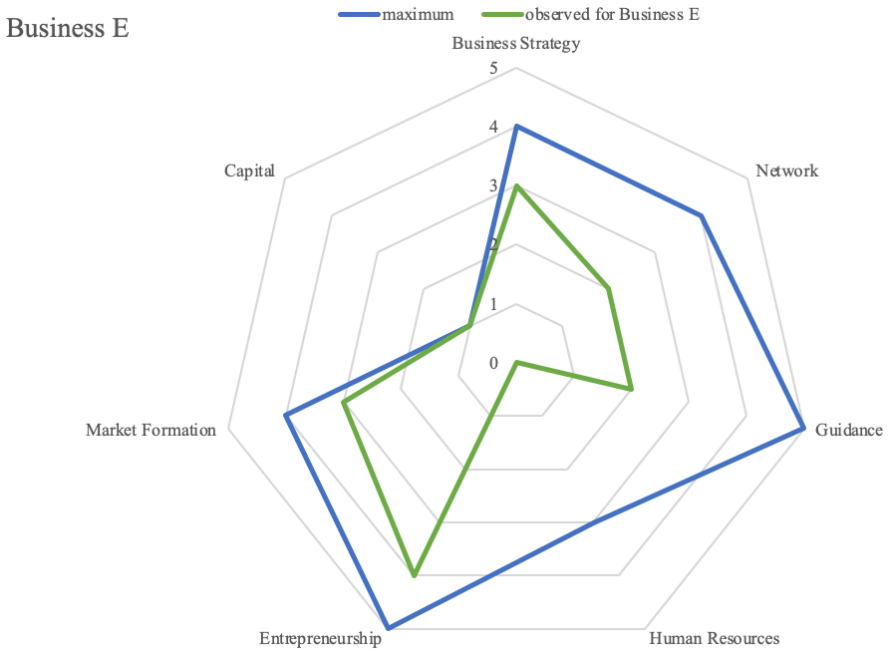

Figure 8. Radar Plot Business E

Business Strategy - ***Medium***

Similar to the other cases, business E sees no use in having a thorough business plan. It is viewed as a waste of time and resources and to decrease the flexibility a startup needs to become successful. The other three indicators are affirmed by Business E. Especially active marketing has brought more customers and external partners. This means three of the four indicators of Business Strategy were affirmed.

Network - ***Medium***

Regarding Network, Business E does find it important to be part of a formal network, and the workshops and conferences that can be accessed through this network are useful as well. Being part of these networks is a way to convey an image of sustainability for the business, which is used to create a larger customer base. The company did not make use of large companies with startup development departments or other types of support systems. For Network two of the four indicators are checked.

Guidance - ***Weak***

Business E states that articulating a vision and expectations, in this case regarding sustainability, is helpful since it attracts more customers. However this is the only indicator of Guidance business E affirms, the other four are not seen as contributing to the business' success.

Human Resources - ***Weak***

Business E also does not pay special attention to creating a varied staff regarding education, expertise or background. The only thing Business E mentions is that, since they focus on providing a service, many women of applied-sciences level are hired since the entrepreneurs' view is that women are better at service tasks and higher level academics tend to get bored with recurring tasks. The business mentioned no use of an advisory board and therefore none of the three indicators for Human Resources are affirmed.

Entrepreneurship - ***Strong***

Entrepreneurship is considered more important by Business E. A need for achievement, being true managers who have control over the team, being willing to take risks and having entrepreneurial-, industry- and management experience are all considered important to the business' success. The social network of the entrepreneurs is not seen as conducive however. Therefore, four of the five indicators for entrepreneurship are affirmed.

Market Formation - ***Weak***

Regarding Market Formation, business E is relatively clear on its usefulness. The business does not have the government as a customer and does not have governments as a customer, but it does serve a variety of customer segments through their scala of different products. The company also sees being part of a niche market as conducive to their success. About this the entrepreneur states that of course, evolving the niche into the dominant market sector would also mean a victory to some extent since it means that the market was overthrown in favor of sustainable business practices. However, for business E it is now better to be part of a niche market thus being one of the first and only in its sector in order to have a market advantage. For Market Formation three of the four indicators are affirmed.

Capital - ***Strong***

Capital for the business was collected through bank loans and private investors, and therefore the indicator for capital was fulfilled. Like business D, business E had large initial investments and needed bank loans and private investors to raise funding. Business E describes this as quite a challenge, but since it did manage to find the funding the indicator for capital is affirmed.

Additional findings

Business E gives a lot of attention to the necessity of a strong **business case**. The profit margins need to be right in order to make the business successful. Furthermore, the **logistics** also need to be organized for the business. Similar to business D, business E delivers, installs, retrieves and refurbishes home appliances, which according to them requires sophisticated transport services. Moreover, business E also states that a persistence, 'guts' and a **long-term vision** are important for the business to succeed.

5.6 Synthesis of Results

5.6.1. Aggregated indicators

The results from section 5.1-5.5 were combined and contrasted in the current section. Table 7 below shows all combined results of each indicator per business, with the exception of the additional results. It can be seen that though none of the preliminary success factors are unanimously fully affirmed by all businesses through all indicators, some of the indicators have been affirmed or rejected by all businesses. It would be interesting to look closer and these indicators to see what contributed to the success of these SCBSUs.

Table 7. Results of Business A-E

Success Factors	**Indicators**	**Business**					**Score**
		A	**B**	**C**	**D**	**E**	
Business Strategy	1. Having a thorough business plan.	0	0	0	0	0	0%
	2. Using active marketing.	0	1	1	1	1	
	3. Having learning and articulation processes in place in various dimensions, e.g. technical design, market demand and user preferences, infrastructure requirements, organizational issues.	1	1	1	1	1	100%

	4. Organizing structural knowledge development through R&D Projects, patents and investments in R&D.	1	0	1	1	1	
Network	1. Being part of a formal network.	1	1	1	1	1	100%
	2. Cooperating with large companies which have specific departments and programs to encourage high-growth start-ups.	1	0	1	0	0	
	3. Making use of support systems e.g. incubators/accelerators.	1	0	1	1	0	
	4. Making use of engagement opportunities e.g. workshops, conferences and competitions.	1	1	1	1	1	100%
Guidance	1. Making use of governmental policies and/or regulatory opportunities e.g. tax incentives, business-friendly legislation/policies.	1	0	0	0	0	
	2. Actively creating legitimacy/credibility for the business.	0	1	0	1	0	
	3. Articulating (and adjusting) expectations or visions, which provide guidance to the innovation activities, and aim to attract attention and funding from external actors.	1	1	1	1	1	100%
	4. Having help from universities functioning as catalysts e.g. Providing grants, office space, guidance and employees.	1	0	1	1	0	
	5. Having cultural support e.g. Making use of role models or benefiting from societal tolerance for risk and failure, research culture, positive image of entrepreneurship and celebration of innovation.	0	0	1	0	0	

Human Resources	1. Employing people from all educational levels in all sectors and areas of expertise.	0	0	0	1	0	
	2. Having personnel with combined management talent, technical talent and entrepreneurial company experience.	1	1	0	1	0	
	3. Having an advisory board.	0	0	0	0	0	
Entrepreneurship	1.The entrepreneur(s) feeling a need for achievement.	1	1	1	1	1	100%
	2. The entrepreneur(s) having the locus of control.	0	0	0	1	1	
	3. The entrepreneur(s) being willing to take risks.	1	1	1	1	1	100%
	4. The entrepreneur(s) having (combined) experience as entrepreneur, industry specific experience, management experience.	1	1	0	1	1	
	5. The entrepreneur(s) having a relevant social network.	0	0	0	0	0	0%
Market Formation	1. Having a sufficiently large market for the business activities.	1	1	1	1	1	100%
	2. Having a varied customer base from a variety of customer segments and geographical ranges.	1	0	0	0	1	
	3. Having large, medium and small companies and governments are customers.	1	0	0	0	0	
	4. Being a part of a niche market.	1	1	1	1	1	100%
Capital	1. Having sufficient financial resources through personal capital, investors, grants, loans and/or prize money.	1	1	1	1	1	100%

From the results of the combined case studies another radar plot was made to see whether any of the preliminary success factors receive similar results from all businesses. This could provide insights on success factors for SBCSUs. However, when we look at the radar plot, besides Capital, none of the PSFs receive similar results by all businesses.

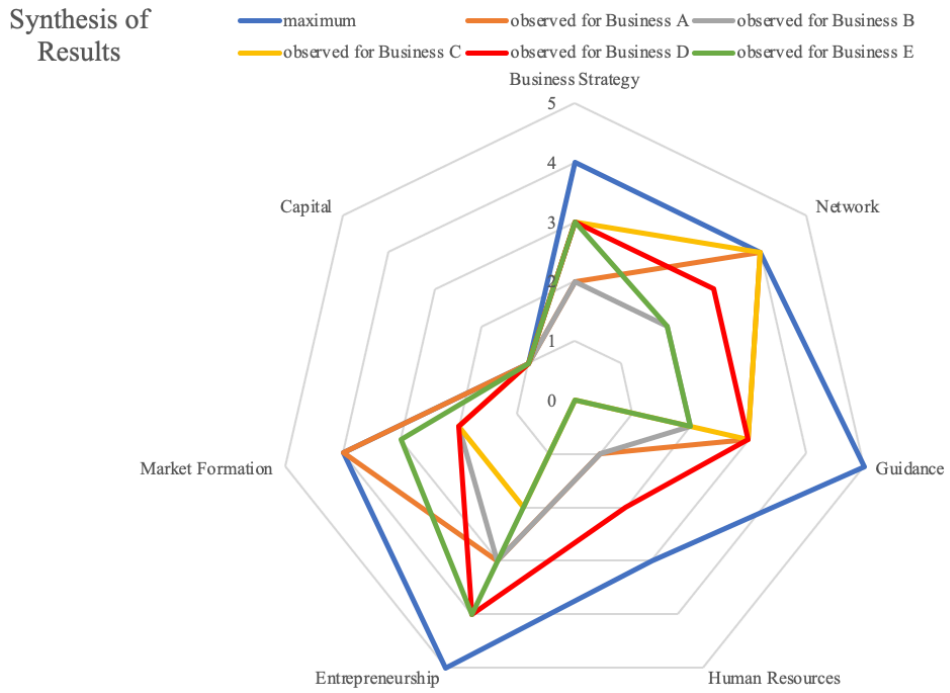

Figure 9. Radar Plot Synthesis of Results

It can be seen right away that all businesses fulfill the Capital indicator, and that there is relative weight given to Network and Entrepreneurship. To give a clearer view on the results, table 8 was created with numerated codes for the relative scores of the PSFs. As explained in the methodology, the created scoring system was used to give each of the PSFs and strong, medium or weak score, per business. These scores can be found below in table 8. In order to create a score for the combined businesses, each score was numerated. This is done as follows: each score is given a corresponding number, weak=0, medium=50, strong=100. These scores are added per success factor and an average is calculated. This average is then labeled with the following scores:

0-20 = weak,

21-39 = weak/medium,

40-60 = medium,

61-79 = medium/strong

80-100 = strong

The outcome of these combined scores can be found in the rightest column of table 8.

Table 8. Aggregated Scoring of Success Factors

Success Factor	A	B	C	D	E	Combined
Business Strategy	Medium	Medium	Medium	Medium	Medium	**Medium**
Network	Strong	Medium	Strong	Medium	Medium	**Medium/Strong**
Guidance	Medium	Medium	Medium	Medium	Weak	**Medium/Weak**
Human Resources	Weak	Weak	Weak	Medium	Weak	**Weak**
Entrepreneurship	Medium	Medium	Medium	Strong	Strong	**Medium/Strong**
Market Formation	Strong	Medium	Medium	Medium	Weak	**Medium**
Capital	Strong	Strong	Strong	Strong	Strong	**Strong**

From the scores for all five cases, regarding the success factors only Capital -which has just one indicator- can be categorized as strong.

Categorically none of the other success factors have an overall strong score. Network and Entrepreneurship both have a medium/strong score, which likely makes these factors more important for the pursuit of the TBL than other factors, however little can be derived from these findings. However, some of the indicators were affirmed by all businesses so these may be worth noting. It can be seen that for Network indicator *1. Being part of a formal network and indicator* and *4. Making use of engagement opportunities eg. workshops, conferences and competitions* both were affirmed by all five businesses as important for the business' success. For Entrepreneurship indicator *1. The entrepreneur(s) feeling a need for achievement* as well as indicator *3. The entrepreneur(s) being willing to take risks* were both affirmed by all five businesses as well. This may indicate that these four indicators could be especially important for SBCSUs in pursuit of the TBL.

Some indicators from the Medium-scoring success factors have been affirmed by all five businesses as contributing to their success. These indicators are: *1. Having learning and articulation processes in place in various dimensions, e.g. technical design, market demand and user preferences, infrastructure requirements, organizational issues; 2. Articulating (and adjusting) expectations or visions, which provide guidance to the innovation activities, and aim to attract attention and funding from external actors; 3. Having a sufficiently large market for the business activities;* and *4. Being a part of a niche market.* This may indicate that these additional four indicators could also be important for the success of SBCSUs.
It can be noted that Human Resources receives a low score. Indicator *3. Having an advisory board* is not mentioned as being conducive to the business' success by any of the businesses in this study, which may mean that an advisory board is not important or relevant for SBCSUs.

Another aspect all businesses agreed on is that having a thorough business plan does not benefit the business success. On the contrary, all businesses explicitly speak of a negative effect of a thorough business plan. These business plans would either be a waste of time or impair the flexibility needed to conduct a successful business according to the interviews.

5.6.2. Additional success factors

The four additional findings that were present in multiple case studies are summarized in this section. All five businesses view a **long-term vision** as a necessity. This concept is related to financial planning, persistence and patience in the results of the case studies.

Three businesses also specifically state that the **business case** must be solid. This is quite a straight-forward finding, logically in order to be successful the business needs to have a plan on how to make profits whilst serving their goals. However, the fact that these entrepreneurs repeatedly mention this notion justifies further future research. Possibly the fact that many startup plans fail is related to a faulty business case.

Furthermore, several entrepreneurs state that combining their **passion with a good business idea** resulted in the success of their business. This is quite a broad result but it can justify more research into the relationship between business success and the motivation behind entrepreneurial endeavors.

Lastly **logistics** was named by two business as an important contributor to their success. This was specifically relevant for the two business that needed to perform installations and repairs on home appliances, which is characteristic for a specific type of SBCSU. This finding could justify further research intro logistical barriers for SBCSU with similar business activities.

7. Discussion

7.1. Limitations

When looking at the validity of the conclusions, we assess whether the conclusions are direct consequences of the findings in the study, or whether they may have been caused by other factors that were not considered. The current study was guided by but not limited to a theoretical framework. This ensured that the results could also show different findings that were not foreseen in the theory and aimed to enhance the validity of the results. The scope of subjects that could explain the success of SBCSUs was therefore wide and allowed for a large set of possible success factors. The fact that the study revolved around five case studies with variety amongst their business activities was aimed to enhance validity of conclusions since it could be seen that the conclusions represented more than a sole business, but a category of businesses. However, to truly be able to produce generalized conclusion a larger number of cases must me examined. The number of SBCSUs in the Netherlands is limited and startups generally have little time or personnel to delegate towards helping researchers through interviews or surveys. Therefore, finding a large enough number of SBCSUs to ensure high validity of results, taking scheduling, data collection and analysis into account, would be a highly time-consuming task. Furthermore, it would go far beyond the time available for the current study.

The reliability of the conclusions is concerned whether the repeated conduction of this study is possible and would arrive at similar results. Naturally, because the study was qualitative by nature and the results have been interpreted, some level of subjectivity is present due to my personal interpretations. This may negatively influence the repeatability of this research. To diminish this influence, I made an effort to become aware of my biases as much as possible in order to eliminate them whilst analyzing the results. Furthermore the research was based on views of entrepreneurs on the success of their business. The study revolves to the greatest extent around their views and opinions of the reasons for their business success. Scientific data to confirm, deny or expand the claims made by the subjects was extremely limited. It may well be possible that their business' success was determined by more or other factors than they thought to provide or were able to see and are therefore not included in the final list of hypotheses. To provide an example, the entrepreneurs of the current studies were predominantly middle-aged white males of Dutch nationality. Studies have been done on the influence of gender on entrepreneurship and found that entrepreneurial intentions are positively related to identification with male gender characteristics (Gupta, Turban, Wasti and Sikdar, 2009). In order to know whether gender, nationalities or other personal qualities of the entrepreneur function as a critical success factor, more research must be done; it cannot be determined solely from the opinions of the entrepreneurs in question. Again, this is just one example. This reduces the

reliability of the conclusions. However, this was aimed to counteract through the use of a multiple-case study, which expanded the variety in perspectives.

7.2. Research during a pandemic

Unfortunately, the collection of data of the current research ran directly parallel with the timeframe where a global pandemic hit the Netherlands. The pandemic caused uncertainty, stress and large societal changes in the whole country.

According to the responses in my search for participants in this multiple-case study, SBCSUs generally had no time or personnel to dedicate to research during these hectic months. It took several months and a large number of repeated requests for participants to come to the final five participants in the interviews. Surveys that were created for this study in order to create a larger database and more general results, resulted in two responses. The surveys were repeatedly sent to many SBCSUs, but most of them did not respond, and those that did responded that they could not participate due to lack of staff and/or time during the pandemic. Because the two surveys could not provide an added value to the study they were discarded from the research. It is believed that, were it not for the pandemic, the research could have provided a larger database and possibly more generalized results.

7.3. Theoretical implications

The results of the multiple-case study on critical success factors for SBCSUs showed significant contrasts with the literature research. The literature on TIS, MLP, SNM, SEE and the literature on business success provided a list of preliminary success factors which were used to guide interviews with a sample selection of SBCSUs, to see to what extent these PSFs aligned with the reality for these businesses. It was also investigated whether any hypothetical success factors could be drawn for SBCSUs on the whole.

The results showed only one of the PSFs, Capital, was seen by all businesses as a critical success factor. However, this must be taken with a grain of salt. First of all, the case sample selection was made based on a set of criteria, one of which was that the business was able to make profit. The businesses were selected on the base of available documentation on their financial status, which showed that all businesses were financially viable. Furthermore, it is unlikely that a business is able to make profits if it was not able to gather sufficient funds to run the business. Therefore, one could say this result is hardly novel. The first hypothesis can be drawn however: *Having sufficient financial resources through personal capital, investors, grants, loans and/or prize money is a critical success factor for SBCSUs.* Because there is significant variation in the type of business activities, the businesses expressed different levels of challenges they encountered whilst looking for business funding. Some businesses stated that they needed little funds

because they delivered a service, and whose main investment was setting up a technological platform. For these businesses finding a loan or crowdfunding was sufficient to set up the business. However, two businesses stated that finding sufficient capital was a significant challenge. These businesses both dealt with the leasing service of home-appliances. Both these businesses had a considerable initial investment to make in order to procure the appliances. Because of the novelty of this type of service and the long period of return on the investments, banks were hesitant in providing loans. Finding sufficient funding may thus be a true barrier for a SBCSU of this type. In a future CE more similar types of businesses may have to be developed to ensure the reuse of home appliances, so further research or regulations to lighten this burden may be needed.

Furthermore, we see that none of the PSFs receives unanimous responses, which is a result on itself. From comparing SBCSUs with the popular strands of literature we find that SBCSUs have significantly different critical success factors. The different businesses characteristics and operations of this novel type of business require more research in order to find what constitutes a critical success factor for SBCSUs. It may even be possible that due to the fact that business activities amongst SBCSUs can still vary a lot, no other common critical success factors exist, and then more detailed research into categories of SBCSUs would be useful.

Some indicators of the PSFs were affirmed by all the businesses, as stated above, which could provide a starting ground for further research. Below these findings have been added to a list of hypotheses in order to create a quick oversight. The hypotheses based on the indicators of the PSFs run from number 2 until 10.

Table 9. Generated Hypotheses on SBCSU success

Hypotheses
1. Having sufficient financial resources through personal capital, investors, grants, loans and/or prize money is important for the success of SBCSUs.
2. Being part of a formal network is a critical success factor for SBCSUs in pursuit of the TBL as it may provide knowledge, an expanded customer base, external partners and/or resources for the business.
3. Engagement opportunities such as workshops, conferences and competitions are highly conducive to the success of SBCSUs.
4. Enforcing a lean-startup strategy is an effective way of implementing learning and articulation processes which contribute to the success of SBCSUs.

5. Actors with plans to set up an SBCSUs should feel a need for achievement and be willing to take risks in order to be successful in their ambitions.
6. The articulation (and adjustment) of visions for the business is a critical success factor for SBCSUs.
7. Having a sufficiently large market for the business activities is a critical success factor for SBCSUs.
8. Being part of a niche market contributes to the success of SBCSUs.
9. A thorough business plan has a negative influence on the success of SBCSUs for it is time-consuming and reduces flexibility in business procedures.
10. An advisory board is not necessary for the successful working of SBCSUs.

Besides research guided by this list of hypotheses, it is also recommended to put further research efforts towards the additional findings of this study. When the interviewees were asked the blank question of what they believed to be critical success factors for their business, remarkable correspondence in the responses was found. Creating and maintaining a long-term vision for the business, ensuring a viable business case, combining your passion with a business idea and setting up appropriate logistics were all named repeatedly without any further steering by the question or PSFs. These ideas were not found in the literature for this study and therefore require further investigation.

7. Conclusions

This study revolved around the question *What are critical success factors of service-based circular startups?* The aim of this study was to find hypotheses related to this question, which could guide further research into success factors for SBCSUs. The research framework was formed by several strands of literature on business analyses which provided preliminary success factors. These success factors guided a multiple-case study conducted with five businesses, which investigated what entrepreneurs believed to be the reasons for the success of their business. From this multiple-case study findings were categorized, analyzed and a list of hypotheses was deducted. It was found that besides having sufficient (financial) capital, none of the preliminary success factors were unanimously confirmed by the SBCSUs in this study. This illustrates the size of the knowledge gap for success factors for SBCSUs; very little is known in dominant strands of business literature on the success of this type of business.

If there is one thing to take away from this study, it is that the success of service-based circular startups is not determined by the same success factors as those currently known in business literature. Most startups fail, and in order to make sure SBCSUs do not, knowledge needs to be developed on the causality of their success. This way, new entrepreneurs can shape their business efforts and set up successful SBCSUs and together make steps towards the envisions Circular Economy.

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