A STUDY ON CIRCULAR ECONOMY TRANSITION IN THE FASHION INDUSTRY THROUGH BUSINESS MODEL INNOVATION

by

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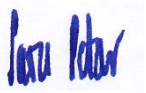

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DEDICATION

I DEDICATE MY DISSERTATION WORK TO MY FAMILY. SPECIAL GRATITUDE TO MY LOVING WIFE FOR HER ENDLESS SUPPORT AND MOTIVATION. IT WOULD NOT BE POSSIBLE TO SAIL THROUGH THIS RESEARCH JOURNEY WITHOUT HER.

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To the most important person in my life - my wife, Shalini Agrawal, who has always supported me in everything during my life journey. Her unconditional love and passion have given me the energy to strive to live a better day than yesterday. GOD has given me the most treasured gift in my life – my son, Snithik Agrawal. This dissertation is for you and your passion for caring for Mother Nature. I am sure that one day you will take this journey forward and make this world a better place to live and prosper.

To my wonderful parents, who offered me the best education and living conditions when I was young. To my sisters – Priyanka and Payal, who keep cheering for me on completing my research milestones successfully.

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ABSTRACT

A STUDY ON CIRCULAR ECONOMY TRANSITION IN THE FASHION INDUSTRY THROUGH BUSINESS MODEL INNOVATION

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This study examines the role of circular startups in supporting the circular economy (CE) transition in the fashion industry through their innovative business models (BMs). CE has emerged as a potential alternative model to the current linear fashion. The literature on business model innovation (BMI) has focused on key stages of the BMI process, its implications, and challenges but lacks in defining a strategic framework required to construct and extend the CE network among the key supply chain players.

This research study is based on a qualitative research method, utilizing a combination of individual interviews with the startups and survey questionnaires of the fashion value chain stakeholders. This approach allows for a comprehensive exploration of how these startups create and deliver value, emphasizing the development of unique product biographies essential in building business value propositions for their clients. Further contributing to the academic and practical understanding of circular business

models (CBMs), the study explains the critical elements required to redefine BMs to support CE transition. The study presents a structured framework that articulates clear strategies for developing and expanding CE networks, facilitating synergistic collaborations between startups and established firms.

The research found that CE-based startups in the fashion industry operationalize value creation and delivery within the seven elements of the BMI dimensions. Furthermore, the research findings highlight the efficacy of distinct networking strategies (Push, Pull, and Synced) followed by the startups in fostering and expanding CE-centric collaborations with established industry players. This strategic networking enhances the scalability of CE practices and integrates incumbent firms into the CE, marking a significant step toward sustainable fashion evolution.

The research findings have valuable suggestions for existing fashion companies and entrants planning to collaborate with value chain players in developing and executing CBMs to support CE transition. Moreover, the networking strategies can offer actionable insights for practitioners seeking to navigate the complexities of sustainable transformation and can significantly boost the overall circularity goals. The policymakers could also use the insights to understand the long-term business potential of circular startups and support them in scaling up by enhancing market demand for their products and services.

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LIST OF ABBREVIATIONS

Abbreviation	Description
CE	Circular Economy
BMs	Business Models
BMI	Business Model Innovation
CBM	Circular Business Model
CBMI	Circular Business Model Innovation
B2B	Business-to-Business
B2B2C	Business-to-Business-to-Customer
GCA	Global Change Award
T2T	Textiles to Textiles
CF	Circular Fashion
ROI	Return on Investment
PPP	Public-Private Partnership
IoT	Internet of Things
AI	Artificial Intelligence
LCA	Life-cycle Assessment
IS	Industrial Symbiosis
PSS	Product-service System
SME	Small- and Medium-sized Enterprise

CHAPTER I:
INTRODUCTION

1.1 Introduction

The fashion industry is one of the largest and most polluting industries worldwide, on account of which its long-term sustainability is under serious threat from various socio-economic and environmental factors (Ellen MacArthur Foundation, 2017; Mishra, Jain, and Malhotra, 2020). The current linear (take, make, waste) way of living is having an adverse impact on the economy, the planet, and people as it mainly focuses on 'volume over value' (Bocken, Kraaijenhagen, Konietzko, Baldassarre, Brown, and Schuit, 2021; Ellen MacArthur Foundation, 2017). Linear fashion is accountable for 1.2 billion tons of greenhouse emissions and 20% of industrial water pollution annually (Ellen MacArthur Foundation, 2017).

The circular economy (CE) is a way forward as it is restorative and regenerative by design while benefiting economies, society, and the environment (Ellen MacArthur Foundation, 2017). The CE is nature’s equivalent of ‘living within your means’ as it’s risky to live beyond your economic and planetary boundaries (Circle Economy, 2022). The CE addresses the underlying cause of major global issues including climate change, biodiversity loss, and pollution while generating enhanced opportunities for growth (Ellen MacArthur Foundation, 2020b). For the fashion industry, a CE means “ensuring that products (apparel, footwear, accessories) are kept at their highest value as long as

possible, eliminate waste and pollution, and regenerate natural resources" (Ellen MacArthur Foundation, 2017).

However, for many companies, transitioning to a CE from the currently prevalent system remains a key challenge since it requires systemic change across the fashion value chain including collaboration among industry actors, large-scale closed-loop innovations, transparency, and traceability (Ellen MacArthur Foundation, 2020b; Mishra et al., 2020). Path-breaking innovations and disruptive business models (BMs) are essential to tackle current challenges and transition toward circular business models (Antikainen & Valkokari, 2016). To transition to CE, companies need to rethink and redesign their BMs in line with closed-loop principles to find more efficient ways for value proposition, value creation and delivery, and value capture while simultaneously considering environmental impact and social factors (N. Bocken et al., 2021; Ostermann et al., 2019; Suchek et al., 2021).

Business model innovation (BMI) can lead to the necessary changes in companies' actions toward value creation among environmental, social, and ecological spheres (Ostermann et al., 2019). Groundbreaking innovations and disruptive business models are necessary to address the existing challenges and move toward CE-based businesses (Antikainen & Valkokari, 2016). The transition towards circular BMI should combine elements from "macro (global trends and drivers), meso (eco-system and value co-creation), and micro (company, customers, and consumers) levels" (Antikainen & Valkokari, 2016).

Potential fashion startups based on the circular business model (CBM) can effectively respond to existing unsustainable trends by playing a key role in defining meaningful strategies for closed-loop production and shifting toward sustainability (N. Bocken et al., 2021). These startups can be instrumental in driving CE transformation across the entire fashion value chain by collaborating with other players in the fashion industry (Ostermann et al., 2019).

Moreover, CE-based startups can influence established companies in the fashion industry willing to increase the extent of circularity in their business by providing specific knowledge about technology or processes essential to developing circular solutions in their existing business models. These startups can further engage with incumbent companies in a joint venture to deliver a CE proposition or service to the target audience (Bauwens et al., 2020).

From the previous research, it is understood that the earlier studies were primarily focused on the role of CE as an alternative to the traditional linear model and on identifying key drivers, barriers, and opportunities in BMs to drive the adoption of the CE approach in the fashion industry (Jia et al., 2020; Mishra et al., 2020; Todeschini et al., 2017). Thus far, research has focused on the CE approaches adopted by large organizations mainly due to higher visibility and leadership positions in their respective market (N. M. Bocken et al., 2017; Frishammar & Parida, 2019; Urbinati et al., 2017). Limited progress has been made in understanding how CBM-based startups offer value propositions to their clients and enable businesses to transition to the CE approach (Bauwens et al., 2020; Henry et al., 2020; Ostermann et al., 2019).

This research explores startups' value creation and delivery mechanisms within CBMs, highlighting the development of unique product narratives as a foundation for building compelling business value propositions. It advances both academic and practical understandings of CBMs by detailing the critical components necessary for redefining BMs to facilitate the transition to a CE in the fashion industry.

Despite all the anticipation about BMI and its implication to drive CE, a strategic framework does not exist to outline the defined pathway required to construct and extend the CE network among all the players in the fashion supply chain, including potential startups and established companies. This understanding is essential for developing and adopting effective circularity practices and increasing sustainability in the fashion industry.

This research contributes by classifying the key elements needed to redefine business models and drive the transition to a CE in the fashion industry, offering:

1. A holistic view of implementing CE practices by potential startups with innovative BMs.
2. An articulation of the structured framework that outlines explicit strategies for nurturing and broadening CE networks among circular startups and incumbent companies.
3. An outline of advancements and prospects for future research in BMI; essential for accelerated CE transition.

The thesis is structured into five sections. Section 2 introduces the foundations of CE, BMI, and the role of circular fashion startups in the CE transition. Section 3 presents

the research methodology. The remaining sections explain the results including key value propositions, value capture and delivery by CE-based startups to the fashion industry. Section 4 provides a discussion and strategies to consider in building and expanding CE networks. Section 5 concludes by recapping the research contributions, limitations, and recommendations for future research.

1.2 Purpose of Research

The primary purpose of this research study is to contribute to the literature by providing insight into innovative BMs followed by circular fashion startups and a strategical framework to build and expand CE networks among the stakeholders of the fashion value chain.

This study focuses on developing a formalized CE ecosystem for the fashion industry. Min et al. (2021), define the CE ecosystem as “the conceptual framework for exploring the crucial actors in the CE process”. With their business model innovations (BMIs), startups can be instrumental in driving CE transition in the fashion industry. The current study thus adopts the CE ecosystem as a guideline to draw a conceptual framework to build and grow CE networks across the value chain to support sustainable fashion. Particularly the study is going to address the following topics:

1. To examine how promising startups implement CE practices and sustainable BMIs in the fashion industry;

2. To develop a conceptual framework to enable building and expanding CE networks among startup and incumbent firms based on business-to-business (B2B) and business-to-business-to-customer (B2B2C) models;

Companies can be better prepared to adopt circular BMI by expanding their views on resource utilization, value creation, and collaboration with key stakeholders (Hofstetter et al., 2021).

1.3 Significance of the Study

This study will assist fashion companies in understanding how they can work together with other supply chain players in developing and implementing circular business models to support accelerated CE transition. A broad view of CE practices executed by the potential startups will guide companies to focus on value creation and customer outreach keeping CE principles at the core.

The strategic framework informed by insights from this research will enable existing companies and entrants in the fashion industry to look for closed-loop business opportunities and expand their CE network to drive sustainable fashion. The proposed strategies for building and developing CE networks across the value chain will significantly boost the fashion industry to accomplish overall circularity.

This study will help policymakers understand the long-term potential of circular fashion startups and support them in scaling up by enhancing market demand for their products and services. It will also provide financial support and training opportunities to build pilot plants and increase brand awareness.

CHAPTER II:

LITERATURE REVIEW

The inception of a circular economy transition within the fashion industry begins by addressing several fundamental questions: Firstly, an exploration of the circular economy's definition is necessary. This is followed by examining the circular economy's function within the domain of sustainable fashion. Additionally, the necessity for innovation within business models is reviewed, highlighting its critical role in facilitating a circular economy. Furthermore, the concept of a circular business model and its importance are explained. The pivotal question supporting this research study pertains to how emerging fashion startups, serving as innovators, can catalyze the transition toward a circular economy.

In the next few sections, the emphasis will be on the literature review of the associated definitions, theories, and concepts as well as answers to the above questions that will be used for elaborating the research findings in subsequent chapters, and thus ultimately contribute to the objective of this research study. The literature review will be carried out on the following topics related to the research questions:

1. The role of the circular economy in the sustainable fashion industry,
2. Business model innovation for circular economy transition,
3. Circular fashion startups as innovation pioneers for circular economy

This chapter highlights the connection between the theoretical concepts and practical understanding of CE transition in the fashion industry, focusing on innovative

business models. The chapter contains four sections. The first section provides the theoretical background about CE and its significance for the sustainable fashion industry. The next two sections are about the definitions, theories, and scope of business model, business model innovation, circular business model, circular business model innovation, and circular fashion startups, which will be applied as the theoretical basis and explain the research findings in subsequent chapters. The final section integrates the preceding three sections and outlines the conclusion of the literature review chapter.

This chapter begins by defining the CE, highlighting its pivotal role in the economy and society, and addressing the challenges inherent in its implementation and its role in the sustainable fashion industry (Section 2.1). After this, Section 2.2 explores the relationship between BMI and the transition to a CE in the fashion industry, articulated through four sub-sections. This section starts with a brief description of BM, BMI, and CBM, and examines strategic focus areas that could amplify the impact of CBM in fashion. Section 2.3 defines circular startups, highlighting their innovative business models and instrumental roles in the CE transition process. The chapter concludes with a literature review summary in Section 2.4, incorporating the key findings and theoretical contributions discussed throughout the chapter.

2.1 Role of circular economy in the sustainable fashion industry

In the contemporary world, the demand for clothing is rapidly increasing and is projected to reach approximately 160 million tons in 2050, which is three times higher than the current demand (Mishra et al., 2020). The massive surge has resulted in

unprecedented production and consumption growth, accelerating material throughputs and increasing disposal and waste (Mishra et al., 2020; Palm et al., 2021). Presently, the fashion industry generates approximately 92 million tons of waste annually which is expected to increase by around 60% between 2015 and 2030 (MacArthur, 2014).

The overall consequences of the linear economy are not limited to producing undesirable material in the form of waste at the end of a product's lifetime. It further continues as the acceptance of resource inadequacy and cascading impacts like greenhouse gas emissions, microplastics, or soil poisoning during the production cycle (Takacs et al., 2020). For fashion brands, the risk associated with the linear model is increasing both in terms of internal risks (operational issues, strategic challenges) and external risks (political and economic unpredictability, competition, consumer behavior) (Ellen MacArthur Foundation, 2021a).

Due to its high resource intensity and consumption, transitioning from a linear model to a closed-loop production system is crucial for the fashion industry to replace the "end of life" concept with restoration, focusing on keeping the resources at their highest value to enable longer use and reuse (Colucci & Vecchi, 2021; Ellen MacArthur Foundation, 2017; Urbinati et al., 2017).

The concept of circular economy is influenced by the work of Boulding (1966), in which he describes "the earth as a closed and circular system with limited assimilative capacity, and argues that the economy and environment should coexist in equilibrium" (Geissdoerfer et al., 2017b). Stahel and Reday (1976), introduced key characteristics of CE, emphasizing industrial economics. They conceptualized a loop economy,

highlighting strategies directed at resource efficiency, waste prevention, regional job creation, and dematerialization of the industrial economy (Stahel & Reday, 1976). In their work, Pearce and Turner (1989) shared the contemporary understanding of a CE system which incorporates numerous features and contributions from a range of concepts explaining the idea of closed loops.

The Ellen MacArthur Foundation played an important role in popularizing and framing the CE concept to a broader audience by co-authoring a range of influential reports in support of consultancy McKinsey on the subject (Ellen MacArthur Foundation, 2017, 2020a; MacArthur, 2014). They define the CE as " an industrial economy that is restorative and regenerative by intention and design" (MacArthur, 2014).

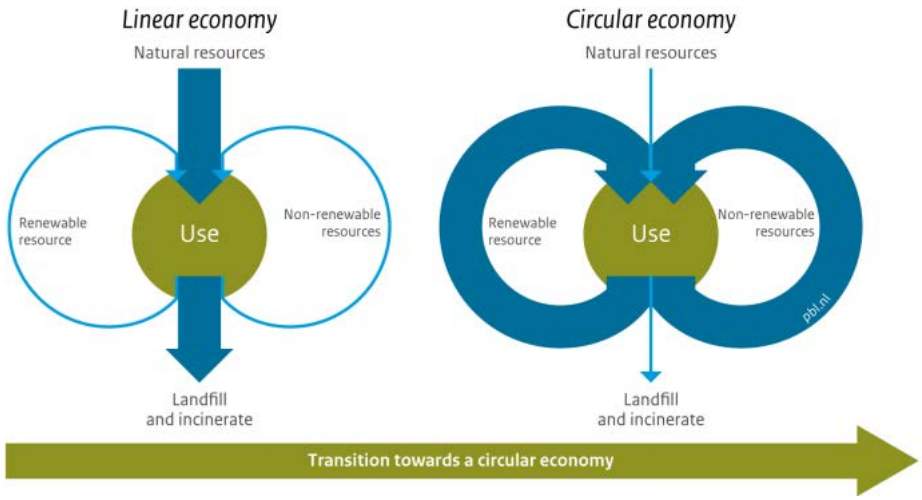

Figure 1.
Transition from linear to circular economies

Source: Natalia Moreira and Kirsi Niinimäki (2022) *Circular Business Models in the Textile Industry*. White Paper. Espoo: Aalto University, pp. 1–56. Available at: https://newcottonproject.eu/news_article/circular-business-models-in-the-textile-industry-new-cotton-projects-second-white-paper/ (Accessed: 21 January 2023).

For this research, a circular economy can be defined as " an economic system in which resource input and waste, emission, and energy leakages are minimized by cycling, extending, intensifying, and dematerializing material and energy loops" (Geissdoerfer et al., 2020). This definition is further illustrated in Fig. 2. CE is a strong foundation for driving novel sources of value, improving resource productivity, and delivering a triple-bottom-line impact of economic, environmental, and social benefits (Ellen MacArthur Foundation, 2020a).

In the circular economy for fashion, products (apparel, footwear, accessories) are:

1. *used more*: Products are designed and manufactured to be durable and last long;
2. *made to be made again*: Products and their materials can be disassembled to enable reuse, remanufacturing, and recycling;
3. *Made from safe and recycled or renewable inputs*: They are free from hazardous substances and their production minimizes the usage of newly extracted resources (Ellen MacArthur Foundation, 2020b).

The CE supports business innovation and value creation through various business strategies including sustainable material innovations, reusability, and repairability by redesigning the products, and resale via tech-enabled sharing platforms (Ellen MacArthur Foundation, 2020a).

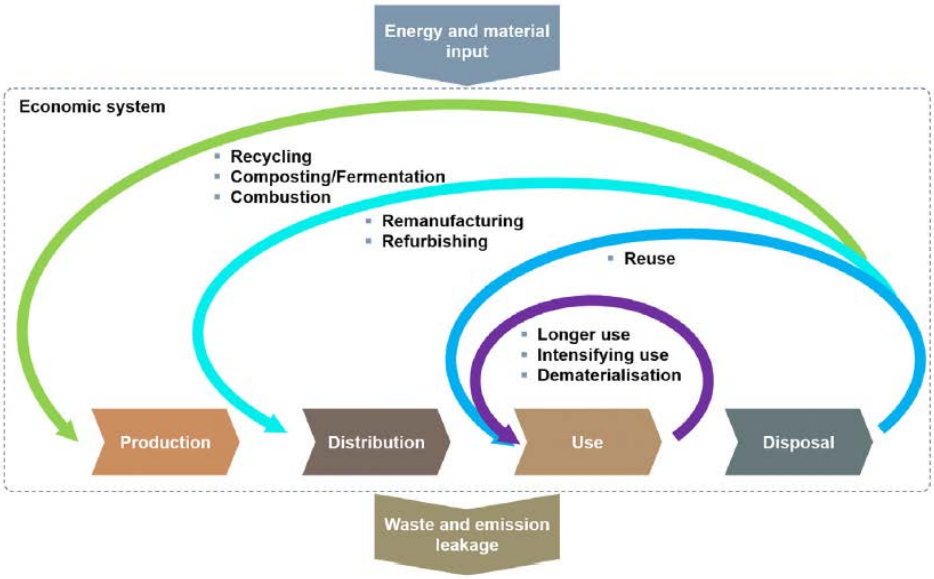

Figure 2.
The Circular Economy

Source: Geissdoerfer, M. *et al.* (2020) 'Circular business models: A review', *Journal of Cleaner Production*, 277, p. 123741.

However, CE implementation for the sustainable fashion industry is challenging due to the predominance of fast fashion, which is characterized by mass production and consumption, low price points, and low service life followed by quick disposal (Ostermann et al., 2019; Todeschini et al., 2017). The production of goods in the fashion industry largely happens through a diversified and fragmented supply chain, which may hinder the CE transition process on account of technological and financial barriers (Suchek et al., 2021).

Despite these challenges, CE has the potential to foster innovative business models that can support sustainable fashion and help improve the welfare of society by reducing waste and energy consumption and developing alternative materials to bring

down environmental costs (Colucci & Vecchi, 2021; Mishra et al., 2020; Ostermann et al., 2019; Todeschini et al., 2017). Examples of CE implementation in the fashion industry include product and process design innovation for zero waste, sustainable textile development from fashion waste and regenerative materials, and the production of long-lasting textiles to reduce waste and energy consumption (Colucci & Vecchi, 2021; Todeschini et al., 2017).

In addition to circular business models, the implementation of CE principles in the fashion industry requires robust recycling and composting practices (Ellen MacArthur Foundation, 2021a). Once the product is no longer in use, it must be recycled instead of incineration or ending up in a landfill. Subsequently, when the product is no longer recycled, it needs to be composted (Ellen MacArthur Foundation, 2021a).

2.2 Business model innovation for circular economy transition

To understand business model innovation (BMI) and its importance in circular economy transition, it is essential first to understand the concept of a business model (BM), business model innovation, circular business model (CBM), and circular BMI since studies usually lack in terms of clear conceptualization of these concepts (Foss & Saebi, 2017).

This section aims to summarize the pertinent literature that can be utilized to assess the findings, which will be discussed in subsequent sections. The following sub-sections briefly review and summarize some related findings and previous theories.

2.2.1 Business Model

The business model (BM) construct appeared in the 1970s and was originally related to system modeling in information technology (Pieroni et al., 2019). Later, the concept of BM gained prominence in the 1990s with the introduction of a new revenue mechanism, driven by the rise of e-commerce (Magretta, 2002; Osterwalder & Pigneur, 2010; Zott et al., 2011). Magretta (2002), describes BM "as a system, how the pieces of a business fit together". Osterwalder (2004) further explained BM and shared a 9-point decomposition that characterizes a BM (depicted in Fig. 3).

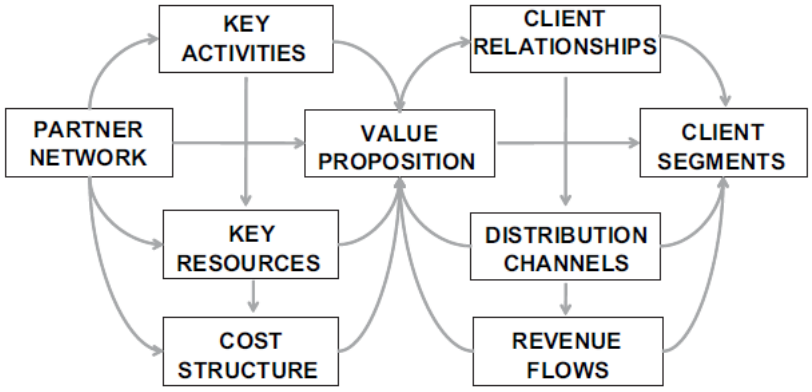

Figure 3.
Osterwalder's 9-point decomposition of a business model

Source: Osterwalder, A. (2004) 'The business model ontology - A proposition in a design science approach', *University of Lausanne, Switzerland*, Dissertation 173.

Richardson (2008), developed a BM framework that exhibits the rationale of strategic thinking of "Value". The BM framework, developed by Richardson (2008), comprises three critical components: "value proposition, value creation and delivery, and value capture". The 'value proposition' represents "the value the firm will offer to a

customer relative to the competition" (Richardson, 2008, p. 139). It provides quantifiable economic, ecological, and social value in a sustainable business (N. M. Bocken et al., 2014).

The second component, the 'value creation and delivery' explains "how to compete by describing how that theory is put into action. It begins to flesh out the organization and architecture of the firm. It also specifies and describes the firm's sources of competitive advantage, i.e., its resources and capabilities" (Richardson, 2008, p. 139). Lastly, the 'value capture' includes revenue and economic models. The revenue model relates to the different sources of income and the economic model outlines the company's costs, margins, and several financial details (Richardson, 2008).

Figure 4 integrates these fundamental frameworks into a sustainable business model canvas, illustrating the relationship between the three components of BM (Richardson, 2008) and nine building blocks of the business model canvas (Osterwalder & Pigneur, 2010).

Figure 4.
Sustainable business model canvas

Source: Adopted from Bocken, N. (2015) ‘Conceptual framework for shared value creation based on value mapping’, in. *Global Cleaner Production Conference, Sitges, Barcelona*, pp. 1–4 (developed from Osterwalder and Pigneur (2010) and building on Richardson (2008).

Geissdoerfer et al. (2018b) define a BM as the “simplified representation of the value proposition, value creation and delivery, and value capture elements and the interactions between these elements within an organization unit”. The key components that constitute a BM include the market segments and value proposition of the firm, the value chain structure necessary to realize this value proposition, the company’s value capture methodology, and the architecture that interconnects all these elements (Saebi et al., 2017).

A business model's essence is defining how companies deliver value to their customers, alluring customers to pay for this value, and converting those payments into profits (Teece, 2010). With the introduction of a new BM, when the economics of the industry changes and is hard to replicate, it can self-generate a robust competitive advantage (Magretta, 2002). However, value creation through BM requires a more complex, integrated set of exchange activities and correlation among multiple stakeholders (Zott et al., 2011). Since the business environment is so dynamic and volatile, BM needs to build new capabilities to innovate its business model to support solutions to socioeconomic challenges Chesbrough (2010).

2.2.2 Business Model Innovation

Mitchell and Coles (2003), originally discussed the concept that managers can purposefully innovate their BM. They referred to BMI as “the process of developing and making business model replacements that provide product and service offerings to customer and end users that were not previously available”. As per Osterwalder and Pigneur (2010), BMI is “a novel way of value creation and its delivery to the target audience which can be achieved through a change of one or multiple components in the business model”. Breuer and Lüdeke-Freund (2017), further emphasize the importance of “Value” as the essence of conventional and sustainable business model innovation.

This research defines BMI as “a change in the BM configuration by generating, diversifying, acquiring, or transforming in response to internal and external incentives” (Foss & Saebi, 2017; Geissdoerfer et al., 2018b). BMI can help coordinate technological and organizational innovations and safeguard value chain partner networks or capabilities essential to preserve and utilize the embedded resource values (Nussholz, 2018).

Teece (2007), proposed a dynamic-capabilities-based view and explained three main stages of BMI (presented in Fig. 5):

1. Sensing (identifying and analyzing new business opportunities);
2. Seizing (designing or modifying BM concepts);
3. Transforming (experimenting, testing, and implementing the BM concepts).

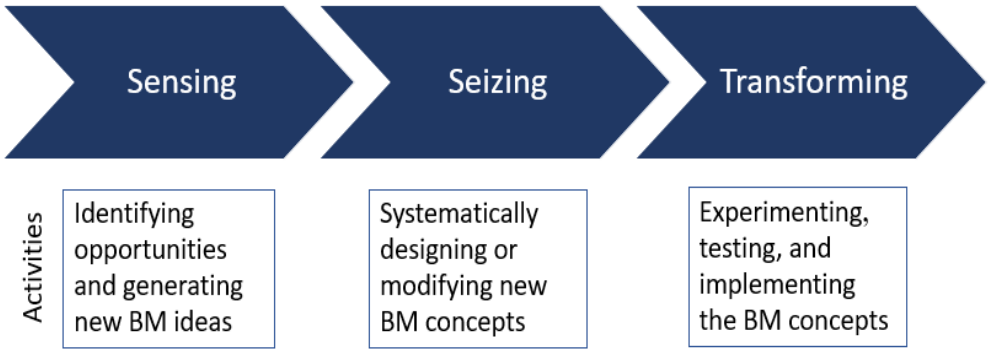

Figure 5.
Main Stages of Business Model Innovation

Source: Pieroni, M.P., McAloone, T.C. and Pigosso, D.C. (2019) 'Business model innovation for circular economy and sustainability: A review of approaches', Journal of cleaner production, 215, pp. 198–216.

Sensing starts mainly with a market examination followed by identifying and evaluating unfulfilled needs and new business prospects (Teece, 2018). It usually begins with an inception stage that involves analyzing the emerging and growing demands of target customers and other companies in the neighboring ecosystem (N. Bocken & Konietzko, 2022; Frankenberger et al., 2013). For CE, sensing predominantly means that companies realize the importance of evolving social and environmental issues and acknowledge them as prospective business opportunities (McWilliams & Siegel, 2011).

Seizing is about "purposeful actions to learn and validate: planning, designing, and executing relatively controlled situations to develop new knowledge" (Berends et al., 2016). For circular BMI, it requires companies to deploy resources, to reduce environmental and social risk through a comprehensive business proposal (Hart &

Milstein, 1999). According to Hahn et al. (2010), during this stage sometimes an instantaneous winning situation can be recognized but more often returns take time, when BMI drives companies before legislation and steadily progresses to gain legitimacy and an edge over its competitors (Schaltegger et al., 2012).

The last stage is transforming in which new BMs are started, followed, and executed by the companies (Frankenberger et al., 2013; Geissdoerfer et al., 2017a). The primary focus of this stage is on the intentional and consistent upgradation of the company's capabilities (Teece, 2018). In the case of BMI, the focus is to ensure business growth and market competitiveness (Foss & Saebi, 2017; Teece, 2010).

BMI not only differs from product and process innovation but is likely to generate higher returns (Chesbrough, 2007; Lindgardt et al., 2012). BMI also plays a crucial role for companies in meeting their social and environmental goals by utilizing environmentally, economically, and socially productive technologies and solutions (Boons & Lüdeke-Freund, 2012; Geissdoerfer et al., 2020). BMI time and again finds ways to offer new benefits at lesser costs, improving circumstances for the companies while ensuring more to their customers (D. W. Mitchell & Bruckner Coles, 2004).

Usually, companies do not have the business mechanism and processes to execute such type of innovation (Amit & Zott, 2010; Chesbrough, 2010). Moreover, several factors are restricting the innovation process including the company's conventional value creation reasoning, resource distribution, technology innovation, external relations, locked-in management structure, etc. (Boons & Lüdeke-Freund, 2012; Chesbrough, 2010; Zott et al., 2011).

However, redesigning the business ecosystem is complex since it needs to find the right balance between the self-interest of participating stakeholders. Accordingly, it influences and enables their cooperative actions to outline CBM (Antikainen & Valkokari, 2016). Due to increased attention on BMI across various areas (sustainability, CE, digitization), different 'sub-streams' were developed for respective investigation (Foss & Saebi, 2017; Pieroni et al., 2019). This research study focuses on one of the 'sub-streams, addressing BMI in CE.

2.2.3 Circular Business Model

The concept of the circular business model (CBM) was first introduced in 2006 by Schwager and Moser (2006), in an article that explained different types of individual business models for circular value creation (Geissdoerfer et al., 2020). Schulte (2013), further supported the role of BMs for the "circular economy to flourish in the long run". Mentink (2014), further defined CBM as "the rationale of how an organization creates, delivers, and captures value with and within closed material loops". Integrating the challenges of transforming CE into a reality and the practice-oriented approach of BMI leads to the concept of CBM (N. M. Bocken et al., 2016).

Natalia Moreira and Kirsi Niinimäki (2022), in their white paper on "Circular Business Models in the Textile Industry – New Cotton Project" clearly elaborate that CBM is a representation of the combination of businesses, with their unique BMs collaborating to generate new circular business opportunities. According to Salmi and

Kaipia (2022), CBM can be based on products (Frishammar & Parida, 2019), services (Urbinati et al., 2017), or a combination of two.

Geissdoerfer et al. (2018b), emphasized that to attain optimum sustainable performance in a CE, all three elements of a business model (value proposition, value creation and delivery, and value capture) must “go circular”. CBM-related activities need not be performed by the focal company itself (Linder & Williander, 2017); instead, CBMs repeatedly incorporate a network of value-chain partners (Krystofik et al., 2015; Schenkel et al., 2015). The value creation and delivery of CBMs involve various participants as “collaborative partners” during the innovation process which might be distinct from “conventional” value chain partners (N. M. Bocken et al., 2018).

As presented in Figure 6, CBMs have a long-term perspective in driving CE transition by closing (recycling procedures), slowing (extending product use phase), narrowing (improving production efficiency), intensifying (use of the product more vigorously), and dematerializing (substituting product utility through service and software solutions) resource loops (N. M. Bocken et al., 2016; Geissdoerfer et al., 2018a).

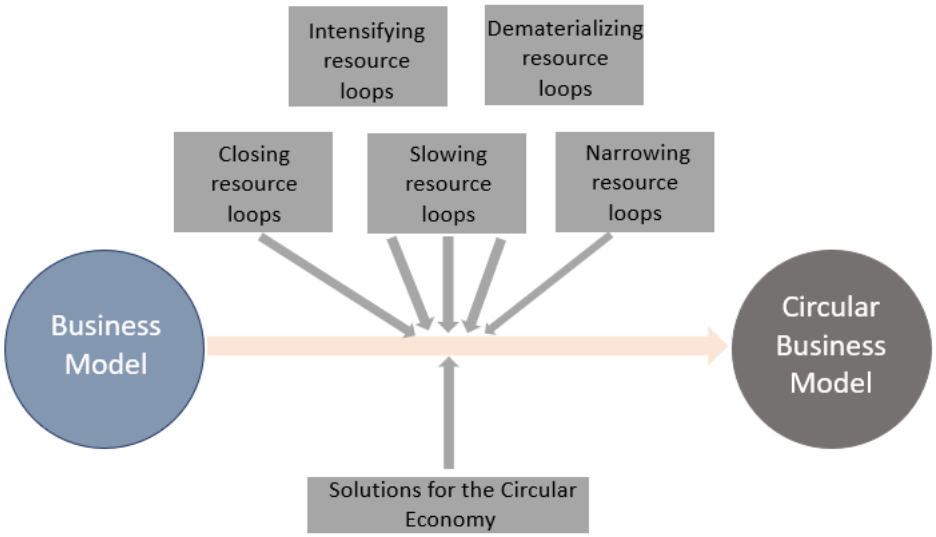

Figure 6.
Transition of Business Model to Circular Business Model

Source: Adopted from Geissdoerfer, M., Vladimirova, D. and Evans, S. (2018b) 'Sustainable business model innovation: A review', *Journal of cleaner production*, 198, pp. 401–416.

According to Urbinati et al. (2017), based on the degree of adoption of circularity, circular business models (CBM) have two main dimensions (as depicted in Figure 7):

1. Customer value proposition and interface: CE concept implementation in offering value to customers.
2. value network: meaningful ways for suppliers to interact and restructure their internal activities (Urbinati et al., 2017).

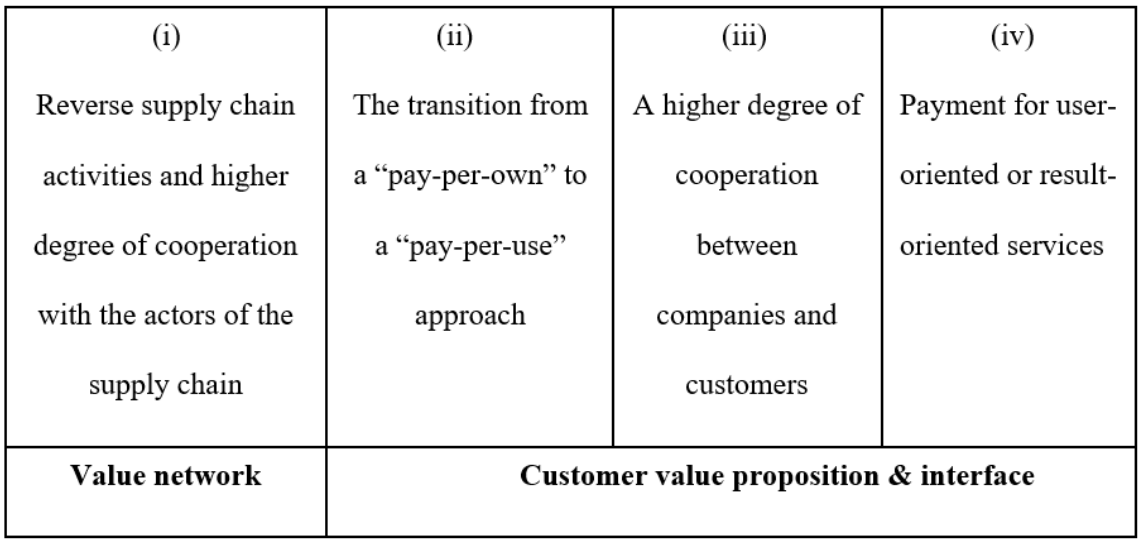

Figure 7.
Circular Economy in companies’ business model

Source: Urbinati, A., Chiaroni, D. and Chiesa, V. (2017) ‘Towards a new taxonomy of circular economy business models’, *Journal of Cleaner Production*, 168, pp. 487–498.

CBMs are essential for CE transition as they offer an opportunity for better growth by disassociating revenues from resource utilization and production, encompassing environmental benefits (Ellen MacArthur Foundation, 2021a). CBMs are often considered a means to support sustainable developments not only in terms of reducing carbon emissions and waste but also in promoting economic growth (Hultberg & Pal, 2021). According to Linder and Williander (2017), CBMs comprise one viable approach for the industry to achieve a significant improvement in resource productivity cost-effectively.

As per Ellen MacArthur Foundation (2021a), “CBM including resale, rental, repair, and remaking has the potential to grow from 3.5% of the global fashion market

today to 23% by 2030, representing a USD 700 billion opportunity with the potential to.

degree pathway."

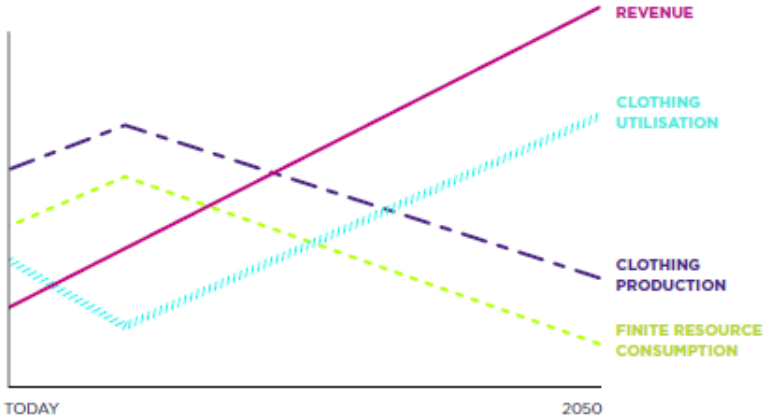

Figure 8.
Conceptually shows how CBM can support CE transition as business revenue is decoupled with production and use of the virgin resources

Source: Ellen MacArthur Foundation (2021a) *Circular business models: redefining growth for a thriving fashion industry*. Ellen MacArthur Foundation, p. 77. Available at: https://emf.thirdlight.com/link/circular-business-models-report (Accessed: 8 February 2022).

Cost-effective and efficient reverse logistic infrastructure and local skills are essential to optimize the profitability of CBM which presently are lacking in many geographies (Ellen MacArthur Foundation, 2021a). Consumers are one of the key stakeholders in CBMs as they not only drive demand but also participate in the supply side by returning unwanted clothes to re-enter the resource loop (Ki et al., 2020; Urbinati et al., 2020).

Ellen MacArthur Foundation (2021a), further stated that the economic and environmental benefits of CBM can be expanded further by focusing on four key areas:

1. RETHINK performance metrics, customer incitement, and experience - In conventional businesses, performance indicators are aligned to a linear model. So, it is essential to review and redefine metrics for measuring success followed by upgrading customer incitement, and experience.

2. DESIGN products for repeated and extended usage – Products must be designed to meet physical (can withstand longer wearability) and emotional (remain relevant and desirable over time) durability, and can be recycled and remade at the end of their life.

3. CO-CREATE supply networks enabling local and global product circularity – The fashion supply chain needs to be transformed into a supply network through industry-wide collaboration and digital technological platforms for successful product circulation.

4. SCALE a broader range of circular business models – Implementing an extensive variety of CBMs across the fashion industry could open new business avenues and eventually maximize environmental and economic opportunities.

While developing and scaling various CBM, it is important to consider key aspects including internal business competencies, operating spaces, product authenticity, technological needs, and cost of service operations (Ellen MacArthur Foundation, 2021a). Policymakers can play a crucial role in replicating CBMs across the fashion

industry by constructing suitable market conditions like moving taxes from labour to using limited natural resources (Ellen MacArthur Foundation, 2021a).

2.2.4 Circular Business Model Innovation

Circular business model innovation (CBMI) incorporates CE-based principles or practices as guidelines for designing the BM. It focuses on enhancing resource efficiency (by narrowing or slowing resource and energy loops) and closing resource and energy flows by altering the way economic value and product interpretation are approached (Pieroni et al., 2019). So, CBMI can be defined as "the conceptualization and implementation of circular business models, which comprises the creation of circular startups, the diversification of circular business models, the acquisition of circular business models, or the transformation of a business model into circular one" (Geissdoerfer et al., 2020).

Velter et al. (2020) further explained that "CBMI is about exploring and negotiating organizational boundaries as the activities of a company and its value network of suppliers, partners, and stakeholders could drastically change when adding new activities". An iterative process of multiple stages including ideation, execution, and evaluation is essential for CBMI (Frankenberger et al., 2013). It can lead to various levels of innovation, ranging from the addition of a new activity to the BM or a complete transformation of its various elements (N. Bocken et al., 2019). CBMI when designed in the right way for resource efficiency can be even more effective with the potential to

reach a reduction of environmental impact by one-tenth of its original value compared to marketing the finished goods (Tukker, 2004, 2015).

The change towards CBMI should integrate “elements from macro (global trends and drivers), meso (eco-system and value co-creation), and micro (company, customers, and consumers) levels” (Antikainen & Valkokari, 2016). Circular BMIs are “networked by nature, requiring collaboration, communication, and coordination within complex networks of interdependent but independent stakeholders” (Antikainen & Valkokari, 2016).

As depicted in Figure 9, there are four different types of CBMI (Geissdoerfer et al., 2020):

1. Circular start-ups – No existing business model is in place, and a new CBM is established.
2. CBM transformation – An existing business model is transformed into a new business model that meets the overall requirements of a CBM.
3. Circular BM diversification – The existing business model remains unchanged, and an additional CBM is established, including joint ventures.
4. Circular BM acquisition – An existing CBM is recognized, obtained, and incorporated into the organization.

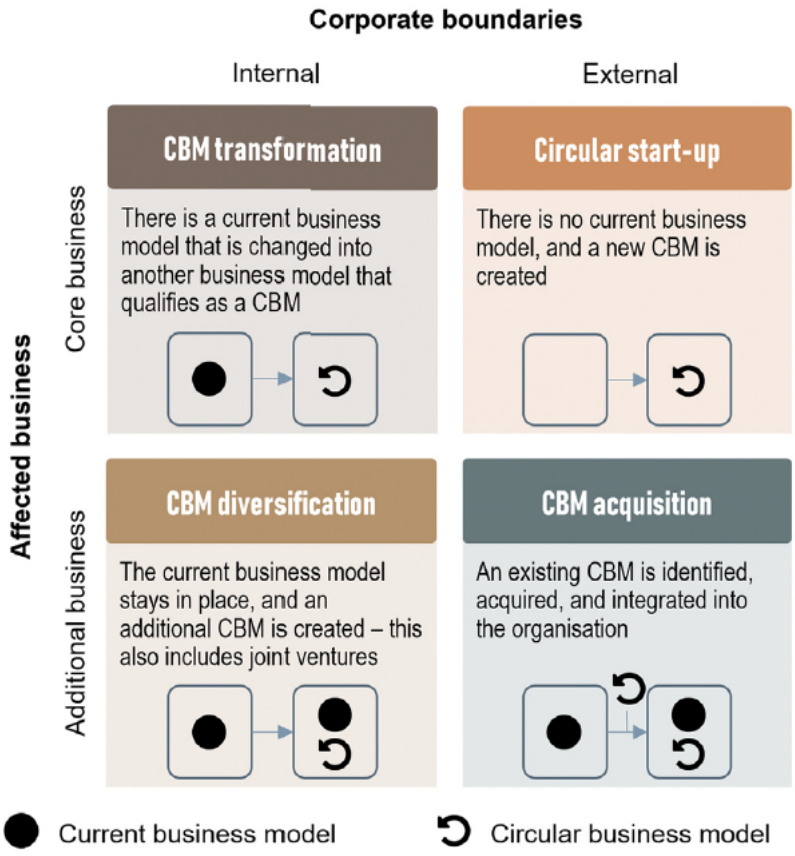

Figure 9.
Types of Circular Business Model Innovation

Source: Geissdoerfer, M. *et al.* (2020) 'Circular business models: A review', *Journal of Cleaner Production*, 277, p. 123741.

This research study primarily focuses on circular fashion startups and their crucial role in driving CE transition across the fashion industry. Such circular fashion startups refer to building a new business model from scratch based on CE principles. As suggested by disruptive innovation theory, in the case of CE - startups might yield more impact with more radical solutions (Christensen, 2013).

"The main drivers of circular BMI are resource efficiency, resource longevity, and financial growth" (Geissdoerfer et al., 2017b). Geissdoerfer et al. (2022), further classified the CBMI drivers across different categories including financial (business growth, business resilience, cost reduction, resource scarcity), legal (regulatory push, legal compliance), market (customer satisfaction, varying customer needs), technical (new technical opportunity), and organization (corporate sustainability).

However, the barriers to the circular business model innovation (CBMI) process can be classified into external and internal barriers (Guldmann & Huulgaard, 2020). External barriers mainly include barriers at the market and institutional level (adverse regularity and public policies, unclear market demand, price parity with virgin raw material, etc.) and value chain level (dispersed and complex value chain, lack of knowledge and trust to build new partnership across the value chain). Internal barriers include barriers at the organizational level (lack of resources and in-house capabilities, minimal evidence of financial benefits) and employee level (lack of knowledge about CE and CBM) (Guldmann & Huulgaard, 2020).

The CBMI process is likely to be hindered due to empirical and structural hindrances at the organizational, industrial, technological, and institutional levels (Evans et al., 2017; Foss & Saebi, 2017; Guldmann et al., 2019) as it's essential to disengage with existing business logic and value network structures for the development of CBM (Evans et al., 2017; Foss & Saebi, 2017; Geissdoerfer et al., 2018a).

2.3 Circular Fashion Startups as innovation pioneers for the circular economy

Startups with business models based on CE principles are referred to as circular-born companies (Colucci & Vecchi, 2021). As per Bauwens et al. (2020), business innovation at startups can occur at various stages along the value chain. It can either be internally by the organization (source) which is mainly technological or due to social innovations by collaborating with other players from the fashion industry.

There is a clear differentiation between core and enabling technological developments within innovation at the source (Bauwens et al., 2020). Core technologies are specific to a product or process however enabling ones are more generic like building a digital platform using information technologies for sharing or trading products and materials. According to a Dutch Environmental Assessment Agency report, high-level circularity strategies frequently necessitate social innovations across the entire value chain. In contrast, low-level strategies rely on technological innovations (Potting et al., 2017).

Since these startups built upon innovative business models from scratch; they operate in an “explore and adapt” mode, whereas incumbent companies function in a “plan and execute” approach (Freytag, 2019). Startups usually go through two main phases of development. Firstly, “search for business” focuses on finding suitable customers and testing the business idea with a marketable prototype. In the next phase, the “growth of business” startup aims to scale up its revenue at a rapid pace by either implementing the validated BM or making the changes in BM as per market need (Freytag, 2019; Ostermann et al., 2019)

With strong partnerships across the value chain, these startups can bring groundbreaking sustainable products and processes, to drive circular fashion (Todeschini et al., 2017). These startups can help established companies improve their circularity quotient through material or technology knowledge transfer (Bauwens et al., 2020). By employing new technologies like blockchain and artificial intelligence, these startups can rapidly disperse their innovations in the fashion industry to contribute significantly to an accelerated CE transition (Bauwens et al., 2020; Ostermann et al., 2019).

Bauwens et al. (2020), in their 5R-framework, which comprises five different 'R-strategies': Regenerate, Reduce, Reuse, Recycle, and Recover (As depicted in Figure 10) explain how circular startups can contribute to accelerating the CE transition. Fashion startups can embrace business strategies with higher degrees of circularity from the beginning in contrast to incumbent firms who usually focus on strategies with a low circularity quotient (Bauwens et al., 2020).

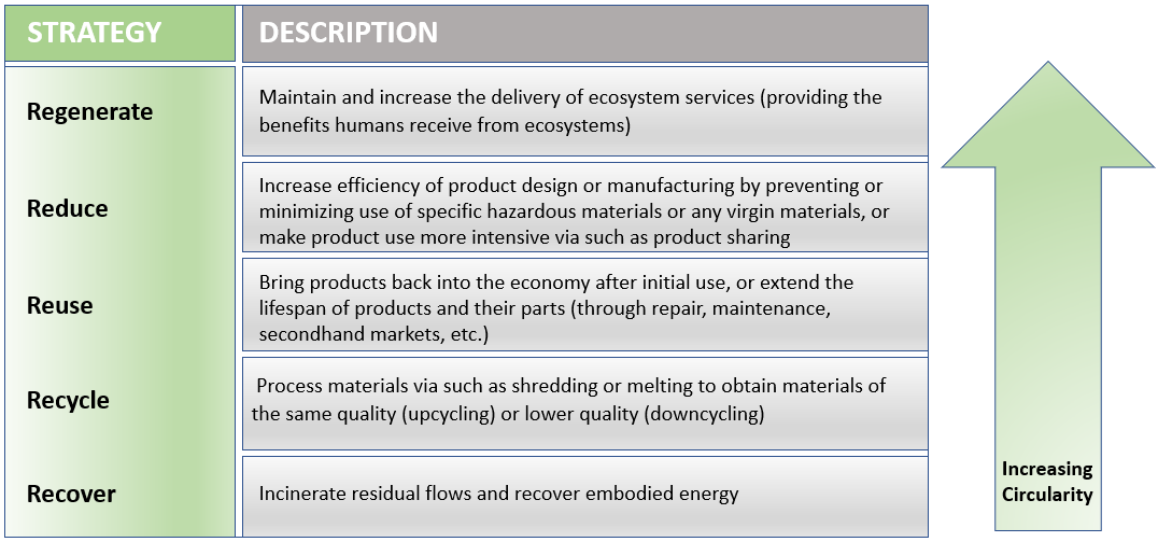

Figure 10.
Circularity Strategies

Source: Bauwens, T. *et al.* (2020) 'Disruptors: How circular start-ups can accelerate the circular economy transition.

Henry et al., (2020), further classified circular startups into five key categories based on the R-strategy they follow and the field of innovation they operate into: 1) Design-based; 2) Waste-based; 3) Platform-based; 4) Service-based; and 5) Nature-based startups.

Design-based startups usually follow BMs based upon the R-strategy 'Reduce' and innovation in 'core technology'. This category covers companies driving for reduction of source material, improvement in process efficiency, or product design innovation (Henry et al., 2020). Waste-based startups mainly deal with R-strategies 'Recycle' and 'Recover' as their key circular strategies and innovate in 'Industrial symbiosis (IS)'. IS is a notable concept (Chertow, 2000) and is extensively followed for CE implementation (N. M. Bocken et al., 2014; Henry et al., 2020).

Platform-based startups have their core archetype based on BMs, constructed around the marketplace for excessive resources from various streams and follow key R-strategies 'Reduce' and 'Reuse' (Henry et al., 2020). Digital platform-based BMs create value for their clients by supporting business transactions (sharing, trading) instead of co-creation including knowledge sharing or learning (Konietzko et al., 2019; Potting et al., 2017).

Service-based startups work on ‘Product-service systems (PSS)’ based BMs for optimum control and improved usage efficiency of their regularly owned products (Henry et al., 2020). Such startups focus on thorough product use instead of selling the highest units of product (Tukker, 2015) and thus pursue the R-strategy ‘Reduce’ to drive CE. Despite PSSs being considered one of the main drivers of circularity by numerous authors (Antikainen & Valkokari, 2016; N. M. Bocken et al., 2017; Evans et al., 2017; Tukker, 2015), a limited number of startups follow this innovation category for switching from product ownership to service-based earnings models (Henry et al., 2020). The main reason for this limited transition is mainly due to the various challenges offered by asset-heavy PSS business models to small- and medium-sized enterprises (SMEs) compared to large companies due to limited funds and standardized planning (Besch, 2004; de Jesus Pacheco et al., 2019; Neely, 2008).

Nature-based startups adopt the top-ranked R-strategy ‘Regenerate’ and core process innovation in their BMs (Henry et al., 2020). So, their focus is to try and minimize any environmental damage, and further sustain and grow the delivery of their products and services based on nature-based options and natural ecosystems (Maes & Jacobs, 2017). Maes and Jacobs (2017, p. 123), explain that using the services of natural ecosystems invariably leads to ‘decreased input of non-renewable natural capital and increased investment in renewable natural processes’.

Circular startups not only collaborate with established firms but also with various other circular start-ups for better resource utilization, risk mitigation, and attain economies of scale (Bauwens et al., 2020). Some of the challenges faced by circular

startups are access to external financing (since their business idea is new and lacks successful market credentials), product price barriers (relatively conventional products remain inexpensive), limited supply chain acceptability, consumer resistance to circular innovations, and present-day regulations which may hinder the growth of circular solutions (Bauwens et al., 2020).

However, it is crucial to change the consumer preference towards reused products for rapid scaling up circular product inflow in the market as startups often use rejected or waste goods for other functions in a new life cycle (Bauwens et al., 2020). Moreover, collaborations of these circular fashion start-ups with established firms may prove crucial to convince fund providers if large companies act as off-takers (source of guaranteed revenue stream for a defined time) and mitigate the supply chain risk (Bauwens et al., 2020).

Circular startups can significantly contribute to the CE transition by pursuing a wide range of CBM strategies and collaborating with incumbent firms to drive circular activities and lead the CE to the next level (Bauwens et al., 2020).

2.4 Summary

Through the literature review, we can conclude that CE has emerged as a potential strategy for developing a sustainable business for the fashion industry. However, companies must innovate their business models to implement the CE concept while proposing values to their customers for the CE transition. They also need to build upon the value network to collaborate with the key stakeholders of the fashion value chain

enabling CE to be part of mainstream business. Startups with their BMI can be instrumental in driving CE transition in the fashion industry.

From the literature review, previous studies primarily focused on the role of CE as an alternative to the linear model. They identified key drivers, barriers, and opportunities in BMs to drive the adoption of the CE approach in the fashion industry. Limited progress has been made in understanding how CBM-based startups offer value propositions to their clients and enable businesses to transition to the CE approach.

In the following chapters, a research methodology will be addressed in detail, including research design, sampling strategy, instrumentation, data collection procedure, data analysis, and validation mechanism. The last two chapters will present empirical data, observations, and findings from the research study. Lastly, a detailed discussion of the results with explanations and rationales followed by implications and recommendations for future research will be provided.

CHAPTER III:
METHODOLOGY

3.1 Overview of the Research Problem

The importance of CE is widely accepted across the value chain as a potential lever to minimize business risks and adverse environmental impacts associated with the fashion industry (Geissdoerfer et al., 2017b; Palm et al., 2021). CE is different from other sustainability approaches as it introduces restorative and regenerative systems with main strategies based on design thinking, circular systems, and resource efficiency (Ghisellini et al., 2016; Ostermann et al., 2019).

However, many fashion companies face several barriers while pursuing concrete measures in adopting CE. Firstly, they need to radically rethink and innovate their business models to find more sustainable ways to create value for their customers while considering environmental and social implications (Ostermann et al., 2019). Secondly, the production of goods in the fashion industry mainly happens through a diversified and fragmented supply chain, which may hinder the CE transition process on account of technological and financial barriers (Suchek et al., 2021). Moreover, due to the lack of a strategic framework, companies still struggle to decide whether to modify their existing BM or create a new one (Urbinati et al., 2017).

Today, CE-based startups are disrupting and transforming the economics of the fashion industry by offering a unique value proposition to their customers. Since these

startups build upon innovative business models from scratch, they can bring groundbreaking sustainable products and processes; to support circular fashion (Todeschini et al., 2017). However, the business idea from these startups is new and lacks a proven record of commercial performance (Bauwens et al., 2020). So, they need a strategic collaboration across the fashion value chain to make their business model replicable and scalable; and contribute significantly to an accelerated CE transition (Bauwens et al., 2020; Ostermann et al., 2019; Todeschini et al., 2017).

However, research in CE networking across the circular startups and established firms of the fashion supply chain is in a nascent stage with no defined framework for companies to follow which will help them build and extend their CBM and support CE transition. A further research study on how circular startups create and deliver values and build CE networking with the key stakeholders in the fashion supply chain will be crucial to contribute to the related academic sectors and business fields.

3.2 Research Purpose and Questions

The main purpose of this research study is an attempt to contribute to the literature an insight into innovative BMs followed by circular fashion startups and a strategical framework to enable in building and expansion of CE networks among the stakeholders of the fashion value chain.

This study aims to develop a formalized CE ecosystem for the fashion industry. Min et al. (2021), define the CE ecosystem as “the conceptual framework for exploring the crucial actors in the CE process”. Startups with their business model innovations

(BMI) can be instrumental in driving CE transition in the fashion industry. The current study thus adopts the CE ecosystem as a guideline to draw a conceptual framework to build and grow CE networks across the value chain to support sustainable fashion.

The research study is going to address how promising startups implement CE practices and sustainable BMIs in the fashion industry. Also, outline a conceptual framework to build and expand CE networks among startup and incumbent firms based on business-to-business (B2B) and business-to-business-to-customer (B2B2C) models.

Based on the overall objective, this study is seeking to answer the following research questions (RQs):

RQ1. How do CE-based startups create and deliver value to their clients?

RQ2. What are their product biographies and implications on the fashion industry?

RQ3. What strategies to consider in building and expanding CE networks in the fashion industry's value chain?

3.3 Research Design

The research design for this study is a mixed-method research approach. The mixed-method research may allow the researcher to address broader or more complex research questions and compile a detailed array of evidence that cannot be achieved by any single method alone Yin (2014). Such a research approach can either be qualitative or quantitative or a mix of two methods (Yin, 2014).

In this research study, initially, qualitative exploratory multiple cases were studied using semi-structured interviews (Creswell & Poth, 2016; Yin, 2014). A multiple-case study can be used to identify similar patterns and attributes between cases and is significantly important in allowing analytical generalization beyond the distinct research context (Eriksson & Kovalainen, 2015; Healy & Perry, 2000).

An online survey was created in the next phase based on the knowledge gained from the semi-structured interviews. This survey was then administered to all the critical stakeholders in the fashion value chain to obtain a detailed understanding of their beliefs about their role and how they are going to contribute to a circular economy for fashion.

The qualitative research method is used to obtain a detailed understanding of underlying objectives and motivations. This research method involves an interpretive, naturalistic approach to the world and helps produce rich, comprehensive, and valid process data that may contribute to the detailed understanding of a context (Creswell & Poth, 2016). It clarifies the problem setting and produces new thoughts and hypotheses for future research (Creswell & Creswell, 2017).

The research study will conduct multiple case studies using exploratory semi-structured interviews to analyze extant startups whose sustainable BMIs are promising in transitioning to a circular economy in the fashion industry. Insights from the proposed research will inform the descriptive summary detailing CE practices the startups adopt as mentioned earlier. Additionally, discuss the implications of such CE practices for the fashion industry.

When the research questions seek to explain present circumstances and an in-depth description of some social phenomena, the case study research is more relevant than other research designs (Yin, 2014). Yin (2014), further states that while doing case study research, it is advisable to articulate a "theory" about the topic being studied as it helps to strengthen the research design. While performing case study research, an important strategy is to develop a descriptive framework that will help streamline the data, focus on the most relevant data, and build a storyline (Yin, 2014).

The main purpose of choosing a multiple case study is to evaluate a contemporary phenomenon in detail and its real-life context (Yin, 2014). As per Herriott and Firestone (1983), "the evidence from multiple case studies is often considered more compelling, and the overall study is therefore regarded as more robust". Multiple-case designs should follow a 'replication' instead of sampling or logic (Yin, 2014). Each case in a multiple-case study should be selected carefully to ensure these cases act like multiple experiments, with either similar results (a literal replication) or contrasting results (a theoretical replication) (Yin, 2014).

The survey prepared from the insights of the semi-structured interviews was administered to the critical stakeholders of the fashion value chain. These actors play a crucial role in scaling up the CE drive initiated by potential startups across the fashion industry. Moreover, the survey will attempt to capture their expectations about how they can collaborate with circular startups and how this transition to the circular economy will affect them. It will also provide a detailed understanding of key trends and drivers that

must be considered to build and extend the value network among startups and incumbent firms.

Creswell and Creswell (2017), further emphasize choosing a particular research strategy while doing mixed-method research. Out of six major strategies identified by (Creswell et al., 2003), this research study follows a sequential exploratory strategy. This strategy is conducted in two phases, with the priority mainly being given to the first phase (multiple case studies). This strategy model is characterized by the initial phase of qualitative data collection and analysis followed by the use of quantitative data and results to support the interpretation of qualitative findings (Creswell & Creswell, 2017). The sequential exploratory strategy due to its two-phase approach makes it easy to implement, explore a phenomenon, and expand further on the qualitative findings (Creswell & Creswell, 2017).

3.4 Sampling Strategy

In qualitative research, the sampling strategy primarily focuses on representing a broader range of perceptions and experiences, instead of repeating their frequencies in the larger population (Ziebland & McPherson, 2006). Creswell and Creswell (2017), suggested that a small and relevant sample size can able to accumulate meaningful information and valuable insights from the interviewees. As per Yin (2014), interviews are a crucial source of case study evidence as they can provide helpful and detailed information.

In this research, startups constitute the units of analysis. So, it is necessary to choose the relevant cases from the fashion industry as the research objective is to understand the BMIs adopted by budding startups and how they can build and expand their network across the fashion value chain for accelerated CE transition. Five startups from different geographies who are the winners of the Global Change Award (GCA) are shortlisted for semi-structured interviews (Global Change Award by H&M Foundation, 2022).

The GCA is an innovation challenge initiated by the H&M Foundation, which aims to lead the change toward a planet-positive fashion industry. Annually, GCA is looking for innovative startups that can help create a sustainable future for fashion and restored earth systems. GCA classifies these startups based on the nature of business innovations, including recycling, material, production, design, and customer use. It is essential to focus on the area of business innovation as each startup incorporates the relevant CE principles while building its business model to provide a unique value proposition to its target customers.

These shortlisted startups build upon innovative business models with clear actions to develop new sustainable products and processes and collaborate with key players in the fashion industry to support the CE transition. The startups considered in this study represent a range of segments, including textile-to-textile waste recycling, reverse supply chain management, material innovation from biological (food and agricultural) waste, blockchain-based material traceability platforms, and many more closed-loop products and services. However, these startups differ in terms of their size,

product commercialization (pre or post) stage, and CE principles adopted for business model innovation.

Based on the startup's portfolio, the interviewee is either the co-founder of the startup, the CEO, the business development head, or a combination of the above. The intent is to reach out to a suitable person in the company who is well-versed in the end-to-end business model innovation process and how the organization is going to support the CE transition in the fashion industry. These startups were interviewed to understand their sustainable product offerings, business innovation, supply chain integration, and value proposition.

In the next phase of sampling, an online survey was created based on the knowledge gained from the semi-structured interview phase. This survey was administered to all the key players in the fashion value chain to understand their beliefs about their role and how they can collaborate with circular startups to support a circular economy for fashion. The survey is administered to approximately thirty companies including raw material manufacturers, yarn spinners, fabric and garment makers, and retail brands. Each actor in the value chain plays a crucial role in collaborating with others and supporting the accelerated transition to CE in the fashion industry.

3.5 Research Instrumentation

For this mixed-method research study, two research instruments were implemented to enhance the data validation and ensure the reliability of the data analysis via triangulation (Yin, 2014). Firstly, semi-structured interviews were conducted with

potential fashion startups to understand their product biographies and how they implement CE practices in their business model to create and deliver value to their clients. Secondly, a survey was administered to all the key players in the fashion value chain to understand their beliefs about their role and how they can collaborate with circular startups to contribute to a circular economy for fashion. The respective sub-sections below provide a detailed description of each research instrument.

3.5.1 Interview

The interviews are one of the most important sources of case study evidence (Yin, 2014). As per Merriam (1998), “Interviewing is necessary when we cannot observe behavior, feelings, or how people interpret the world around them”. Creswell and Creswell (2017), further suggested that semi-structured interviews allow the interviewees to share their experiences and help the interviewer collect the soft data. An interview guide (refer to Appendix A) is used to define the interview questions to compile the required information from the participants in line with the research objective.

An interview guide has been defined as “a list of questions which directs the conversation towards the research topic during the interview” (Cridland et al., 2015; Krauss et al., 2009). A semi-structured interview guide consists of two levels of questions: main themes and follow-up questions (Kallio et al., 2016). The main themes cover the main content of the research subject and the participants are encouraged to express openly their insights and experiences (Kallio et al., 2016). The order of the main themes could be progressive and logical (Krauss et al., 2009). Follow-up questions are

mainly used to make the main themes convenient for the participants to understand (Turner III & Hagstrom-Schmidt, 2022). Follow-up questions could be pre-designed, spontaneous, or based on the participant's answer (Turner III & Hagstrom-Schmidt, 2022).

As this research study primarily focuses on the BMI of potential fashion startups, the final research instrument used during the interview consists of seven key dimensions product biographies, CE principles, value creation, business value proposition, value chain network, customer insight, and cost structure. Regarding the value capture, only the 'cost structure' element was analyzed as it was not possible to evaluate the 'revenue streams'. Since these startups were in their initial stages of the lifecycle, concentrated mainly on product commercialization and fundraising from potential investors, and had not started trading yet (Spender et al., 2017). Another dimension of 'Adoption factors' (Lewandowski, 2016) was also not included in the proposed BMI instrument as it mainly focuses on factors required for change towards the CE system by incumbent firms (Ostermann et al., 2019).

The dimensions considered for the study emerged from the instrument proposed by Lewandowski (2016), Lüdeke-Freund et al. (2019), and Urbinati et al. (2017). As per Pieroni et al. (2019), the instrument presented by Lewandowski (2016) is one of the most applicable for analyzing and building innovative business models for CE. Lewandowski (2016) presented the instrument based on the adaptation of the business model canvas instrument (Osterwalder & Pigneur, 2010). To improve the robustness and relevance of the instrument, dimensions from the instrument proposed by Lüdeke-Freund et al. (2019)

and Urbinati et al. (2017) are also included. Table 1 presents the final analysis dimensions and their definitions.

Table 1

Dimensions of BMI for CE transition analysis - adapted from (Ostermann et al., 2021)

Dimension	Definition	Reference
Product Biographies	Covers the product specifications and its sustainable benefits to end customers	(Lüdeke-Freund et al., 2019)
CE Principle	Circular principles are i) design out of waste and pollution; ii) regenerate natural systems; and iii) extend the material's lifetime	(Ellen MacArthur Foundation, 2021b)
Value Creation	How business model innovation developed by the startup creates economic values	(Lüdeke-Freund et al., 2019)
Business Value Proposition	Comprises the CE concept implementation in offering value to the customers	(Lewandowski, 2016), (Lüdeke-Freund et al., 2019), (Urbinati et al., 2017)
Value chain network	Focuses on meaningful ways to build a circular supply chain network	(Lüdeke-Freund et al., 2019), (Urbinati et al., 2017)

Customer insight	Includes the target customer segmentation and approach for its expansion	(Lewandowski, 2016), (Lüdeke-Freund et al., 2019)
Cost structure	Covers the cost implications during business model operation	(Lewandowski, 2016), (Lüdeke-Freund et al., 2019)

3.5.2 Survey

The surveys help collect rich potential data and prioritize qualitative research values alongside the research techniques (Braun et al., 2020). Surveys usually consist of a set of open-ended questions, drafted by the researcher and focused on a particular topic (Braun et al., 2020). The survey questionnaire as exhibited in Appendix D was outlined based on the literature review as well as findings from the semi-structured interviews.

The main objective of the survey is to compile a detailed understanding of key trends and drivers that need to be considered to build and extend the value network among startups and incumbent firms. Through the survey participants can also provide detailed insight in terms of how open they are to collaborate with potential start-ups to support circular fashion and scale it further to drive accelerated CE transition.

The survey comprises a total of twelve questions with each question having multiple options. Participants need to choose a suitable choice for each question to share their feedback. Survey questions primarily cover an insight from the participants on their

understanding of CE in fashion, their belief and role in leading circular fashion, expectations from circular startups, drivers, and challenges in collaborating with potential startups, and the role of government policies and end-consumers in adapting and expanding circular fashion in positioning it as a mainstream fashion business.

3.6 Data Collection Procedures

The data collection in qualitative research is primarily done in the form of spoken or written language instead of numbers (Polkinghorne, 2005). For this research study, primary data is collected through semi-structured interviews followed by a survey questionnaire. The secondary data is considered to come from a literature review and pertinent studies of published reports, documents, and articles.

3.6.1 Identifying Interviewees

With the focus on circular startups, the researcher reached out to the H&M foundation team which is the organizer of GCA for the contact details of the GCA winners. Subsequently, the researcher started reaching out through *Purposive Sampling* to these potential startups that seemed to be engaged in business innovation and working toward circularity (Bryman, 2016).

The researcher connected with a total of sixteen startups over e-mail requesting their time for an interview. Through the e-mail, the researcher introduced himself and his research subject to the startup companies, enquiring whether they would participate in an interview. Out of sixteen startups, five companies agreed to online interviews.

In defining the sample size, the researcher followed the concept of *Information Power* which states that “the more information the sample holds, relevant for the actual study, the lower amount of participants is needed” Malterud et al. (2016). Creswell (2002), also suggested that a small sampling size of up to 5 participants can be used for case study research. The researcher also felt that the five participants covering the main CE innovation areas (material, production, and recycling) are sufficient for understanding their circular business models and how they are supporting the CE transition in the fashion industry.

3.6.2 Conducting Interviews

The researcher conducted five in-depth semi-structured interviews lasting from 35 minutes to 40 minutes from July 2022 to September 2022. Virtual interviews were conducted using Zoom, a video conferencing software, that has been popular in qualitative research due to its ease of use (Archibald et al., 2019). Interviews were conducted based on an interview guide (refer to Appendix B) to ensure that the discussion will focus on how these startups drive value creation on their end products by incorporating circularity through BMI (Planing, 2018). Based on *Abductive* reasoning, interview questions were reviewed and amended for respective participants, allowing the researcher to go deeper with understanding their business model innovations. During the interview, there was allocated time for an open discussion with the interviewee to cover market insight on circular fashion at large.

Interviews were conducted in English, as it was a common language among interviewees and researcher. The semi-structured interviews were recorded with permission from the interviewees to enable transcription and coding (Valentine, 2005). The transcriptions were analyzed manually according to research objectives followed by compiling data in Excel format (Table 2). The consolidated data was the foundation to evaluate information and key features of the startups, elements of their innovative business models, and how they can be instrumental in the transition of CE across the fashion industry.

Table 2

Discussion Summary with startups on BMI dimensions for CE transition

	Categories						
Startups	Product biographies	CE Principle	Value creation	Business value proposition	Value chain network	Customer Insight	Cost structure

3.6.3 Conducting Surveys

In the next step of the data collection procedure, an online survey was administered to all the key stakeholders in the fashion value chain including raw material manufacturers, yarn spinners, fabric and garment producers, and retail brands. A total of 25 participants shared their responses through a survey questionnaire. These responses helped in gaining a detailed understanding of their beliefs about circular fashion, its

progression over the linear economy, the key challenges, and expectations they have in collaborating with circular startups, the major steps in building a strong network among players, their contribution toward the circular economy transition in the fashion industry, and the role of consumers and government policies to accelerate the CE transition. The survey also covered insights about the role of government policies and consumers in supporting circular fashion.

3.7 Data Analysis

The content analysis technique is applied to analyze the consolidated data and code it according to seven dimensions. Content analysis is a systematic and detailed approach to analyzing crucial trends and patterns (S. Stemler, 2000; White & Marsh, 2006). According to Stemler (2000), using word frequency counts to identify the words of potential interest in the content analysis is good. Stemler (2000) further stated that the content analysis technique is quite relevant and meaningful due to its reliance on coding and categorizing the data.

Weber (1990, p. 37) defined a category as “a group of words with similar meaning or connotations”. “ Categories must be mutually exclusive and exhaustive” (S. Stemler, 2000). When the validation of inferences has been made based on data, it demands the use of multiple sources of information which takes the form of triangulation (S. Stemler, 2000). Qualitative content analysis with an inductive research approach often requires careful and repeated reading of the text (White & Marsh, 2006).

To start a content analysis study, collated data must be fragmented into sampling, collecting, and analysis units (White & Marsh, 2006). The sampling and collecting units will be determined through pragmatism however the analysis units will be based on research questions (White & Marsh, 2006). In qualitative research, the objective is transferability (a perception of whether research findings from one context are relevant to another), not generalizability. So, not all objects that were analyzed need to have a uniform probability of being part of the sampling (White & Marsh, 2006).

Content analysis can be used with a large variety of data sources, including textual, audio, and visual data (e.g., photographs or videos) (S. E. Stemler, 2015). The end goal of qualitative content analysis is to display the "big picture" of the defined subject through the contemplative order of a sequence of comprehensive information (White & Marsh, 2006).

3.8 Methods of Validation

Triangulation is the key strategy used for this study to improve the validity and trustworthiness of the research findings. Triangulation is a vital methodology in evaluating and managing various biases and delivering valid propositions in qualitative approaches (Mathison, 1988). Creswell and Poth (2016), further suggested that triangulation can be applied in cross-validating the consistency of collected data in case more than one research method is used. It further validates the reproducibility of the observation and interpretation as well as the rigorousness of the study (Gomm et al., 2000). Therefore, the triangulation approach is followed to a certain proportion in this

research study by collecting data through interviews, questionnaires, and document analysis which can be further triangulated against each other.

The study has some limitations that may restrain the generalizability of the findings. One of the limitations of this study could be related to the limited number of interviewees. However, as mentioned in the previous section, the outcome of the interview is not completely decided by the sample size rather it is important to collect relevant and substantial data which can be further used for analysis purposes. Creswell (2002), also suggested that a small sampling size of up to 5 participants can be used for case study research. In this study, 5 respondents participated in the interview process which is considered appropriate. Moreover, even though the research is focused on suitable and innovative cases, exploratory research does not assure generalizability to all the companies in the fashion industry.

CHAPTER IV:

RESULTS

This chapter provides the key results of this research work. It comprises two sections including a detailed description of the case study and data analysis produced by two research instruments – semi-structured interviews and survey questionnaires.

The chapter began with an introduction of the case companies and how they started with their CE journey. Furthermore, some descriptions of their innovative product offerings and their implication for the fashion industry. Finally, important findings in terms of the main challenges and expectations from supply chain partners to collaborate with these startups will be presented.

4.1 The Research Case

This section provides details regarding the startups and their CE journey as they were shortlisted as case companies for the interview. The participants from respective startups involved in the study shared their crucial inputs and contributions during the interview. The information shared about their company's product offerings and their applications, role in the company and innovation journey, business value propositions, challenges in collaborating with the fashion supply chain, customer insight, and their future growth plans are some of the success factors of the study. It also covers the details of the fashion supply chain players who participated in survey questionnaires.

4.1.1 Details of the case companies in the study

The study involved five companies that are early-stage startups offering innovative products to support CE transition in the fashion industry.

Table 3

List of the Startups with coding ID covered in the study

Case Company ID	Coded ID	Year Founded	Size*	Innovation Area	Circular startup typology	Circular strategies
A	IAS	2015	Small	Recycling	Waste-based	Closing and Slowing the loop
B	IBS	2016	Small	Recycling	Design-based	Slowing the loop
C	ICS	2014	Small	Material	Waste-based	Closing the loop
D	IDS	2018	Small	Production	Platform-based	Narrowing the loop
E	IEM	2018	Medium	Production	Service-based	Narrowing the loop

*CE startups overview. *Micro companies have less than 10 employees; small companies less than 50; medium companies less than 250; and large companies 250 or more (Papadopoulos et al., 2018)*

4.1.1.1 Case Company A

Company A is a textile startup, founded in 2015 that converts end-of-life textile 'waste' into new yarns for brands and manufacturers. The 'closed-loop' product company

offers circular material made from end-of-life textiles through their novel technology which allows them to purify and recover new materials from otherwise difficult-to-recycle streams.

This circular raw material reduces the dependence of the fashion industry on new virgin materials and provides meaningful ways to reduce the burden of textile waste. This circular product had long-term implications for the fashion industry by minimizing its negative impact on the environment from the greenhouse gas emissions generated during the production of man-made fibers from crude oil like polyester.

The company's business model follows two of the CE principles (Ellen MacArthur Foundation, 2015), a) design out of waste and pollution; and b) extend materials' lifetime. Its CBM certainly provides an advantage in the long term by minimizing the impact of volatility in raw material prices and availability. In terms of business value proposition, the company enables true circularity by separating fibers within the waste clothing on a molecular level and reprocessing them back into new raw materials. This reduces the burden of greenhouse gases on our environment which are mainly responsible for global warming and climate change. Thus, supporting the CE transition in the fashion industry.

The company is taking some significant actions to build a resilient supply chain network across the fashion value chain, as their co-founder explains:

"It is very important for us to first explain the importance of our circular efforts to the key actors of the fashion supply chain which includes brands, fabric, and yarn manufacturers. Followed with strong collaboration among the key stakeholders to build

and expand our network which is essential to scale up the production of our circular material and its demand in the market."

Strong demand from leading global brands followed by keen interest from fabric manufacturers to use more circular materials is the key driver for the company to continue its CE journey. However, scalability and availability of closed-loop material at a commercially acceptable price are some of the barriers that hinder its growth at a faster pace. Presently company operates in a business-to-business (B2B) customer segmentation however, in the future, they are planning to extend to business-to-business-to-customer (B2B2C) since the end customer plays a crucial role in the whole process of unused clothing.

Currently, company A is working on scaling up its production by starting the first commercial manufacturing plant and servicing the demands of circular textile material from leading global fashion brands. Since several other startups are also exploring this textile-to-textile (T2T) recycling space, company A focuses on rapid expansion to generate sustainable revenue from the business.

4.1.1.2 Case Company B

Company B is an IOT-based product startup, established in 2016. It drives innovative technological development by offering intelligent garment and wearable electronic solutions to the fashion industry supporting its transition from a conventional linear model to a circular economy. The company brings industry knowledge and proficiency in microelectronics for textile application by utilizing a patented, multi-layer

composite yarn production process. It offers RFID tags in the form of electronic threads that are reusable, flexible, and can withstand the utmost conditions.

As per the company's estimate, annually fashion industry uses about 12.5 billion conventional metal RFID tags which go to the bins after garment sales and finally end up in the landfills. In contrast, the company's e-thread-based RFID tag uses less than one percent metal and remains integrated inside the garment like a passport. These e-threads help the brand in the traceability and authenticity of the garment and inventory management, after-sales, and textile waste sorting of discarded garments. In the end, these tiny e-threads can be removed from waste garments and reused in fresh production making them truly circular products.

The company's innovative BM is based on one of the core CE principles, 'extend materials lifetime (at their highest value)' since its IOT-based e-threads can be used multiple times. The company offers a unique value proposition to leading global fashion brands by clearly explaining the long-term sustainable benefits of its e-threads over existing RFID tags.

The company first drafts a pilot proposal with the brand aligning on the key milestones and expected outcomes. Subsequently, collaborate with the brand's nominated supply chain partners including fabric and garment producers to educate them on the process of integrating e-threads into the finished garments. In the end, all the concerned stakeholders evaluate the performance of packed garments at the retail store on all the laid down parameters. This whole exercise helps the company to scale up the e-thread adoption across different brands and geographies.

Presently company's focus is on B2B customers however, in the future they see an opportunity in the B2C space as well since there is an immense scope of 'garment rental' as a potential CBM where end customers can directly order e-thread for quick and convenient product traceability. The company is opening its subsidiaries in different countries across the globe to explore investment opportunities for rapid expansion and scale-up production. Their long-term goal in the next five years is to be a producer and technology provider of e-threads to the global fashion industry and contribute to its transition towards CE at a rapid pace.

4.1.1.3 Case Company C

Company C is a textile material startup founded in 2014 that offers high-quality sustainable yarn and fabrics for the fashion-luxury sector made from fruit juice production by-products. The company through its patented and innovative manufacturing process extracts cellulose from the fruit pulp (the wet residue that remains at the end of the industrial production of fruit juice), then transforms this cellulose into yarn and subsequently into premium fabric. This circular material reduces the dependency on virgin natural resources and reuses a by-product not suitable for food consumption. Thus, minimizes the exploitation of land and water, and the use of harmful pesticides.

The company firmly believes that increasing the awareness and understanding of what sustainable and circular fashion means helps evolve the knowledge of all the key actors of the fashion industry, as their CEO says:

“We are also trying to push the idea of circularity not just in where the raw materials come from but also in how you use it, the fact that you can maybe mend it or recycle it at the end of the life. So not just using it a few times and selling it away or waste it away but having a garment that is there to last.”

The company’s contemporary BM is based on the CE principle of “design out of waste and pollution” and it continues to drive the fashion supply chain to somehow include circular material innovations in their product range to create a long-term impact. Some of the key challenges the company faces while collaborating with the stakeholders are the product’s credibility and its acceptability at the manufacturer’s facility to plan regular bulk production trials. However, the company strongly believes that support from brands and retailers in terms of prolonged commitment to use such circular materials in their product range can be highly beneficial.

“If brands commit to buy a certain amount of the circular material at a certain price, the innovators can somehow use that as leverage for their fundraising” – CEO of company C.

The company operates in the B2B model in terms of the business side but it also extending its outreach in the B2B2C space while explaining the product superiority, acceptance by leading brands, and transparent communication to the consumer. The company evaluates suitable opportunities to collaborate with established players for quick scale-up and market outreach. The main hurdles the company experiences during new customer acquisition and sustaining the existing ones are speed and production capacity to complete specific sampling requirements. The company presently focuses on

extending the production capacity and price improvement of its product offerings to reach a wider audience rapidly as in the future there is significant competition expected in bio-based circular textile materials.

4.1.1.4 Case Company D

Company D is a pioneering traceability platform established in 2018 to create end-to-end traceability starting from fiber to retail. Its innovative technology generates article-level transparency across the fashion value chain which further contributes to inventory optimization. Through its digital coins, the company tokenizes the physical amount of the product being traced and thus provides one hundred percent assurance for no ‘double’ counting to its customers.

The company offers complete visibility to the brands on the usage of sustainable materials across the supply chain which further helps brands in increasing the share of such materials in their product portfolio and making evidence-based sustainability claims. The company further provides the possibility of integrating this information with the existing product barcode which can be scanned using the app and the required details can be shared with the end consumer. This traceability platform creates a long-term impact on the fashion industry by allowing brands to make sound decisions regarding the adoption of circular products consistently, making genuine product claims, winning the trust of end customers, and eventually growing their market share.

The company’s ingenious BM essentially works with two ends of the supply chain. On one side are the fiber producers at the top and on the other extreme are the

brands and the retailers. All the transactions on the platform happen in real-time as it offers ‘fiber forward traceability’ and thus enables circularity in the fashion industry by furnishing the actual composition of the garment. These details surely help brands to make a sound decision as to how to recover new materials from the garment at the end of its life.

The main value proposition for a brand to use the company’s platform is the ability to track multiple sustainable fibers including natural, man-made cellulosic, and synthetic fibers at the same time. The company strongly believes that all the key stakeholders need to collaborate closely to drive rapid CE transition in the fashion industry. The company already works with 30 of the major international brands and primarily operates in the B2B model. It feels its unique business proposition of ‘fiber forward traceability’ is what attracts customers and helps extend its outreach rapidly.

“Our focus is always on delivering good quality information with brands to ensure that they understand the value that we bring to them and that’s only our way of customer retention, nothing else” – Head of Customer Engagement of Company D.

The company presently does not charge anything from suppliers to create their accounts and do the transactions, the only monetary contracts are with the brands and fiber producers. However, the company is planning to come up with a nominal subscription fee to maintain these data on its servers. It has aggressive growth plans and would like to serve the largest top 50 brands in the world in the next two to three years.

4.1.1.5 Case Company E

Company E is an independent nonprofit institute formed in 2018 to build AI-based solutions to help farmers produce cotton crops more sustainably and economically. Its tech-enabled system helps cotton farmers safeguard their crops by regulating the accurate time to spray pesticides through instant and localized guidance. The company's solution guides small-scale cotton farmers on the optimal time to take preventive action and protect their farms against crop losses due to pests.

Cotton crops, in general, are susceptible to pests. According to the company's estimate, thirty percent of crop yield was lost in recent years due to pest attacks. Smallholder farmers encounter most of the challenges including unexpected yield and low income. To overcome this, a significant amount of pesticide is used during cotton production. It is estimated that in India, cotton accounts for fifty percent of total pesticide usage. The unsystematic use of pesticides results in a financial burden to the farmers along with an adverse effect on their health, the soil, and mother nature.

The company offers the solution primarily to the cotton farmer who uses its app and works closely with the farmer welfare program to manage pest infestations. Its unique BM supports sustainable farming which in the long run helps fashion players to use a greater share of natural raw material in their product mix and subsequently retrieve the useful material from the discarded garments.

The distinctive value proposition, in this case, is the high level of engagement between the farmers and the adoption of the technology through an app or any other platform. The company strongly believes that the technology ecosystem that they were able to build is something that can be extended to other countries at a rapid scale. The

company open-sources its data which enables supply chain partners to embrace and use it in a meaningful way without the company being the primary driver in the ecosystem.

"We are working with nonprofit farmers who are interested in making sure that technology is being introduced in their livelihood programs which in some way make sure, they get better yield and have the best access to information" – Founding Member of Company E.

The company sometimes faces roadblocks in being able to access useable information including end-use profiles, and target geography to build tech models however the company incorporates expertise from a group of relevant people to build something sector-agnostic. The company is also getting a lot of support from the government in terms of the use of technology in building climate-resilient agriculture. The company in its future growth plan would like to better its tech solution to improve the farmer's livelihood further and reach diverse geographies. Eventually, creates a long-term and positive impact on the entire agricultural community.

4.1.2 Details of the participants in the study

This section summarizes the details of the five case companies from the interviews (Table 4) and the twenty-five participants involved in the survey questionnaires (Table 5) voluntarily. All personal information of the companies and participants was anonymized, and they were instead identified by unique IDs.

Table 4

Interview Summary of the Participants from the Case Company

Case Company	Segment	Position Interviewed	Interview Duration	Business Value Proposition
A	B2B2C	Co-Founder	35 min.	Sustainable yarn for the fashion industry produced from end-of-life textile waste
B	B2B	Founder and Chairman	35 min.	RFID tags in the form of e-Threads for digital identification of garments
C	B2B2C	CEO	35 min.	Bio-based, high-value textiles fibers from Agri-waste
D	B2B	Head of Customer Engagement	35 min.	Revolutionary traceability platform custom-built for the fashion and textile ecosystem
E	B2B	Founding Member	40 min.	Early pest warning and advisory system using computer vision for cotton farmers

Table 5

Summary of the Survey Participants from various Companies

Surveyee	Coded ID	Position	Industry Segment
Brand 1	B01	Global R&D Manager	Fashion Brand
Brand 2	B02	Senior Director	E-Com Fashion
Brand 3	B03	CSR Manager	Hypermarket
Brand 4	B04	Chief Merchandising Officer - D2C Brands	House of Fashion Brands
Brand 5	B05	Vice President	Denim Brand

Brand 6	B06	Chief Business Officer	Formalwear Fashion Brand
Brand 7	B07	Senior General Manager - Central Sourcing	House of Fashion Brands
Brand 8	B08	Assistant Vice President – Wovens Sourcing	Fashion Brand
Brand 9	B09	Fabric Manager	Denim Brand
Brand 10	B10	CEO - India Business	Fashion Brand
Brand 11	B11	Sourcing Product Manager	Fashion Brand
Brand 12	B12	Merchandising Manager	Hypermarket
Brand 13	B13	Senior Manager	Fashion Brand
Brand 14	B14	Associate Manager	Fashion Brand
Brand 15	B15	Director Strategic Sourcing	Fashion Brand
Fiber Manufacturer 1	FM01	Business Development Director - South Asia	Fiber Supplier
Fiber Manufacturer 2	FM02	Vice President	Fiber Supplier
Fiber Manufacturer 3	FM03	Chief Commercial Officer	Fiber Supplier
Yarn Manufacturer	YM01	Director	Yarn Supplier
Fabric Mill 1	FAM01	Business Head	Denim Fabric Mill

Fabric Mill 2	FAM02	Marketing Head	Fabric Mill
Fabric Mill 3	FAM03	Group President and CEO - Textiles	Fabric Mill
Garment Manufacturer 1	GM01	Senior Vice President	Garment Manufacturer
Garment Manufacturer 2	GM02	General Manager - Sustainability	Garment Manufacturer
Textile Consultant	TC	Business Director	Textile Consultant

A total of 25 companies participated in the online survey. The survey includes fifteen brands, three fiber manufacturers, one yarn spinner, three fabric mills, two garment manufacturers, and one textile consultant. All these diversified but crucial supply chain actors provided important insight in terms of their expectations and challenges in collaborating with CBM-based fashion startups to support the CE transition.

4.2 Data Analysis

This section presents an analysis of the important findings from the personal interviews of the startups and survey questionaries of the fashion supply chain actors. The analysis executed in this section covers data triangulation from various primary sources including interviews and questionaries and secondary sources including company websites.

4.2.1 Coding System of the Participants

The coding system used in the study is consciously outlined to streamline the reading and understanding in an analytical and inferential way. It is used to classify and represent the findings in accordance with the purpose and objective of the research. Table 6 represents the legends used to recognize the statistical data of the interviewees and the survey respondents keeping intact their anonymity and confidentiality.

Table 6

Legend for Interviewees and Survey Respondents

Participants	**Legend**
Type	I: Interviewee; R: Survey Participants
R-Segment	B: Brand; FM: Fiber Manufacturer YM: Yarn Manufacturer; FAM: Fabric Mill, GM: Garment Manufacturer; TC: Textile Consultant
Startup size	S: Small; M: Medium; L: Large
Example	IAS: Interviewee Case Company A with small size FAM01: Fabric Mill 1

4.2.2 Findings from the Interviews

During semi-structured interviews, all the GCA winner startups were able to provide valuable insights in terms of their product biographies, CE principles followed during the BMI process, the business value proposition offered, important value creation activities followed, crucial elements required for supply chain collaboration, target customer segments, and their cost structure.

In the interview, the respondents were asked open-ended questions regarding the six important themes (listed in Table 7) followed by respective sub-questions.

Table 7

Interview Themes for the Participants

Item	Interview Theme
1	Product Biographies
2	Initiative Description
3	Business Value Creation and Value Proposition
4	Supply Chain Integration
5	Customer Insight
6	Cost Structure

A set of interview sub-questions as explained in Appendix B was used to capture the related information during the interview process.

4.2.2.1 Summary of Dimensions of BMI for CE Transitions Analysis

In the initial phase of data analysis, the interview transcripts of each respondent were carefully reviewed. Subsequently, the information collected from different respondents during respective interviews was coded based on the dimensions that emerged from the instrument proposed by Lewandowski (2016), Lüdeke-Freund et al. (2019), and Urbinati et al. (2017). (as shown in Table 1)

The BMI dimensions applicable to each case company have been mapped and summarized individually to explain the product biography of the startup, the CE principles followed by the firm, its 'value' mechanism across value proposition, value creation and delivery, and value capture, as well as the targetted customer segments.

Table 8

Summary of BMI dimensions for CE transition analysis: Case Company 'A'

Item	Dimensions	Description
1	Product Biographies	Circular yarn from Textile-to-Textile Recycling
2	CE Principle	Design out of waste and pollution, Extend materials' lifetime
3	Value creation	Closed-loop textile material production and promotion
4	Business Value Proposition	Sustainable yarn for the fashion industry produced from end-of-life textile waste
5	Value chain network	Close coordination with manufacturers and brands to scale up production and demand
6	Customer insight	Currently focuses on B2B and soon towards B2C since customers play an important role in the whole process of unused clothing
7	Cost structure	Input cost of end-of-life textile material, Higher production cost due to pilot plant

Table 9

Summary of BMI dimensions for CE transition analysis: Case Company 'B'

Item	Dimensions	Description
1	Product Biographies	RFiD Threads for digital product traceability
2	CE Principle	Extend materials' lifetime
3	Value creation	Reusable and washable RFID material, invisibly integrated into the garment for endless applications
4	Business Value Proposition	RFID tags in the form of e-Threads for digital identification of garments
5	Value chain network	Brand outreach for RFID Threads nomination and usage across the fashion supply chain
6	Customer insight	Mainly works with B2B customers however in the future sees an opportunity in the B2C space
7	Cost structure	Higher production cost due to pilot route, working on large investments for scaling up production

Table 10

Summary of BMI dimensions for CE transition analysis: Case Company 'C'

Item	Dimensions	Description
1	Product Biographies	Regenerated cellulosic fiber from fruit juice production by-products
2	CE Principle	Design out of waste and pollution

3	Value creation	Innovative, high-quality sustainable material for luxury fabrics produced from the food waste stream
4	Business Value Proposition	Bio-based, high-value textile fiber from Agri-waste
5	Value chain network	Building strong partnerships with brands and manufacturers to create awareness about circular textile fiber and its usage
6	Customer insight	For business deals with B2B customers and communication on circular fashion works on B2C strategy
7	Cost structure	Extraction cost of feedstock from fruit juice waste, Additional manufacturing cost due to batch process

Table 11

Summary of BMI dimensions for CE transition analysis: Case Company 'D'

Item	Dimensions	Description
1	Product Biographies	Sustainable fiber forward traceability platform with digital tokens
2	CE Principle	Extend materials' lifetime

3	Value creation	SAAS-based end-to-end traceability platform from fiber-to-retail, ensuring authenticity and source of origin for sustainable textiles
4	Business Value Proposition	Revolutionary traceability platform custom-built for the fashion and textile ecosystem
5	Value chain network	Collaboration with the complete fashion supply chain in building transparency during material movement without any duplication
6	Customer insight	Mainly works with B2B customers
7	Cost structure	Regular cost in system upgradation and maintaining customer accounts

Table 12

Summary of BMI dimensions for CE transition analysis: Case Company 'E'

Item	Dimensions	Description
1	Product Biographies	Artificial Intelligence (AI)-based pest management system for cotton farmers
2	CE Principle	Regenerate natural systems
3	Value creation	Personalized advisories for farmers to decrease the indiscriminate use of pesticides and improve the quality and yield of the crop
4	Business Value Proposition	Early pest warning and advisory system using computer vision for cotton farmers

5	Value chain network	Works closely with farmers and local government bodies to manage pest infestation and reduction in pesticide usage
6	Customer insight	Mainly works with B2C customers
7	Cost structure	Regular cost for system maintenance, customary modification, and maintaining records

The BMI dimensions summary of each startup provided crucial details in terms of their unique value proposition for the fashion industry, business approach towards the targetted customers, and real-world contribution in supporting the CE transition. Additionally, these dimensions help interpret and determine the important measures in constructing CE networks across key fashion supply chain stakeholders and startups.

4.2.3 Findings from the Survey Questionnaires

In the next phase of analysis, the feedback from each survey respondent against all twelve questions was reviewed thoroughly and illustrated in graphical form to understand and elaborate the viewpoint. The key quotes from some of the participants were also coded and categorized to highlight their opinions on CE and its transitional journey in the global fashion industry.

4.2.3.1 Feedback from Survey Participants

During the online survey questionnaire, all the participants shared their understanding of CE in fashion, their belief and role in driving circular fashion, the scope

of circular innovations from fashion startups, expectations, drivers, and challenges in collaborating with potential startups, and the role of government policies and end-consumers in adapting and expanding circular fashion in positioning it as a mainstream fashion business. These inputs against each question have been illustrated in the form of a Pie or Bar chart to display the survey results in a meaningful way.

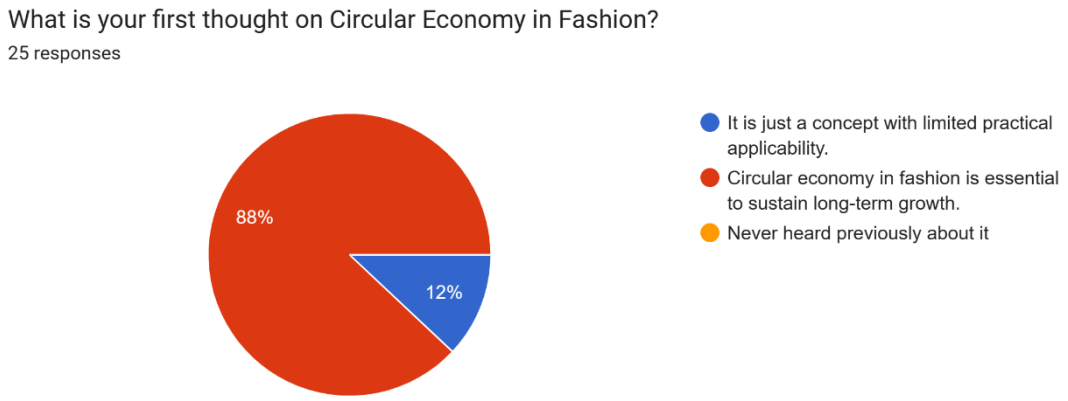

Figure 11.
Thoughts on CE in Fashion

All the participants were well aware of the term ‘Circular economy’ and its implication in the fashion industry. The majority acknowledged that CE in fashion is essential to support its long-term sustainable growth.

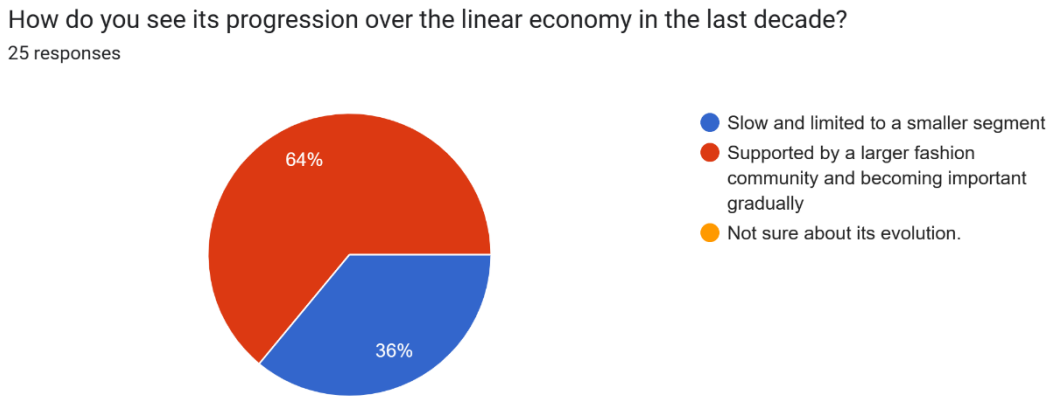

Figure 12.
Progression of CE over the linear economy

About two-thirds of participants accepted the continued progression of CE over a linear economy supported by a large fashion community and constantly becoming vital for the entire fashion supply chain.

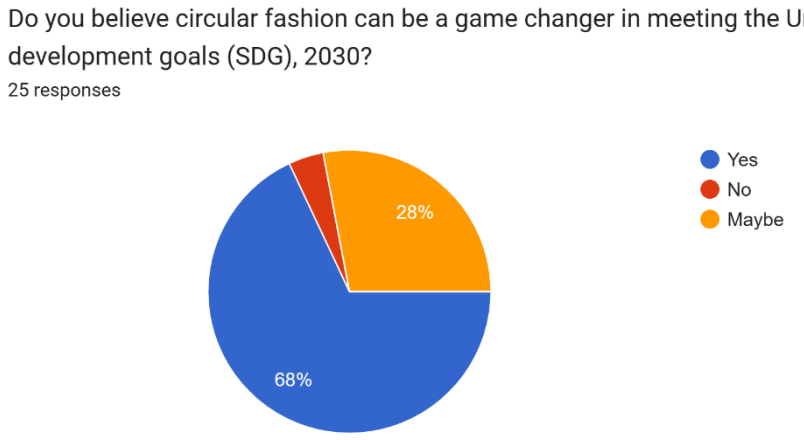

Figure 13.
Role of CE in Meeting SDG, 2030

Over two-thirds of participants believed that circular fashion (CF) is essential in meeting the United Nations SDG, 2030. Rest one-third of them are not sure about the impact of CF in meeting SDG, 2030.

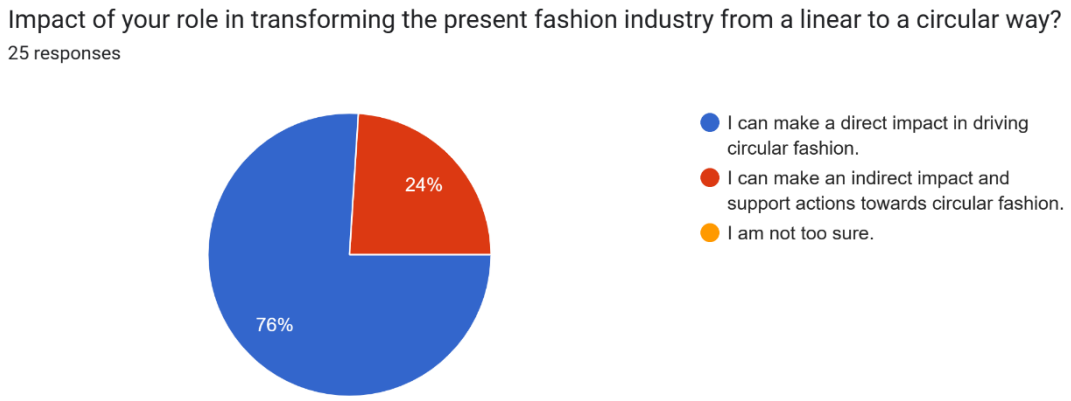

Figure 14.
Role in transforming the fashion industry from a linear to a circular

All the participants agreed that they could make either direct (over three-fourths) or indirect (about one-fourth) impact and support actions toward transitioning the linear economy to CE in the fashion industry.

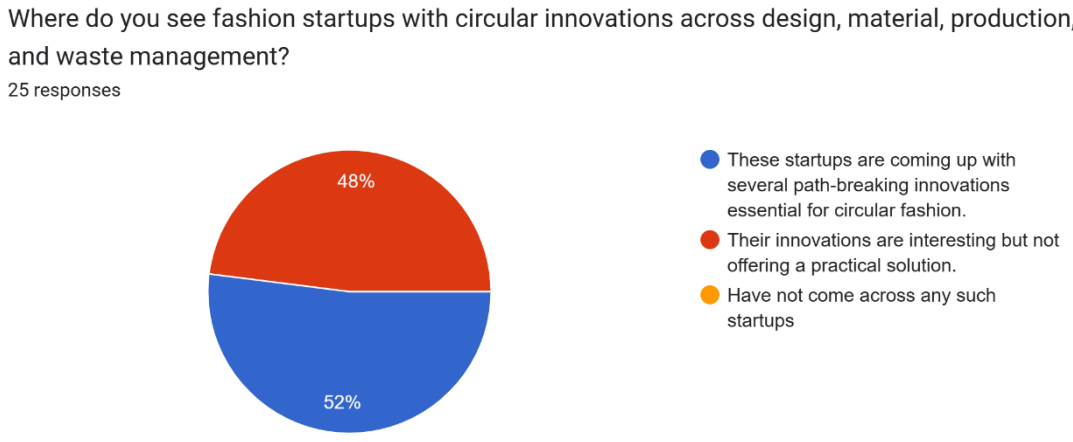

Figure 15.
Scope of circular innovations from the fashion startups

The participants have contrary views on the role of fashion startups supporting CE. About half of them accept that these startups are bringing cutting-edge technological innovations that are essential for circular fashion. However, the other half believe that their innovations are not able to offer realistic solutions.

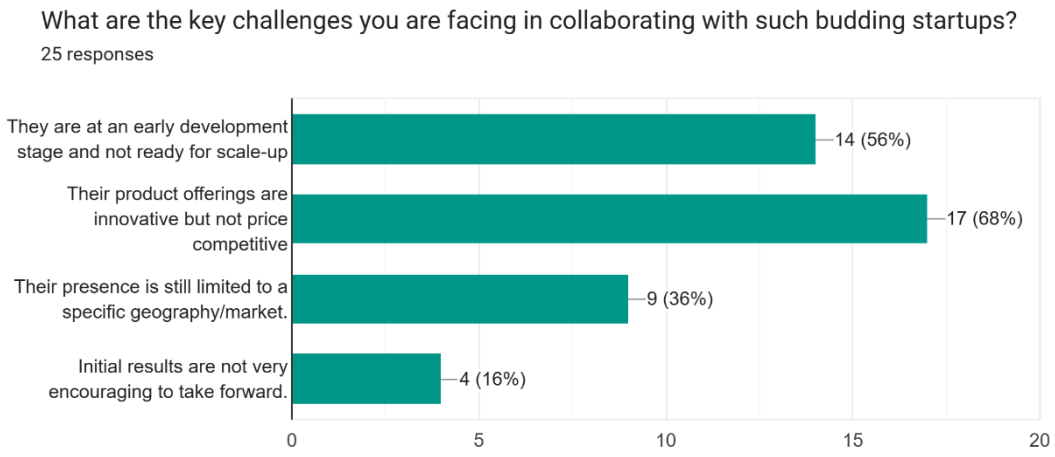

Figure 16.
Challenges in collaboration with the startups

The two key challenges highlighted by the participants in collaborating with the circular startups are price competitiveness and bulk scalability of their innovative products. Other concerns raised are limited geographical outreach and inconsistent test results.

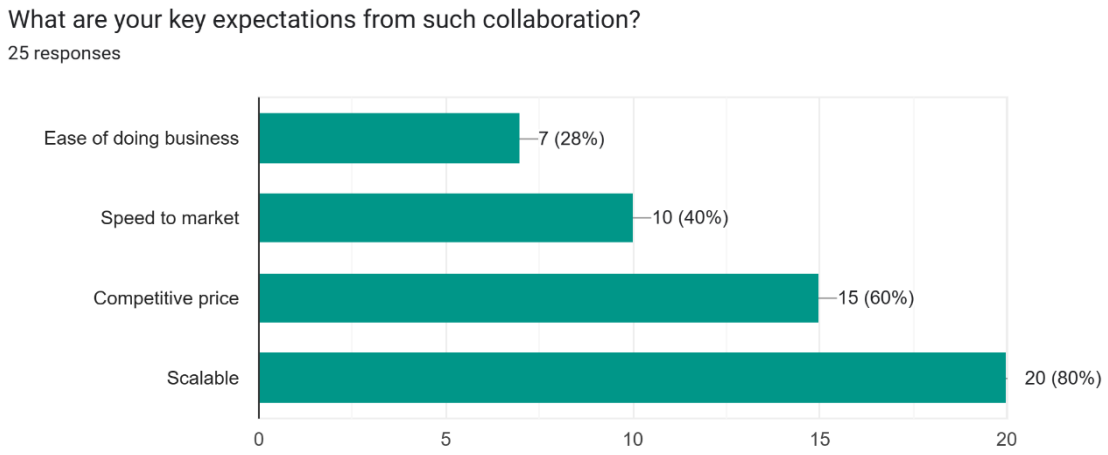

Figure 17.
Expectations from Circular Collaboration

The main expectations in building strong collaboration among incumbent firms and fashion startups are to bring such circular innovations at scale and competitive prices to successfully support the CE transition in the fashion industry. Other expectations are to quickly deliver these innovations to the consumer market and ease of doing business with each other.

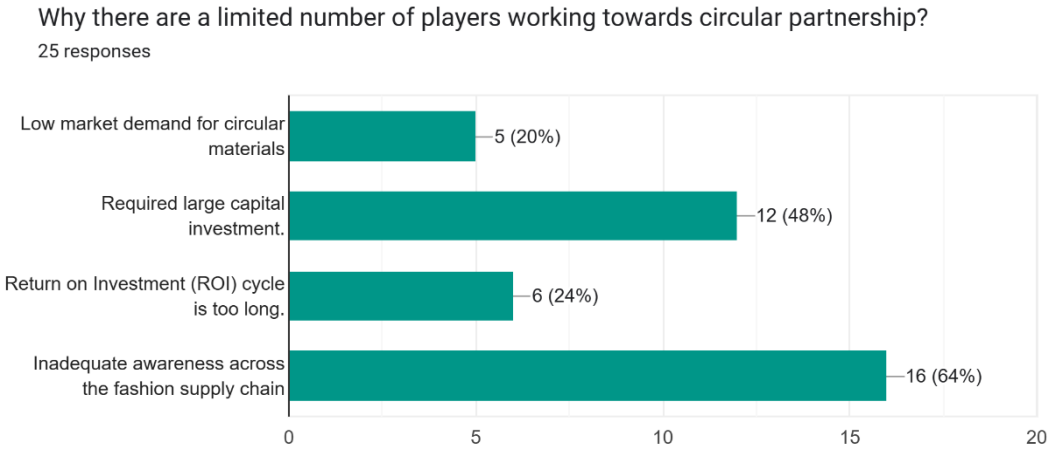

Figure 18.
Scale-up challenges in circular partnerships

The participants acknowledged that presently there are a restricted number of circular partnerships mainly due to insufficient recognition of such collaboration across the fashion supply chain and the requirement of large capital investment to build them from scratch. Other notable points are that the return on investment (ROI) cycle on such investments is too long and the market demand for circular materials is still very limited.

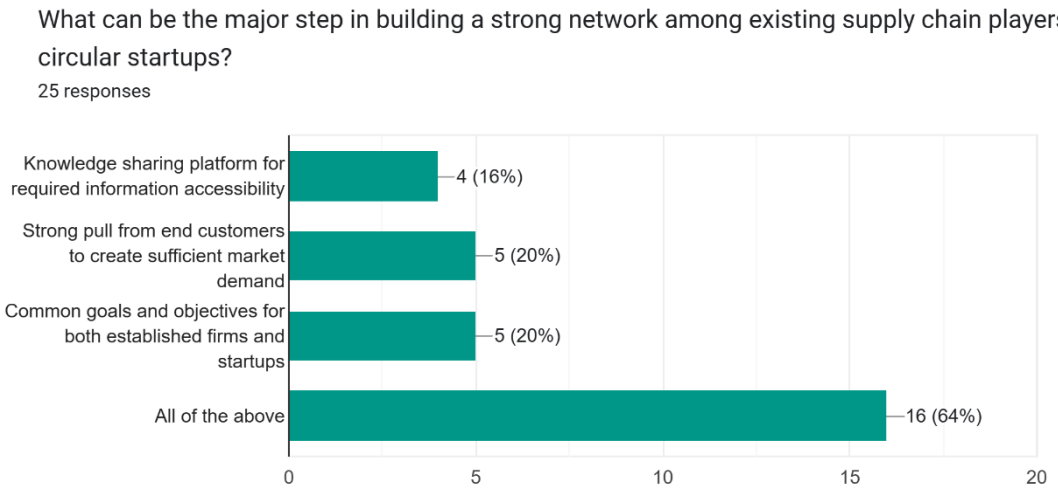

Figure 19.
Action steps in building CE Network

The key action steps required to build a strong CE network among established supply chain actors and fashion startups are to align on shared objectives and mutual goals, to build the knowledge-sharing platform to provide the necessary information on CE transition, and to generate a strong pull from end customers to create sufficient market demand for circular fashion.

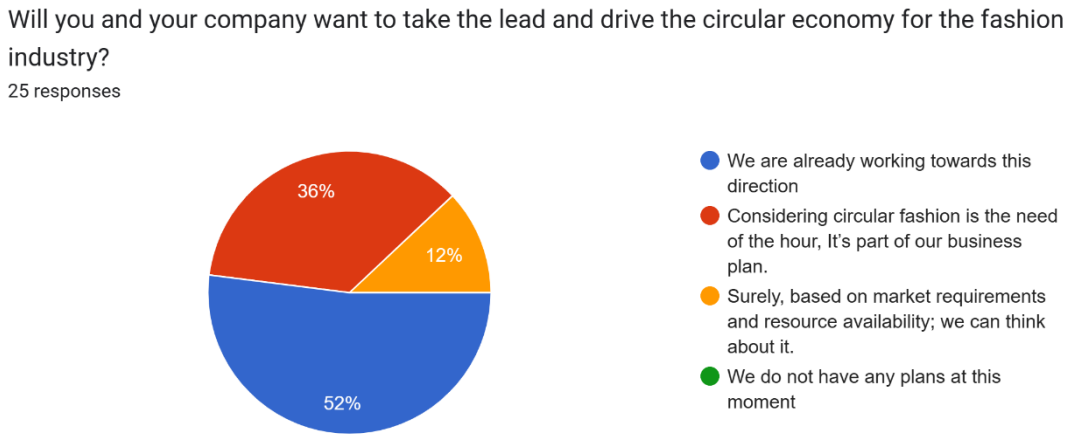

Figure 20.
Company perspective in leading and driving CE in Fashion

About half of the participants agreed that they had already taken the necessary steps to drive CE in the fashion industry. More than one-third of them conveyed that it is part of their business plan to work toward CF. A small number of participants accepted that based on the market requirements and resource availability, they could think about it.

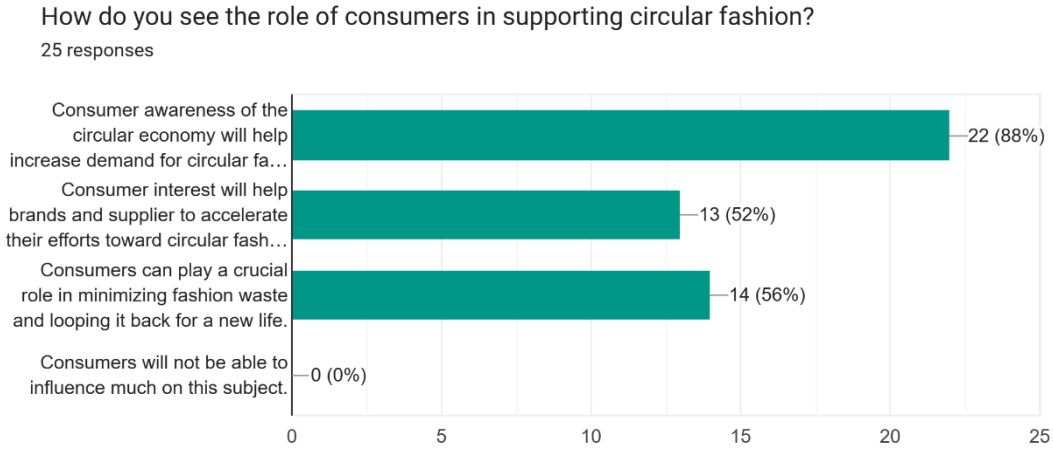

Figure 21.
Role of consumers in supporting circular fashion

Most of the participants believed that creating awareness about CE among consumers will help boost the demand for circular fashion (resale, recycle, repair, reduce). About half of them accepted that the role of consumers is crucial in reducing fashion waste and closing the loop in the fashion cycle. Half of the participants also accepted that interest from end customers will surely help brands and suppliers expedite their efforts toward circular fashion.

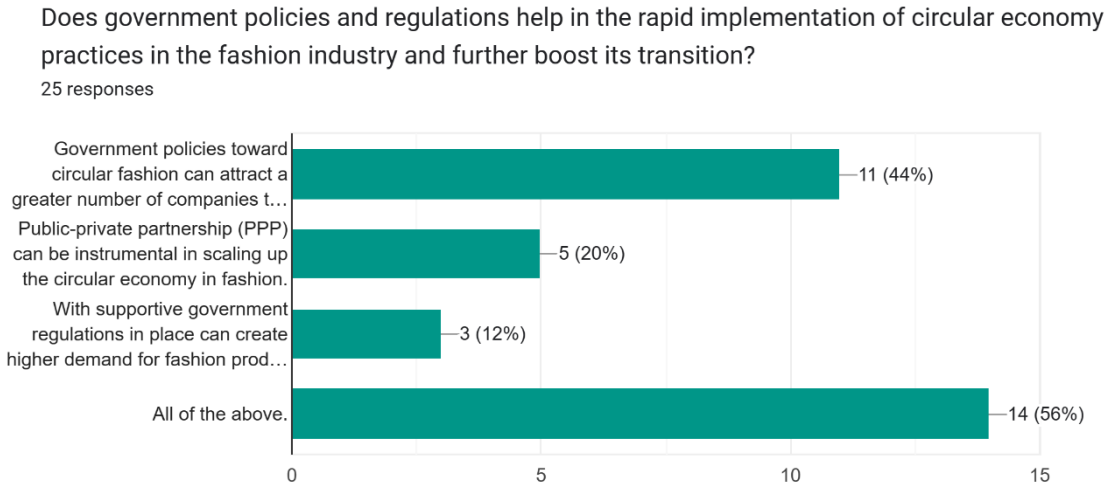

Figure 22.
Role of government policies and regulations in CE transition

The majority of the participants accepted that suitable government policies and regulations can draw a large number of companies to engage and collaborate with circular startups. Few of them believed that Public-Private Partnership (PPP) could be instrumental in scaling up the CE in fashion. Also, suitable government policies can create higher demand for fashion products made through closed-loop production.

4.2.3.2 Key Quotes from Survey Respondents

Most of the participants provided valuable quotes regarding CE and its transition in the current fashion industry. All the key quotes shared during the survey were coded and categorized in terms of opinions from respective supply chain actors like brands, fiber manufacturers, fabric mills, garment manufacturers, and textile consultants (as shown in Table 12). These quotes clearly explain the present perspective of different stakeholders from the fashion ecosystem towards CE and its future scope in the fashion industry.

Table 13

Key comments from survey participants towards Circular Fashion

Surveyee	**Coded ID**	**Position**	**Industry Segment**	**Comments towards Circular Fashion**
Brand 2	B02	Senior Director	E-Com Fashion	We should act now on circularity, or else will be too late
Brand 3	B03	CSR Manager	Hypermarket	It need not be complicated, can be made simpler with areas like recycle, and reuse. Traceability will be key but completely depends on consumers

Brand 4	B04	Chief Merchandising Officer - D2C Brands	House of Fashion Brands	Circular Fashion as a concept in India is not new - it's been there for 100's of years. We have been recycling, reusing, gifting to siblings/cousins, exchanging for utensils, or giving away to needy our apparel. However, over the last 20-30 years especially in urban India with the advent of fast fashion retailers and Western cultures, it's reduced. We need to just re-educate and build organized methods of repurposing the used-up apparel and we can get this culture back.
Brand 6	B06	Chief Business Officer	Formalwear Fashion Brand	Cost-effective and technically workable solutions and innovations to manufacture the fabric without affecting the original quality, attributes, and properties which the virgin fibers give are a must.
Brand 7	B07	Senior General Manager - Central Sourcing	House of Fashion Brands	The circular economy in the apparel industry is a great initiative toward sustainable fashion

Brand 8	B08	Assistant Vice President - Wovens Sourcing	Fashion Brand	The industry sees Circular fashion as a marketing tool to make economic gains, in my opinion, this hinders the growth of circular fashion. If the industry makes this cost neutral, and affordable then it would gain larger momentum and succeed in more people adopting to it.
Brand 9	B09	Fabric Manager	Denim Brand	Time is running out. The big shift in fashion is the Circular Economy.
Brand 10	B10	CEO - India Business	Fashion Brand	The developed countries need it the most, India needs sustainability practices in fabric and garment manufacturing to step up recycling a lesser challenge in India
Brand 12	B12	Merchandising Manager	Hypermarket	Brands have to pay higher prices for products so suppliers will be interested to work more vigorously on circular fashion. Also, govt has to put strict rules and regulations so Brands and suppliers follow the same
Brand 15	B15	Director Strategic Sourcing	Fashion Brand	Concept is great but execution and awareness are missing

Fiber Manufacturer 2	FM02	Vice President	Fiber Supplier	It's for our next generation, it's not business but responsibility
Fiber Manufacturer 3	FM03	Chief Commercial Officer	Fiber Supplier	Systemic change needed
Fabric Mill 2	FAM02	Marketing Head	Fabric Mill	Real change can only be achieved when sustainability is accounted for at every stage of the value chain
Fabric Mill 3	FAM03	Group President and CEO - Textiles	Fabric Mill	Circular fashion is a must to service the clothing requirements of 8 billion people (current world population)
Garment Manufacturer 1	GM01	Senior Vice President	Garment Manufacturer	All these efforts are at a very nascent stage and more understanding and scalability need to be built.
Textile Consultant	TC	Business Director	Textile Consultant	Funding for circular business is a concern area

CHAPTER V:
DISCUSSION AND CONCLUSION

The analysis results explained in the prior chapter share a comprehensive view of the potential startups in terms of their path-breaking innovations, business value proposition, value creation and delivery, value capture, and strategy to collaborate with key supply chain stakeholders. It also provides the complete CE journey of these new-age companies and how incumbent firms of the fashion supply chain perceive the growth of these startups, challenges, and expectations in building long-term relationships. This chapter covers a detailed discussion of each research question along with the limitations of this research study.

The main objective of this study is to attempt to contribute to the literature and the holistic view of the CE practices followed by the potential startups with their innovative BMs by reviewing and following the BMI dimension instrument proposed by Lewandowski (2016), Lüdeke-Freund et al. (2019), and Urbinati et al. (2017). Also, propose a structured framework to define the strategies to build and extend CE networks among startups and incumbent companies.

5.1 Discussion of the Findings from the Interviews

The insights collated during the interviews further explained the product strategy of each startup and its sustainable impact on the fashion industry, their motivation, and most importantly their actions to drive the circularity. It was found that CE-based startups

can create values and deliver them to their customers within the elements of the BMI dimensions: 1) product biographies, 2) CE principles, 3) value creation, 4) business value proposition, 5) value chain network, 6) customer insight, and 7) cost structure (Lewandowski (2016), Lüdeke-Freund et al. (2019), and Urbinati et al. (2017)). The 'value' initiatives followed by the case companies to support CE transition in the fashion industry under these seven elements are outlined in Appendix D and each element is discussed thoroughly in this section.

5.1.1 Product Biographies

For CE-based startups, the product biographies are about 1) offering differentiated products or services; 2) extending the product and service portfolio; and 3) adding new features to complement their products and services.

These potential fashion startups attract customers by offering unique and innovative products and services that enhance user experience and promote greater circularity. For example, case company A focused on offering truly circular yarn from textile waste with its performance comparable to virgin material for endless applications for the fashion industry. Another circular startup like case company D had developed a digital platform offering sustainable fiber traceability across the fashion supply chain supporting CE transition.

Based on the interviews, it was found that these startups have a significant impact across the fashion industry by extending their product and service portfolio. A platform-based startup company D had made crucial modifications to extend its service portfolio to

offer material traceability for various natural and man-made fibers for the fashion and textile ecosystem. Another service-based startup company E made a significant impact on the livelihood of small cotton farmers by partnering with local government bodies and extending the outreach of its advisory system across different geographies.

Adding new product features to complement their product and services is strategically very important for these new-age companies to create value for their customers. For example, case company C recently collaborated with the leading fiber manufacturer to produce sustainable fiber made from its agri-waste-based cellulosic feedstock with unique product features creating awareness of CE and long-term business relationships.

5.1.2 CE Principles

The core foundation of these startups is based on the CE principles, which are 1) design out of waste and pollution; 2) regenerate natural systems; and 3) extend the material's lifetime (Ellen MacArthur Foundation, 2021b). The key activities followed by each startup in terms of product development, process innovations, and technology adoption to drive CE transition are in alignment with the CE principles.

Based on the CE principle of ‘extend the materials lifetime’, Design-based startup company B developed RFID threads for digital product traceability. These fine threads can be used multiple times during their lifetime and help save a significant amount of metal usage in comparison to conventional single-use RFID tags. Another, waste-based startup company A which offers circular yarn from textile to textile recycling follows two

CE principles i.e. design out of waste and pollution and extend the material's lifetime. The company uses end-of-life textile waste to produce circular yarn which can be reused and thus reduces our dependence on new virgin material.

These startups build their BM keeping CE principles at the core of their business activities which help them drive circularity at a rapid pace across the fashion supply chain. Such is the case of service-based case company E, which follows the CE principle of ‘regenerate natural systems’. The company helps cotton farmers in pest management and eventually improves yield and bettering their livelihoods.

5.1.3 Value Creation

N. Bocken (2015), highlighted that for sustainable value creation: three essential elements from the business model canvas (Osterwalder & Pigneur, 2010) are 1) key stakeholders; 2) key activities; and 3) key resources and capabilities. These case companies put continuous efforts to drive these elements to create value for their clients.

CE-based startups have to work with a diversified group of supply chain stakeholders including suppliers, distributors, reverse logistic partners, co-financiers, etc. to achieve sustainable growth and create a positive impact on the entire fashion industry. The case company A works with the textile waste collectors to get the feedstock for its circular yarn, followed by textile supply chain players like fabric and garment manufacturers, and lastly with the brands to adopt their circular innovation as part of their collection.

In addition to collaborating with the supply chain actors, these startups focus on key activities like product innovation, process standardization, and adoption of digital technology to scale up quickly and drive CE transition. In the case of startup company C which creates value for its client by offering innovative, high-quality sustainable textile material for luxury fabrics produced from innovative production processes converting food waste into feedstock and thus reducing the burden on natural resources.

Another important element for these early-stage companies is to secure their key resources and invest in capability enhancement to remain relevant for their customers. Case company D which offers fiber-forward traceability, is continuously working to upgrade its digital platform to include appropriate details for different types of sustainable fibers from various supply chain partners to drive end-to-end traceability and contribute to CE transition in the fashion industry.

5.1.4 Business Value Proposition

The business value proposition for a startup is about 1) offering superior value through their product and service to the customers compared to the competitors (Profit); 2) fostering a positive impact for the mutual interest of the community (People); and 3) profound effect for the environment (Planet) (N. Bocken, 2015).

These potential startups have worked extensively over the years to build meaningful value propositions for their target audience. For instance, case company B offers reusable and washable RFID tags for the digital identification of garments. These

e-threads help brands in product authentication, inventory optimization, and retail management.

To support circularity on all fronts, CE-based startup needs to achieve a positive and long-term impact on society. The service-based case company E through its early pest warning and advisory system helps farmers decrease the indiscriminate use of pesticides, improve the quality and yield of the crop, and eventually support the entire agricultural community.

Waste-based circular startups usually offer meaningful value through their innovative and sustainable products to have a positive impact on the environment. Similarly, the case company A offers circular yarn through closed-loop production for the fashion industry produced from end-of-life textile waste which otherwise ends up in landfills creating a huge menace to Mother Nature.

5.1.5 Value Chain Network

For a potential fashion startup, a value chain network mainly aims to find significant ways for strong cooperation with the supply chain stakeholders. Different types of startups follow unique methodologies to build strong networks with the actors for rapid growth and create a notable impact on the entire fashion industry. Case company C which is a waste-based startup believes that it is crucial to build strong partnerships with brands, fabric, and garment manufacturers for greater acceptance of its sustainable fiber from agri-waste. It is also important to create awareness about circular textile material and its usage.

Value chain networking for a service or platform-based startup is different than design or product-based startup. A platform-based startup like case company D focuses on making required provisions on its platform. This is mainly to incorporate specific requirements from the stakeholders and to drive closer collaboration across the complete fashion supply chain in building transparency during material movement without any duplication.

5.1.6 Customer Insight

All the CE-based startups interviewed have well-defined customer segments and approaches for their expansion. These startups need to take such initiatives to strategically maximize their customer outreach without significantly expanding the overall operating budget (Han et al., 2023). The researcher found that when circular startups scale, they try to extend their reach with more than one type of customer channel which includes B2B (Business-to-Business) and B2B2C (Business-to-Business-to-Consumer). However, some of them limit themselves only to B2B channels to streamline their key stakeholders and resource optimization.

Case company C elaborated that it follows the B2B channel for business operation and the B2B2C channel to explain why its product is superior versus competitors and create awareness about CE among consumers. As the company CEO explains:

"We are also trying to push the idea of circularity not just in where the raw materials come from but also in how you use it, the fact that you can maybe mend it or

recycle it at the end of the life. So not just using a few times and selling it away or waste it away but really having a garment that is there to last”

Design-based startup B primarily works with B2B customers as it’s in the early stage of expansion in different markets. The company focuses on reaching out to leading global brands for the nomination of its RFID tags and subsequently works with fashion supply chain actors for pilots and the execution of bulk programs. However, the company believes once the usage of its product enters into other CBMs like rental, resale, etc. then interaction with direct consumers will be significant and the company will follow B2B2C channels.

5.1.7 Cost Structure

The cost structure for any startup mainly covers the cost implications during the business model operation and is part of ‘value capture’. For different types of startups, the cost structure varies in securing either tangible resources such as feedstock (waste textiles, agri-waste, etc) and production facilities or intangible resources including digital technology, patents, and human resources (Han et al., 2023).

For waste-based startup A, its key cost components to execute its innovative business model include the input cost of end-of-life textile waste and the production cost of making circular yarn since the manufacturing is through a pilot plant. So, the company is working on scaling up its production by starting the first commercial manufacturing plant to bring down the overall cost and improve profitability.

However, for a platform-based startup D, the main cost implications include providing training to supply chain stakeholders on platform usage, the regular cost of system upgradation, and building human resources for maintaining each customer account. So, it is planning to come up with an annual subscription fee based on the size of the company to generate revenue and drive sustainable growth.

5.1.8 Summary of BMI Dimensions Discussion

The key takeaways from the interview results about the CE journey of potential startups are 1) the core foundation of the BMs is based on CE principles which allow these companies to inculcate circularity in every business decision 2) strong beliefs in their innovative products and services which can support CE transition across the fashion industry. As highlighted by N. Bocken (2015), to drive BMI a CE-based startup needs to execute actions on respective elements of value proposition, value creation and delivery, and value capture.

The respondents highlighted that despite all the challenges, their companies diligently work on each aspect of the BM in the form of BMI dimensions. They also explained that creating awareness about CE among end-consumers is an integral part of their CE journey as consumers play a crucial role in the extended use and reuse of their clothing over time (slowing), bringing it back to a closed-loop production system for recycling (closing), and generating consistent demand for circular materials.

The respondents further emphasized the importance of business value propositions that create significant implications across the economic, social, and

environmental spheres of the fashion industry. Moreover, such a unique value proposition allows the CE-based startup to attract a higher number of incumbent firms from the fashion value chain to associate with and select its product and service to drive the CE transition. Based on its value proposition, a potential startup can generate the required funding from investors which is essential to achieve scale and sustain in an adverse business environment.

Another important point that is evident from the interviews is that these startups regardless of their ability to create and deliver value to their customers, sometimes find it difficult to build and expand CE networks with the fashion value chain partners. They somewhat lack in generating a sufficient push to involve key stakeholders in the CE ecosystem. Since these supply chain actors are originally part of the linear economy, bringing them together in a circularity framework requires progressive actions from these startups along with the adoption and execution of BMI dimensions.

However, to get a thorough understanding of the scenario and correlate it further with the RQs, the researcher conducted detailed survey questionnaires with the key stakeholders of the fashion supply chain (fiber manufacturers, yarn spinners, fabric mill, garment vendors, and fashion brands) covering the key aspects required to build and nurture a trustworthy collaboration among startups and incumbent firms which is essential for CE transition in the fashion industry. The major findings from the survey are discussed in detail in the next section.

5.2 Discussion of the Findings from the Survey Questionnaires

The questionnaires were used in the study for data validation from the supply chain player's perspective and to certify the reliability of the analysis. This is essential to build a strong foundation required for long-term business collaboration among startups and established firms.

The results from the survey questionnaires were able to summarize the overall understanding of the participants (established firms) in terms of 1) CE, its scope, and impact on the fashion industry; 2) the role and belief of the respondents and their companies in driving CE; 3) key expectations, drivers, and challenges in collaborating with circular startups; 4) major steps in building CE networks among the startups and existing supply chain actors; and 5) the role of government regulations and consumers in adapting and implementing CE practices in the fashion industry.

5.2.1 CE, its scope, and impact on the fashion industry

All the respondents have a clear understanding of the term 'Circular economy' and the majority of them acknowledged its continuous progression over a conventional linear model (Ellen MacArthur Foundation, 2017) in the last decade.

"Circular economy in the apparel industry is a great initiative towards sustainable fashion" (B07).

The role of CF and its rapid growth is going to be crucial in meeting the United Nations SDG, 2030 as circulating the fashion waste continuously in a closed-loop production process is going to help achieve SDG 12 (Akter et al., 2022).

5.2.2 The role and belief of the respondents and their companies in driving CE

Considering the long-term impact of CE on the global fashion industry, the respondents expressed that their role could contribute directly or indirectly to supporting the CE transition across the fashion value chain.

“Real change can only be achieved when sustainability is accounted for at every stage of the value chain” (FAM02).

However, in terms of the company's perspective to lead the initiative in driving CE majority of them are either already working towards it or such initiatives are part of their business plan. Few of the companies have not started anything yet in this direction. Based on the market requirements and resource availability only, they will be going to plan further.

5.2.3 Key expectations, drivers, and challenges in collaborating with fashion startups

One of the interesting findings is that these established companies have contrary opinions on the role of fashion startups supporting CE. About half of them are excited and accept that the path-breaking innovations from these budding startups are essential for CE. The other half believe that these interesting developments did not provide any practical solution.

Circular innovations that are scalable and available at competitive prices are the main expectations from the incumbent firms to create and extend business associations with fashion startups to successfully support the CE transition.

“All these efforts are at a very nascent stage and more understanding and scalability needs to be built” (GM01).

The key challenges these supply chain actors usually face in partnering with the circular startups are high product premiums for innovative products over existing ones, limited production through pilot routes, and inadequate geographical outreach.

5.2.4 Major steps in building CE networks among the startups and existing supply chain actors

Presently there are a limited number of circular partnerships mainly due to insufficient recognition of such collaboration across the fashion supply chain. Moreover, there is a requirement for large capital investment to build a CE-based startup from scratch and scale it up further. Other notable points are that the return on investment (ROI) cycle on such investments is too long and the market demand for such circular materials is still in the nascent stage.

“Concept is great but execution & awareness is missing” (B15).

“Funding for circular business is a concern area” (TC).

The key action steps required to build a strong CE network among established supply chain actors and fashion startups are to align on shared objectives and mutual goals, to build the knowledge-sharing platform to provide the necessary information on CE transition to each stakeholder of the fashion supply chain, and to generate a strong

pull from the end-consumers for circular fashion to create adequate market demand and sustainable business growth.

5.2.5 The Role of Government Regulations and Consumers in adapting and implementing CE practices in the fashion industry

Supportive government policies and regulations can encourage both small and large-scale companies to engage and collaborate with circular startups. Also, such official guidelines can generate higher demand for fashion products made through closed-loop production. Moreover, the PPP could be instrumental in scaling and extending the CF outreach to a wider audience.

Creating awareness about CE among the final consumers will surely help to boost the demand for circular fashion (reduce, repair, resale, recycle). Also, the role of consumers is crucial in reducing fashion waste which otherwise is going to end up in the landfill. Instead, return it to the closed-loop production cycle to support circularity in fashion. Eventually, the continuous interest and demand from end customers will surely help brands and suppliers expedite their efforts toward CE in fashion.

5.3 Key strategies in building and expanding CE Network

Based on primary data (i.e., interviews, surveys) and secondary data (i.e., reports, company website), the researcher observed that there are three key strategies followed by the startups in building and expanding CE networks with the key stakeholders of the fashion industry. 1) Push strategy; 2) Pull strategy; and 3) Synced strategy.

These grounded networking strategies were described based on 1) the startup's approach towards circularity and 2) how they elaborate networking through seven elements of BMI dimensions. These strategies are summarized in Table 14 and visualized in Fig. 23 in the form of a strategic framework.

Table 14

Three CE-networking strategies based on related factors

CE Networking strategies	Description	Startup category	Examples
Push	Pursue networking mainly through Brand outreach	Design-, waste-based	Case companies B and C
Pull	Pursue networking by creating demand from end-consumers, followed by expansion	Service based	Case company E
Synced	Pursue networking through customer outreach and market demand concurrently	Waste-, platform-based	Case companies A and D

5.3.1 Push Strategy

The first networking strategy followed by the startups is “Push”. This is mainly used by those startups that reach out directly to fashion brands and retailers to explain the business value proposition of their circular products and services. Subsequently, brands connect them back to their global supply chain network for initiating trials and execution of bulk orders.

Design and waste-based startups usually follow this strategy to build networking among the fashion supply chain players since they can create a rapid impact on the brand's circular needs with their unique product design and closed-loop textile materials suitable for numerous end applications. Case company B reaches out to leading global brands, aligning with them to adopt and nominate its reusable and washable RFID threads for digital product traceability. Similarly, case company C with its bio-based, high-value textile fibers collaborates with renowned fashion designers and retailers to promote sustainable luxury fabrics.

Their approach to circularity is to reach out to key decision-makers of the value chain for quick adoption and scale-up of their circular products and services to drive rapid CE transition in the fashion industry. However, in building and extending CE networking through 'push strategy', it is really important for the startups to complete the respective pilot or commercial orders from the brands promptly meeting required expectations. It helps startups reach out to more brands and their supply chain partners and able to build a strong CE network across the fashion value chain. Through such networking initiatives, the startups believe meaningful changes can be made in manufacturing practices or consumption behaviors but it usually takes far more time to manifest (Han et al., 2023).

5.3.2 Pull Strategy

The second networking strategy is "Pull". Through this strategy, circular startups pursue networking by generating demand for their circular products and services from the

end consumers, followed by rapid expansion. Mainly service-based startups follow this strategy to reach out to a larger audience through advanced digital technologies and create a lasting impression.

Case company E provides personalized advisories for cotton farmers to decrease the indiscriminate use of pesticides and improve the quality and yield of the crop through computer vision. Its unique BM supports sustainable farming which in the long run helps fashion players to use a higher percentage of natural fibers in their garments and afterward retrieve the useful textile material from the discarded clothing.

Such potential startups are started with a robust sustainability mission and focused on resolving societal and environmental challenges with their innovative circular solutions. While working against a conventional 'linear' system, these startups need to find novel ways, not only to build and grow their business but to lead the way to solve socio-environmental issues. From the interviews, it is evident that to build and expand CE networks through this strategy, circular startups get involved in various ways of impact networking initiatives followed by rapid expansion across the fashion supply chain.

5.3.3 Synced Strategy

The third networking strategy adopted by circular startups is "Synced" in which these potential startups pursue networking through customer outreach and market demand concurrently. In this two-way approach, on one side startups generate push by reaching out to target brands and their supply chain partners, and on the other side create the

required demand for their circular products and services from end-consumers. Waste and platform-based startups generally follow this networking strategy as they can touch base with each stakeholder of the fashion supply chain starting from fiber manufacturers to final consumers.

Case company A offers sustainable yarn for the fashion industry produced from end-of-life textile waste through closed-loop production. The company coordinates closely with key actors of the fashion value chain including brands to scale up production and demand. Case company D through its revolutionary end-to-end traceability platform custom-built for the fashion and textile ecosystem, ensures authenticity and transparency for sustainable textiles during material movement without any duplication.

Unlike the other two networking strategies, where impact and business development are seen as an extension of commercial networking initiatives, a synced strategy involves simultaneously pursuing the expansion of socio-environmental impact and circular business growth. The circular startups following this networking approach, need to ensure regular connections with each stakeholder of the value chain to sustain the demand for their circular products and services created simultaneously through brand outreach and pull from consumers. It is essential to create positive momentum to support CE transition activities across the entire fashion industry.

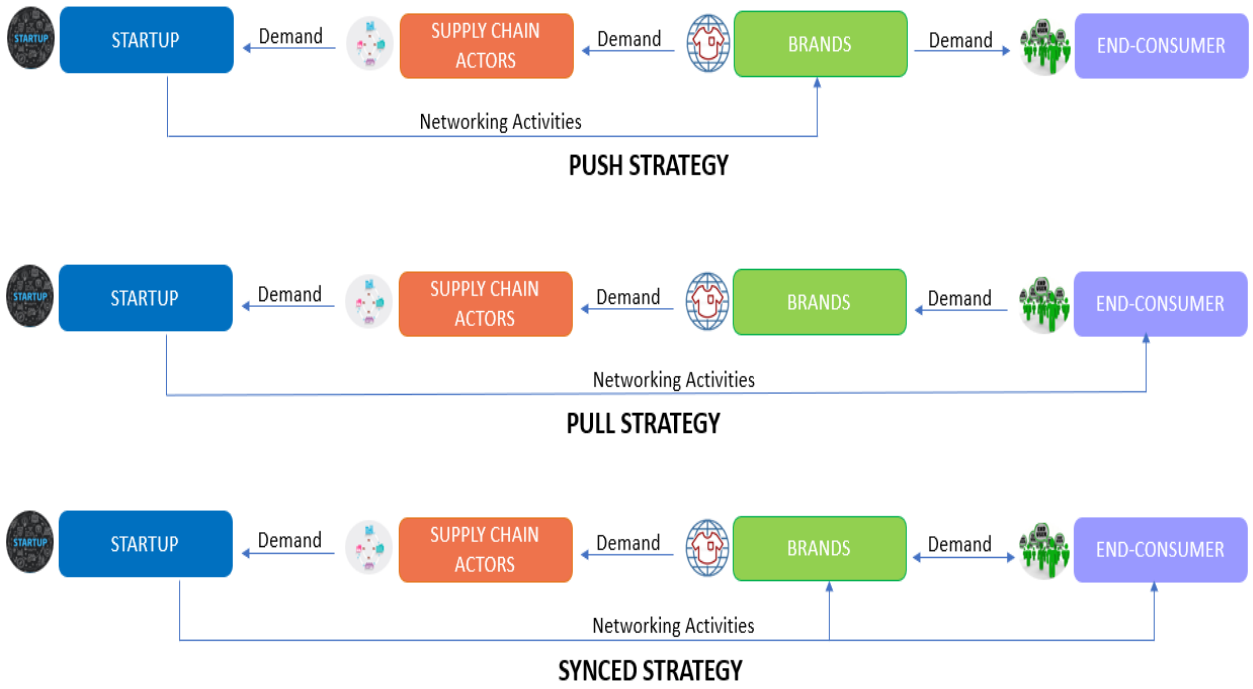

Figure 23.
Visual representation of three networking strategies.

Based on section 5.3, the researcher proposes a conceptual framework (Fig. 24) for building and expanding CE networks among startups and key stakeholders of the fashion value chain. The strategic objectives of circular fashion startups through brand outreach initiatives (Push) are quick adoptions of their innovative products and services by the supply chain partners followed by the bulk scale-up. However, during demand creation initiatives (Pull) startups generate demand for their circular offerings from consumers by creating a positive impact on the environment and society through transformation.

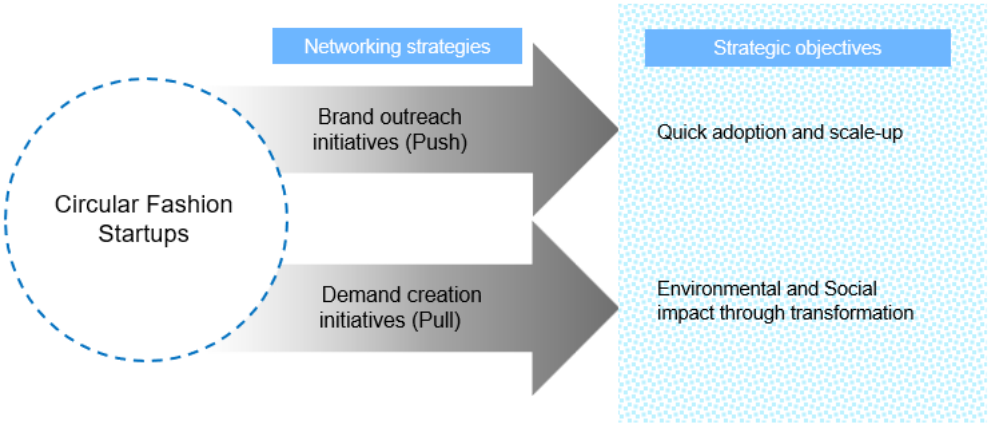

Figure 24.
Conceptual framework for building and expanding CE-networks

5.4 Answers to the Research Questions

At the start of the research study, three main questions were asked to fulfill the research objective. The answers to each research question were obtained and discussed respectively in numerous sections. An overview of the relevant responses to each question is provided below:

Table 15

Research Questions and Answers

No.	Research Questions	Answers in respective sections
1	How do CE-based startups create and deliver value to their clients?	

	Findings: CE-based startups follow the elements of the BMI dimension instrument proposed by Lewandowski (2016), Lüdeke-Freund et al. (2019), and Urbinati et al. (2017) to create and deliver value to their clients.	- Detail refers to Section 4.2.2.1, 5.1 and Appendix D
2	What are their product biographies and implications on the fashion industry?	
	Findings: The potential startups interviewed during the study offer unique and innovative products and services to the supply chain stakeholders for better user experience and more circularity. They create a positive, long-term, and sustainable impact on the fashion industry and support the rapid CE transition.	- Detail refers to Section 4.1.1 and 5.1.1
3	What strategies to consider in building and expanding CE networks in the fashion industry's value chain?	
	Findings: The three key strategies followed by the startups in building and expanding CE networks in the fashion industry's value chain. 1) Push strategy; 2) Pull strategy; and 3) Synced strategy.	- Detail refers to Section 5.2.4, 5.3, Table 14 and Fig. 23

5.5 Limitations of the Study

The researcher identified two limitations with this study. Firstly the limited sample size of five startups from the GCA winners participated in the study. So the research findings may not be generalized to represent all the fashion startups working

towards CE transition. Secondly, the study is limited by the lack of impact assessments of value mechanisms followed by these startups.

The limited number of startups interviewed during the study to share their CE journey on various aspects of BMI dimensions provides a fair understanding of how fashion startups create and deliver value to their clients and create a positive impact on the fashion industry. However, the study has limitations in terms of the size of the case companies as it mainly focuses on early-stage startups having limited outreach to the global fashion supply chain. In the study, the researcher was able to find relevant examples of design-, waste-, service-, and platform-based startups (Henry et al., 2020) but nature-based startups were not covered in this study. Nature-based companies mainly focus on building and growing circular products and services based on regenerative ecosystems (Maes & Jacobs, 2017). Regarding the financial framework of the startups, the researcher was able to gather information mainly on cost implications since these startups were in their initial stages of the lifecycle, focused mainly on product scale-up and fundraising from potential investors, and had not started trading yet (Spender et al., 2017).

Secondly, the research study is limited in terms of impact assessments of the value mechanism followed by the circular startups. Since there is a lack of validated methods like life-cycle assessment (LCA) to assess the environmental impacts of circular startups in real-world scenarios although few companies follow LCA to track their progress (Das et al., 2022). Measuring social impact in terms of change in consumption

behavior or social protocols is still challenging for firms due to prolonged timelines and qualitative nature (Han et al., 2023).

5.6 Recommendations for Future Studies

Further research on this study could involve a comparative analysis of the various types of circular startups (design-, waste-, service-, nature-, and platform-based) to understand the real-time impact of each on CE transition in the fashion industry. The inclusion of a larger sample size of circular startups with diversified portfolios and various stages of product commercialization will be able to provide clear guidelines for defining meaningful strategies to formalize the CE ecosystem.

A deeper qualitative analysis of the proposed networking strategies will help a larger audience to decide and choose appropriately in line with their BMI. Moreover, a detailed evaluation of how value proposition, value creation and delivery, and value capture activities followed by the startups, create social and environmental impact. Such a thorough assessment can support the researcher's work on CE transition in the fashion industry.

5.7 Conclusion

The research aimed to provide a holistic view of CE practices followed by potential startups with innovative BM. It was also, defining clear strategies to build and extend networks among startups and incumbent companies which is essential for accelerated CE transition. The contribution of this research work is towards three major

areas. Firstly, based on the data collected via semi-structured interviews, reviewed and validated through triangulation, the researcher elaborated on the product biographies of the circular startups and their implication on the fashion industry. Secondly, by following the BMI dimensions instrument proposed by Lewandowski (2016), Lüdeke-Freund et al. (2019), and Urbinati et al. (2017), the researcher interpreted how circular startups create business values and deliver them to their clients. Lastly, the researcher proposed a conceptual framework to examine and describe the key strategies followed by the startups to build and extend CE networking with incumbent firms.

This study aligns with the work of Lewandowski (2016), Lüdeke-Freund et al. (2019), and Urbinati et al. (2017), in its examination of the development of innovative BMs by circular fashion startups to facilitate the CE transition. This correlation suggests that the findings from this study provide empirical support for the BMI dimensions previously proposed, emphasizing the importance of these dimensions as a framework for analyzing and constructing innovative BMs within the CE context. Moreover, the study expands on existing literature by identifying variances in the application of these BMI dimensions across different circular fashion startups. These variances are attributed to the unique product biographies, sizes, and geographical locations of the startups. Additionally, the results from the empirical research indicated that the business value proposition offered by these CE-based startups must align with the business expectations of the established firms to build a secure and trusted CE network essential for CE transition in the fashion industry.

Subsequently, the literature review explained in detail about the CE, its socio-economic significance, challenges in its implementation, and its role in the sustainable fashion industry. The study also described the terminology of BM, BMI, CBM, and Circular BMI, the focus areas to extend the impact of CBM, and the relationship between BMI and CE transition in the fashion industry. Lastly, it talked about circular startups, their types, details of their innovative business models, and how they can be crucial in the CE transition process.

Moreover, the insights from the semi-structured interviews explaining the product biographies of each startup, their drive to support CE transition, and their sustainable impact on the fashion industry were reported. The research findings on how CE-based startups create values and deliver them to their customers within the elements of the BMI dimensions: 1) product biographies, 2) CE principles, 3) value creation, 4) business value proposition, 5) value chain network, 6) customer insight, and 7) cost structure (Lewandowski (2016), Lüdeke-Freund et al. (2019), and Urbinati et al. (2017)) were reviewed and recorded.

In the study, findings from survey questionnaires were described to bring out the fashion value chain player's perspective which is vital to build a strong foundation required for long-term business collaboration among startups and established firms. The results from the survey questionnaires were summarized explaining the overall understanding of the participants (established firms) in terms of 1) CE, its scope, and impact on the fashion industry; 2) the role and belief of the respondents and their companies in driving CE; 3) key expectations, drivers, and challenges in collaborating

with circular startups; 4) major steps in building CE networks among the startups and existing supply chain actors; and 5) the role of government regulations and consumers in adapting and implementing CE practices in the fashion industry.

Moreover, the findings highlighted three core strategies followed by the startups in building and expanding CE networks in the fashion industry's value chain. 1) Push strategy; 2) Pull strategy; and 3) Synced strategy. These grounded networking strategies were described based on 1) the startup's approach towards circularity and 2) how they elaborate networking through seven elements of BMI dimensions.

A push strategy mainly prioritizes direct outreach by the startup to the fashion brands explaining the business value proposition of the circular products and services, and afterwards extending the CE networking across the brand's supply chain partners. Through the pull strategy, potential startups with a robust sustainability mission pursue networking by generating demand for their circular products and services from the consumers, followed by rapid expansion through the value chain stakeholders. The synced strategy which combines the dual objective of expansion and social impact allows these startups to pursue networking through customer outreach and market demand concurrently. The interview findings emphasized a dilemma among the startups following pull and synced strategies to find an appropriate balance between business goals and social impact (Bauwens et al., 2020; Han et al., 2023).

The research findings have important suggestions for fashion companies planning to collaborate with other value chain players in developing and implementing CBMs to support accelerated CE transition. A holistic view of the execution of CE practices by the

potential startups can help both new-age and incumbent companies to focus on value creation and delivery to their clients keeping CE principles at the core.

In terms of business implications, the networking strategies followed by the startups can help circular practitioners to adopt and implement relevant strategy options that can significantly boost the overall circularity goals of the fashion industry. The strategic networking framework informed by the research study can enable established firms and entrants in the value chain to look for closed-loop business opportunities and expand their CE network to drive sustainable fashion.

The policymakers could also use the research insights to understand the long-term business potential of circular fashion startups and support them in scaling up by enhancing market demand for their products and services. Subsequently, regulators can assist these startups in getting financial support and training opportunities to build pilot plants and increase their brand awareness. In conclusion, the main objective of this research study is significantly accomplished, and hopefully, the inferences of the research findings and discussions incorporating the relevant concepts and practices will contribute to the related academic sectors and real-world business.

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APPENDIX A

PROCESS OF BUILDING THEORY FROM CASE STUDY RESEARCH

Step	Activities	Purpose	Application in this dissertation
Getting started	Definition of research question	Focuses efforts	Defined initial research questions
	Possibly a priori constructs	Provides better grounding of construct measures	Toolbox and guidelines for BMI dimensions process to experiment with was a priori construct
Selecting cases	Neither theory nor hypotheses	Retains theoretical flexibility	The selection was neither based on theory nor hypotheses
	Specified population	Constrains extraneous variation and sharpens external validity	Primarily worked with the startups and supply chain actors
	Theoretical, not random, sampling	Focuses efforts on theoretically useful cases-i.e., those that replicate or extend theory by filling conceptual categories	Selected cases from different innovation area and of different sizes to explore the impact of such factors
Crafting instruments and protocols	Multiple data collection methods	Strengthens grounding of theory by triangulation of evidence	Used semi-structured interviews, survey questionnaires, and document analysis
	Qualitative and quantitative data combined	Synergistic view of evidence	Focused on qualitative data and quantitative data
	Multiple investigators	Fosters divergent perspectives and strengthens grounding	One investigator throughout the research study
Entering the field	Overlap data collection and analysis, including field notes	Speeds analyses and reveals helpful adjustments to data collection	Data collection overlapping and analysis in a continuous process
	Flexible and opportunistic data collection methods	Allows investigators to take advantage of emergent themes and unique case features	Emergent themes were incorporated into research sub-questions that were closely reviewed

Analysing data	Within-case analysis	Gains familiarity with data and preliminary theory generation	Within case analysis (e.g. table 8 to table 12) to thoroughly study the individual case company data
	Cross-case pattern search using divergent techniques	Forces investigators to look beyond initial impressions and see evidence thru multiple lenses	Cross-case analysis (in Chapter 5) to compare company business models
Shaping hypotheses	Iterative tabulation of evidence for each construct	Sharpens construct definition, validity, and measurability	Data was applied at each stage using iterative tabulation for the primary data analysis
	Replication, not sampling, logic across cases	Confirms, extends, and sharpens theory	Cases represented differently businesses, sizes, and CBM followed to enquire about theoretical and precise replication across cases
	Search evidence for 'why' behind relationships	Builds internal validity	Each case was reviewed individually and compared with other cases to keep 'why' as an integral part of understanding
Enfolding literature	Comparison with conflicting literature	Builds internal validity, raises theoretical level, and sharpens construct definitions	Provided assessment of data validity through triangulation approach
	Comparison with similar literature	Sharpens generalisability, improves construct definition, and raises theoretical level	Covered crucial and emerging themes supporting research questions during the literature review
Reaching closure	Theoretical saturation when possible	Ends process when marginal improvement becomes small	Expected saturation due to an early stage of CE transition among multiple cases

Source: Process of building theory from case study research *(Eisenhardt, 1989)* and how the process was adapted in this dissertation.

APPENDIX B

MAJOR ADVANTAGES AND CHALLENGES OF USING

QUALITATIVE APPROACH

Concern Area	Advantages	Challenges
Research question	Research issues and participants covered could be evaluated in depth and in more detail.	Research occasionally might not be accepted and understood, particularly in scientific societies.
Research question	The direction and framework of research could be revised promptly while new information and findings have emerged.	Rigidity during the research process might be more difficult to assess, demonstrate, and maintain.
Data collection	Interviews are not limited to specific questions but could be guided by researchers or interviewers in real time.	The presence of a researcher in the process of data gathering might be unavoidable, which could affect the responses of participants
Data collection	The data collected from qualitative research depends on human experience and this should be more compelling than data gathered from a quantitative approach.	The quality of research heavily depends on the skills and techniques of the researcher and interviewers during the interview process so that data could be easily influenced by personal biases, judgments, or perceptions of the researchers and interviewers.
Data analysis	Complexities and subtleties about the participants or even the research topics covered might be missed by those positivistic inquiries.	Issues on confidentiality and anonymity could cause problems during the presentation of data analysis and findings.
Data analysis	Data is normally gathered from a few individuals or cases so that findings might not apply to a larger population, but some findings could still be transferred to another setting of the problems and thus could generate ideas and hypotheses for future quantitative research.	Data analysis and findings could be time-consuming and difficult to present in visual ways. Also, the quantity of data could make analysis time extremely consuming and even affect the interpretation and findings.

APPENDIX C

DATA COLLECTION METHODS

Method	Overall Purpose	Advantages	Challenges
questionnaires, surveys, checklists	when need to quickly and/or easily get lots of information from people in a non-threatening way	-can be completed anonymously -inexpensive to administer -easy to compare and analyze -administer to many people -can get lots of data -many sample questionnaires already exist	-might not get careful feedback -wording can bias client's responses -are impersonal -in surveys, may need sampling expert
interviews	when want to fully understand someone's impressions or experiences, or learn more about their answers to questionnaires	-get full range and depth of information -develop relationship with client -can be flexible with client	-can take much time -can be hard to analyze and compare -can be costly -interviewer can bias client's responses
documentation review	when want impression of how program operates without interrupting the program; is from review of applications, finances, memos, minutes, etc.	-get comprehensive and historical information -doesn't interrupt program or client's routine in program -information already exists -few biases about information	-often takes much time -info may be incomplete -need to be quite clear about what looking for -not flexible means to get data; data restricted to what already exists
observation	to gather accurate information about how a program actually operates, particularly about processes	-view operations of a program as they are actually occurring -can adapt to events as they occur	-can be difficult to interpret seen behaviors -can be complex to categorize observations -can influence behaviors of program participants -can be expensive
focus groups	explore a topic in depth through group discussion, e.g., about reactions to an experience or suggestion, understanding common complaints, etc.; useful in evaluation and marketing	-quickly and reliably get common impressions -can be efficient way to get much range and depth of information in short time - can convey key information about programs	-can be hard to analyze responses -need good facilitator for safety and closure -difficult to schedule 6-8 people together
case studies	to fully understand or depict client's experiences in a program, and conduct comprehensive examination through cross comparison of cases	-fully depicts client's experience in program input, process and results -powerful means to portray program to outsiders	-usually quite time consuming to collect, organize and describe -represents depth of information, rather than breadth

Source: Adapted from *(McNamara, 2008) Basic guide to program evaluation.*

APPENDIX D

BMI DIMENSIONS SUMMARY FOR CE TRANSITION ANALYSIS

Categories	Case Company				
	A	**B**	**C**	**D**	**E**
Product Biographies	Circular yarn from Textile to Textile Recycling	RFID Threads for digital product traceability	Regenerated cellulosic fiber from fruit juice production by-products	Sustainable fiber forward traceability platform with digital tokens	Pest Management for Cotton
CE Principle	Design out of waste and pollution, Extend materials' lifetime	Extend the material's lifetime	Design out of waste and pollution	Extend the material's lifetime	Regenerate natural systems
Value Creation	Closed-loop textile material production & promotion	Reusable and washable RFID material, Invisibly integrated into the garment for endless applications	Innovative, high-quality sustainable material for luxury fabrics produced from the food waste stream	SAAS-based end-to-end traceability platform from fiber-to-retail, ensuring authenticity and source of origin for sustainable textiles	Personalized advisories for farmers to decrease the indiscriminate use of pesticides and improve the quality and yield of the crop
Business Value Proposition	Sustainable yarn for the fashion industry produced from end-of-life textile waste	RFID tags in the form of RFID Threads for digital identification of garments	High-quality Sustainable fabrics for the fashion-luxury sector made out of fruit juice production by-products	Pioneering Traceability platform custom built for the fashion & textile ecosystem	Early Pest Warning and Advisory System using computer vision for cotton farmers
Value Chain Network	Close coordination with manufacturers and brands to scale up production and demand	Brand outreach for RFID Threads nomination and usage across the fashion supply chain	Building strong partnerships with brands and manufacturers to create awareness about circular textile fiber and its usage	Collaboration with the complete fashion supply chain in building transparency during material movement without any duplication	Works closely with farmers and local government bodies to manage pest infestation and reduction in pesticide usage
Customer Insight	Business-to-Business-to-Consumer	Business-to-Business	Business-to-Business-to-Consumer	Business-to-Business	Business-to-Business
Cost Structure	Input cost of end-of-life textile material, Higher production cost due to pilot plant	Higher production cost due to pilot route, working on large investments for scaling up production	Extraction cost of feedstock from fruit juice waste, Additional manufacturing cost due to batch process	Regular cost in system upgradation and maintaining customer accounts	Regular cost for system maintenance, customary modification, and maintaining records

APPENDIX E

INFORMED CONSENT FORM

INFORMED CONSENT FORM

Project: Circular economy transition in the fashion industry through business model innovation

PURPOSE

The purpose of the study is to fulfill the partial requirements of a doctoral degree studying by the Researcher. The study is aimed to gain an understanding of how fashion startups with their innovative business models drive the circular economy (CE) transition in the fashion industry.

PROCEDURES

Global Change Award (GCA) winner start-up will be requested to participate in our research questions via an online interview individually. The interview will take approximately 45-60 minutes of your time. Research questions may include product biographies, CE initiatives, value propositions, supply chain integration, and customer insights about the company.

POSSIBLE RISKS

We don't anticipate that there are any risks associated with your participation in this research. However, you have the right to refuse to answer any question, skip questions or stop your participation in the research at any time.

BENEFITS

The potential benefits to you may be limited; however, the overall impact on the fashion industry and associated companies will be significant since new information and study results relating to the circular economy transition and networking among key stakeholders will become available to enable companies to look for closed-loop business opportunities and expand their CE network to drive sustainable fashion.

CONFIDENTIALITY

All information obtained in this study will be kept strictly confidential and anonymous. The interview will be recorded and a transcript will be produced. You will be sent the transcript and allowed to correct any factual errors. All information and documents collected from this study will be kept in a secure place and will be destroyed after the data is analyzed. Only an authorized person will have access to the data of the research. Any summary interview content or direct quotations from the interview, that are made available through academic publications or other academic outlets will be anonymized so that you cannot be identified, and care will be taken to ensure that other information in the interview that could identify yourself is not revealed.

RIGHT AS A VOLUNTEER

Your participation in this research is voluntary. If you decide not to participate or to stop your participation in this research at any time, it will not result in any consequence or any loss of benefit to which you are otherwise entitled. If you have any questions about this research project or your right as a participant, you may contact the Researcher at (+91) 8369353320.

INFORMED CONSENT FORM

Project: Circular economy transition in the fashion industry through business model innovation

PARTICIPANT AGREEMENT

The research of this study has been fully explained to me. I voluntarily consent to participate, and I have enough time and opportunity for my questions to be answered. I understand that I may refuse to take part or stop my participation in the research at any time. The transcribed interview or extracts from it may be used as described above. I can request a copy of the transcript of my interview and may make edits I feel necessary to ensure the effectiveness of any agreement made about confidentiality. I also understand that I may contact the Researcher if I have got any questions about this research project or my rights as a participant.

I. the undersigned, confirm the understanding of the above Participant Agreement.

PARTICIPANT:

_____	_____	_____
Name of Participant	Signature	Date

RESEARCHER:

_____	_____	_____
Name of Participant	Signature	Date

Copy: ☐ Participant

APPENDIX F

INTERVIEW GUIDE

A. General questions to ask all participants

Overall goals:

- Understand WHAT their product offerings and their sustainable impact on the fashion industry.
- Understand HOW they create meaningful values and follow CE practices in delivering values to the customers.
- Understand WHO is their key supply chain partner and how they work toward a resilient supply chain network.

WHAT: The objective is to try and find out their product strategy and its correlation with CE, their motivation, and most importantly their actions to drive the circularity.

HOW: Understand how the interviewee is involved in certain technological innovations or new business models. Try to perceive the technology and its end application, acknowledge the technological/business challenges, and how the person incorporates CE practices while offering the value proposition to the customers.

WHO: Outline how this focal actor (interviewee) is in collaboration with the other stakeholders of the value chain network that are crucial to the focal actor in terms of raw material supply, product procurement, knowledge supply, etc. Find out key drivers and challenges in the fashion supply chain.

B. The questions below I used as guidelines and exemplary questions, i.e., not all questions were used in all the interviews. I always make sure that I cover the guidelines mentioned in A.

1. Theme: Product Biographies.

Sub-questions:

- What are your main product offerings and their end applications?
- How do these products offer sustainable benefits to the end customer?
- What are their long-term implications on the fashion industry?

2. Theme: Initiative Description

Sub-questions:

- What is your role in the firm and how do you drive the innovation process?
- Please provide a general description of the Business Model your company follows and how it is aligned with the principles of the Circular Economy.
- Does the circular business model provide any competitive advantage over conventional/linear ones?

3. Theme: Business Value Creation and Value Proposition

Sub-questions:

- How does the company drive value creation in the end products?
- What type of value proposition your company follows, to support circular fashion?

4. Theme: Supply Chain Integration

Sub-questions:

- What are your key actionable to build a resilient supply chain network across the fashion value chain?
- Please describe some of the key drivers and barriers affecting the Circular Economy networks.

5. Theme: Customer Insight

Sub-questions:

- What is your customer segmentation i.e., Business to Business (B2B), Business to Customer (B2C), or Business to Business to Customer (B2B2C)?
- How do you approach the new customer acquisition and sustain the existing one?

6. Theme: Cost Structure

Sub-questions:

a) What are the main elements to drive cost implications on the end products?
b) How has the company performed since its inception and what are the future expansion plans?

APPENDIX G

SURVEY COVER LETTER

Circular Economy Transition in the Fashion Industry

Dear Participant,

This study aims to obtain insights into your understanding in terms of the role and long-term contribution to supporting the circular economy for fashion.

I would greatly appreciate it if you could take some time to complete this survey. The survey is straightforward and should take approximately 5-10 minutes to finish. Please choose the appropriate answer from the given multiple choices for each question.

Your response will remain entirely confidential.

Thank you so much again for your support.

Best regards,

Suyash Agrawal

DBA Student

Contact number: +91-8369353320

Email: itsmesuyash@yahoo.co.in

APPENDIX H

SURVEY QUESTIONNAIRE

Name	
Organization	
Job Title	

1. What is your first thought on the Circular Economy in Fashion?
   a) It is just a concept with limited practical applicability.
   b) Circular economy in fashion is essential to sustain long-term growth.
   c) Never heard previously about it.

2. How do you see its progression over the linear economy in the last decade?
   a) Slow and limited to a smaller segment.
   b) Supported by a larger fashion community and becoming important gradually
   c) Not sure about its evolution.

3. Do you believe circular fashion can be a game changer in meeting the United Nations' sustainable development goals (SDG), 2030?
   a) Yes
   b) No
   c) Maybe

4. Impact of your role in transforming the present fashion industry from a linear to a circular way?
   a) I can make a direct impact in driving circular fashion.
   b) I can make an indirect impact and support actions toward circular fashion.
   c) I am not too sure.

5. Where do you see fashion startups with circular innovations across design, material, production, and waste management?
   a) These startups are coming up with several path-breaking innovations essential for circular fashion.
   b) Their innovations are interesting but do not offer a practical solution.
   c) Have not come across any such startups.

6. What are the key challenges you are facing in collaborating with such budding startups?
    a) They are at an early development stage and not ready for scale-up.
    b) Their product offerings are innovative but not price competitive.
    c) Their presence is still limited to a specific geography/market.
    d) Initial results are not very encouraging to take forward.

7. What are your key expectations from such collaboration?
    a) Ease of doing business
    b) Speed to market
    c) Competitive price
    d) Scalable

8. Why there are a limited number of players working towards circular partnership?
    a) Low market demand for circular materials.
    b) Required large capital investment.
    c) Return on Investment (ROI) cycle is too long.
    d) Inadequate awareness across the fashion supply chain.

9. What can be the major step in building a strong network among existing supply chain players and circular startups?
    a) Knowledge sharing platform for required information accessibility.
    b) Strong pull from end customers to create sufficient market demand.
    c) Common goals and objectives for both established firms and startups.
    d) All of the above

10. Will you and your company want to take the lead and drive the circular economy for the fashion industry?
    a) We are already working towards this direction.
    b) Considering circular fashion is the need of the hour, It's part of our business plan.
    c) Surely, based on market requirements and resource availability; we can think about it.
    d) We do not have any plans at this moment.

11. How do you see the role of consumers in supporting circular fashion?
    a) Consumer awareness of the circular economy will help increase demand for circular fashion (resale, recycle, repair, reduce).
    b) Consumer interest will help brands and suppliers to accelerate their efforts toward circular fashion.

c) Consumers can play a crucial role in minimizing fashion waste and looping it back for a new life.
d) Consumers will not be able to influence much on this subject.

12. Do government policies and regulations help in the rapid implementation of circular economy practices in the fashion industry and further boost its transition?
    a) Government policies toward circular fashion can attract a greater number of companies to participate and collaborate among industry peers.
    b) Public-private partnership (PPP) can be instrumental in scaling up the circular economy in fashion.
    c) With supportive government regulations in place can create higher demand for fashion products made through closed-loop production.
    d) All of the above.

13. Any additional comments related to Circular Fashion, please share.